

**Future Visioning System For Designing and Developing  
New Product Concepts in the Consumer Electronics Industries**

**A thesis submitted for the degree of Doctor of Philosophy**

**by**

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**Abstract**

This thesis discusses development of a future visioning system model that can be adopted to create new product concepts for consumer electronics companies operating in a highly competitive business environment. The research work investigates consumer electronic product companies and their market environment to identify problematic issues and indicates that a proactive new product strategy which opens new markets through developing concept-led products is a strategic priority, thus the concept development stage in new product development process is in need of improvement. An evaluation of existing concept development tools for the purpose of proactive product strategy is presented and concludes that future visioning procedure is the most appropriate tool. To develop a future visioning system model as a concept development tool, the theoretical future visioning system models are analysed and mapped to extract essential structure and contents of future visioning procedure. The consequent future visioning system model is then revised according to the findings and suggestions from the field research work which investigated four major consumer electronics product companies in practice. The findings also validates the necessity of adopting a proactive product strategy and evaluates acceptability of the future visioning system model for practical use. The final future visioning system model is defined after the opinions of the design managers are considered and applied.

The major suggestions from the research findings are:

- (1) Executing proactive product strategy can be a valuable strategic tool
- (2) A new process is necessary for the companies to create one-step-ahead product
- (3) Future visioning system is recommended as an advanced approach that creates new product concept.
- (4) Future visioning system model should consist of eight stages: project initiation, environmental scanning, future visioning, generating product concepts, scenario planning, concept testing, concept visualisation, and finalized concepts.
- (5) Product concepts can be generated from future vision by applying backcasting.
- (6) Scenario planning should be used in the future visioning system model as a concept testing tool providing objective validating criteria.
- (7) Executing a future visioning system model creates new roles for the designer such as information integrator, process moderator, and futurist.

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## **Part I. Research Foundation**

### **I.1 Introduction**

By understanding that change is a normal part of the competitive landscape and consolidation of dramatic shifts in economy, new business models, segmented markets and an innovative technology as a competitive weapon, companies are forced to develop a set of strategic capabilities that enable a constant state of reinvention. Customers who are exposed to the various choices of products and updated by market information through the Internet are also creating a new business environment by their sophisticated purchasing behaviour which tends to be more demanding and complicated. To cope with this competitive situation and achieve market leadership developing a new product which creates a new customer value and satisfaction is important for the companies because this sustainable capability opens a new market and gives the company an opportunity to take a market lead. Therefore, new product development strategies and processes are where the firms focus on and put their efforts in. For the designers, redefining their involvement and participative roles in new product development is required as a necessity of offensive product development strategy and the process is stressed to cope with the new business environment.

Based on this understanding, in this part, it is explained how this research work was initiated and then evolved to a practical research work to examine the process of identifying the design issues and the problematic situation appropriate for the investigation and logical for leading the discussion to a certain level of generating new knowledge. The formulation of the investigation structure and the methodological tools used are also explained to discuss how much the investigation was performed in an organized and strategic manner.

### **I.2 Research Initiation**

This study entitled “environmental scanning and future visioning system for generating new design concepts” was mainly motivated by the researcher’s previous research work, “Strategic Design Management Tools for New Product Development” that addressed the importance of new product development and its time efficiency in the present business

world. It suggested that consumer product companies must feed valued information more into the initial stage of a new product development process to get better outcomes in a shorter time. Live information input in the early stage of NPD eliminates problems and prevents late changes so that it can satisfy both the needs of the economical cost of manufacture and the on time launch. To feed information to the new product development process design managers should build a design information team which continually updates information and provides it into the development process. By doing this design managers can increase the designer's role in the organization and enhance the quality of designer's performance in the new product development process.

In this research the suggestions from the previous research work became initial ideas for this work and have implications for the research direction and its boundaries. Consumer product companies including both the electronic product sector and domestic electrical appliances, and their new product development processes are the main areas of this investigation. Design managers and designers from those companies are the target users of the application of this research work.

### **I.3 Research Aims and Goals**

The ultimate goal of this research work is to establish a new paradigm of design function and roles of designers in new product development process by investigating into the consumer electronic product companies and their consumer markets. Based on the initial idea that systematic information input in the early stage of NPD is critical to design activities, the research work aimed firstly, to analyse the feasibility of developing and introducing a comprehensive environmental scanning and future visioning system for developing new design concepts. Secondly, to explain the effects of such information integrated system on redefining designers' roles in the new product development process. Thirdly, to propose a model of environmental scanning and future visioning system by synthesising the research outcomes.

This thesis consists of three main parts of discussions and demonstrations about the research procedure and the consequential outcomes from the each stage of the research.

In chapter 1 of part one, the nature of research work and understandings adopted by the researcher in this investigation is stated for demonstrating the necessity of the design research work. The mechanism of the research formulation in terms of choosing investigation methodology and tools is also explained to examine how logically the research work was led by the researcher from the initial motivation of the inquiry to the research outcomes.

In chapter 2, the researcher provides analytical views about the consumer electronic product markets and the strategies used by the companies. These views explain how the future visioning system can be strategically used as a product concept development tool in companies' perspectives. The chapter also addresses critical views about designers' role and their activities in the product development process. It shows how the application of future visioning system in the new product development process can have an affect on increasing designers' role.

In chapter 3, the importance of new product development strategy and process recognised thorough the literature search is discussed. It provides understanding of the development process and addresses the problematic situations and the controversial issues in the new product development sector. The issues recognised in this stage were examined and later deducted into the one critical issue which gives the direction to the research and opens the further discussion.

In chapter 4, generating a product concept in the early stage of new product development as the core of the issues is discussed in detail. Current methods and skills of concept generation are compared to derive a feasible method which may be more efficient for offensive concept development strategy. Analysis of the current concept development methods indicates that those methods and tools are suitable for non offensive product developments categorised as new product line, additions to existing products, repositioning products and cost reduction products. The conclusion initiated the search into the academic researches and business practices to develop a new product concept generation method.



The last chapter of part one, future visioning as a tool of concept generation is discussed as an effective method of generating new product concepts and the feasibilities of its application is examined by outcomes of both the interviews with people from business practice and the academic research in literature. This generates the foundation for the hypothesis that is examined in part two through the field studies and by analysing work. The outcome of the literature search and the interviews in this stage also formulate the hypothetical model of the future visioning system. The contents and the structures of the system are explained in this chapter and the evaluation work about the final model is discussed in part three.

Part two mainly discusses how the hypothesis and the outcome from the previous research stage are proved by both exploring the field cases and analysing the findings. Based on the results of this work, the hypothetical model of the future visioning system that was formulated in the previous stage as an information integrating concept development system, is assessed and modified by both comparing it with other systems in the practice and overlapping it with the suggestions from the secondary interviews.

In chapters 6 to 9, the case studies of the four major consumer electronic companies are presented. Each case study is evolved from describing overall views of the companies' business activities and environment to explain their recent business concerns and focuses on how the companies' business and new product development strategies are formulated. The design strategies are also then discussed to show how importantly design contributes to achieving the business strategies and goals as they develop and operate the new concept development tools in practice. The interpretations of the case study outcomes are applied to the hypothetic future visioning system model for the modification.

Part three contains the assessment and discussion of the final prototype of the future visioning system and its application. In conclusion the researcher suggests a new role of product designer as a concept developer and the future visioning system as the tool by which they achieve this goal.

## **Chapter 1. Research Methodology and Tools**

### **1.1 Introduction**

For the designer and design manager, who are constantly under pressure to develop high-quality design, research work is an important vessel by which they develop high-quality design tools such as theory, methods and process (Owen, 1998). Since designers extend the possibility of a new way to improve the quality of industrial life and its products by applying these tools in practice, research should be conducted in a strategic manner. However, careful consideration of adopting appropriate approaches to a research issue and its methodology is as important as conducting research work itself. The entire research procedure is steered and the outcomes influenced by the methods and approaches that are adopted. Thus, it is necessary to explain in this chapter how the researcher structured the research work and developed the discussion to the outcomes by applying what kind of method and tools.

### **1.2 The nature of the research**

This research work was started from understanding the nature of research to properly set its structure, procedure and methods, which were understood by the researcher as the important factors of the research work. The traditional characteristics of research defined by Cross (1998) initially influenced to decide the characteristics of this research work; “purposive, inquisitive, informed, methodical, and communicable.” Cross suggested that design research issues have to be worthy of investigation and purposive of generating new knowledge so that the findings of the research can be reported and be capable of testing by others leading to further research. Furthermore, the research should be planned and conducted based on familiarity with previous, related research by a strategic and disciplined manner. However, research in design and design related matters should extend understanding beyond definitions of classic research used by other academic disciplines. Because design has its own purposes, values, measures and procedures which distinguish itself from science, art and any other discipline, the researcher should create unique characteristics for the research itself and the research should be interpreted as such “an exploration attempting to abstract from what we know in the hope of finding new model that may shed light on what we can do in design” (Owen, 1998).

Considering that technology and the global economy are altering the context within which designers practice, and these forces require designers to have a broader and deeper intellectual foundation to operate (Poggenpohl, 1996), the researcher defined that the boundaries of the research inquiry and the source of information should not be restricted to design discipline itself. In addition, since the expectation for designers to integrate various professional disciplines to get ideas for a new product is growing (Rassam, 1995), the research in design and design related matters should diversify to include sources of information outside the designer's experience, and develop a more collaborative approach to design. This also implies that the research should be flexible to employ multiple methods and approaches including those derived from other disciplines such as social and behavioural science, business and marketing as well as concentrating on developing its own methods.

Research outcome should be extendable and testable knowledge which satisfy both practical and academic needs (Newbury, 1996). Glanvill (1999) also argues that 'what research produces should be stable to be useful in making knowledge, i.e., the outcome should be repeatable and unambiguous'. To achieve this goal it is necessary to build a 'professional attitude to research which is a more systematic and rigorous approach to understanding and referring to previously completed research works, and to communicating research findings to the field' (Allison, 1994).

Based on the understanding of the nature of design research as notes above, this research work set out to generate a body of knowledge which helps design managers and designers in practice to enhance their design activities, and non designers to have better understanding about design. To achieve this, the research work was tied to design practice and driven by its needs. In order to reduce certain gaps between the research work and design practice the researcher constantly devoted time to keep up with newest information of design issues or problems in practice and then modify the research procedure.

### **1.3 An overview of the research process and methods**

This research work was conducted in a four-step procedure. Each step proceeds based on the outcomes of the precedent stage: (1) foundational research; (2) primary research; (3) field research; (4) research work validation and conclusion.

#### **1.3.1 Foundational Research**

The foundational research was composed of four subsidiary research activities: defining the nature and disciplines of the research; initial investigation into the research area; identifying researchable issues in the research boundary; structuring secondary research. Each stage was conducted with its own purposes and objectives set by the researcher at the beginning of the stages. In the first stage of the foundational research, the researcher reviewed definitions and methods of research in general. This helped the researcher deepen his knowledge about the nature and methodologies of research, and define the characteristics that the research ought to have. However, the researchers' actual understanding about research nature and methods were built and enhanced incrementally as the research work proceeded under the teachings of the supervisor. Based on this understanding the entire research work was steered and its methodology was developed.

In parallel with the review of research nature, the researcher carried out an investigation in consumer electronic companies and markets to gather general information, from which contemporary issues and trends in consumer electronics industry were identified. The analysis of the outcomes here helped the researcher define a direction for the next investigation activity which narrow the research boundary down to focus on more specific issues. The analysis about the consumer electronics industry is demonstrated in chapter 2. Once the research boundary was narrowed down, the researcher focused on identifying a significant key issue for further investigation according to the criteria set by the researcher under the guidance of the supervisor.

The criteria used here are:

- (1) Is the issue a commonly recognised matter by the people in practice and academic?
- (2) Is it a researchable matter that can raise a practical argument?

- (3) Do the anticipated outcomes of the argument provide a feasible suggestion to the mattered situation of the issue?
- (4) Can the suggestion be proved or validated by a certain method so that it can be a new applicable knowledge in practice?

The key issue defined at this stage was then analysed in order to identify its nature and characteristics, on which the researcher formulated how the primary research should be structured to evolve the research issue.

### **1.3.1.1 Desk Research.**

In the foundational research stage, the literature review was firstly conducted to collect general information about consumer electronics industry. Sources of the literature review are listed below (Table 1-1)

Table 1-1, Information Sources of the Literature Review

Category of Information Source	Reviewed Literatures
Company Annual Reports	LG, Samsung, Sony, Philips (1998-1999)
Independent Analysts' Reports	Euromonitor: Consumer Electronics World Survey (1998-1999), Reed Business Information: Market Prospects (1998), Key Note: Market Report (1998-1999) Financial Times Management Report (1997-1998) Retail Intelligence: Consumer Goods Europe (1999)
Reports published by manufacturers	Philips: Consumer Electronics- A World Survey and Market Prospects to 2000
Financial, business and mainstream press coverage	Financial Times (1998-1999) Fortune (1998-1999)
Company Web sites and Online databases	Hoover's Online: <a href="http://www.hoovers.com">http://www.hoovers.com</a> FT.com Financial Times: <a href="http://new.ft.com">http://new.ft.com</a>

For this literature Review the domain of New Product Development (NPD) was defined as the key range that the investigation should focus on. There are some identified reasons for this decision. Firstly, NPD is the place where most of companies' investments or their efforts are put to. Secondly, NPD aims to produce products by which companies achieve the ultimate goal of their business activities. Finally, NPD is where efficient collaboration

work of all departments and maximized use of information is required. This implies that any issues arising from the NPD might be controversial and valuable for the researcher to figure out some feasible ways by which designers set new direction for their design participations and roles in company.

### 1.3.1.2 Interviews

In addition to the literature review, in-depth interviews with people in practice were carried out at the foundational research. The interviews were conducted mainly to:

- 1: Fill gaps in the available published information per company;
2. Access to the latest year's data where published sources are out of date;
3. Generate a composite industry view of the strategic direction of the electronic product market;
4. Gather the expert's views on current trends in new product development and design.

As an independent research student, the author was allowed access to some of the key players in the home electronics product industry such as Samsung, Philips, LG and Braun. Face-to-face and telephone interviewing with design managers and senior designers was permitted by Samsung, LG and Braun. E-mail interviews were conducted with Philips (Table 1-2).

Table 1-2 List of Interviewees

No	Interviewee	Company	Position	Interview Form/ Contact Address
1	J.H., Kang	LG Electronics	Senior Designer	Face to Face Interview
2	D.S., Choi	LG Electronics	Senior Designer	Face to Face Interview
3	D.I., Wi	LG Electronics	DPA team operator	Face to Face Interview
4	A., Froger	Philips	MR Officer	E-mail Interview: Annemieke.Froger@philips.com
5	I., Willems	Philips	MR Officer	E-mail Interview: Ingrid.Willems@philips.com
6	B., Kling	Braun	Principal Designer	Telephone and E-mail interview Bjoern_Kling@gillette.com
7	S.S., Ahn	Samsung	Principal Designer	Face to Face interview

Each interview was conducted according to the interview questions prepared in advance. Interviewees were firstly questioned to give their opinions and thoughts about the current issues and trends in consumer electronics industry, and then asked to answer the questions that were devised to identify any problematic situation of company's design

related activities. Same questions were composed focusing on new product development activity and all the matters related to it. Table 1-3 show the domains that the interview questions covered and the actual interview questions.

Table 1-3, Interview Questions

Main Domains of Questions	Subsidiary Domain	Actual Question
Facility	Design technology	Is it possible to access to all the design technologies that are necessary to develop your products?
	Tools to speed design	Do you make good use of all available tools to develop products and trap problems?
	Test technologies	Do you have all the technologies when you need to test your new designs in production
	Manufacturing technology	Do you access to all the process technologies that you need to manufacture new design?
Human Resources	Culture & Innovation	Do the designers have opportunities to contribute their ideas to projects?
	Vision / shared values	Do members of a development project team tend to share the same vision about to achieve it?
	Value of Company Supporting	Do the designers benefit from company supporting that is both relevant and useful to their work on project?
Development Process- General	Product Information	Is the product information always up to date? Does it accurately reflect the current state of the design?
	Specification Changes	Are requirements, priorities and specifications stable enough to enable original schedules and plans to be retained?
	Invention	Are your new technologies proved to be stable before inclusion in project, rather than allow project timescales to suffer from uncertain technology characteristics?
	Education on Techniques to Compress Time	Are the designers given sufficient guidance and training about the development process?
Development Process- Product planning & Product definition	Concurrent with Market Research	Is product planning carried out in parallel with market research and product concept testing?
	Success Factors Identified in Specification	Does specification clearly identify factors considered critical for project success?
	Idea Selection	Are new ideas screened quickly for potential, using enough effort to develop the concepts and judge their feasibility?
	Methods, Tools to Aid Specification writing	Are appropriate methods used to create requirement & specification document?
New Technology New Products	Long Term Vision	Is it clearly understood by the designers that how the general new product introduction steady fits within the long term objectives of the business?
	Strong Technology Base	Is your company able to draw upon a strong base of technologies, ready for easy in corporation into projects?
	Products Planned in Families	Are products planned in families with platform and derivative products?

	Modular Design	Are products designed from modules and reusable design blocks with future needs in mind?
Regulatory Compliance	Incremental Innovation Radical Innovation	What the %s of developments that arise from incremental changes and radical innovation.
Activities	Market Foresight	Is it ensured that your company is fully prepared to develop new technology to meet specific customer's future needs?
	Joint Concept Development	Do your customers work with your company to develop the out line specification for new products?

In terms of obtaining valid and reliable information, it is important to remember that throughout the interviews that questions should be carrying clear information and be put properly to respondents to avoid misunderstandings or errors of interpretation because the results, findings, or knowledge from the interview are gained through the conversation which may be framed as a potential source of bias, error, misunderstanding, or misdirection, a persistent set of problems to be minimised (Holstein and Gubrium, 1995).

### **1.3.1.3 Analysis of the Outcomes**

Upon the completion of the company research phase, information inputting and synthesising took place. Where insufficiencies or irregularities were found between desk research outcomes and interviews, supplementary research was conducted to confirm and amend those findings. The objectives of the analysis were to:

1. Provide a comprehensive review of the consumer electronic market
2. Assimilate and evaluate the trends and issues of new product development and design
3. Decide key issues for the research.

From the analysis of the outcomes it was concluded that there are constant pressures for companies to develop more innovative products because of fast changing business environment and new demands from experienced customers. This situation forces companies to develop more efficient New Product Development Strategy by which they can rapidly deal with the changes and create innovative products.



Developing NPD (New Product Development) process is also identified as one of the controversial issues in terms of developing innovative products. For the companies operating in a fast changing environment where the product lifecycle is also getting faster, reducing development time is highly required to increase their competitiveness because it brings benefits of controlling market launch time and investment in money. For this reason companies are putting more efforts into developing or enhancing NPD Process.

From the synthesising work it became clear that concept development is at the core of the NPD process and its effectiveness is essential to the success of new product development. The entire process of product development is controlled in terms of time, investment and outcomes if the right and well defined concepts are achieved at the inception stage of NPD. In view of this, the necessity for an investigation into concept development was raised to develop an enhanced or a new tool for concept generation. In terms of the status of design in organisation, it is identified that designers' role and portion of design activities in NPD process have been being increased as company top executive's understanding about importance of design, and customer's demands for design features have grown. Designers are needed not only as a traditional meaning of stylist but also as a problem-solver, communicator, interpreter of complex systems and integrator. Especially in the inception stages of NPD process it is pervasive that designer's roles are transforming from a consultant role or a participant role to a leading role because their skills of integrating information to produce product ideas or vision for the future with their visualisation skills, are recognised as the tools which can facilitate the NPD process. These facts raised possibilities of a new designer's role in the NPD process. These identified issues and matters were categorised into five different domains: (1) New Product Development Strategy; (2) New Product Development Process; (3) Concept Development Process; (4) Designer's Role; (5) Information Management.

### **1.3.2 Primary Research**

The primary research was organised as the second stage of this research work, in which the identified research issues were specifically analysed and then integrated into an

arguable research topic. There are the five main aims for conducting the primary research set by the researcher. The aims are: (1) To prove the validity of the identified issues in NPD from an academic point of view; (2) To logically explain how the issues are inter-related matters; (3) to abstract one research topic by the integration of the issues; (4) To formulate a hypothetical statement as a foundation for inducing a suggestion to the finalised topic; (5) finally, to develop a hypothetical suggestion model. These aims also explain how the researcher evolved the research process.

### **1.3.2.1 Formulation of Hypothetic Suggestions**

To achieve the aims this primary research was conducted in two stages. At the first stage, the intensive literature searches each area of the research issues which were carried out. To explain the logic on which the first stage of the primary research evolved, firstly, the nature of new product development is reviewed to examine how it can be a crucial success factor for the consumer electronics companies operating in the dynamically evolving market. Secondly, all kinds of new product strategies are reviewed against the characteristics of the contemporary consumer electronics market to examine how the proactive new product development approach is effective for dealing with the current market situation. Thirdly, the researcher defined a definition of new product in the proactive new product strategy to prove the fact that developing new product idea is an essential factor for executing a proactive new product strategy. Fourthly, the general process of new product development was reviewed again to find how new product concept development process influence success of new product development. This validated the needs for developing a new product concept development process. Lastly, new product concept development methods were collected and analysed to find a better approach considering the characteristics of the proactive new product strategy.

Based upon the outcomes of the first stage of the primary research, some hypothetic suggestions were proved from a theoretical point of view. First, adopting a proactive new product development strategy which produces ‘one step ahead product’, is highly recommended for the companies operating in new business environment where the pressure of developing new product is increasing. Second, to effectively implement the

strategy, companies put more efforts on enhancing new product development (NPD) process, especially, new product concept development stage in the inception phase of NPD process. Lastly, it is suggested that the future visioning approach can be an appropriate tool for the proactive new product strategy.

### **1.3.2.2 Development of Prototype Model**

After the hypothetic suggestions were made, developing a prototype model of concept development process was initiated as the second stage of the primary research. Both historical and current models of the future visioning that had been reported in academic journals were collected and then carefully analysed against each other to find out basic elements that the models have in common. Triads of models were chosen and compared to draw out features shared by any two of them that made them distinct from the third. Those common features were then adopted to compose the basic structure for the future visioning prototype model. Applying the future visioning prototype model, the researcher restructured the new product development process and analysed how the prototype model can be functioning in the new product development process and what structural changes will appear. From the analysis it was identified that environmental information scanning and concept test process need to be enhanced for an effective operation of the future visioning prototype model in the new product development process. These triggered further literature searches on the information gathering and concept test methods. The subsidiary literature search was executed focusing on finding appropriate contents of information gathering and type of concept test method for the future visioning. From this search scenario planning was suggested as an effective method for testing the future based concepts. To develop a general scenario development process that can be applied to the future visioning system model, three scenario-planning models that were developed by the practitioners were carefully selected and analysed. This analysis was also conducted based on the principles of the repertory grid technique that defines the most shared feature among the models as the essential element for a modified model.

### **1.3.3 Formulation of field research**

Upon the completion of formulating the hypothetical future visioning model, it was necessary to conduct an investigation into companies to testify the validity of the hypothetical statement and the model. There are some objectives of the field research to achieve as follows:

1. To provide practical information which support the hypothetical model.
2. To discover facts and elements by which the model would be modified.
3. To identify feasible benefits from adopting and utilizing the model.
4. To finally generate more understanding of the model as a concept generation tool.

#### **1.3.3.1 Case study and Company Selection**

Case study was adopted as a methodology of investigating a contemporary phenomenon within its real-life context to get qualitative information that would both validate the necessity of adopting a hypothetical future visioning system model for practical use and enhance the structure and contents of the prototype model. To increase the credibility in the quality of the resources of data, the degree of insight in the discussion of the result and the support from relevant situation in the practice, the process of selecting four different companies for the case study was carefully conducted according to the criteria the researcher defined as follows:

1. **Relevance to the research area:** the company's business should be related to the area that the research work focuses on so that the outcome of the investigation can be accepted as validated information that concern the pre-specified research area and issues.
2. **Comparability with other organisations chosen:** the companies should have similarities in size of business operation and business environment they are in because the comparison between each investigation outcomes can gain the credibility when the information is gathered from the organisations under the same circumstances and conditions.
3. **Availability of Information:** it should be considered that whether the company can generate or provide any relevant information that can be used for the research

discussion in terms of the new product development process, proactive product strategy, concept generation process, and future visioning.

4. **Accessibility to Information Source:** it is an important consideration to find out whether it is possible to gain access to the people who are responsible for the information to get feedback about the interpretation of the provided information or validate the information because without the feedback or validation from the information provider information may be interpreted far from its original meanings and concerns.
5. **Market Leading Organisation:** whether company is taking a leading role in the consumer electronics industry in terms of creating and dominating market is an important consideration because any suggestions or recommendations generated from the interpretation or analysis of the information they provide may be influential to companies who follow their lead.

The investigations into each company were carried out following the same procedure. Firstly the companies' management strategies were reviewed to discover how the companies' recognise the current market situation that is rapidly changing and how they prepare to cope with it. Secondly, it was investigated how new product development strategy is formulated as a tool for implementing the management strategy. Thirdly, the companies' design philosophy and strategies were examined to know how they cooperate with the companies' new product development strategy. Fourthly, the investigation focused on finding how the design philosophy and strategies are implemented in relation to the new product development process. Lastly, the companies' new product concept development processes are assessed to find any relevance to the future visioning system model. Following this procedure it was intended by the researcher to find essential environmental factors for operating the future visioning system model and detect the additional elements that can be used for enhancing the model. However, this investigation procedure was flexibly applied to each company because the companies' management styles are all different from each other's and they all approach to new product development with their own contents and resources. From this it was possible to prove the hypothetical suggestions against real situation in practice.

In terms of new product strategy, for instance, the investigation into Sony revealed that their proactive new product strategy that sets out to develop a 'one step ahead' product and their efforts to promote their designers and engineers with innovative product concepts and support them to realise those concepts into the forms of product, contribute to the company to create new product markets in which they can achieve early domination of the market. In this content, the product development procedure of the AIBO and its succession products were examined in detail. This supports the hypothetic suggestion that the proactive new product strategy is an effective tool for the company to deal with the dynamic market.

The investigations into Samsung, LG and Philips showed that they also implement the proactive new product strategy as operating 'market-lead' product development projects. In the new product concept development, these companies take the similar approach. The companies develop a future vision and anticipate future lifestyle based on the vision. They then create new product needs and new product concepts by analysing the future lifestyle. This fact proved the feasibility of operating the future visioning system model in practice as a practical concept development tool. To facilitate the new product concept development process, each company makes efforts in different content. In case of Samsung, they focus on developing a mechanism of anticipating the future. They integrated their information forces and developed the 'grand map'. This map provides the historical flow that shows the development patterns of culture and products. From decoding the pattern of the historic evolvement, their designers learn how environmental factors interacts each other and affect on culture and product development. LG emphasises on the importance of reliable information input to the designers for enhancing new product concept development so that they reinforce their information system and provides designers with affluent information. The strategic alliance with information providers outside the company is also one of the ways they boost their new product concept development process. Philips also considers information input as the important factor that influences the outcome of the new product concept development process so that they strategically include the experts of trend analysis and futurology outside the company to get more validated information. The inputs of the experts' opinion and

specialized information help the company formulate a theoretical foundation for their anticipation about the future. The experts are involved again for validating the outcome of the concept development process. These outcomes indicate the additional facts that are adopted for enhancing the future visioning model.

### **1.3.3.2 Information-gathering methods**

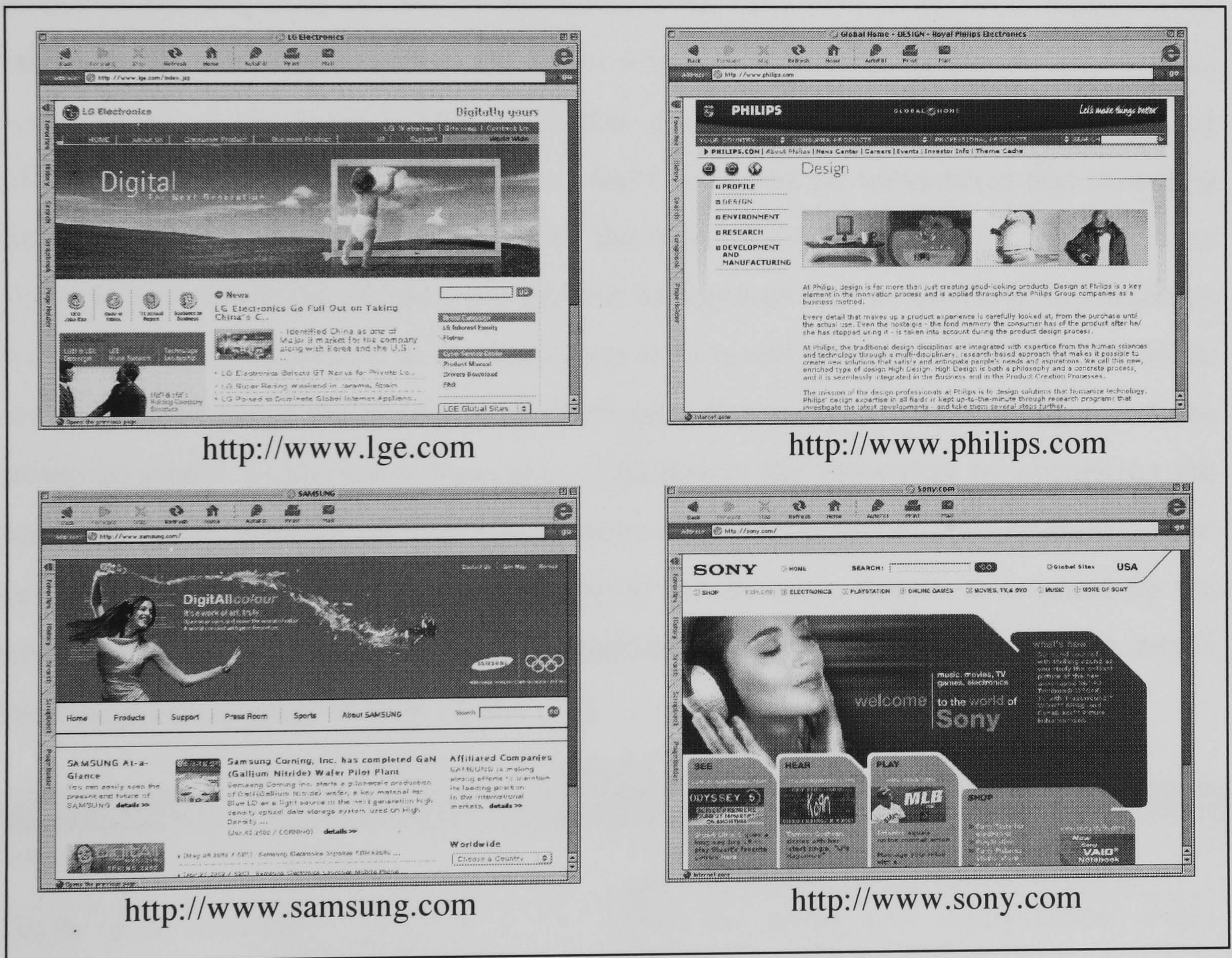
As information gathering tools for the company research stage, literature search, interviews and observation were compatibly used. Because the company investigation was intended to find practical facts by analysing companies' management and design strategies, the literature search focused on companies' management reports and design related publications. Copies of the keynote speeches and public presentations given by the companies' top managements were also gathered as the important information source that enables the researcher to identify latest moves and changes in the companies' management and strategy. To detect information about the companies' new product development trends are needed to compare each company's new product development style, the UK consumer product magazines and journals such as 'T3' and 'Stuff' were continually subscribed to and monitored by the researcher.

To gather the information about the companies' new product development projects and concept development processes in-depth face-to-face interviews with the design managers and principal designers were rearranged. Throughout the interviews with Samsung and LG, for instance, the companies' confidential reports and documents about their recent projects were limitedly allowed to the researcher for reviewing. In case of Sony and Philips, most of the interviews questioning about their new product development project were carried out through E-mail and telephone conversation. Both companies kindly responded to the researcher with the latest general information about their new product development projects. The most of the information about the Sony AIBO and SDR-3X projects were acquired and updated through these Email interviews.

Attending the companies' official expositions was one of the effective ways to acquire the latest new product information and to detect the customers' reactions and opinions

about the companies' new product development trends. For instance, Philips arranged a special tour to 'Vision of the Future' exhibition in Eindhoven for the researcher. At the exhibition the researcher was able to take part in a discussion with a group of visitors who were also specially invited by the company on that day. From this it was identified that how the customers are involved in Philips' new product concept development process. Monitoring the companies' official Internet Web sites was also a useful method of gathering subsidiary information of the companies. General information about the companies such as overviews of corporation management, strategy, new products and design were acquired by this Web site monitoring. Picture 1-1 shows the main websites monitored during the research period.

Picture 1-1 Websites of The Companies





### **1.3.4 Modification of the Prototype Model**

Based on the outcomes of the field research, the prototype model of the future visioning process was reinforced and modified in some perspectives (Lucey,1995) as follows;

- (1) The environment of the system: defining an optimum environment for effectively operating the prototype model in practice
- (2) Structure of the system: the system as a transformation process should have an efficient structure that consists of the clearly defined stages from input to output
- (3) Boundaries of the system: the features which define the extent of the system should be obvious.

After the modification was completed, the companies' design managers and senior designers who are in the position of influence on the decision-making were contacted for validating the prototype model of the future visioning because those people are the final beneficiaries of the model. This validation process was carried out by Email and telephone conversation. All the examiners had been given the information that contained the questions and the prototype model of the future visioning before the contacts were made. In the validation process, the general background and purposes of this research work were firstly explained to the examiners who would assess the prototype model to convince them about the necessity of developing the model. The advantages that the prototype model would bring were also explained to the examiners by comparing the prototype model with the existing new product concept approaches. The examiners were then asked to give their opinions according to the questions that were prepared by the researcher. The questions given to the examiners were composed to assess the model from the practical point of view (Table 1-4).

Table 1-4 Categories and Actual Questions of the Interview

Categories of the Question	Actual Question
Completeness of the process	Does this model clearly indicate where it starts and ends in terms of the required mission?
Clarity of the structure	Does this model have clearly defined stages that constitute the process?
Practicability of the model	Can the requirements for operating the model be satisfied in practice?
Acceptability of the model	Can it be adopted for practical use by your companies?
Additional suggestions	Please give suggestion about the model if you

have any.
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### **1.3.5 Subsidiary Method for the Validation**

To validate the necessity of developing the future visioning model as a new product concept development tool, the researcher presented the paper titled “Environment Scanning In a Fast Changing Environment” at the European Design Conference at Aveiro, Portugal. The content of paper was also demonstrated by a visual presentation at the conference and discussed by the conference participants. Through the open conversation with the conference participants the feasibility of the future visioning was discussed and some of suggestions to the research work were made. For example, a participant raised the possibility of adopting ‘backcasting’ as an alternative approach to the concept development and information scanning. Typically backcasting is applied on long-term complex issues, involving many aspects of society as well as technological innovations and change. This method uses experts both to build future scenarios and to determine the specific requirements for realising those scenarios (Deszca et al., 1999). As this goal-oriented forecasting focuses on a range of possible future scenarios and their consequences, what future state can be attained and the best means of achieving it are determined (Robinson, 1982; Hay et al., 1991). This suggestion triggered research work on backcasting so that the researcher can fortify the concept generation method for the future visioning process model. The full copy of conference paper is attached in Appendix 1.

### **1.4 Research Consideration and Conclusion**

In this chapter it was explained how this research work was structurally organised and methodologically conducted. As discussed above this research work was conducted in the notion of creating new knowledge that can be adopted for practical use in design and its related area. It addressed the problematic situation of the consumer electronic industry and identified the most controversial issues from it. Then the critical factors that constitute the primary issue were identified through the foundational research interviews and literature research. These identified factors were further reviewed to validate their relations to the prime issues through the in-depth literature research, and examined to find

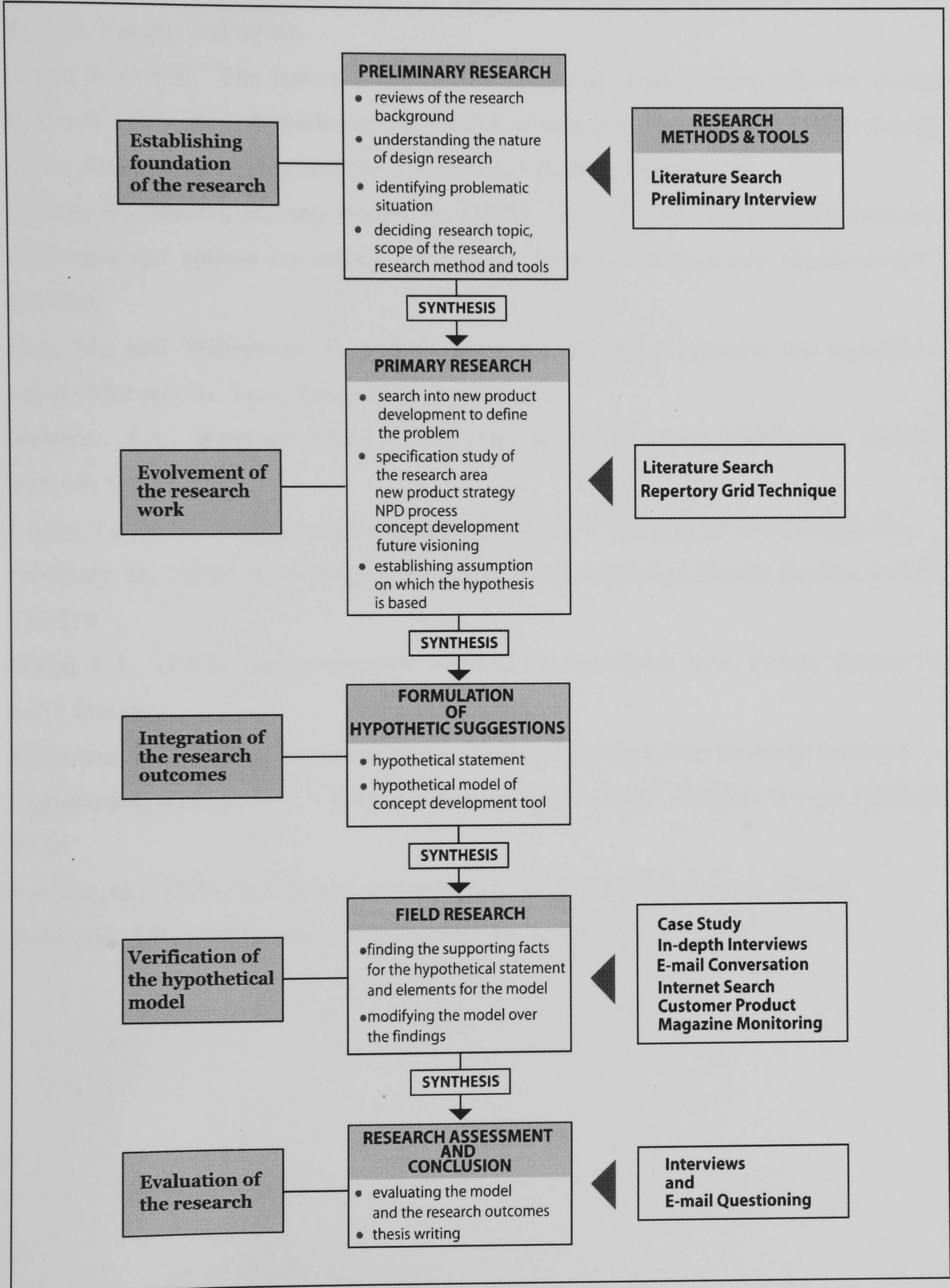
how they can be integrated and restructured into a single research inquiry which seeks to generate a solution for the problematic situation as its outcome.

After the constitutional factors of the prime issue were validated from the theoretical perspective, the hypothetical suggestion was formulated. This suggestion was then verified and reinforced through the field research that consisted of the case studies about the selected companies. The modified suggestion was finally assessed by the people who are in practice. However, the methodology and structure that are demonstrated in this chapter are the finalised results of the research. During the research work, the methodology and structure that had been defined at the beginning of it were continually assessed against the progress of the investigation and modified under the instruction of the supervisor. This enabled the researcher to steer the research work within the research boundary defined at the initial stage and to acquire the outcome at the anticipated level.

This research work depends on the non-standard information produced by the qualitative research methods such as the interviews, monitoring and discussions so that information analysis and interpretation were the important key considerations in the research methodology. In the analytical process, the information recorded and filed during the study were familiarised by careful reviews and evaluated in the light of previous research, academic texts and common sense explanations. To get better interpretation of the information the supplementary contacts with the people interviewed were made.

Once the analytical framework and explanations became clearer, all the information was then linked together to make a holistic body of evidence for the research work. This takes the form of tacking backwards and forwards between the literature and the information collected in practice. The evidence that the information provides was used to try out on others to find out whether more work is needed in some areas because the analysis may have omitted to take account of some factors or have over-emphasised others. With this analytic procedure, the researcher tried to validate and interpret the information gathered through the qualitative investigation in an objective manner. Figure 1-1 illustrates the entire procedure of the research work.

Figure 1-1 process and structure of the Research



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## **Chapter 2. Consumer Electronics Product Market and Trends**

### **2.1 Introduction: Overview of the Chapter**

The ultimate purpose of this chapter is to establish understanding about the consumer electronics industry and explain its rapidly evolving market situation for inducing the discussion about the necessity of New Product Development in chapter 3. To achieve the purposes this chapter focuses on providing a strategic analysis of the latest trends and developments in the consumer electronics market. It demonstrates overall performance, structure and growth avenues of the world consumer electronics market, and extracts a knowledgeable opinion about the future direction of the consumer electronics industry and its development prospects. This chapter also discusses the key market drivers that influence the current market for consumer electronics and the assessment of the key trends influencing major opportunities and threats facing electronics manufacturers. It lastly presents the feasible future trends and factors that may have influence on shaping the consumer electronics market by synthesising the discussions.

### **2.2 Scope of Company Coverage**

In this research consumer electronics is taken to include all electronic hardware and software products and system, fixed and mobile intended for purchase by large numbers of the public, and which can provide them with access to services, functions and content at their discretion. The analysis about the consumer electronics industry and its market in this chapter was achieved based on the information acquired from the reports published by the independent market assessment companies and the industry study groups and other semi-official sources. The information covers the consumer electronics companies that produce the products categorised as in the table below.

Table 2-1 Product Categories

<b>Category</b>	<b>Sector</b>	<b>Subsector</b>
Consumer Electronics	Mainstream CE	TVs, Plazma Display, VCR, Camcorder, Digital Still Camera, DVD Player, Digital Audio Player, Audio System, Portable Audio,
	Computer Related Products	Notebook Computer, Desktop Computer, Hard Disk Drive, Monitor, Printer, PC Camera

	Consumer Communications	Mobile Phone, Cordless Phone, Corded Phone, Fax, Business Communication System
Domestic Appliances	House Holds  Personal Care	Refrigerator, Air-Conditioner, Microwave-Oven, Washing Machine, Dish Washer, Vacuum Cleaner, Iron, Juicer & Mixer, Electric Fan  Oral Care, Body Beauty & Health, Male Shaving & Grooming

### **2.3 World Economic Trends**

During the review period between 1999 and 2001 the global economy continued to improve. According to LG Economic Research Centre (2001), the global economic growth rate reached 4.8 percent in 2000 which is the highest rate since 1988. This growth was due primarily to the economic surge of the United States and widespread economic recovery in Europe, Japan, and the newly emerging markets in Asia.

After the financial crisis during 1997 and 1998, Asia's recovery continued to gather strength. Across the region, growing external trade was fuelling industrial production, while rising incomes were finally reviving domestic demand. At the same time, stable currencies and asset prices increased foreign and domestic confidence (Price and Register, 2000). According to the world survey (Euromonitor 2000), the economy in the United States made progress in 2000 with 5 per cent annual growth rate that was achieved by increases in consumption, facility investment, and exports. The European economy was also similarly strong in 2000, generating growth greater than 3 per cent, mainly due to economic expansion in the region and a weak euro for most of the year. However, only Latin America which depends on political actions rather than economic fundamentals, had major problems in many countries with slow growth.

According to the forecast by the electronics industry analysts (Reed Electronics Research, 2000), the recovery of the global economy during the review period, caused the highest growth in consumer purchasing power in emerging markets and indicated major opportunities for growth in expenditure levels on the electronics industry. Over the long

term, this recovery of economy will continue to facilitate sales of consumer electronics product lines in all markets.

#### **2.4 The Characteristic of the Consumer Electronics Market**

Today's consumer electronics market can be defined as a market where demand is product driven, which means that product innovation is a vital element in maintaining leadership positions in the marketplace, and suppliers tend to introduce new technologies in order to stimulate demand by imposing new standard (Marketing Tracking International, 2002). Hazewindus (2000) described its current state as follow: "The consumer electronics industry is currently in great turmoil. Technologies change rapidly, new products and services flood the markets and usage is booming. Mergers, acquisitions and alliances are occurring on a global scale as business parameters are changing."

Consumer electronics is a large, global business which is undergoing rapid change with a paradigm shift induced by the convergence of technologies, products and markets. Ahn (2000) explained that "the consumer electronic industry is in the mist of a new wave of change. The world of consumer electronics is rapidly 'going digital'. The different worlds of consumer electronics products began to use similar technologies and are now starting to develop significant overlaps. This technological "convergence" drive triggers further changes in products, markets and businesses."

#### **2.5 Industrial Structure and Competition**

The industrial structure of the large consumer electronics companies varies greatly. According to Hazewindus (2000), "innovation activities are usually spread over the world, with typically the more basic R&D is concentrated in the firm's home country. The more 'applied' work may then be done in important markets (Europe, USA), in centres of technology (Sillicon Valley) or advanced markets (Japan), near important factories or component suppliers (Far East)."

The competition in this consumer electronics product market has been continuously rising because of a stream of market entrants of companies from the Far East. The Japanese



companies dominate the market accounting for 50% of world production. In 1996, for example, the top ten companies in the world recorded sales of \$95.6 billion. Almost 67% of this amount was accounted for by the six leading Japanese electronics companies while there are only two European companies in this group with combined sales of \$21.5 billion and two South Korean manufacturers with sales of \$10.4 billion. Table 2-2 shows the largest electronics firms worldwide according to profitability.

Table 2-2 World-Leading Consumer Electronics Manufacturers 1999

Rank	Company	Country	Operating profit (US\$ million)	% growth 1995-1999	Operating margin (%)
1	Samsung Electronics	South Korea	3,829	-31.0	17.2
2	Sony	Japan	2,813	-258.5	5.0
3	Philips Electronics	Netherlands	1,642	59.1	5.6
4	Matsushita	Japan	1,610	-41.7	2.5
5	Sharp	Japan	315	-66.7	2.2
6	LG Electronics	South Korea	276	-59.1	3.1
7	Sanyo Electric	Japan	266	-57.6	1.8
8	Toshiba	Japan	249	-86.1	0.6
9	NEC	Japan	-100	-98.5	0.1
10	Hitach	Japan	-282	-108.7	-0.4

Source: Euromonitor(2000)

The consumer electronics product market is mature and its customers are no longer satisfied with traditional products as carriers of benefits or services. Marzano (1999) asserted that “the ways of competition in consumer electronics market is changing. Competitiveness is not secured by large-scale production facilities or organization but ideas for new products and services which provide people with a series of positive experiences and new values”. Koo (2000) also argued that “customers become accustomed to seeing things that were unimaginable a while ago through their experience with digital technology products such as the Internet, mobile phones and digital cameras. And their expectations for new products have been increased by the experiences. Business no longer has superior access to the information because of the proliferation of information delivery technology. Customers’ access to information rivals that of companies. This change has transformed the way that companies do business”.

### 2.5.1 International Market Overview

The world consumer electronics market was valued at US\$203 billion in 1999 and it is expected to grow by an annual average increase of 5%, amounting to over US\$260 billion in 2004 (Reed Electronics Research, 2002).

Table 2-3 Total Consumer Electronics: Global Sales by Value 1999-2004

	1999	2000	2001	2002	2003	2004	% growth 1999/2004
US\$ million	202,880	208,978	219,310	231,295	245,207	260,869	28.6

Source: Euromonitor

### 2.6 Regional Analysis by Sales

In the Asia-Pacific countries that constitute the largest market for consumer electronics, the value amounted to just under US\$61 billion in 1999 in spite of the effect of the Asian Crisis which was evident in the decline of 7% in market value during 1998. They are forecast to extend its position as the largest regional market for consumer electronics, with sales exceeding US\$90 billion at the end of 2004. China and Japan will continue to form the key markets in Asia-Pacific with combined sales accounting for over three quarters of regional sales by 2004.

Table 2-4 Total Consumer Electronics: Asia-Pacific Sales by Value 1999-2004

Year	1999	2000	2001	2002	2003	2004	% growth 1999/2004
US\$ million	60,981	66,172	71,496	77,799	85,315	93,814	53.8

Source: Euromonitor

The west Europe market for electronic consumer products was US\$21 billion in 1999 and it is estimated to grow to US\$23.2 billion by the year 2002 (Reed Electronics Research, 2002). The stimulus provided by huge media companies, coupled with new technological developments for products to be used in the home, will provide the platform for growth in the consumer electronics market. In Eastern Europe, forecast growth is held back by

uncertainties over the future development of the market in Russia. Other markets are forecast to register continued growth, as incomes continue to reach parity with levels found in Western Europe. In Poland sales are expected to be driven by sales of PCs and mobile telephones, the latter sector forecast to reach a value of over US\$1 billion by 2004 (Leed Electronics Research, 1998)

Table 2-5 Total European Consumer Electronics Market

US\$ million	1999	2000	2001	2002	2003	2004	%growth 1999/2004
Western Europe	58,797	59,790	61,242	63,184	65,278	67,587	14.9
Eastern Europe	8,738	8,770	8,939	9,162	9,531	10,040	14.9

Source: Reed Electronics Research

## **2.7 Global Trends in the Consumer Electronics Industry**

### **2.7.1 Restructuring in the Consumer Electronics Companies**

The majority of consumer electronics product companies in the latter part of the 1990s experienced difficult conditions which resulted from price deflation and the economic upheavals and the leading players with broad-based activities and diversified structures scored poor levels of profitability. To overcome the difficulties in the business all the major consumer electronics companies undertook major restructuring programmes. At organisational level, the companies focused on the divestment of unprofitable and non-core activities, improved company-wide coordination through reorganised business units expending ownership of subsidiaries and placing in relevant divisions, and reduced numbers of employees. This restructuring of management was prominent among the Japanese and South Korean consumer electronics companies where the centralised structure inhibited flexibility.

### **2.7.2 Creating Global Brand**

One of the prominent trends in the consumer electronics industry in the latter part of 1990s was that the major consumer electronics companies focused on building global brands to maintain leadership in a market characterised by global competition and

increasing levels of maturity in key sectors. The values attached to global brands demonstrated similarities, with marketing usually emphasising a visionary aspect. In this respect, the companies' global advertising proliferated in the latter part of the 1990s, with prime examples being Sony's "Do you dream in Sony?", Philips' "Let's make things better" and LG Electronics' "Digitally Yours" campaigns.

### **2.7.3 Product Innovation**

Innovation was still the key source of competitive advantage for major electronics companies (Shapiro, 1998). Without technological innovation there would have been no consumer electronic industry. This can take the forms of continuous innovation, which involves minor or value-added changes in established products, or radical and discontinuous innovation, which is more risky but potentially more profitable. Value-added products are those that build on existing technologies, but which offer enhanced performance. Value-added changes reduce product replacement cycles in mature market sectors thereby raising profitability for manufacturers. The strategic use of value-added technologies also allows manufacturers to segment a market, marketing extensive product ranges, differentiated on price and capabilities to appeal to individual customer groups.

Discontinuous innovation holds high risks for leading manufacturers as development costs are substantial. It also often gives rise to disruptive technologies, meaning they impact on sales of existing product lines. The risk of radical innovation in the consumer electronics industry can be reduced by appropriate action to ensure new technologies have the appropriate software and services available to ensure consumer uptake.

During the review period, innovation was reinforced by the continued shortening of product life-cycles and NPD opportunities presented by the convergence of IT, audiovisual and communications technologies. Maintaining technological leadership became particularly challenging in the latter part of the 1990s because of the strong pressures caused by the difficult market condition to the majority of consumer electronics companies to cut costs. This situation forced the companies to shift their great focus of research and development expenditure onto core areas, and accelerated the number of

strategic alliances (Euromonitor, 2000). Examples include LG Electronics' concentration on digital TV and its strategic alliance with Philips in LCD Monitor production.

#### **2.7.4 Standardisation**

Technical standardisation has been one of the predominant features of the consumer electronics industry in the 1990's (Dai, 1996). Any significant technological breakthrough in the history of this sector could hardly achieve commercial success without fierce competition among the companies involved. This was demonstrated recently in the consumer electronics market. Enormous R&D work has been undertaken by companies all over the world to bring about HDTV and multimedia products in an effort to revitalise the saturated and declining consumer electronics industry. This has caused two format battles. The controversial European HDTV system, HD-MAC, and the ambitious Philips multimedia system, CD-I, exemplify the participation of European technologies in the on-going processes of standardisation. The decisive factor therefore, is whether major manufacturers aim to seek an open standard for a new technology, or choose to develop proprietary technologies. In the industry where the fundamental importance of network economics has a strategic priority such as telecommunications and software, the adoption of open standards is becoming more widely adopted.

#### **2.7.5 Miniaturisation**

The strategy of miniaturisation that involves making objectives with minimal environmental impact by cutting down the amount of material and energy involved and generally making them smaller, has been adopted by the major consumer electronics companies. Depending on the expanded availability of high-performance materials and technology, the companies are improving the performance-size ratio of their products. As the products are becoming smaller and the storage and transport cost lower, more product ideas are becoming economically feasible. This miniaturisation potentially has brought a positive environmental impact due to reduced material use and enabled the products increasingly to nestle into human bodies because of reduced size. Miniaturisation trends, for instance, can be seen in consumer video market, the latest home digital camcorder weighs less than 450 grams while the first video camera recorder (camcorder) weighed

around 2.5 kilograms. It can be plugged into a television for viewing and is capable of holding immense amounts of data, such as 2.5 times that held on a floppy disc, and also allows manipulation and combination of live and still pictures.

## **2.8 Global Trends in Technological Perspective**

### **2.8.1 Telecommunications**

Rapid expansion of the telecommunication and wireless telecommunications market is the most eminent trend in the consumer electronics industry. Developments in the telecommunications industry created major new markets for electronics hardware manufacturers. Especially, mobile telecommunication is acting as the driving force. The explosion in mobile telephones created huge demand for wireless handsets in the latter part of the decade. According to Financial Times Conference Report (1997), about 100 million mobile telephone handsets were sold in 1997, outstripping the sales of personal computers. The number of worldwide mobile phone subscribers reached 200 million in 1997, and the figure is expected to reach 1000 million by the end of 2005. It is forecast that by the end of 2010, the total will be greater than 1500 million, by which time it will have equalled the total number of fixed-line telephone users around the world. The spread of communications technologies into other electronics sectors continues to provide major opportunities for electronics manufacturers.

### **2.8.2 Internet**

The Internet is having profound implications both for the structure of the electronics industry and the development of the market. In addition to creating new markets for hardware and opening up new sales channels, the Internet is effecting the relationship between electronics manufacturers and their customers by revolving around core service areas including shopping, entertainment and education. The Internet allows consumers to locate with ease key information on products, the most important information being price. This has implications for the pricing policies, product portfolios and marketing of electronics manufacturers. By creating an interactive website, companies are able to establish direct relationships with consumers, enabling customer profiling, building a

detailed understanding of demand and the capability to sell directly to customers (Bieler and Stevenson, 1998)

The Global Internet population is forecast to double between 2000 and 2003, driven by growth in emerging markets (Table 2-6). The continued expansion of Internet use will be the key driver for the changes in the operating strategies of consumer electronics companies. The competitive advantages accruing from a mass customisation approach will be utilised for a growing range of consumer electronics goods, as the Internet is integrated into operational strategies. This will act as a further incentive for consumers to deal direct with manufacturers (Thomson, 1999).

Table 2-6 Worldwide Internet Forecasts, 1998-2005

Internet connections	1999	2000	2001	2002	2003	2004	2005
Total connections	73,019	89,784	109,052	133,081	162,332	196,003	223,352
Internet subscribers							
Business	2,267	2,879	3,543	4,230	4,940	5,654	6,364
Residential	70,357	85,011	101,253	119,887	141,755	163,345	182,441
Internet users							
Corporate	53,373	76,137	102,617	129,729	155,802	181,235	207,072
Residential	98,319	121,209	145,666	174,714	209,259	242,270	270,967
Internet penetration(%)							
Society	1.6	1.9	2.3	2.7	3.2	3.6	4.0
Household	4.8	5.8	6.8	7.9	9.2	10.4	11.4
Workforce	2.5	3.6	4.7	5.9	7.0	7.9	8.9

Source: Internet Market Forecast (1998)

### 2.8.3 Digital Technology

Many of the developments currently being carried out in the consumer electronics industry and related industries are based on the transition from analogue to digital technology. Thirty years ago almost all electronic equipment used in the home was based on analogue technology. Since then digital products have appeared in the home notably home computers and more recently digital telephones. Digital technology has been redefining the electronics marketplace by driving new product development, blurring the boundaries between traditionally homogenous sectors and bringing into competition

leading players from the consumer electronics, IT and wireless communications industries (MTI, 1999). It is enabling the launch of new series of products and services in consumer electronics product market. For example, the launch of digital television in 1997 and the emerging interactive industry constitutes some of the largest business opportunities such as the set-top box product which is required to access digital television, DVD in general; in particular the DVD-Rom and at a later stage the recordable DVD version, Home Cinema and widescreen TV; Equipment to gain access to interactive and Internet services, such as DAB (Digital Audio Broadcasting) receivers, Network Computers (NC), browsers.

During the 1990s the number of new electronic products to be found in the home has increased and they are virtually all based on digital technology. This trend will continue as it allows a more efficient use of the electro magnetic frequency spectrum used to transmit radio, TV, data and telecommunications signals. It also gives superior sound and picture quality to those produced by analogue techniques, mainly due to vastly reduced noise and interference. In addition, developments in digital technology across a broad front of consumer electronics products as well as computer based home based equipment enable products to be interconnected, which were previously considered to be quite independent, with fascinating results (Reed Electronics Research, 1998)

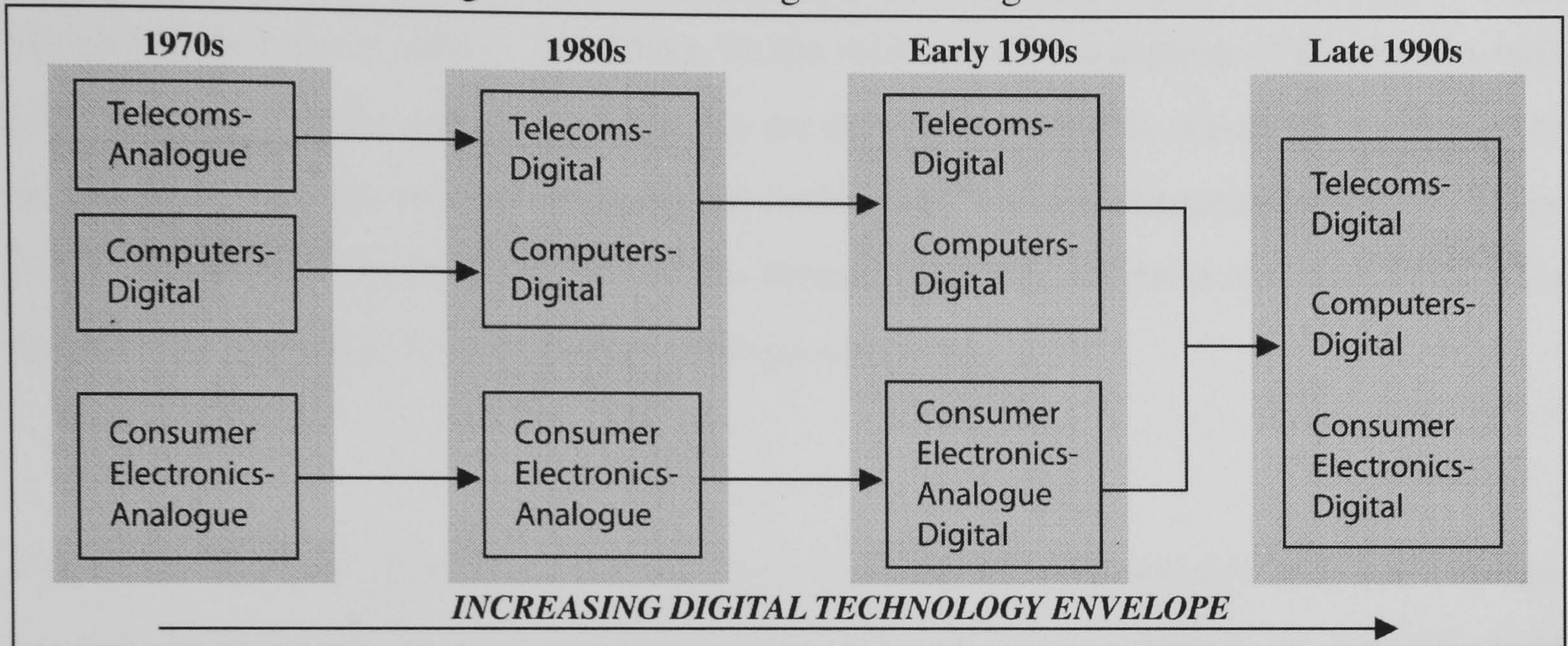
## **2.9 Future Technological Issues**

As the consumer electronics industry has been characterised as its increased tendency towards technological convergence since the 1970's (Figure 2-1), such trends will continue to have an important effect on the consumer electronics industry of the future. Digital technology, used by the telecoms and computer industries, has now arrived in the consumer electronics industry so that equipment from these three industries can be interconnected with possibilities which have yet to be fully explored and the distinction between different types of service/entertainment is also becoming less important. The idea of interconnecting consumer electronics equipment will be really part of more comprehensive schemes. For instance, consumer electronics would form part of the smart house of the future as consumer electronics, domestic appliances, environmental controls,



and security/fire alarms are being networked. Work is taking place to develop wireless technology for this purpose with its advantages of band width and dramatic reduction of cabling within the home.

Figure 2-1 Technological Convergence



Source: Reed Business Information (1998)

## 2.10 Future Global Trends in the Electronics Industry

The consumer electronics industry is likely to change in the next decade due to the following factors (Hazewindus and Burgelman, 2000):

- Emergence of the Internet, in terms of both Internet economy and of consumer-use;
- Globalisation, of industry as well as of products and services;
- De-coupling of knowledge-intensive design and marketing, and production;
- Ubiquitous computing, leading to an expansion of the consumer electronics playing ground.

As a result of the change it is anticipated that the globally operating consumer electronics firms that have the broad knowledge and innovation resources, design, brand name, marketing and logistics power to keep up with the changing technologies, will survive the ongoing shakeout in the industry. Sharing with this perspective Ahn (2000), the senior manager of Samsung Electronics Design Centre, explained: “to survive in the competitive consumer electronics market the companies should be in a position to recoup the high

innovation cost on the very competitive global mass markets, and able to provide user-friendly products to them”.

In terms of new product development, as the growth of digital technology in the consumer electronics market is leading to the widespread integration of products across market, there will be continued emphasis on developing models which have distinctive features and designs, incorporating higher technology and environmental features. Thus, the companies are required to focus on the research and development in order to maintain market leadership and to offer added value products.

Change in the consumer electronics industry will allow new entrants to come into the market, particularly in new product areas that are being opened by technological convergence and where the innovation rate is high, and lead specialist niche-market players survive where a premium price can be demanded for superior design or quality. According to the Consumer Electronics Association in USA (2000) however, alliances in some form with the large companies will usually be needed because the fundamental economics of mass markets still require the new entrant companies to have size and global presence to survive.

In addition, Since the consumer electronics industry has become pan-regional and global with the companies operating across national markets such as Samsung, Sony, Philips, and LG, global operations in the future will mean more than just operating worldwide. Therefore, the companies will need to increasingly set global production, marketing and sales objectives, with individual markets operating within the global structure and not as stand-alone operation.

## **2.11 Conclusion**

Consumer electronics has had a very important impact on many aspects of people's lives and it would still be expected to take place in the next decade. As technical possibilities increase, there is no reason that diversification in products and services will decrease. As

consumer electronics products become more digitised, software-based and miniaturised on one hand and more networked and interoperable on the other, services will be made available on a much wider range of consumer electronics products, and conversely, consumer electronics products will offer an increasing variety of services.

However, as described above consumer electronics is a mass-market industry that is very often aimed at high volume and low price products. Products are price competitive; brand is an important issue; having a wide offer from top tier expensive products to cheap products is often needed. For the industry, therefore, it is necessary to control much more diverse technologies in order to stay competitive in parallel with obtaining the necessary knowledge addressed through different strategies such as alliance, and buy & merge. In addition, because technological convergence is expected to create new competition and consumers especially around the Internet in which a new community is coming into being, and unexpected usage and related behaviour are being developed, the companies need to accelerate the introduction of new products based on the broad knowledge including innovation resources and design to survive in the emerging new competitive environment and to satisfy the new customer.

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## **Chapter 3. New Product Development (NPD)**

### **3.1 Introduction.**

The aim of this chapter is to argue the importance of new product development (NPD) and the necessity of a proactive product strategy for companies in the fast changing business environment to enable the researcher to examine the validity of the research subject and introduce discussion about new product concept development. This chapter begins with explaining the classification of the new product types to give the definition of new product that this research work refers to.

The first theme discusses why NPD is increasing in importance by approaching the subject from the technological point of view. The second theme examines the adoption of offensive product strategy which aims to create a new market with the 'first in the field' products for coping with the business environment where the pressure for NPD is getting extreme. The third theme outlines the factors that are influential on NPD process through which the new product strategy is implemented. The fourth theme states that the inception phase of NPD process is where the companies should give more attention to facilitate NPD. The fifth theme raises the issues of concept development process as a way to improve the NPD process.

In discussing the themes, the author initially provides a rationale for growing stature and importance of new product concept development process in NPD. This chapter concludes with the suggestion that the firms under the pressure of developing new products should optimise their efforts on utilizing the new product concept development process.

### **3.2 Strategic Needs for New Product Development (NPD)**

According to Webb(2000), there are the changes that have come about in current industrial undertakings, in particular:

- Increasing technical demands;
- Increasing product complexity;
- Increasing organizational complexity; and
- The inter-company and international nature of business.

The primary cause of these changes lies in the innovative process itself which generates increasing levels of expectation in all aspects of life at each completion of the process cycle. Technology creates opportunities which raise the level of expectations on the part of society as a whole. These raised expectations, in turn, stimulate needs for new products with ever increasing technical advances.

Webb(2000) argues that the advance of technology throughout the twentieth century was the greatest factor responsible both for the social change on a global scale and the vast improvement in the standard of living for all. However, our increasingly sophisticated society which raised people's expectations is still becoming progressively dependent upon more advanced technological products for its very functioning. Therefore, the product market becomes more dynamic and companies are required to adopt strategies of creating greater product variety and more frequently upgrade products to serve more effectively the diverse and evolving preferences of global product markets.

In terms of the nature of business which is to provide customers with innovation-based solutions (Drucker, 1985), the role of NPD in the modern business world is increasing in importance. Several studies (Tracy, & Wierseme, 1995; Whiteley, & Hessian, 1996; Cross, 1997) identified that focusing on cutting costs and achieving cost advantages will not grow a business in as powerful a fashion as product and market development in the business environment where downsizing and reengineering efforts are combining to cripple employee morale. Roberts(1998) also shared this view. She wrote, " So focused have companies been on improving profitability, that investing in innovation products and new marketing approaches has been much lower on the priority list for many. As a consequence, product and service differentiation has eroded. Since no existing market share is secure these days, and product life cycles are getting shorter, there is a greater need than ever for product and service innovation." For this reason, companies are turning to NPD to grow their now-more-cost-competitive businesses and improving the innovation climate is of growing importance in today's corporate world (Donlon, 1998; Tomkovick, & Miller, 2000).

New product is a source of competitive advantage (Thomas,1993; Bruce & Cooper,2000). Whether a new product is an extension which requires fewer resources or a breakthrough which entails high risk, it leads to a sustainable competitive advantage by constituting the firm's portfolio of new product development projects. New product also provides competitive advantage for the future. According to Hamel and Prahalad(1994), future competition is to be prescient about the size and shape of tomorrow's opportunities and to conceive fundamentally new types of customer benefits or to conceive radically new ways of delivering existing customer benefits. Thus, new products that anticipate and fulfil customers' unarticulated needs, provides opportunities to get ahead of competition( Roberts, 1998).

Other strategic reasons for NPD ( Thomas,1993) are listed bellows:

- New products reinforce a firm's strategic direction or changing strategic direction by introducing additional features to accommodate changing buyer or market needs.
- The launch of a new product or family of products can enhance or detract from a firm's corporate image among its customers.
- New products can provide long-term financial return on investment.
- New products can capitalize on R&D.
- Developing new products improves the utilization of production and operation resources.
- Successful new products can create jobs and provide opportunities for career development.
- Organisations that have used their marketing programs to build equity in a brand name can use new products to further capitalize on their investment.

Resulting from this, it is can be concluded that new product development certainly is on the agenda of top managers both as a relatively important competence for achieving company objectives and a competence where companies pay attention to dealing with the dynamic product markets. However, for companies to develop new products, it is a necessary step to develop a new product strategy which defines the type of products to be

developed, the markets in which they will be sold, the technology to be incorporated and the resources necessary to develop them. Without a clear strategy, the new product programme lacks direction; without good direction the new product team members are unlikely to operate effectively and achieve new product objectives(Kotler et al., 1996) .

### **3.3 New Product Strategy**

Among the derivative strategies that most manufactures develop to achieve their corporate objectives such as production strategy, promotion strategy and resource strategy, new product strategy most directly influences an organisation's new product development activities and the success of new products by generating a number of additional second level strategies specific to new product development, including dedicated R&D, design, manufacturing and marketing strategies which address the short, medium and long term needs and influences from a number of key contributory areas and collectively result in the development of products relevant to both the new product and hence the business strategies(Jones, 1997; Souder & Song, 1997; Kumar at al., 2000)

#### **3.3.1 Categories of New Product Strategy**

Freeman(1982) identified that there are four generic groups of new product strategy into which most manufactures can be classified. Firstly, offensive product development which focuses on significant R&D activity developing new technology and new processes. This approach enables manufacturers to be first to market with innovative new products, and requires the latest information concerning technology, market forecasts, anticipated consumer behaviour and economic indications(Song & Parry, 1999). Offensive product development provides the opportunity for early domination of the market and long term growth when its product is successful. Secondly, defensive product development, which relies on the company's existing resources and skills to develop and manufacture competitively priced versions of the product, develops new products to satisfy existing consumer demand and meet anticipated short term expectations (Pascale and Athos, 1981).



Thirdly, imitative product development, which copies the market leaders to benefit from their earlier innovation and growth in domestic markets. This approach relies on taking advantage of localized markets and the ability to manufacture products at low cost, producing clones (Schnaars, 1994). Lastly, traditional product development which primarily subordinates styling trends, customer preferences and seasonality. This approach is used for the market where there is little call for change in the product, innovation has little role and the constant consumer demand allows for profitable manufacture.

In this research, these four groups of new product strategy are reclassified as ‘proactive’ and ‘reactive’ new product strategy for clarifying the discussion. Proactive new product strategy is designed to open up new markets by totally new product. Reactive new product strategy is, by contrast, often stimulated by competitive forces or other changes in the market-place and is typically designed to maintain market share or current rates of growth.

### **3.3.2 Proactive New Product Strategy**

Adopting a new product strategy is usually associated with perception of the markets and business environment in which a company operates, its corporate objectives and business strategy. For the company facing the competitive environment where technologies and market preference change rapidly, a proactive stance brings a competitive advantage through new products which open up new market(Lynn et al., 1996; Deszca, et al., 1999; Kumar et al., 2000). It is around this matter that the discussion in this chapter is further developed.

### **3.4 New Product Categories**

In relation with the new product strategy it is necessary here to define the product type for the further discussion. Definitions of what constitutes new product are varied in several point of views.

Based on its innovativeness, Robertson(1967) proposed an alternative approach to classification which placed products in three groups: (1) Continuous innovations which

involve the modification of existing products and lead to few if any changes in consumer behaviour. (2) Dynamically continuous innovations which do not change behaviour patterns in any fundamental way. (3) Discontinuous innovations which are dramatically new and which lead to significant changes in patterns of behaviour and usage.

According to how new the product is to the company and how new it is to the marketplace, new products are also classified into six categories of new product (Booz, Allen and Hamilton, 1982): (1) New to the world products that create an entirely new market. (2) New product lines that are designed to enable a company to enter for the first time an existing product sector. (3) Additions to existing product lines. (4) Improvements and revisions to existing products. (5) Repositionings where existing products are retargeted in order to appeal to new market segments. (6) Cost reductions where products are modified to provided to provide similar performance but at a lower cost. These six categories of new products are regenerated into four groups of classification: (1) Totally new to the world. (2) Product improvements. (3) Product modifications. (4) New brands.

In terms of the level of difficulty and market potential, new product types are categorized into two major categories: “Base” products and “Derivative” products (Wilson, et al.,1996). Base products consist of two major types: “breakthrough” products and “platform” products, which are distinguished from other alternative products in aspects of providing customers with entirely new or significantly higher benefits. While platform products are the results of fundamental improvements in cost, quality, and general performance over previous generations of similar products, breakthrough products create or expand a new category and/ or create cross-category competition; are new to customers, often requiring substantial customer learning; raise issues related to channels of distribution and organizational responsibility; and create the potential for new infrastructure and add-ons (Leeman and Winer, 1997).

Derivative products are the products that are modified to meet more specific customer needs. These products consist of four categories of products (Wilson, et al., 1996): (1)

“customised” product; a base product that has been modified specifically for a particular customer, distributor, or retailer. (2) “enhanced product”; a base product that is added of new, distinctive features or higher performance. (3) “cost-reduced” product; a product which is created after the base product is introduced with fewer features or lower performance. (4) “Hybrid” product; a product which combines aspects of two or more base products.

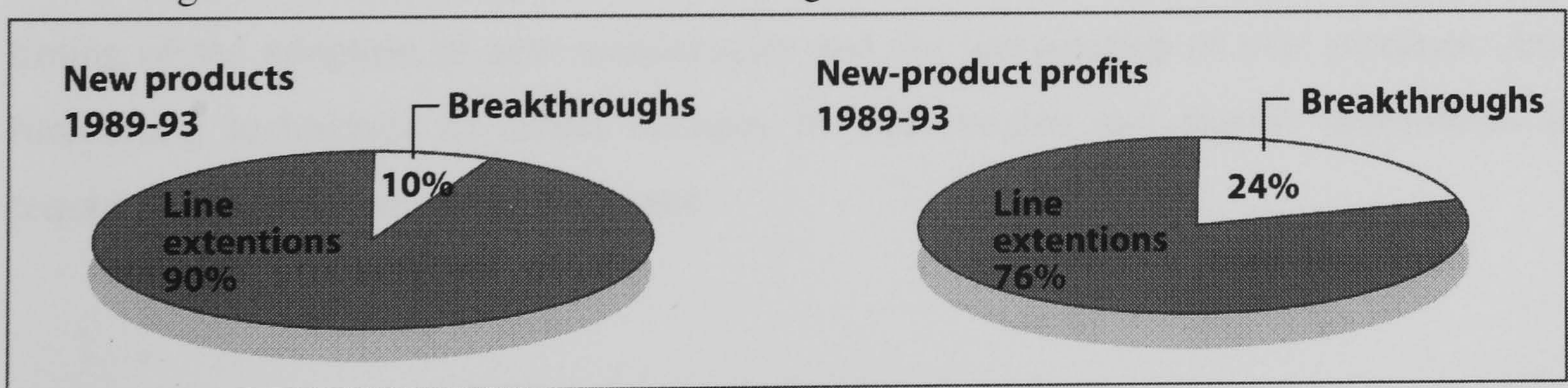
### 3.4.1 Breakthrough Product

In this research, among the new product types discussed the ‘breakthrough product’ is adopted as the ‘new product’ type that the proactive strategy produce for achieving its objectives.

Breakthrough products are usually associated with greater risk than less innovative products because they involve more uncertainty in terms of the nature of the product itself, the organisation’s capacity to effectively and efficiently produce the product, market acceptance, and ultimately, profitability (Leonard and Barton, 1994).

However, these products hold the promise of being the most successful products a company can launch and providing the highest returns (Kuczarski, 1988; Lynn et al., 1996). According to Angeli(1995), breakthrough products accounted for only 10% in new product introductions between 1989 and 1993, in the USA but contributed 24% of the profits from new products.

Figure 3.1 Introduction of Breakthrough Products and Profit Contribution



Source: Fortune May 1, 1995

### 3.5 Competitive Contexts and New Product Strategy.

Before assessing proactive new product development strategy over the today’s market environment, it is necessary to categorise the product market and discuss how the

different competitive contexts in the product markets give rise to a distinct new product strategy. Based upon the stability or instabilities of technologies and customer preferences, there are three different competitive contexts characterised as stable, evolving and dynamic product market (Sanchez, 1996).

### **3.5.1 Stable Product Markets**

When both technologies for creating products and markets preferences for products are not changing significantly, the product markets are likely to be stable. Industrial organisation economics on irreversible commitments specific-use assets, control of product production processes, hierarchical integration to achieve control of product processes, and defence of established market position are usually emphasised. Thus, product strategy focuses on increasing market share by reducing costs for producing standard products and by extending control of distribution channels. When product creation occurs it is likely to follow a sequential path through the functional divisions that serve the core production and distribution processes of the firm.

### **3.5.2 Evolving Product Markets**

As the technological changes affect new products or improved production processes, customer's preferences become increasingly sophisticated and the demands for new products are growing rapidly. Because of the evolving technologies and market preferences, market conditions begin to change and the pressure for faster development of new products increases. In this evolving product market, new product strategy emphasize timing of the adoption of new technologies and the introduction of new products. And forecasting techniques to detect changes in technologies and market preferences is required to facilitate the timing process.

### **3.5.3 Dynamic Product Market.**

When high rate of technological changes makes accelerated evolutions of product concepts, manufacturing process capabilities, and technologies for coordinating product creation processes, product markets become more dynamic. Sophisticated customers in

their abilities to select products and their varied preferences also induce rapid changes in market condition. In this dynamic market situation, strategic emphasis is usually placed on speed to market, rapid performance upgrading, and proliferation of product variety. In addition, since the uncertainty about where the market is headed in the long term is high level, the necessity to develop the strategy which copes broadly and effectively with a range of changes in future becomes significant in importance.

### **3.6 Defining Today's Product Market**

Underlying the contributions of changes in technologies, today's consumer electronics product market can be identified as a dynamic product market where technology plays a great role as a driving force of rapid market change (Ahn, 2000).

Gary Shapiro (1999), the chairman of Department of Trade and Industry , USA, describes today's dynamic situation of consumer product market driven by technology:

*The convergence of technology in the consumer market will mean a convergence of interest between two pillars of the American economy- the PC and CE industries. While both sides often ally toward their own methods and strategies, it is clear interest- and with them, their products- will continue to intertwine. In the coming years, the consumer will expect standards and protocols that will allow information and entertainment to flow from product to product, in the home, at the office, in the car, in a briefcase or in a backpack. Software will be devised to work as part of a fluid environment, independent of hardware carrier. As the track is laid for the infrastructure of our digital times, consumers will expect the same kind of functionality, ease of operation and reliability they have come to expect from their current consumer electronics products. Meeting this challenge is the common goal of both the PC and CE industries.*

#### **3.6.1 Technology as a Driving Force**

Fast changing technology in modern society causes great need for transformation to adopt new emerging features of business and shapes competitive characteristics. Kaku(1998) argues that a series of revolutionary ideas such as quantum mechanics and information

technology completely redefined everything about life and opened a new era which is moving fast. He describes the dynamic changes caused by development of technology, “Clearly, we are on the threshold of yet another revolution. Human knowledge is doubling every ten years. In the past decade, more scientific knowledge has been created than in all of human history. Computer power is doubling every eighteen months. The Internet is doubling every year. The number of DNA sequences we can analyse is doubling every two years. Almost daily, the headlines herald new advances in computers, telecommunications, biotechnology, and space exploration. In the wake of this technological upheaval, entire industries and lifestyles are being overturned, only to give rise to entirely new ones. But these rapid, bewildering changes are not just quantitative. They mark the birth pangs of new era”

The acceleration of science and technology is changing the nature of business (Thurow,1996). For instance, in information technology a shift to digital age is widely changing the business economic paradigm. Digital technology enables people to easily obtain, share, and act on information in new and remarkable ways so that knowledge becomes much more accessible for everybody, everywhere, at any time; the possibility of the controlling counterpart in commercial affairs reduces; it implies that jobs, activities and business can be moved more readily between regions or time zones. As time constraints and competitive pressures become more important, market definitions and boundaries will break down. The changes in the business economic paradigm (Hougaard and Duus,1999) are set out below (Table 3-1).

Table 3.1 Changes in the Business Economic Paradigm

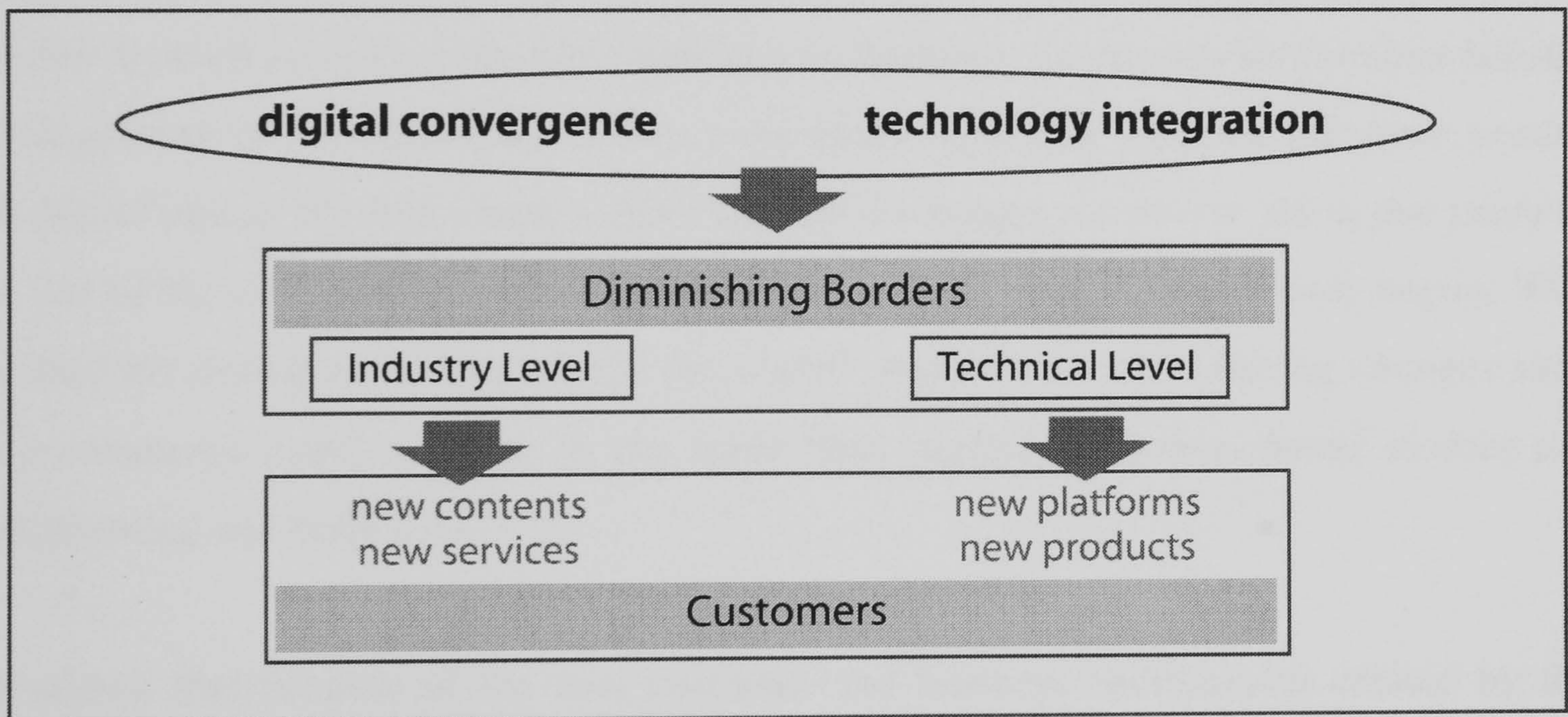
Key Concept	Industrial Age	Digital Age
The marketing concept	Consumer needs and focus on the competitive triangle, i.e. customer, competition, company.	Customer relations and virtual match.
Competitive advantage	Through generic strategies and consistent activity configuration.	Through smooth adaptation, networking and organisational learning.
Resource allocation	Effective segmentation	Meaningful customisation.

Positioning	R&D and mass communication	Integration and variability.
Preferred mechanism and activity form	The hierarchy due to high transaction costs	The market or hybrid forms due to lower transaction costs.

Initial Source: Hougaard & Duus (1999)

Koga (1998), Senior Executive Vice President of Toshiba, also argues technology integration (TI) and digital convergence (DC) are rapidly transforming the business structure to a different integrated business style. According to him, TI and DC offer new platforms, which related industries commonly share and ride together, new complex products to customers that are created by applying together multiple-field technologies, new services to promote their effective use and new digital contents, while keeping the ties and awareness of each other's value chains.

Figure 3.2 Transformation of Business Structure by Technology



Source: Koga (1998)

Emerging hardware, software, and communications standards that provides the immediacy and spontaneity of technology, also increase the velocity of business and leads reshaping business and consumer behaviour. For example, more regular uses of PCs at work and at home, high increases in Internet uses, emerging new consumer devices handling almost every kind of data will keep us constantly in touch with other systems and other people. In this context, Gates (2000) writes:

*The 2000s will be about velocity. About how quickly the nature of business will change. About how quickly business itself will be transacted. About how information access will alter the lifestyle of consumers and their expectations of business. Quality improvements and business process improvements will occur far faster. When the increase in velocity of business is great enough, the very nature of business changes.*

### **3.6.2 Technology and Company Strategy**

Based on understanding the changes that technology brings to our society, leading companies of consumer electronics products adopt the changes and reflect it in their management and strategy. John Koo (2000), Vice chairman & CEO of LG, explains that technology is a tool which can bring more affluence to society and create new environment for business. He addresses it in “The year of Digital LG”:

*The new year, the new millennium is upon us. The year 2000 that we so anxiously awaited is now a reality. We are attaching so much meaning to year 2000 because this number is much more than the mere start of a millennium; for the new millennium heralds the beginning of the digital age. There were many signs that signified the move toward the digital age in the last century. Also, the rapid changes we saw in just a few years at the end of the 20<sup>th</sup> century confirmed that the digital age had in fact already begun. With the Internet acting as the apostle for the digital revolution, some amazing changes such as e-commerce came to form. At the same time, digital technology-based devices are transforming our daily lives.*

He admits that because of the new customer and business environment created by the technological development, it has become apparent for the companies operating in that environment that they must have different approaches to management in order to compete. Koo continues his speech:

*The rules of game between companies are also changing. Economy of scale, where competitive edge was secured by large-scale production facilities or organisation has disappeared, replaced by ideas for new products and services as the main factor for corporate competitive strength. In the digital age, the ability to link individual management elements into a network is being highlighted as the core competency and*



*values offered to customers are emphasised over price. Amidst these overwhelming changes, the management style of a company also needs to change. The existing thinking, process, and strategy can no longer guarantee a company's survival.*

Marzano, Managing Director of Philips Design, asserts that companies are faced with time of convergence by technology which creates a new customer environment requiring companies to have new approaches to customer needs. In his article "The Old Dreams are Dead! Long Live the New!" he describes (2000),

*And it's changes in that direction-in the direction of sustainable, harmonious lifestyles that I'd like to talk to you about today... touching on a number of issues that I see coming up in the near future. Thanks to digital technology, we are in a better position to fulfill people's dreams that ever before: dreams, for instance, of being able to know and do more, dreams of being able to keep in touch even though we're far apart. Dreams of being able to keep in touch even though we're to make people's dreams come true, we need, now more than ever, to understand what motivates them, inspires them and drives them in their daily lives- and deeper down as well, in their culture, in their inner selves. The days when a company could produce some technological magic and expect people to buy it purely on those grounds alone are gone.*

He also argues that advanced markets are contributing to a new shift. Due to digital technologies, elements that were once perceived as new attractive qualities in a product are now seen as commonplace and intrinsic qualities to be taken for granted. In this new environment, economic value of products and services are superseded by new elements that related to what people have come to want.

According to an article "New Values for the new millennium" released by Philips Design (2000), technological advances create a new paradigm characterized by mass customization as a consummation model and by mass fragmentation as a production model. And to compete in this environment it is required for companies to be specialized for dealing with the development and the manufacturing of very specific customized solution. It describes:

*These one-to-one customisations are not possible at the moment in a world characterised by mass productions and global markets, and this is why nowadays customisations are made on the basis of consumer research that use segments of consumers in order to identify what the majority wants. But the Web, just like the craftsman of centuries ago could do in his village, can approach the whole of the global community at the same time and identify different needs and desires. We can think then of the future market as a place in which many brands will sell to the consumers customized products, services or experiences, providing them with the guarantee of the quality.*

Samsung (2001) also accepted that technology is a main driving force that creates the rapid changes in the customer environment and reshapes the nature of business. To effectively respond to the changes, they announced 'Digital Management' approach which aims to stay ahead of the great waves of change under way as the Information Age continues to transform global business and culture. Samsung puts great effort into shaping new corporate identity and management systems to accommodate the emerging social realities of the 21<sup>st</sup> century. In particular, the company has committed to digital technology as the core competency needed to expand the number of their product lines.

Based on the understanding that today's business is facing the rapid transformation of its structure spurred by technology, Toshiba set three key strategies to tackle the challenges of responding to the changes in an age of rapid and constant change. Firstly, Toshiba are striving to become a more agile company characterised by speed and flexibility in creating new products and services with high-growth potential. Secondly, they are endeavouring to create an organisation without boundaries that will encourage the flow of ideas, resources, and talents up and down beyond conventional organisational boundaries with Toshiba and extensively with their business partners. Thirdly, they stress that respect for people is an essential part of their corporate culture.

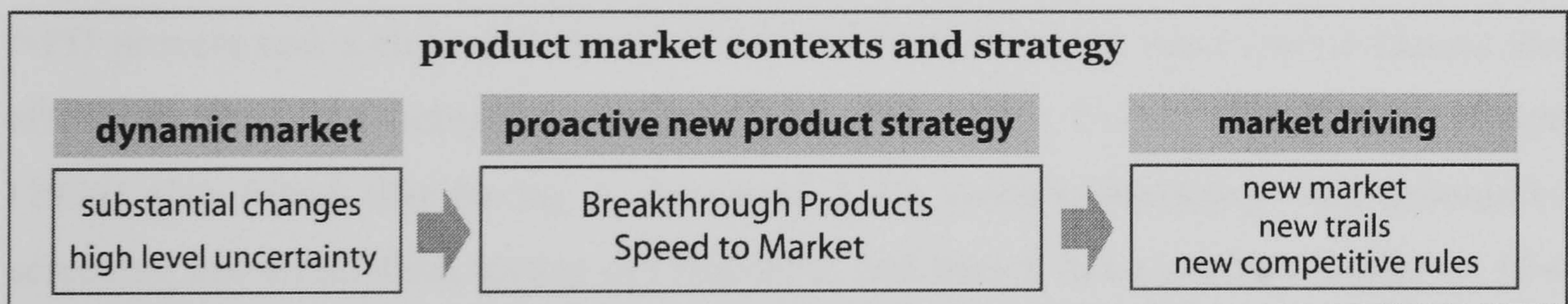
To implement these strategies, Toshiba set up Advanced-I Group (ADI) which is designed to lead the entire company toward the changes required by new age of world business characterised by technology integration and digital convergence. Through this

special organisation, they pioneer new businesses and bring new technology-integrated digital products to fruition in the fused fields such as computers, communications, audio visual, broadcasting and publishing.

### 3.7. Implication

Resulting from this it becomes more obvious that today's product markets are getting more dynamic reflecting the increasing contributions of technology. As technology brings obsolescence of some occupations and shifts in the structure of employment and changes in the terms of trade between regions and countries, there is a high rate of substantial changes in economic and social conditions, to which management must strategically respond. In this changing business environment, firms should stay ahead of the change curve to have competitive advantages through creating new products which opens new markets, blazes new trails, and reinvents the competitive rules (Lynn et al., 1996; Muffatto, 1999; Song et al., 1999) because the major changes by rapid development of technology consequently increase the uncertainty in terms of where the market is headed in the long term by setting new conditions for every aspects of business.

Figure 3.3 Product Market Contexts and Strategy



However proactive new product strategy through developing breakthrough products is associated with high risks of cost and time consuming because of long, expensive and ineffective development process (Lynn et al. 1996; Spivey et al. 1997). According to the survey by Scott (1999), accelerating new product development cycles (cycle time reduction) becomes a high ranked critical concern among the companies. In practice, over one third of product development projects overrun in development process by at least 100% and many more by up to 50% so that there is a constant delay which effects the profitability of a product in a competitive market where the pressures on time-to-market are rising and the product life is less than the design time (Department of Trade and

Industry, 1999). The cost of this is loss of market and loss of profit. Thus, it is necessary to analyse issues and discussions around New Product Development (NPD) process for finding feasible solutions to the risks of time and cost consuming in developing new product.

### **3.8 New Product Development (NPD) process as a Success Factor**

New product development is a process that transforms technical ideas or market needs and opportunities into a new product (Bruce and Cooper, 2000). The success of new product development depends on several factors. According to the research of Lynn et al. (1996), there are 10 critical determinants identified as the success factors for technological innovation: (1) having a structured new product development (NPD) process; (2) having a clear and shared vision on the team; (3) developing and launching a product within the proper time frame; (4) refining a product after launch and having a long-term view; (5) possessing the optimal team skills; (6) understanding the market and its dynamics; (7) securing top management support for the team and the team's decision; (8) applying lessons learned from past projects; (9) securing good team chemistry; and (10) retaining team members with relevant experience. Among these factors, moreover, NPD process and a clear and shared vision are considered the most critical factors that affect new product development success (Lynn et al., 1999). Cooper (1994) and Crawford (1994) also found that having a structured NPD process, including idea generation, screening and evaluation, testing development, and launch has a positive impact on new product success.

#### **3.8.1 Problematic Concept Development Process in NPD Process**

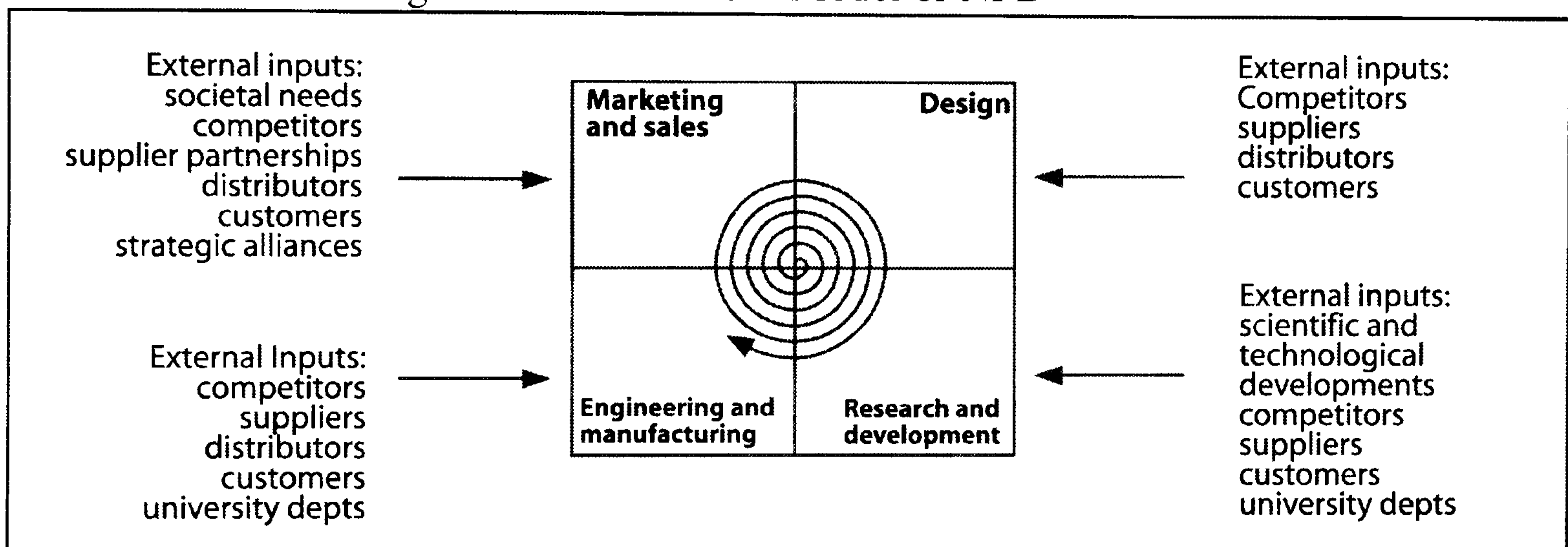
Two major factors which influence success of NPD process are identified through reviewing the literature on new product development and innovation (Rassam, 1995; Hart, 1996; Thackara, 1997; Thomas, 2000): Information management in NPD process, and speed in NPD process.

#### **3.8.2 Information Management in NPD Process**

NPD process can be characterised as a 'knowledge-accumulation process' that requires

inputs from a variety of sources because NPD process is where multidisciplinary collaboration is required to make the tasks successful. As NPD process progresses from initial idea, participation with knowledge from a variety of different professions, such as marketing, R&D, design and manufacturing, are required gradually over time. If the various professions actively collaborate and information is well supported to them through NPD process, its outcome is more successful (Cooper and Kleinschmidt, 1990; Liker et al., 1995). External inputs coupled with the internal activities also have been shown to contribute to successful product development by facilitating additional knowledge flows in to the organisation (Cusumono and Takeishi, 1991; Kamath and Liker, 1994). The model in Figure 3.3 helps to highlight the accumulation of knowledge and the external information input flows.

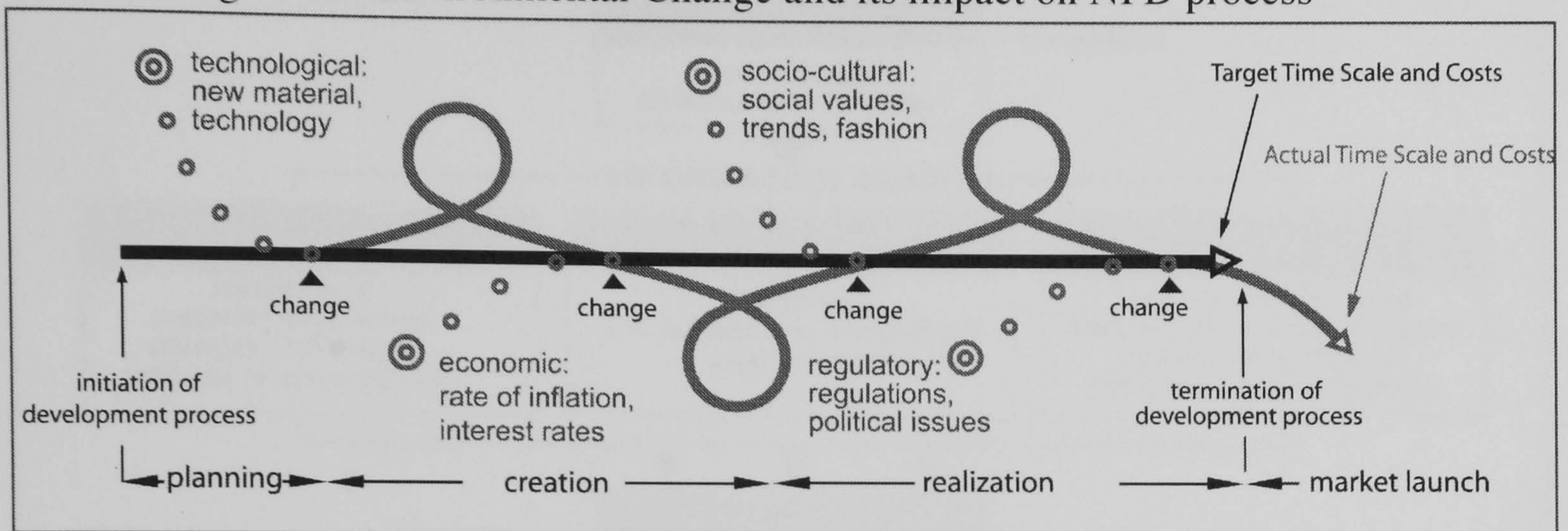
Figure 3.4 A Network Model of NPD



Adapted from Trott, 1998

Therefore, it is important to manage the information related matters to make NPD process success. For instance, neglecting the synthesis of the relevant information about environmental factors in the early stage of NPD process often causes major changes to the product on development. Because the changes in environmental factors are latent on many occasions, if there are no preparation for the impacts that the environmental changes might bring, it is inevitable there will be late changes in NPD process (Ahituv et al., 1998). What is at issue is that the late changes delay the time scale of the development project and increase the investment cost (Figure 3.5).

Figure 3.5 Environmental Change and its impact on NPD process

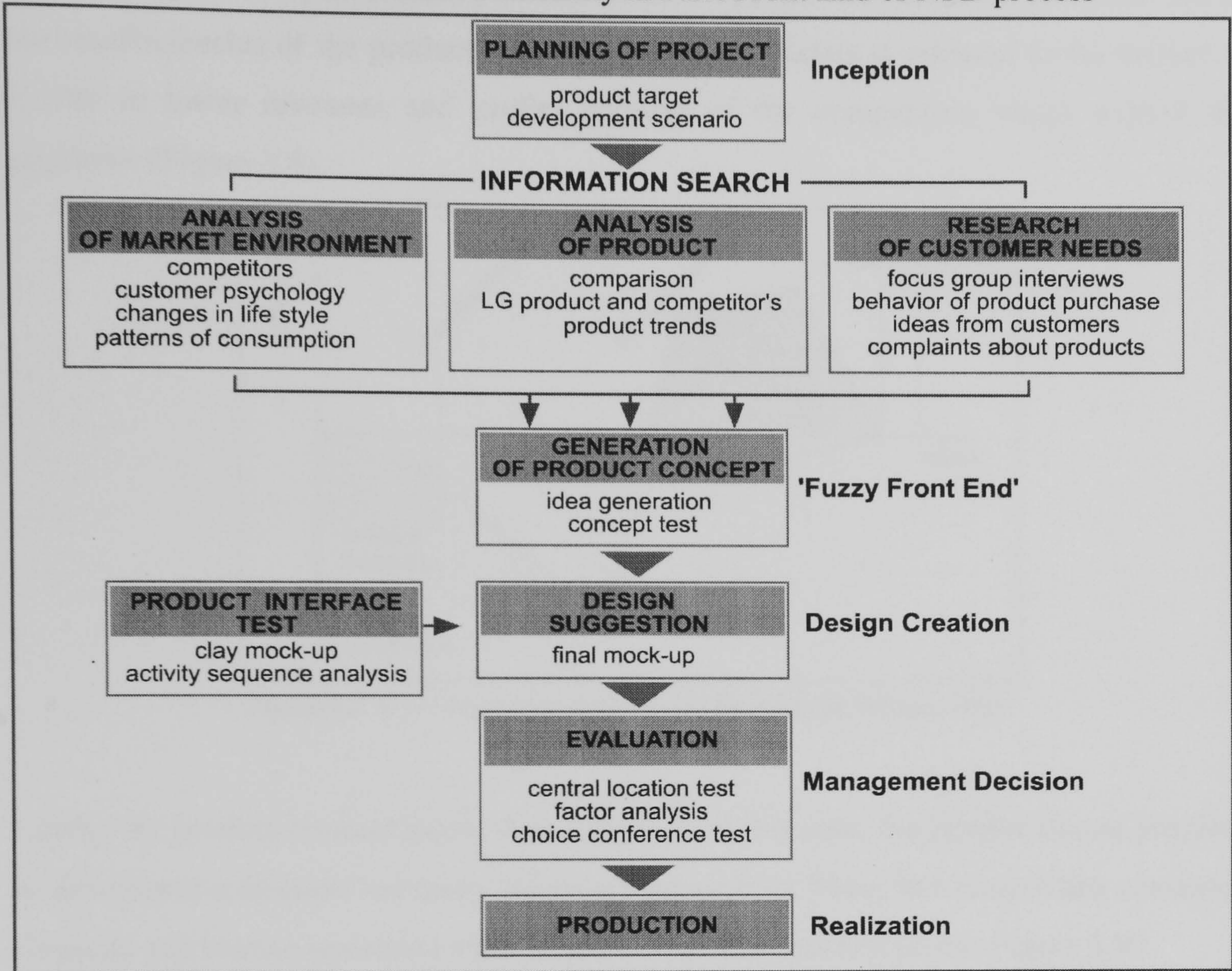


Among the activities in NPD process, the concept development process is where the most intensive information searches are required and where the outcomes need to be carefully integrated. Because product concept is an interpretation of the product, it should include the major consumer benefits and features that will define the product and satisfy a market need. If the product concept fails to integrate technologies, product performances, and user expectations, then the outcome of the NPD process hardly meet its objective (Thomas,1995;Hart,1996). Figure 3-6 shows the intensity of information search works before the concept development and the information flow to the concept development process.

### 3.8.3 Speed in the NPD process: starting with right concept

Proceeding of NPD process is often influenced by the proficiency in idea-development and idea-selection stages which are referred to as the “fuzzy front end” of NPD because idea-development and idea-selection typically involve ill-defined processes and ad hoc decisions which negatively dictate all further development activity (Cooper et al, 1986; Fox, 1993). If product concept is ill-defined and fails the concept test due to lack of pre-development activities and the absence of objective evaluation criteria in front-end idea selection decisions, then the development itself may get terminated. Even though the concept is forced to proceed to development, it may result in market failure, lost opportunity and the waste of all efforts invested (Crawford, 1994;Hart, 1996).

Figure 3.6 Information Intensity in First Front End of NPD process



Adapted from LG Electronics

On this point, Wilson (1993) explains how the delays in the initial phase affects the product obsolescence by identifying three cases which are likely to happen in the product development process. Firstly, the development team moves to product development too early: if new information is fed into the team, it may cause revision of product concept, or project cancellation (Figure 3.7).

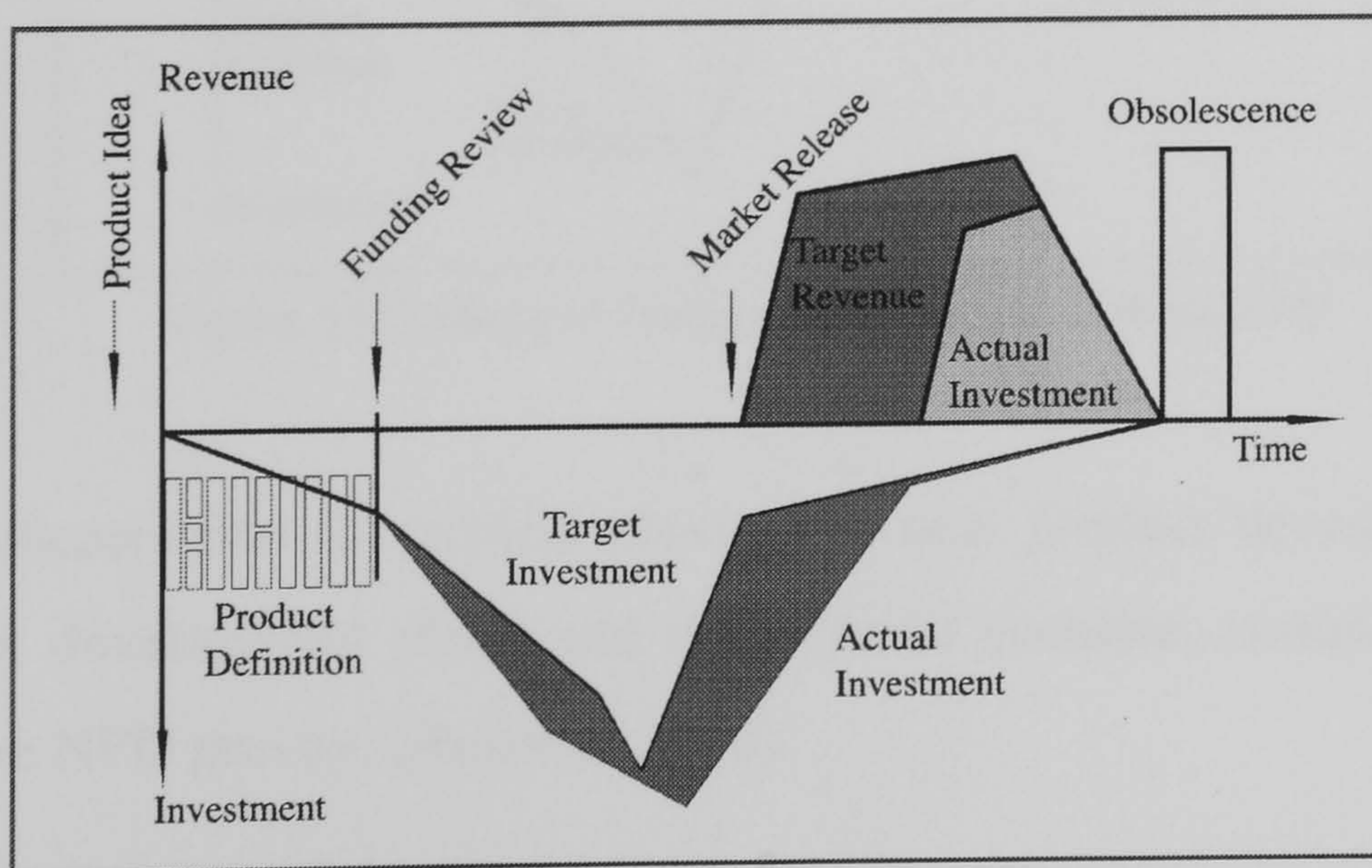


Figure 3.7 Early Move to Product Development by Wilson, 1993

Secondly, the development team proceeds to development with unsolved problems due to the insufficiencies of the product concept. When the product is released to the market, it results in lower revenues and profits because of the competitors which exploit the problems (Figure 3.8).

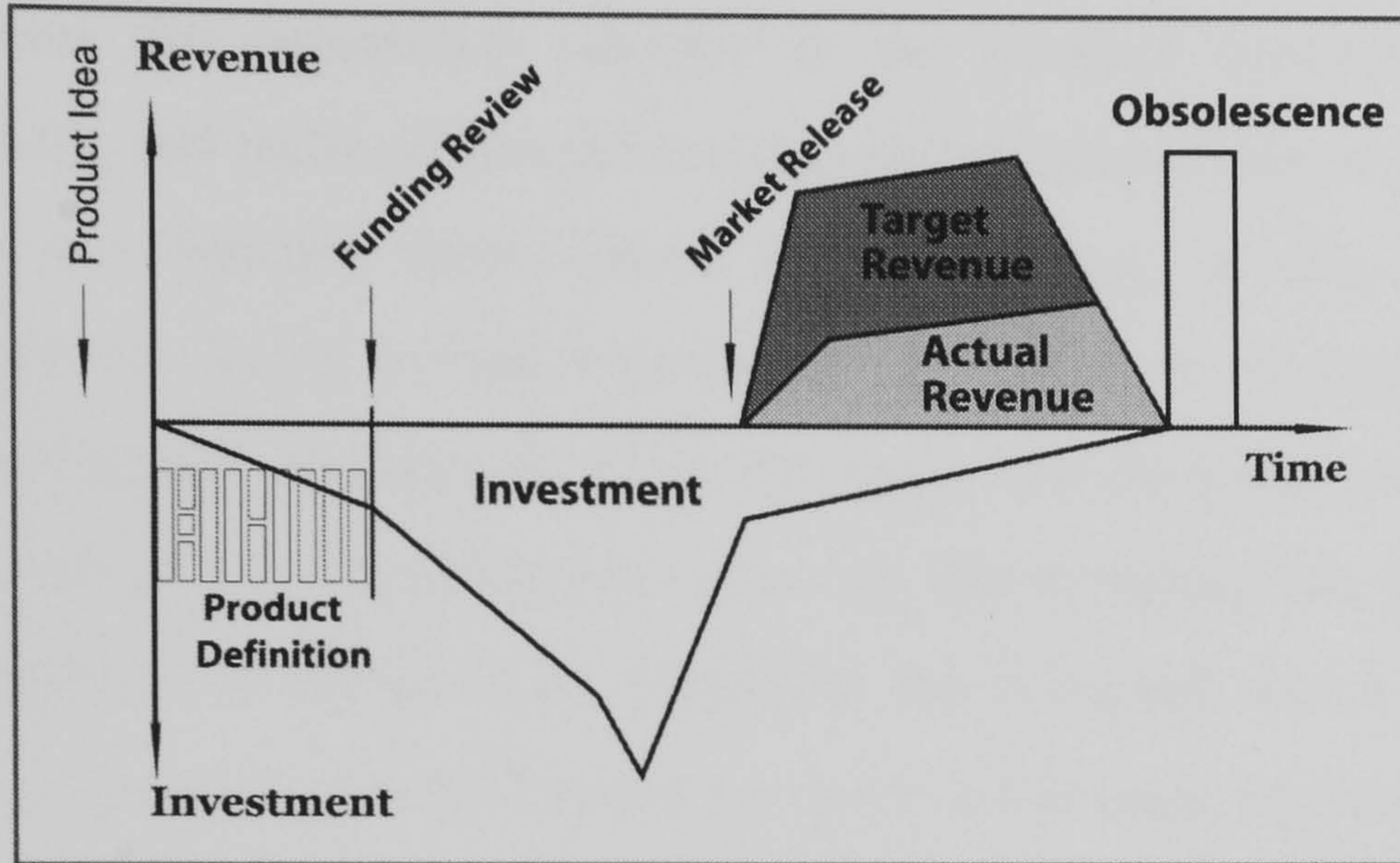


Figure 3.8 Development with Unsolved Problem by Wilson, 1993

Lastly, the product concept phase does not exist. In this case, the project cannot progress to development because too many issues are unresolved. Thus, this project just consumes financial and human resources without producing revenues and profit (Figure 3-9).

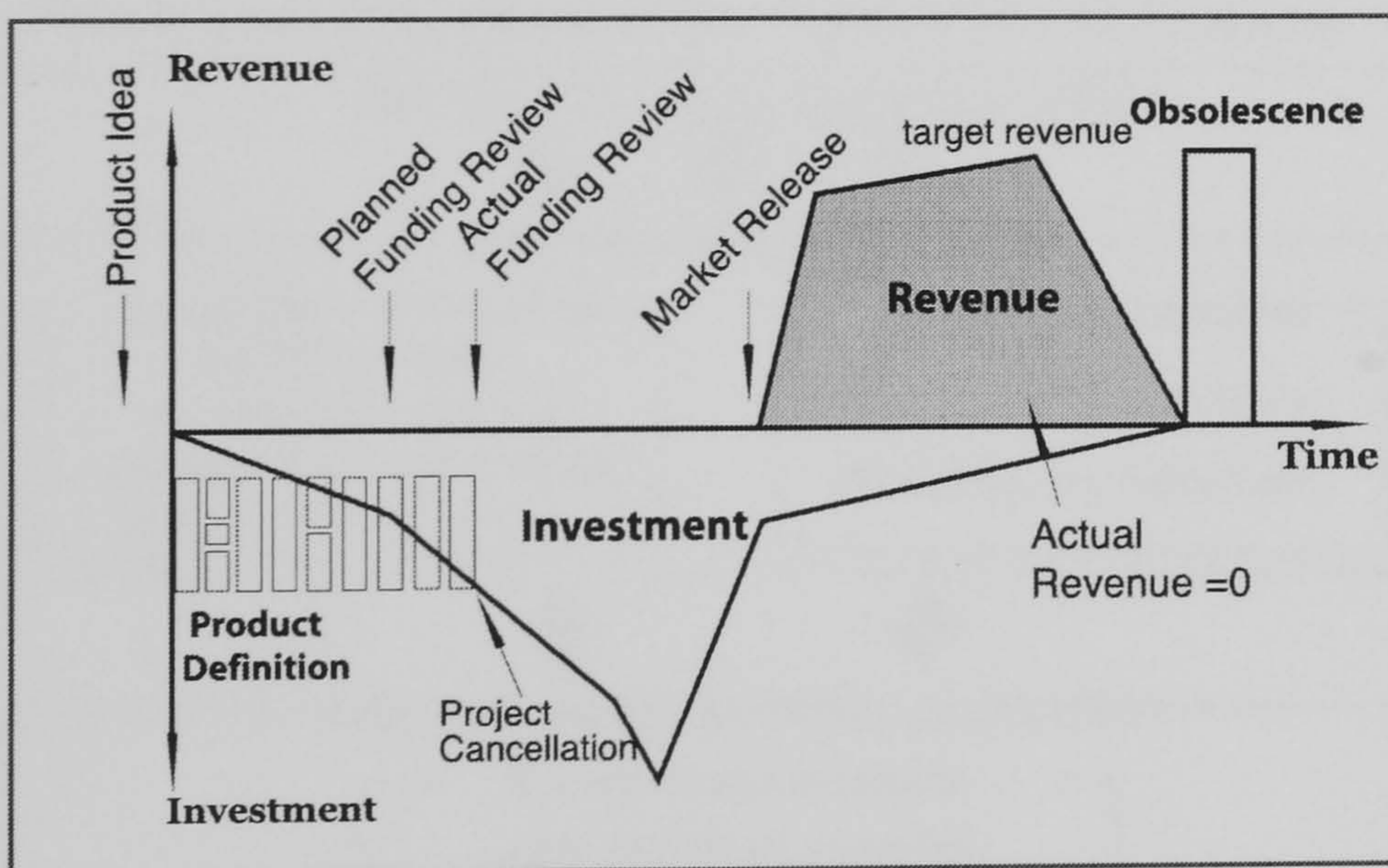


Figure 3.9 Prolonged Product Definition by Wilson, 1993

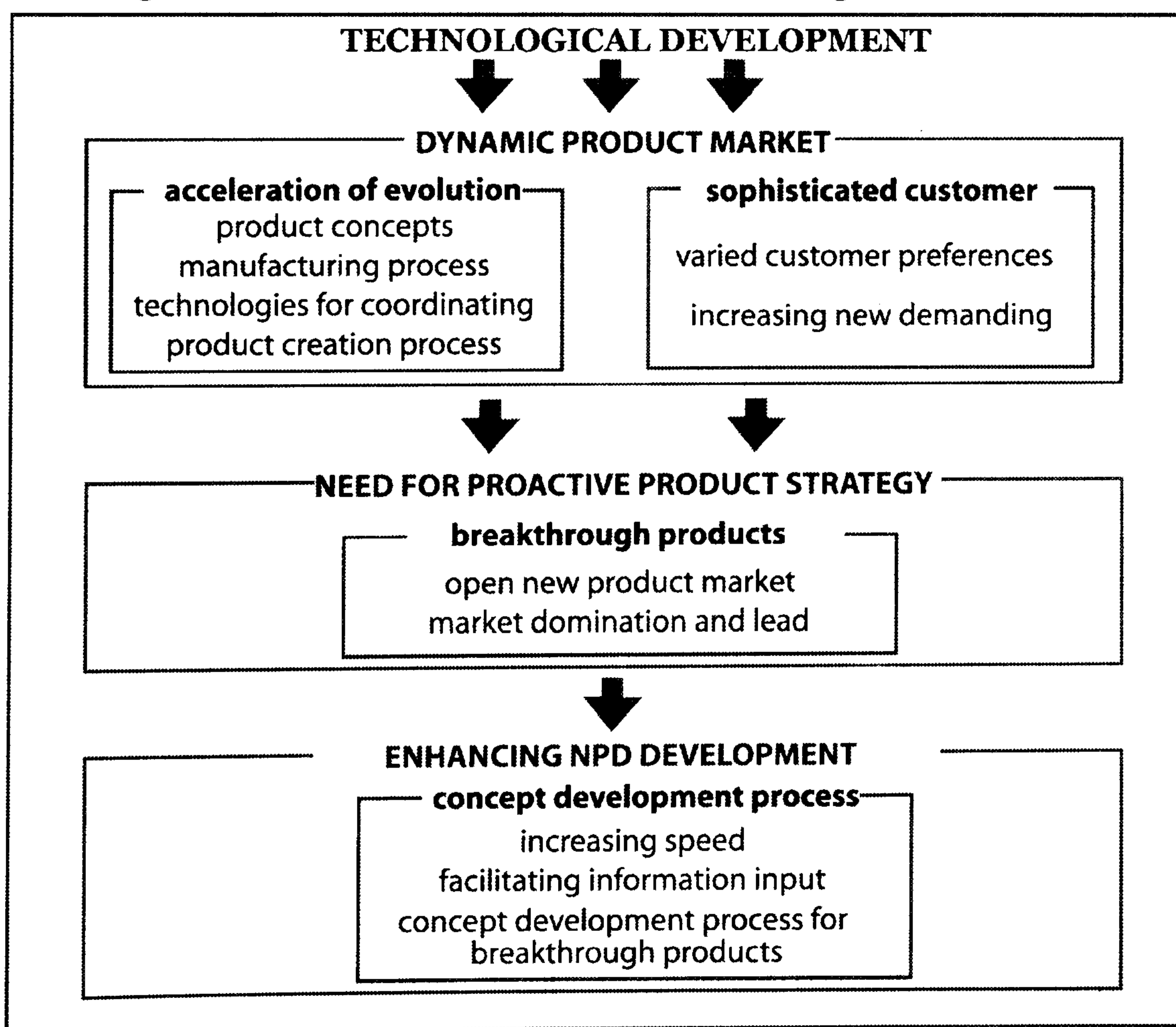
All of these indicates that the critical element in new product development process is product concept development phase and it has to be accurate, complete, and timely in order to improve NPD process (Rosenau,2000).



### 3.9 Conclusion and Hypothesis

From the discussion above it is concluded that NPD is increasing in importance in today's business environment where the rate of change is increasing so that the uncertainty about where the changes are heading is extremely high. As the technological changes accelerate the substantial changes in the product concepts, manufacturing process capabilities, and technologies for coordinating product creation process, customer preferences are also become more varied and demanding. In this dynamic product market, firstly, firms should pursue a proactive new product strategy that focuses on developing breakthrough products to drive the rapid changing market rather than they respond to the market. By launching new products, the company can open new product markets and dominate the market lead. Secondly, the company which takes a proactive stance for the new product strategy should put more efforts into improving NPD process to enhance both the speed of the process and the information input to the process which are considered the important success factors of NPD. Lastly, the concept development stage in NPD process should be taken account of by the developers since the inefficiency in the concept development process causes great time delay and cost increase, and also this stage is where most of information is concentrated and transformed.

Figure 3.10 Illustration of the Concluding Discussion



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## **Chapter4. New Product Concept Development Process**

### **4.1 Introduction**

As discussed in the previous chapter, the concept development process is the critical phase that influences the success of NPD process. Because the new product concept is a description of the product that includes the product definition and specification, it determines the direction and characteristic of the entire product development process. If the concept is poorly defined and does not give clear direction, then time delays by late changes or project cancellation is inevitable so that the project results in less revenue or consuming company's financial and human resources. For this reason, careful consideration should be given to the concept development process in order to optimise the NPD process and reduce the risks associated with the passage of time.

In relation to new product strategy, enhancing the concept development process is also necessary for generating the right concept which fits to the strategy objectives. For a company running a proactive product strategy for creating a new market through breakthrough innovation, the product concepts must be innovative. Because the breakthrough products are often developed without clearly defined customer needs or market segments, and their full range of potential uses may not be apparent to either customers or creators, its success mostly depends on the complementary innovativeness in the product concept and technology which surpasses competitors, the accuracy of the anticipation which envisions future requirements that customers are currently unable to articulate, and the translation of these needs into a new product idea (Rosenberg, 1994; Deszca et al., 1999).

In addition, from a marketing perspective, breakthrough innovations may require new knowledge and analysis of different customers and different needs, and new service capabilities and new distribution and communication channels. This implies that a breakthrough product may also require a new knowledge base, systems, procedures, skills (Abernathy and Clark, 1985; Clark and Fujimoto, 1990, 1991). This tends to push the concept development process for the breakthrough products in the direction of incremental change.

The main objective of this chapter is to build a feasible concept development process model based on reviewing and evaluating the existing models. To achieve this objective, firstly, the existing process models are examined in terms of their structure and the contexts for extracting the essential factors that are required to the formulation of the model. Secondly, tools and methods of the concept generation are reviewed in terms of primary objectives, product types and limitation of use in order to identify suitable tools or methods for breakthrough products

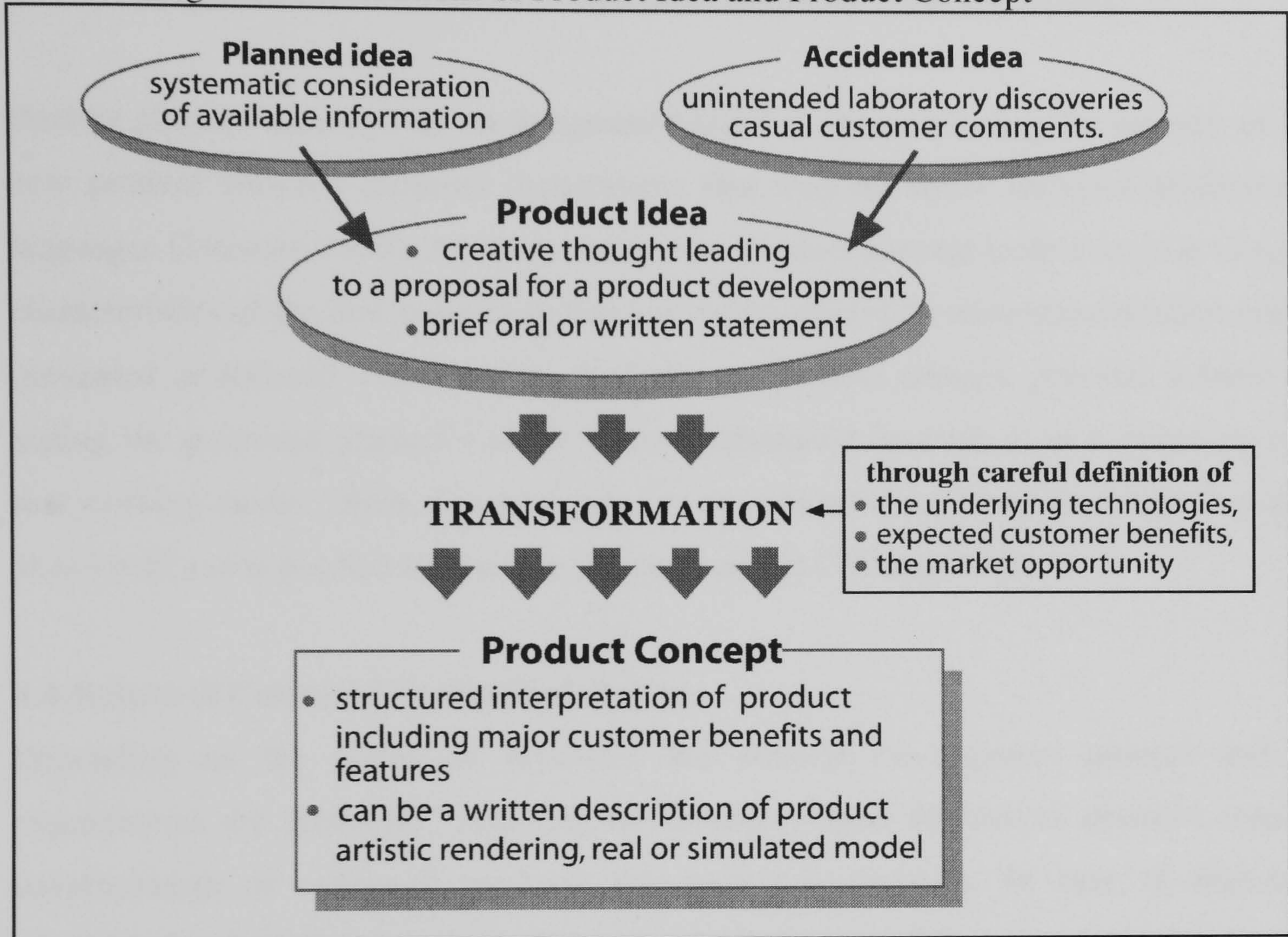
## **4.2 Definitions of New Product Idea and Concept**

To avoid any confusion in the discussion in this chapter, it is necessary to clarify meanings of ‘product idea’ and ‘product concept’. A product idea is a creative thought that leads to a proposal for a product development. It forms a basis for an investigation and a set of starting points for an innovation (Urban and Hauser, 1993). Product ideas usually result from formal idea-generation activities or spontaneous happening. In this point, Wilson, et al. (1996) defined two different types of ideas: “Planned” idea and “Accidental” idea. According to them, planned ideas are generated through a systematic consideration of available information, such as analysing customer suggestions and complaints, investigating potential use of manufacturing by-products, or brainstorming potential ways to customize one of the firm’s existing products. While, “Accidental” ideas may arise from such as unintended laboratory discoveries or casual customer comments. Both types of idea usually can be presented as a brief oral or written statement.

A product concept is a more structured interpretation of a product as it includes the major consumer benefits and features that will define the product and satisfy a market need. ‘Product concept’ is usually transformed from a raw product idea through careful definition of the underlying technologies, identification of expected customer benefits, and assessment of the market opportunity so that it can be understood as the final output of the idea development process (Ahn, 2000). A concept can be a written description of the new product in detail and an artistic rendering, a real or simulated model, or any other representation that facilitates comprehension of the new product. Based on understanding

this it is induced that 'product concept' is a specified form of product idea which is generated from initial idea through a systematic process (Figure 4.1). From this definition it is also defined that the concept development process is synonymous with the idea generation phase.

Figure 4.1 Definitions of Product Idea and Product Concept



### 4.3 Functions of Product Concept

From the aspect of product innovation, there are four important functions of the product concept (Orihata and Watanabe, 2000):

- (1) Integrity: Product concept embodies product requirements such as user expectation, market needs, and company's requirements.
- (2) Innovation initiative function/drive: Creating product concepts is the starting point for product innovation regardless of whether it is talking about a mature industry or a minor product.
- (3) Defining technology development goals: Product concept contains an implicit message about performance expectations, which must be translated into technical requirements. As the requirements are satisfied by the existing technology, the

concept is realised. But if existing technology is not enough to realise the concept, there are needs for a new technology or a technical breakthrough.

- (4) Giving definition to marketing strategies: Product concepts contains market needs that become selling points for the new product. Usually the selling points are strengthened or sharpened through trials before the mass production

Product concept also acts as an integrated basis for communicating the essence of the new product between different departments that may all speak different professional languages (Thomas, 1995). A clearly stated core product concept leads everyone to agree characteristics of the new product so that any delays caused by miscommunication can be prevented or reduced. Furthermore, A clear new product concept provides a basis for testing the proposed product's merits before substantial investment in a prototype or a real working model. Often, financial risk can be reduced if a systematic design that goes ahead with a new product is based on a tested concept (Wilson, 1993).

#### **4.4 Nature of Concept Development Process**

Depending on the nature of products, the concept development process and its requirements are different. There are, for example, some differences between concept developments of consumer products and high-tech products. In case of high-tech products, because the process is often technology-driven rather than market-driven, it is necessary to define and prove the technology before some advances may be perceived as unnecessary or just a novelty. Attempting to incorporate unproven technology into a product increases the chance of failure, or at least may cause unanticipated delays in getting the product to work and to market (Vogel, 1993)

In consumer products, user needs rather than technology may drive the development agenda. Products need to meet consumer's needs in being useful, useable, and desirable at the same time. Product success might be measured both at point of sale and at point of use. Developers have to determine customer's real needs and personal preferences by offering what they want, when they want it, and how they want it. And they also must understand how customers express what they need. However, customers typically are not



good at expressing what they need (Sanders, 1992; Orihata and Watanabe,2000). Their needs may be latent or tacit. They might be able to recognise what they want when confronted with a visual representation. Thus, the concept development process for consumer product should more focused on figuring out the multiplicity of levels of customer needs.

Furthermore, the objectives of the concept development process are also different in terms of new product strategy and the product categories. If the firm's new product strategy takes a reactive stance such as defensive, imitative, or traditional product strategy, the concept development process aims to enhance the existing ideas by knowing the current market and consumer demand (Schnaars, 1994; Jones, 1997). By contrast, for the products in the category of proactive new product strategy, the objective of concept development is to develop original ideas and product concepts which create market needs (Orihata and Watanabe, 2000). The concept development process relies on the latest information concerning technology, market forecast, anticipated customer and consumer behaviour as well as economic indicators (Jones, 1999).

#### **4.5 Concept Development Process Model**

There are several models of concept development process identified through this research work. Through reviewing proposed models, it is possible to understand the mechanism of concept development process and find the factors that are necessary to build a new process model.

##### **4.5.1. Vogel's Concept Development Process Model**

Vogel's model (1993) represents a general concept development process that involves three basic steps-investigation, concept generation, and concept selection.

###### **(1) Investigation and development planning**

The investigation phase aims to identify the problems and reach the definition of the product requirements based on customer needs. To achieve the objectives, the investigation involves fact-finding, review, and confirmation of client-provided information. It also includes identifying the current and likely constraints which affect the

design trade-offs that will be made during design of the product. Careful user analysis and interviews are the important tools here to understand the product setting and the user's likes and dislikes. Because the success of investigation phase depends on the skill of information gathering, the kind of information to be collected should be made clear and it should be comprehensive and detailed. It is also important to specify what levels of quantity and quality of information are required keeping balances between them (Walker, 1993).

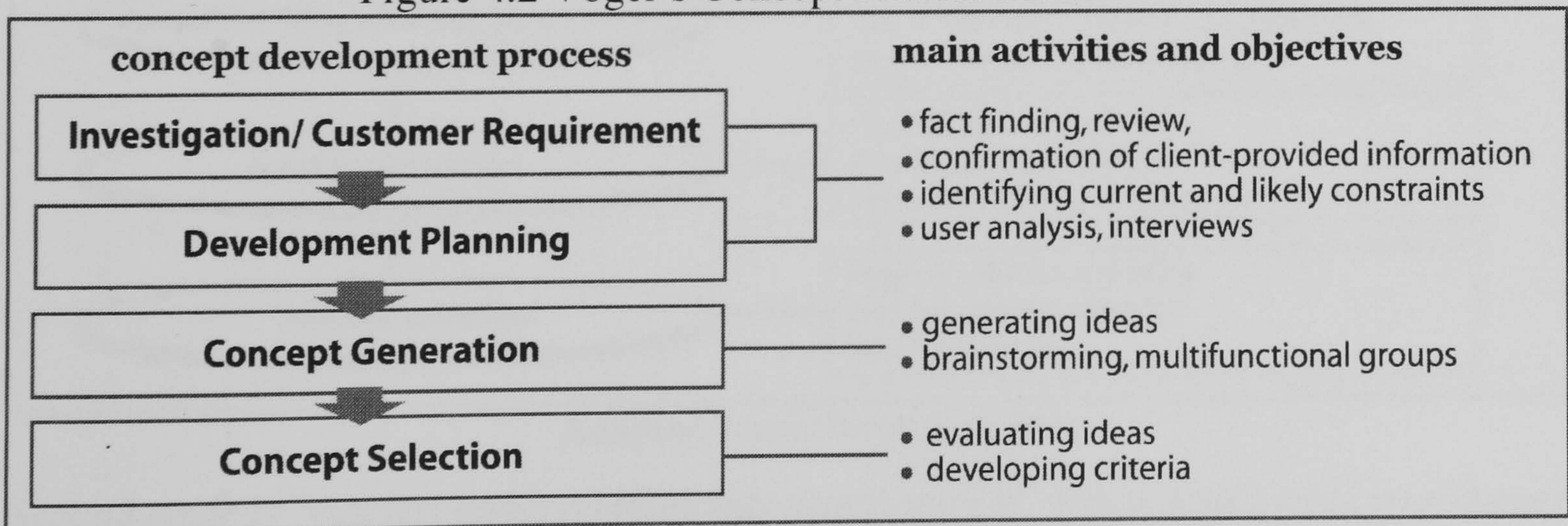
### (2) Concept Generation

The goal in this phase is to generate a large number of ideas without critical judgment. In order to get the broadest range of ideas from many different perspectives, brainstorming and multifunctional groups composed of people from different departments are often used as an idea generation tool. Generating a large number of ideas ensures that the best solutions are considered, and that the developers have a firm grasp on the reasons for the eventual selection.

### (3) Concept Selection

Concept evaluation is conducted to find the best concepts through the criteria that reflect the "must" and "want" requirements identified in the first step. The objectives of the selection phase are (1) to have a timely, efficient, and balanced evaluation of proposed new product concepts; (2) to reject poor concepts before spending significant resources in evaluating them or in actually developing the idea; and (3) to avoid rejecting solid concepts that should actually be pursued. Figure 4-2 illustrates the context of Vogel's concept process model.

Figure 4.2 Vogel's Concept Process Model



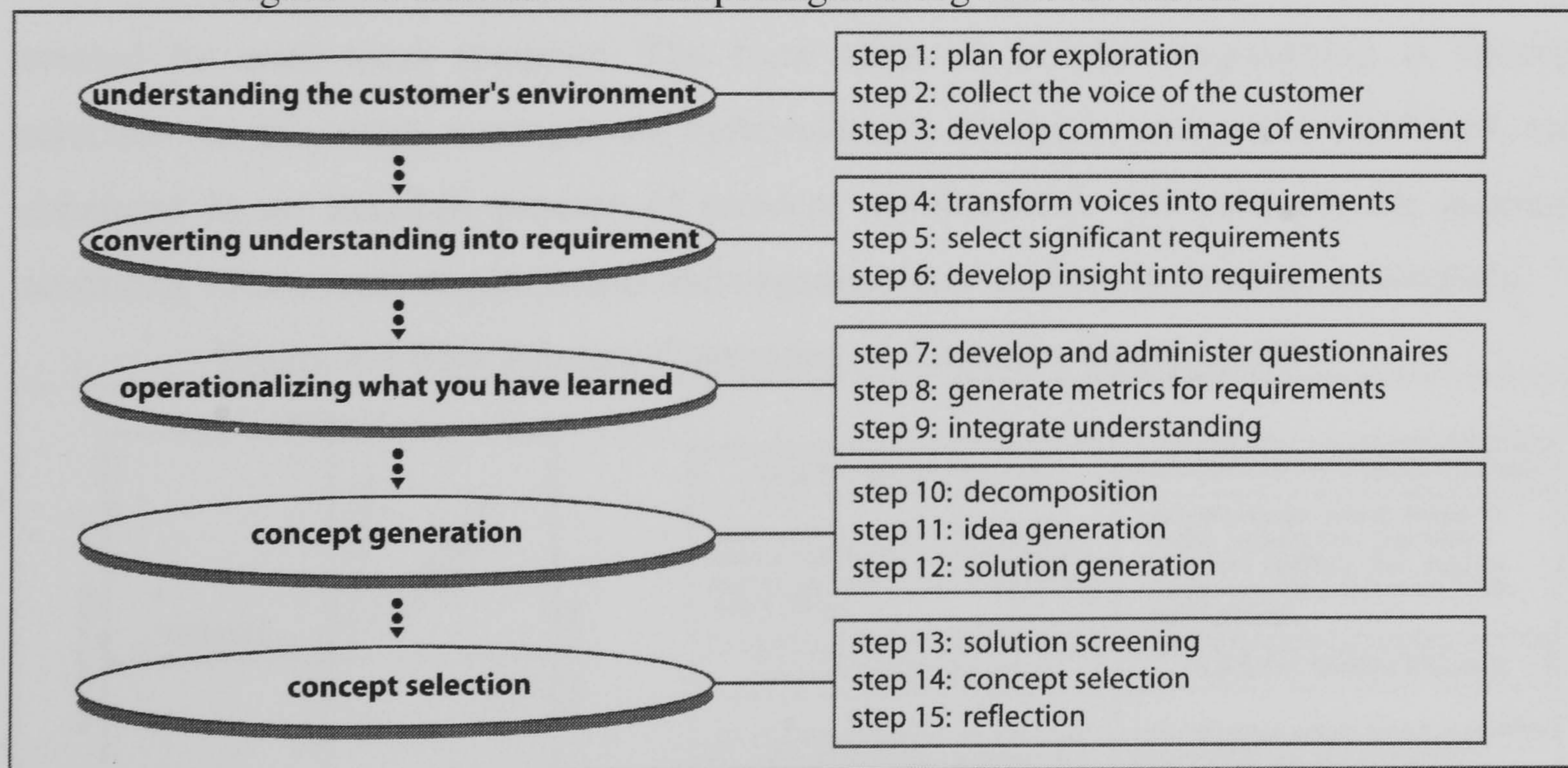
Adapted from Vogel (1993)

#### 4.5.2 Burchill's Concept Engineering Process Model (1993)

This model was developed in relation to reducing product life-cycle costs by using concept design. Its genesis was in the Dr. Shoji Shiba's Total Quality Management decision aids in the context of a quality-deployment case study (1991) and Dr. Deming's concept of operational definitions which define the customer's requirements (1986). Concept Engineering Process Model places emphasis on investigation and information converting phase. The process alternates between the level of thought and the level of experience in a way that allows participants to understand what is important to the customer.

The model has five stages, each with three subsidiary steps (figure 4.3). First stage is "understanding of the customer's environment" which consists of development of plan for the exploration, the actual exploration and development of a contextual anchor. Developing a plan of the exploration is the first step in which the scope of the project is articulated. Appropriate market segments and customer type are also identified in this stage.

Figure 4.3 Burchill's Concept Engineering Process Model

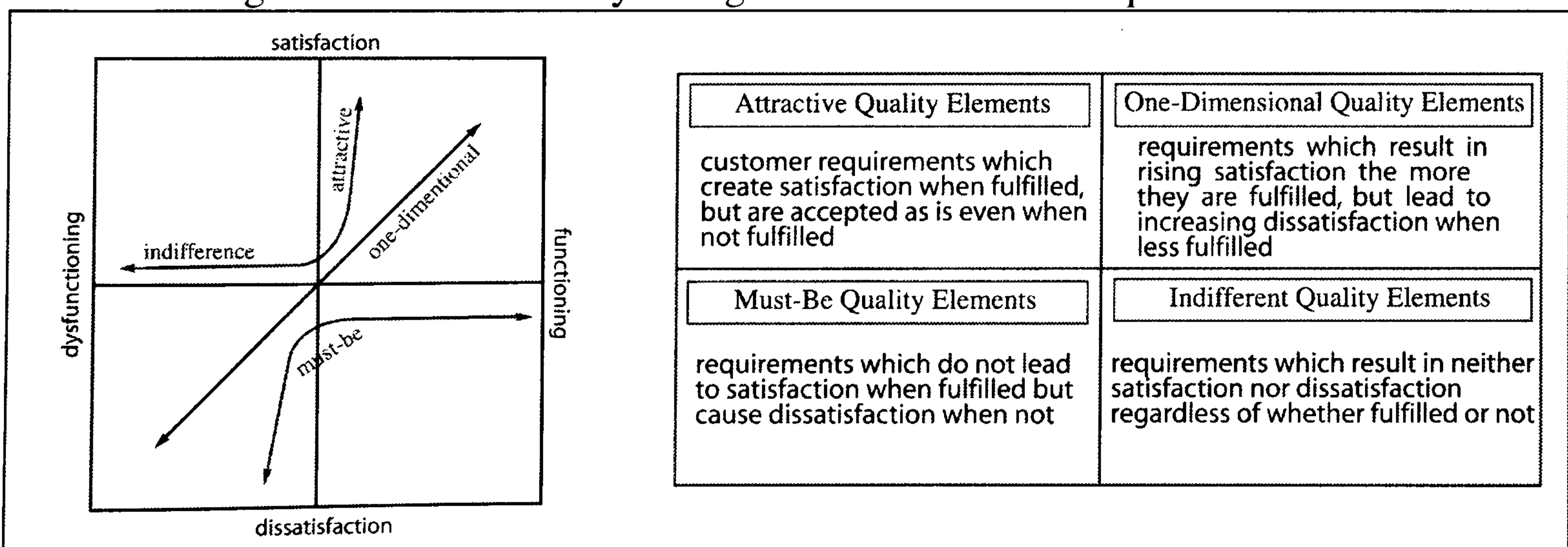


Adapted from Burchill (1993)

Second stage is "convert understanding into requirements" which distils what was learned from the customer exploration into a small set of well-understood, critical customer

requirement statements better suited for use in downstream development activities. After the transformation, the most important requirements are selected with the respective understandings of the opportunity and new insight into the requirements is developed. Third stage is “operationalising” which ensures that the key customer requirements are clearly, concisely, and unambiguously communicated in measurable terms. The key customer requirements are validated with customers and operationally defined in measurable terms, and the resulting information is displayed in such a way that the relationships among requirements, metrics, and customer feedback are easily seen. To assess customer attitudes towards the selected customer requirements, there are two useful tools to be employed in this stage: self-stated importance assessments and Kano’s analysis. The self-stated importance questionnaire is a traditional marketing research technique which indicates the relative importance of requirements as stated by the customer (Hauser, 1992). Kano’s analysis explains the relationship between the fulfilment of a requirement and the satisfaction or dissatisfaction experienced by customer (Kano, et al., 1984) (Figure 4.4). In fourth stage, there is a transition in the development team’s thinking from the “requirement or problem space.” Through individual and group collaboration efforts, a list of ideas is made and systematically the ideas are reviewed and enhanced. This stage concludes with ideal solution concepts created by each team member. The final stage of concept engineering is concept selection. In this stage, concepts are systematically reviewed, compared, combined, and enhanced in an iterative process of concept development. All concepts are assessed according to customer requirements and organizational and environmental constraints.

Figure 4.4 Four Primary Categories of Customer Requirement

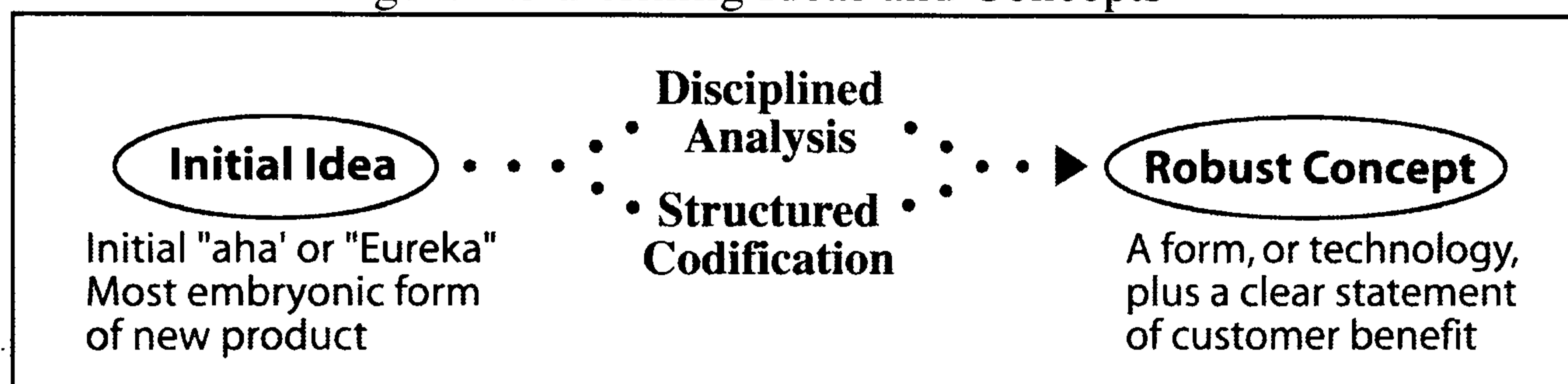


Adapted from Kano, 1984

### 4.5.3 Nortel's Galileo Process

Nortel, one of the world's leading telecommunications equipment manufacturers, developed an idea development process named "Galileo" which leverages the intellectual capital base of the company's employees to (1) help idea generators translate their embryonic ideas into robust concepts and (2) help decision makers systematically evaluate and compare concepts for investment purposes (Montoya-Weiss and O'Driscoll, 2000). The Galileo process mainly involves the capture and subsequent transformation of a new product or service idea into an assessed product or service concept. In this concept development process, an idea is defined as the initial, most embryonic form of a new product or service idea; typically a one-line description accompanied by a high-level technical diagram. On the other hand, a concept is defined as a form, technology, plus a clear statement of customer benefit which are transformed from the initial idea through disciplined analysis and structured codification of that analysis (Figure 4.5).

Figure 4.5 Defining Ideas and Concepts



Adapted from Montoya-Weiss and O'Driscoll (2000)

The four-phased process consists of (1) Idea Qualification, (2) Concept Development, (3) Concept Rating, and (4) Concept Assessment. Because this approach is based on the assumption that the idea generator is the individual who is arguably the most motivated to bring the idea to fruition as a result of his/her vested ownership, the first three phases are completed by the idea generator who wishes to have a new product or service idea evaluated by a decision maker. Thus, it is required of the idea generators to qualify, develop, and rate their ideas using a standard, predefined set of criteria and rating mechanisms. This makes it possible for each product concept to be assessed and directly compared to any or all other ideas that have been through the Galileo process.

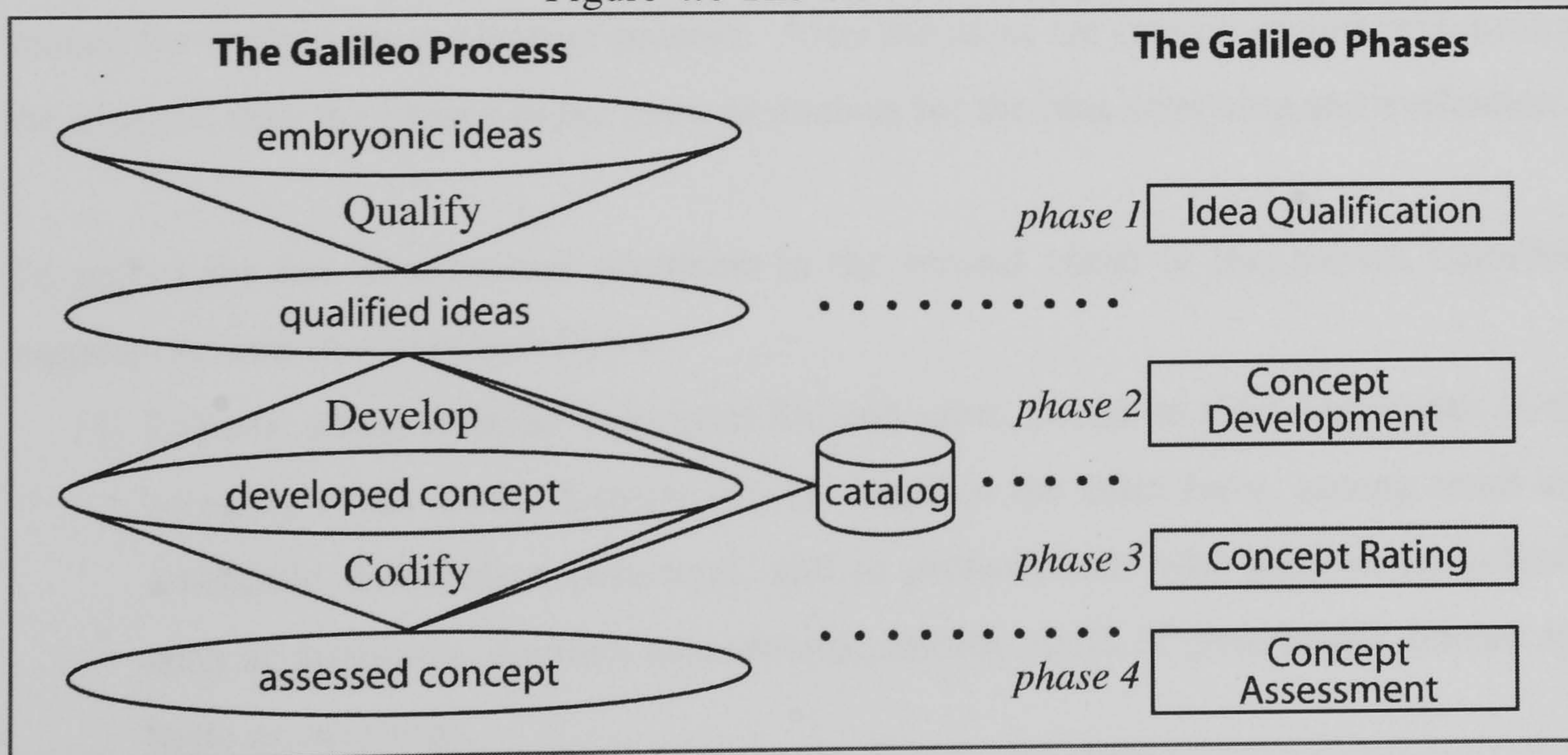
The fourth phase is completed by a decision maker who has the authority to approve further research and development. The idea generators' concept are brought to the decision maker in a standard format so that those concepts are evaluated in a formal, consistent and comprehensive manner. The evaluation work is carried out according to four sets of criteria: marketing, technology, business, and human factors. Table 4.1 shows the key criteria as relevant for front-end idea development and evaluation. Figure 4.6 illustrates the basic structure of the four-phased process.

Table 4.1 Key Criteria for Concept Evaluation

	KEY CRITERIA
<b>MARKETING</b>	<b>assessments of user needs, market trends, market potential, competition, and concept definition</b>
<b>TECHNOLOGY</b>	<b>assessments of technical feasibility, skill set/resource availability, synergy with company's development strategy, and concept novelty</b>
<b>BUSINESS</b>	<b>assessments of size of the opportunity, time to market customer alignment, and strategic alignment</b>
<b>HUMAN FACTOR</b>	<b>human factors resource requirements, usability assessment, productivity enhancements, and interface competitive analysis</b>

Initial Source: Weiss and O'Driscoll (2000)

Figure 4.6 The Galileo Process



Source: Weiss and O'Driscoll (2000)

#### **4.5.4 Crawford's Concept Generation Process Model**

In this model, product concepts are perceived as the solutions for the problem identified through in-depth analysis of market, and the product is a particular form that integrates the solutions for the problem. This process starts with identifying or establishing a team or nucleus for ideation and ends with a pool of new product ideas including vague ideas as to a working model.

There are three elements that need to be considered as the input to this process:

- (1) Form: The physical thing created, or in the case of a service, its is the sequence of steps by which the service is created
- (2) Technology: The source by which the form is attained
- (3) Benefit: The product has value only as it provides some benefit to the customer that the customer sees a need or desire for.

This model aims to create a large number of product concepts regardless of whether those are initial ideas or working prototypes for the purpose of increasing the rate of generating quality ideas which progress toward the next phase of NPD process. To achieve the objective, a team or nucleus is specially organised and involved in the process through both analytical and surprise problem solving activities. This team or nucleus is also trained for leading the evaluation process. After the ideas are created or gathered through the process, they are passed to the team or nucleus for the idea screening and evaluation.

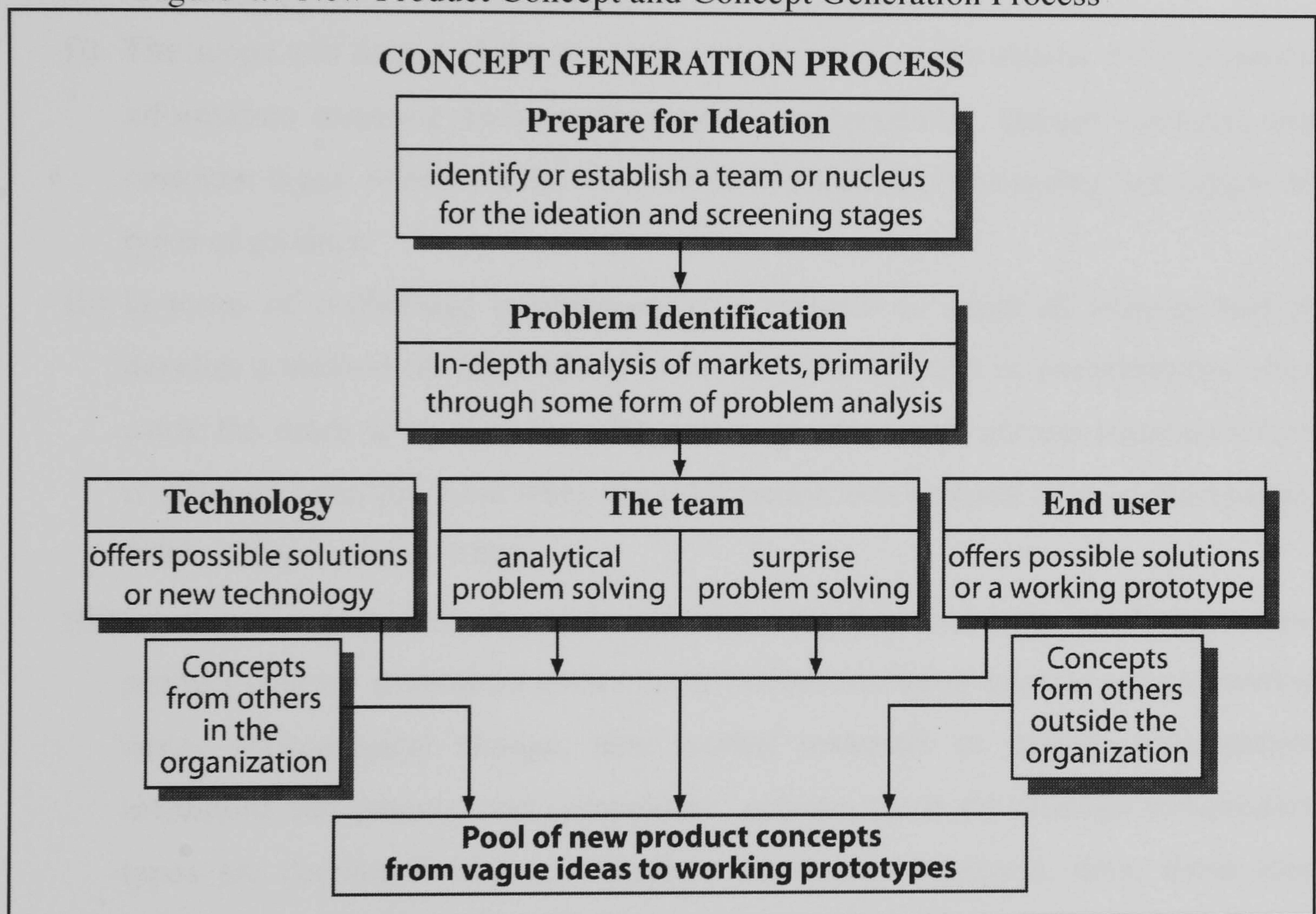
To gather the list of consumer problems in the second phase of this model, Crawford suggests several methods as follows

- (1) Experts: using them as surrogates for end users, based on their experience in the category under study. Experts can be found in the sales force, among retail and wholesale distribution personnel, and in professionals who support an industry such as architects, doctors, accountants, and the staffs of government bureau and trade associations.
- (2) Published sources: industry studies, the firm's own past studies on allied subjects, government reports, investigations by social critics, scientific studies in universities.

- (3) Stakeholder contacts: direct ask to household or business/industry consumers through one-on-one interviews, focus group, observation and role plays
- (4) Scenario analysis: it generates future problems which the end user will have, but does not at this time. Scenario can be developed by both extending the present to see what it will look like in the future, and leaping into the future to pick a period that is then described. Both use current trends to some extent, but the leap method is not constrained by these trends.

Figure 4.7 illustrates the definition of product concept and the concept generation process from the Crawford's model.

Figure 4.7 New Product Concept and Concept Generation Process



Adapted from Crawford (1997)

#### 4.5.5 Implementation

From reviewing the proposed models above, it is identified that there are three major activities and the subsequent requirements that are necessary for structuring a concept development process: information scanning in idea sources, generating concepts, and concept evaluation and selection.



(1) Information Scanning:

As a preparation process of the entire concept development process, this phase should be conducted in three stages: Firstly, concurrent information from product environments should be collected as the facts which indicate the requirements from the each sectors of the product environment. Secondly, the information should be confirmed and converted into requirements. Thirdly, the requirements should be integrated into measurable terms and then structured into a form which shows the relationship among the requirements (Burchill, 1993; Vogel 1993). But there are some elements arising that should be considered in this phase:

- (i) The scope and nature of the development project must be clearly defined before information scanning because the product environments, market segments and customer types, which are the target areas of information scanning, are subject to types of product.
- (ii) In terms of confirming information, it is required to adopt an existing tool or develop a method for the evaluation because the changes in environments often cause the needs to up date the information gathered with current situation which is different from the point when the information was scanned (Fahey, Narayanan, 1985; Ahituv, et al., 1998)
- (iii) Sources of information should be varied for more valued outcome. Input to new product concept generation comes from various initiation sources such as market needs, technological change, new market materials or supply availabilities, inventions and patents, and competitors' actions. Once the strategy and product types are decided in the new product development process, then, those idea sources should be carefully studied to initiate a right investigation for gathering information. However, for the companies pursuing a proactive new product development strategy, it is important to look at all potential idea sources, not just initiation sources, to effectively respond to the different needs of new product concepts (Urban and Hauser, 1993).

(2) Concept generation:

From the definition that ‘product concept’ is a specified form of product idea which is generated from an initial idea through a systematic process (Figure 4.1 and 4.5), it is induced that concept generation phase should be specified from initial idea generation to product concepts generation. At this point, the Galileo Process model has clear definitions for the product idea and product concepts and it has the specified process from initial idea development to concept development (Figure 4.6). While, other concept development models do not have the specified process because the meaning of product concept is not clearly defined and perceived to be the same as that of product idea (figure 4.2 and 4.3).

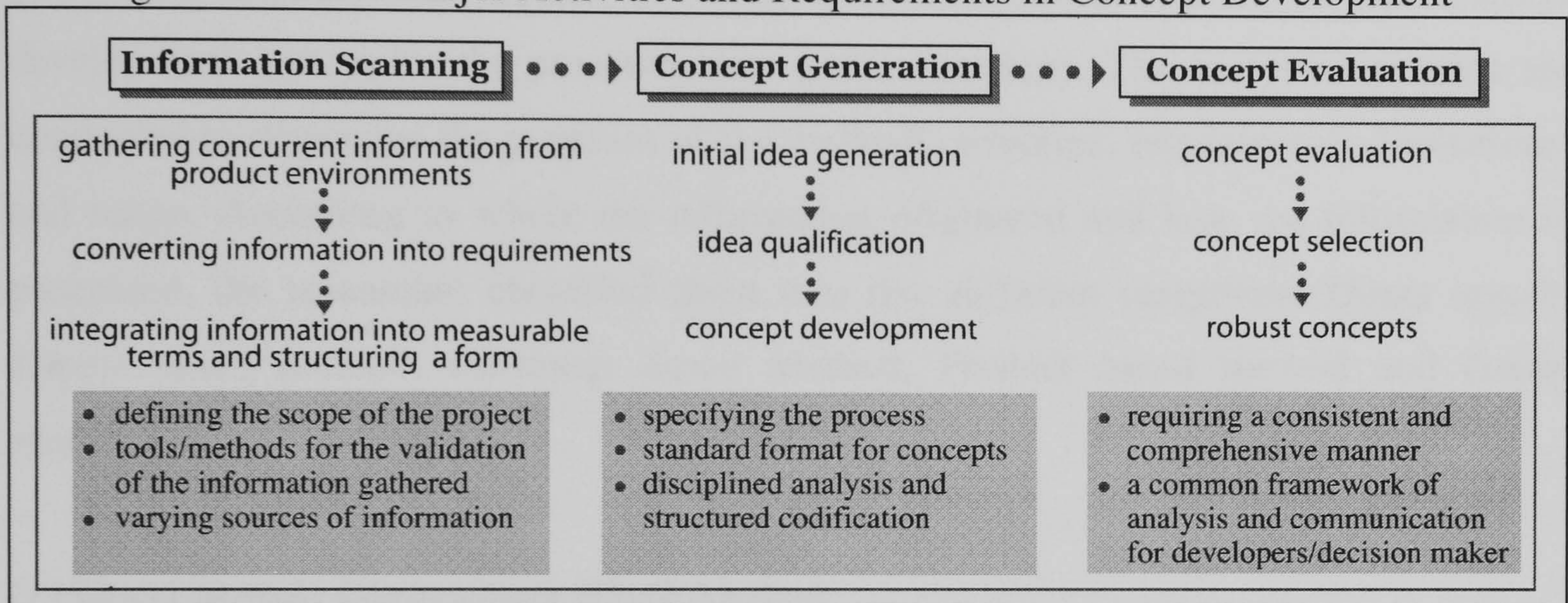
In the Galileo process, there are more chances of getting quality concepts for specifying the process because there is a qualification phase to choose quality initial ideas and the concepts are generated from among those ideas. Crawford’s model (Figure 4.6), in contrast, does not include an evaluation process for the initial ideas. Ideas are generated from various sources and put together regardless of forms of the ideas. This implies that there is no filtering phase to eliminate poor initial ideas so that those ideas pass through to the main selection process. This may require too much extensive concept selection process. And as the forms of the ideas vary from written description to prototype model, this also causes difficulty to evaluate each idea in a formal manner.

(3) Concept evaluation and screening:

Concept evaluation should be conducted in a consistent and comprehensive manner. In the Galileo process model, the idea generators conduct the evaluation at both idea qualification and concept rating phase. After the evaluation ends with a list of qualified concepts, the decision maker is brought into the process to evaluate the concepts and selects a robust concept (Figure 4.6). This allows for more effective and efficient use of decision maker’s time but requires both the idea generators and the decision maker to have a common framework for analysis and communication. If they do not use common measure, it is hard to evaluate all the ideas in a consistent and

comprehensive manner. Therefore, a standard set of criteria and rating mechanisms should be clearly defined and applied to all the concept evaluation works. Because the selection process is only as good as the selection criteria established for concept evaluation, criteria must be firmly established in reality and must accurately reflect a strategic need and requirements identified at the first step of the concept development process. Figure 4.8 illustrates the structures of the prototype model of concept development process figured out from the discussion.

Figure 4.8 Three Major Activities and Requirements in Concept Development



#### 4.6 Method and Tools in the Three Major Activities

In this stage of the discussion, it is necessary to investigate the requirements, methods and tools for the activities identified because methods and tools represent an important way to improve the concept development output and decide the structure and major contents of each phase in the concept development process. Especially, since adopting the right methods and tools affects the developer's decision quality at different stages of the concept development process so that the overall success rate of the new products can be improved (Mahajan et al., 1992; Greenwald et al., 1989).

##### 4.6.1 Information Scanning

Determination of the methods and contents of information scanning is mostly decided by what type of concept development tool is adopted in the process because each type of the concept development tools has different needs for information according to their approaches and mechanisms of generating ideas. For this it is appropriate that the

discussion about the concept development method and tool should be done first. In chapter 5, the researcher discusses this matter in relation with the future visioning process.

#### **4.6.2 Methods and Tools in New Product Concept Generation Phase**

There are several idea generation methods and tools identified through the literature search. By analysing these methods, the expert based method is chosen as the concept generation method and applied to build a new prototype model of the concept development system for the proactive new product strategy. The analytical reviews are conducted to determine the purposes of the methods, structure, requirements, limitations, and usage. According to where the information originated and how the information is processed, the researcher classified them into five different categories: Direct search, Expert based method, Customer based Method, Product based method and Group method.

##### **(1) Direct Search: Environment Based Method**

This method focuses on the environment for the idea sources. Direct search is an effective method for the company that wants to collect basic information or opportunity from external idea sources (Urban and Hauser, 1993). For instance, competitive activities can be monitored by a feedback system which reports a competitor's sales practices, distribution, and new products. Library search, attending a relevant trade show and market observation are the commonly used tools for the direct search. The examples of the feedback reports from LG using this method are shown in Appendix 2

##### **(2) Experts Based Method : Visioning Techniques**

This method generates ideas by examining trend data and predicting some future events based on the outcomes. The efficiency of this method is dependent upon the quality of the social trends forecasting available to the experts involved and the quality of the information used to construct, monitor, and update the future visions (McCracken, 1986). They have the potential to go far beyond the identification and monitoring of customer trends, given proper information collection and management. The flexibility of visioning

models permits the product development team to address any issues it may deem relevant.

There are two techniques identified which fall into this category.

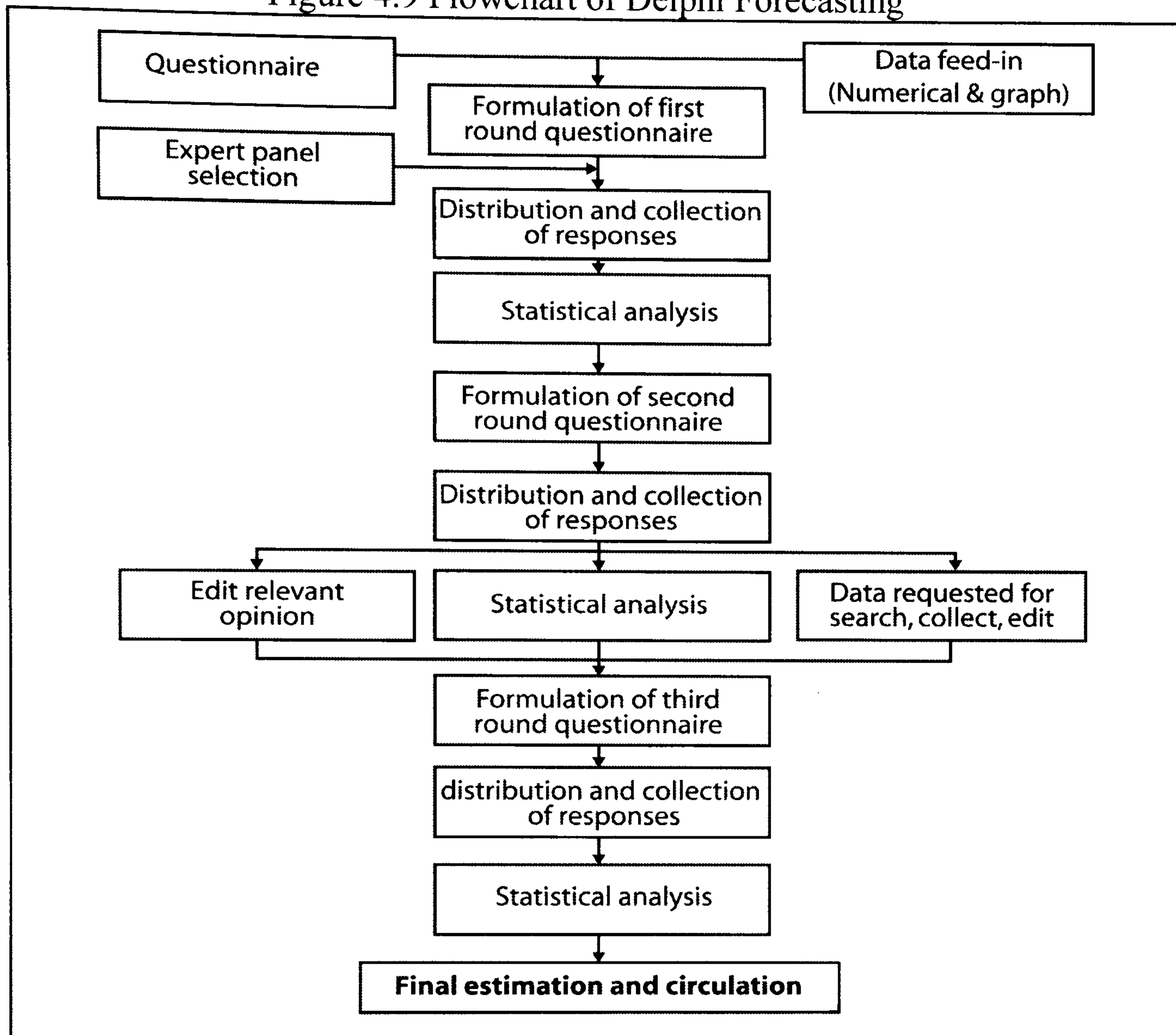
- i. The Delphi technique is a widely used idea generation tool. It incorporates an iterative process (Figure 4.9) designed to query an interest group of experts assembled around specific topics for the purposes of reaching a consensus of opinion on issues related to that topic (Kochtanek and Hein, 1999). The Delphi method and its extensions are based on the assumption that the independent and sequential pooling of the opinions of experts in the relevant field are the best sources of technological and new product sales forecasts. However, it is not a procedure intended to challenge statistical or model-based procedures, against which human judgement is generally shown to be inferior: it is intended for use in judgement and forecasting situations in which pure model-based statistical methods are not practical or possible due to the lack of appropriate historical/economic/technical data, and thus where some form of human judgemental input is necessary (Wright, et al., 1996).

The Delphi technique to long range event generates accurate forecasts of both industry trends and events but some events are interpreted differently by various experts so that it is important to induce all of participants to allocate effort systematically to understand the movements in technology and their implications for new-product idea generation in the same manner in the year of the forecast and in subsequent years.

- ii. Backcasting is a goal-oriented forecasting which uses experts both to develop future visions and to determine the specific requirements for realising those visions (Robinson, 1982). Because backcasting analysis focuses not on what the future is likely to be, but rather, on what future state can be attained and the best means of achieving it, its success depends on the commitment of the firm to

engage in continuous monitoring or scanning of critical environmental factors which emanate the signals from the market and customers (Deszca, et al., 1999).

Figure 4.9 Flowchart of Delphi Forecasting



Adapted from Basu and Schoeder (1977)

### (3) Customer Based Method

Customers' opinion and ideas are used as the major sources for concept generation in this method. Customers are involved to the concept development process through a certain form of in-depth interviews or discussions.

- (i) Leader User Analysis is a tool for assessing future needs for products that are novel, or for product categories characterized by rapid change (Urban and von Hippel, 1988). It derives data from lead users whose present strong needs will become general in marketplace months or years in the future in relation with their real-life experience with novel attributes and product concepts of commercial interest. Lead users are familiar with conditions that lie in the future for most

other users, and often attempt to fill the need they experience, they can serve as a needs-forecasting laboratory providing valuable new product concepts to inquiring manufacturers (Deszca, et al., 1999). However, there is a major drawback of lead user analysis. Because lead users often have needs that significantly differ from those of later adopters, it may fail to identify untapped opportunities or the unarticulated needs of potential mainstream customers (Moore, 1991). Thus, lead user analysis requires additional market feedback from alternatively defined sets of potential customers to complement it (Lynn et al, 1996)

(ii) Focus Groups (Calder,1977); The purpose of focus groups discussion is to generate concepts through customers' opinions, semantic structure, usage patterns, attitudes, and buying processes. This method usually involves 6 to 10 customers engaged in an open and in-depth discussion about a new product with which they are familiar. The discussion begins with each person making comments on how they use or when they last bought the product under discussion. The results are used in understanding consumers' opinions about the new product and its usage situations. This information then can be used for new product concept development as long as the environment and consumer perceptions remain stable. Focus group method allows an early contact with users providing an in-depth feeling for the products in the target market, and incorporates the voice of the consumers into the development of new product at less cost and time than other techniques (Crawford, 1997). To help guarantee the usefulness of focus group findings there must be a high quality articulation of the moderator to avoid too much influence from certain group members who are talkative and forceful (Moor, et al., 1993). This method is used most commonly in all new product development processes for consumer products (Urban and Hauser 1993).

(iii) Quality Functional Deployment (QFD): QFD, originated in Mitsubishi's Kobe shipyard in the early 1970s (Prasad, 1998), is designed to help the NPD project

team to identify and interpret the needs and wants of customers. The aim is to establish the importance of product attributes and transform them into technical requirements (Nijssen and Frambach, 2000). It intends to force integration of customer needs, responsive product design, manufacturing quality control, and service. By this method, customers are firstly asked to define “quality” in their terms, then these requirements are transformed into a detailed engineering specification through an “integrated design” effort that evaluates alternative product designs and production processes simultaneously (Urban and Hauser, 1993). This method is usually used by a start-up company which cannot evaluate its own product because it has no prior product in the market. New ideas are derived from applying QFD to identify shortcomings of a number of competitive products.

#### (4) Product Based Method

There are three concept generation tools as a way of force-generating concepts which reduce the concept design problem to its core elements and analyse different aspects of the concept design problem: task analysis, product function analysis, and lifecycle analysis (Baxter, 1995). Based on the analysis, these methods generate many possible solutions. These methods are often used for generating ideas for platform products and derivative products which are developed from fundamental improvements or modification in cost, quality, feature and general performances over previous generations or existing products (Wilson, et al., 1996).

- i. Task Analysis: which analyses the interaction between the product and the product user by observation and generates new product concept by using the results. Experience of how customers use products stimulates concept generation to improve the user interface and to adopt the subsequent application of ergonomic or anthropometric design methods.
- ii. Product function analysis: which analyses the functions of the product as perceived by the user and reveals radical innovations or incremental innovation according to level of order functions. This analysis starts with brainstorming through which the functions of the product as perceived by the user are identified.



After the prime function of the product is selected among the identified functions, basic functions and subsidiary functions are arranged in a systematic order. The lowest order functions relate directly to single features or components of the product. And then, by exploring how each function could be achieved differently from a present product, new concepts are generated.

- iii. Life cycle analysis: it is a broader analytical technique for exploring opportunities for refining and improving the design of products. This analysis has three main steps, firstly, the product life cycle is described containing the inputs, transformations and outputs for every stage. Secondly, establishing the basic purpose of each step in the life cycle and attributing measures of costs and value to it. Lastly, opportunities are identified for improvement, either environmental improvement or general improvements in the product's design.

(5 ) Group methods:

- i. Brainstorming (Osborn,1963) is a systematic creative group session that is widely used to generate ideas without being constrained by the applicability of the idea (Satzinger, Gafield, and Nagasundaram, 1999).This technique is performed by individual's acting alone or by groups of people. Group brainstorming provides a forum for group members to generate ideas and allows for each participant's ideas to be a stimulus for others (Nagasundarom, and Dennis, 1993). Depending on the purpose or subjects of the projects, outcomes of this technique session are different.
- ii. Synectics is a group session in which the original problem is converted into a much wider problem or analogy. For this alternative problem solutions are generated. At a later stage these solutions are transformed back into solutions for the original problem. It is based on four simple concepts (Gordon, 1961). Firstly, the group session participants must listen to other participant's idea with full attention so that the discussion group considers an idea completely without unproductive shifting among ideas. Secondly, the group must build on good points of ideas while overcoming any bad points. Then explicit effort is expended in overcoming concerns and making the idea acceptable. Thirdly, the group must

work simultaneously on what appears to be the same problem. The group then works with the leader and the client to achieve a working definition and common understanding that is used to address the problem of creating a new product idea. Finally, the leader should encourage participants to reach an effective group process as the facilitator and scribe.

From the methods reviewed above, expert based method is the most appropriate idea generation method which fits to the nature of the proactive product strategy in that it generates an informed vision of future events and then extracts embryonic future needs of customers from it (Deszca, et al, 1999). Comparing it with other methods, the outcome ideas from expert based method are superior in uniqueness and future orientation (Kouzes et al., 1996), because the future needs of customers are the ones that the end users will have, but do not at this time. In customer based method, in contrast, the outcome concepts are the ones which have already resided in customers' minds; just those that have not been articulated, and the concepts are likely to be told to competitors and anyone else who will listen (Crawford, 1997). For this reason a future visioning technique should be considered as concept development method for proactive new product strategy.

Table 4.2 Summary of New Product Concept Generation Tools

	tools	information source	form of outcomes	product type	limitation requirements
<b>Direct Search</b>	library search trade show search market observation	environment industry reports secondary data documents	feed back report	any products	heavily depending on individual's information scanning skill
<b>Expert Based Methods</b> Visioning Techniques	Delphi technique	experts	future views	new to the market	requires a consistent manner of interpreting events quality of the social trend forecasting of the experts
	backcasting		future views and list of requirements		
<b>Customer Based</b>	leader user analysis	customers	a list of ideas	new to the market	hard to define the leader user
	focus group			any new product	needs quality skill and articulation of moderator
	quality function development			derivative products	require a specialist to reduce miscommunication between design stages and functions
<b>Analysis Based</b>	task analysis	product/user	a list of ideas	platform products & derivative products	requires use of intuition, imagination and logic to come up with creative solutions to the problem
	function analysis	customers	a list of functions		
	life cycle analysis	products	opportunities for improvements		
<b>Group Method</b>	brainstorming	customer or developer	a list of ideas	any products	require a high quality of facilitating group to encourage effective group functioning
	synectics	customer and developer	a list of ideas	any products	

In terms of generation of future vision, there are some other future visioning techniques identified by the supplementary search.

- i. Trend extrapolation: this technique produces a future vision by extending historical and present patterns and behaviour. Because its' future vision is built up on analysis and projection of trends which may not continue, it is risky to adopt for an important decision making in business and marketing (Shuman, 1989).
  
- ii. Cross-Impact Matrix Analysis: this method is developed on the fact that an event has multiple causes and both intended and unintended effects. It is used for investigating any relationship among the events which have control on the determination of the futures of organisation such as consumer response to corporate marketing efforts, competitive price changes, and government regulatory activities (Millett, 1998). In implementing the technique one has to obtain data from a range of sources including employees, shareholders, directors, customers, competitors, the market and many others. The procedure involves assessing the impact that changes or trends in these factors is likely to have on present, proposed or potential activities of the organisation. Anything that threatens the prosperity of the organisation is viewed as having negative effect on the establishment, while opportunities are reasoned to have positive effects (Proctor, 2000).  

Cross-Impact Matrix Analysis quantitatively estimates the impact of each variable of interest on each other variable through a mathematical model relating the variables, such as an input-output model, a sequence-dependent model (decision tree) or a dynamic model. It is also combined with the Delphi method to ask knowledge people to provide subjective estimates of the relationships among the variables, usually in the form of a matrix of conditional probabilities (Blanning and Reinig, 1999). There is a catch in this method in that not all ramifications of an action can be foreseen, especially in the long-range area. This creates an imperfect picture of tomorrow, which is chronic but inevitable (Shuman, 1989)
  
- iii. Decision trees: it is a pictorial representation of the potential results of alternative approaches to crucial decisions. It develops trunk and both main and subsidiary branches which represent decisions in time. Each branch has both branching

possibilities and potential chances of getting trimmed off by the developer. Branches in the greatest distance from the ground represent events farthest into the future, while those closest to the ground are those which have just taken place or are just about to. Alternatively, branches to the right of the trunk may represent future events, while events which predate the present may be shown to the left. The bottoms of the trunk represents the original intent of the person acting, while upward movement depicts development of events. They are intended for deriving alternative short-range futures in a specific field of society.

- iv. Scenarios; they are projections of a potential future which are developed on combinations of what might happen and assumptions about what could happen (Fahey et al., 1998). Scenarios are not intended to prove that what is projected will take place. They are means of bounding uncertainty and of understanding the dynamics of forces which generate the future by their interaction. These scenarios are methodically researched and developed in sets of three, four, or more so that managers or organisations can study how their decisions or organisations would fare in each future in the set.

Among these future visioning techniques identified above, scenarios are widely adopted by companies and organisations as the method of generating future vision (Meadows et al., 1996; Ringland 1998). By explaining what possible futures might look like, how these futures might come about and why they might occur, scenarios are usually used to help managers to formulate vision. Specially they permit readers to recognise the future possibilities and consequences of today's action, understand the interaction of environmental factors, and consider alternative possible outcomes of real past and present events as well as those contemplated for the future (Shuman, 1989) so that, unlike other methods such as the Delphi technique, trend extrapolation and cross-impact matrix which hardly foresee the ramifications of an action or environmental changes, scenarios systematically tackle the uncertainties in the long term future (van der Heijden, 1996; Ringland 1998).

However, present models of scenarios have been developed for different purposes and usages in different contents so that it is inappropriate to adopt the whole system of scenario planning tools for concept development of which the purpose and nature are not same. For this reason, scenarios are adopted by the researcher just as the instructive models from which the essential structure and process of future visioning are derived.

From the reviews of all the tools and methods above, in addition, it is shown that both tools and methods are not independently used for one purpose. They are often blended into other methods or combined with each other according to the conditions and nature of the projects. Thus, the researcher does not exclude any possibilities of combining tools and methods or borrowing some factors from other methods and tools reviewed for building a future visioning process. In chapter 4, the development procedure contents of the future visioning tool is explained in detail.

#### **4.6.3 Concept Selection Method and Requirements**

After number of concepts are generated, a selection process is required to find the best concept or concepts. Because the selection process is only as good as the evaluation criteria, it is important to establish firm criteria in reality (Ulrich et al, 1991; Vogel, 1993). Sharing this content, Kotler(1988) recommends a series of criteria for selection of the new product concept:

- Communicability and believability; Benefits of concept should be clear and believable.
- The need level; concept should be as solving problem or filling a need, the stronger the need, the higher the expected consumer interest.
- The gap level between the new product idea and existing products; the greater the gap, the higher the expected consumer interest.
- Perceived value; the higher the perceived value, the higher the expected consumer interest.
- Purchase intent
- User targets and purchase frequency

Hollins (1996) approaches the concept evaluation criteria from the design aspect, and suggest “concept assessment matrix” which has the criteria that are important at various stages of the design process and are closely related to the market requirements of the product or service. It consists of five stages of evaluation.

1. Safety level; eliminating any concepts which do not meet safety regulations or appear to be dangerous right at the start of the system of assessment.
2. Strategy level; all or any concept which cannot meet or fulfil company requirements and other constraints defined at an earlier stage of concept development should be discarded.
3. Market level; in this stage the remaining concepts are considered on a relatively superficial level with each other against a particular criteria and placed in order of those best meeting the criteria. According to company’s market other identified additional important criteria should be added
4. Combination level; identifying the concept most likely to be a market success and including in it all the superior features of all the other concepts considered.
5. Specification level; the chosen concept is re-evaluated against the requirements of the design specification. It need only be considered against the “needs” rather than the “wants” of the specification.

This matrix gives advantage in that it omits most concepts that will have resulted from the various design methods. However, the selection process itself should be relatively simple and criteria should be set according to a company’s own unique needs and the purpose of the product development. Wilson et al, (1996), suggest three tests as the evaluation criteria to enhance this process in terms of simplicity: market test, the significant-point-of-difference test, and the ability to meet the key challenges test. Firstly, concepts are tested against the fundamental question that asks whether there are actually any customers willing to pay to obtain and use the proposed product. Secondly, the concepts are evaluated over against whether the proposed product provides distinctive customer benefits relative to its competition. Lastly, the concepts should be assessed by the key challenges related to developing, marketing, and using that product. Potential barriers to success are also used for concept evaluation.

The purpose of concept selection is to find the best idea which is good enough to proceed to the next phases of the development process and to commit the company to additional investment in the concept. After the initial selection process is done with the remaining concepts, it is necessary to test them to decide which can be approved to proceed. Thus, concept testing is necessary in the selection process as the last step of concept development. Concept-testing methods identified during this investigation follow:

**Analogies** assess the proposed concepts over the historical data of similar products (Ozer, 1999) Based on the assumption that the environment remains stable, this method predicts the performance of a new product in terms of awareness, trial, repeat purchase, and market share. Analogies also help companies determine the approximate marketing effort required to achieve a similar level of performance (Wind, 1981). While this method is effectively used for modelling the relationship between two contingent products such as consumer goods (computer and software) and business-to-business products (supermarket scanners), it is not used for some type of products such as “new-to-the-world” products because there is no other similar model in the market to compare (Tversky, 1977; Bayus, 1987; Bucklin and Sengupta, 1993).

**Expert’s Opinion** is one of the widely adopted methods which can be used to evaluate concepts by predicting whether various events are likely or unlikely to affect demand for the product (Michel, 1992; Chang, 1993; Goldfisher, 1993). However, this method can be effectively used only when the environment is stable and it tends to be inaccurate in predicting a competitor’s price retaliation because expert’s opinions are subject to such biases as optimism, conservatism, anchoring, and an emphasis on easily available data (Armstrong, et al., 1987; Armstrong, 1986). Another limitation for this technique is how to get the experts to contribute. Some individuals’ decision to join or not to join may be influenced by the presence of other experts. Because the process of this method and its outcomes mostly depends on participation of the targeted group and their expertise and knowledge, it is important to find an efficient way to bring them together (Kochtanek and Hein, 1999; Rowe and Wright, 1999). Internet search, online bibliographic databases,

publication search, conferences and organisation searches are generally used for identifying experts.

**Intentions:** this method evaluates a new product concept by generating the prediction of potential customers' trial or repeat purchase of a new product. While this method is widely used for durable and nondurable products and for services products, it is rarely used for "new-to-the-world" products because its reliability depends on the assumptions that there are no changes in concept, environment, and positioning between the first exposure and product introduction (Morwitz, et al., 1993) and the respondents may lack knowledge to make reliable judgments (Shocker and Hall, 1986).

**Information acceleration:** this method is a special case of scenario analysis which provides robust electronic representations of the product without prototyping to the respondents in relation with infrastructure, context, and economic or regulatory aspects of the future environment. The respondents think about the product given through a multimedia computer simulation and evaluate. As a result, many variations of the product concept can be tested, relatively inexpensively. The information can be gathered from an online TV commercial, newspaper advertisement, and a video showing other people's opinions about the product. Using this information a discrete choice among several alternatives is made (Urban, et al, 1997). This method also accelerates product development learning, shortens cycle time, and reduces the risks by facilitating the quantification of the value of each technological development and feature (Deszca, et al, 1999). To run this method, developers should put further efforts into learning the software, hardware and programming required.

**Focus Group:** for the concept evaluation, this method generates the evaluation criteria from customers' point of view about new products. The proposed concepts are then assessed against these criteria. The procedure to generate customer's opinions is the same as it is in concept generation phase. An open discussion or in-depth discussion involving 6 to 10 users are lead by a moderator who facilitates a nondirective and free-flowing



discussion. Quality of its result also depends mostly on the skills and articulation of the moderator.

**Scenarios:** this method is also used for concept testing purposes as well as concept generation. The proposed concepts are evaluated over the projected future vision and conditions. In the event that the concepts are developed through scenarios, the future vision and conditions that are projected for the concept generation are used again as the evaluation criteria.

#### **4.7 Conclusion and Implementation**

The concept development activities, referred to as the “fuzzy front end” of new product development, are effective in separating successful and unsuccessful new products (Cooper, 1996) because they typically involve ill-defined processes and decisions which cause time delays and cost increases (Cooper and Kleindshmidt, 1986). It is noted from the reviews of current concept development models that the concept development process usually consists of three distinctive stages of activities: information scanning, concept development and concept selection.

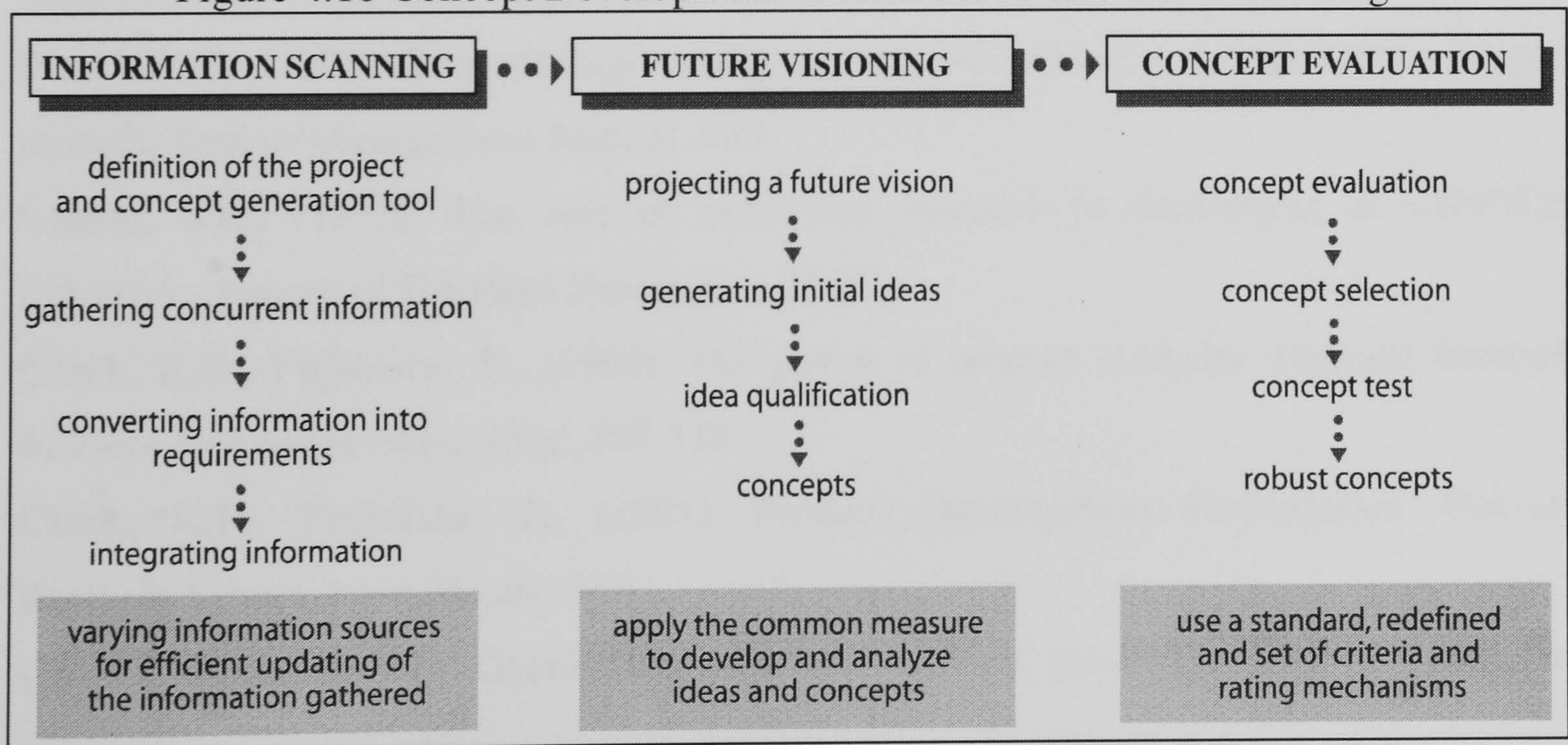
Considering the fact that the outcomes of concept development are influenced by the input information (Snoek and Hekkert, 1996), the information scanning as an information preparation phase, should receive as much attention as the concept generation itself. But because determination on the structure, contents and major targets of the scanning are all done according to the nature of the project and type of the concept generation tool, the information scanning should be started with the clear definition of the project and concept generation tool. Varying information sources are also an important matter to consider in information scanning in terms of the confirmation of the gathered information. Information from various sources let the developers detect the changes in product environment more effectively so that the information can be updated and confirmed.

As a company carries out new product concepts development many times, it gets more experienced at the management of the development process, but at the same time it will realise that a need for specific routines and instruments to facilitate the processes and

evaluate the outcomes in systematic and simple way, is increased. Tools and methods help satisfy this need and help to reduce the uncertainty involved in developing new concepts effectively (Griffin and Page, 1993). Considering the objective, product type, environment, and time frame as the criteria of the method selection (Ozar, 1999), a future visioning technique is an appropriate method for the proactive new product strategy and breakthrough products. To facilitate the future visioning technique as the concept generation method, it is necessary to develop its own contents and procedure. Therefore, using scenario planning models as the role model is brought into the consideration for developing future visioning structure because of its popularity in usage and systematic approaches to the future.

To fortify the concept evaluation process and reach better selection of concepts, firm criteria should be predefined and applied onto the entire concept development process as the common measure for all the ideas and concepts. This helps the developers to generate qualified ideas and concepts and to bring them to the final selection phase in a consistent and comprehensive manner because common measures for analysis of the ideas and concepts helps the developers and the final decision maker communicate so that the developers can avoid developing any ideas and concepts which do not reach the requirements of the decision maker. Figure 4.10 illustrates the concept development process and the requirements based on future visioning technique.

Figure 4.10 Concept Development Process based on Future Visioning



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## **Chapter 5 Environmental Information and a Model of Future Visioning**

### **5.1 Introduction**

In this chapter the researcher demonstrates the formulation of the prototype model of future visioning. This chapter firstly explains the attitude about the future that should be prerequisite to future visioning, and discuss as how the influent optimism approach to the future is linked to the strategic posture that is required by the company in the competitive market. This chapter then compares the future visioning models that had been developed by the practitioners and academics to find out the essential factors that are adopted for structuring the prototype model of future visioning. Next, it is discussed how the scenario planning can get involved as the future vision test tool in the prototype model of future visioning. All the scenario planning process models collected are contrasted with each other to extract the elements of the scenario planning process that is adopted for the prototype model. This chapter also discusses the contents and manner of the environmental information scanning for the future visioning so that it explains how the prototype model of future visioning process can be completed as the concept development process that is suggested in chapter 4. Lastly, chapter 5 demonstrates the structure of the prototype model of the future visioning and discusses that how it should be operated by explaining the contents of each stage of the process.

### **5.2 Attitudes to Future**

Most of assumption about the future and our relationship to it usually falls into two polar opposite approaches: optimistic and pessimistic. May (1996) argues that our thoughts about what will happen in the future are influenced by a number of factors, including our hopes and fears for the future. Depending upon where the observer put their values, the same future events are differently viewed and their attitudes to the future are differentiated. If people put more value on hopes rather than fears about what will happen, the future events are more likely to be viewed optimistically. While, others who are dominated by their fears about the future events exhibits a general tendency to see the worst of all future situations. This leads to an internal approach to the definition of optimist and pessimist. Polka (1973) further specifies the dimension of optimism and pessimism into essence optimism/pessimism and influence optimism/pessimism. In the



essence category, history is seen as a book that has already been written so that the human intervention cannot change course of events. The influence category, in contrast, implies that history is a process that man can or cannot manipulate so that there is the supposed or rejected possibility of human intervention. These categories compose a matrix and produce four resulting combinations that assumption about the future may fall into (Table 5-1).

Table 5-1 Matrix of Assumptions about the Future

	<b>Influence Pessimism</b>	<b>Influence Optimism</b>
<b>Essence Optimism</b>	<ul style="list-style-type: none"> <li>● a better future is destined to come humanity plays but not influential to its development</li> <li>● possible to foresee the improvements</li> </ul>	<ul style="list-style-type: none"> <li>● the world is good and man can make it even better</li> </ul>
<b>Essence Pessimism</b>	<ul style="list-style-type: none"> <li>● chaos overrules the future humanity have no control over its development</li> <li>● useless to foresee the future</li> </ul>	<ul style="list-style-type: none"> <li>● unpleasant and problematic reality human being can both imagine and effectively work for better world</li> </ul>

For the future visioning it is necessary to assume influence optimism which implies the possibility that human can affect the course of events and their decisions and actions are an important shaping force. This implicitly suggests that the idea of determinism must be rejected in favour of at least an element of free will and effective choice. In such a situation of determinism, pre-existing and commonly external conditions which fix the course of some process or events are assumed so that human being are totally unable to influence the processes or events in which they are involved. If the human being's interventions or influences on the future events are ignored then the future visioning loses its fundamental purpose of being constructed. Thus, optimistic attitude to the future in which human forces play a role of shaping the future, is an important requirement in the construction of the future vision.

Slaughter (1993) argues that optimism and pessimism are too simple to be applied uncritically to futures problems because both terms are ambiguous. To quote his explanation, "an optimistic person may believe that there is no cause for alarm, when in fact there may be very good cause for it. Similarly, a pessimistic person may get so concerned about a particular problem that they will get up and do something about it"

Therefore the important thing to dealing with issues, concerns and fears about futures is not in a person's starting disposition but in dealing with the human responses. According to him, the responses are categorised into four sets which are structured from the matrix of acceptance and rejection, low-quality and high-quality. First, acceptance of the possibility that what is feared will come to pass, and exploration of low-quality responses. Second, acceptance of the possibility and exploration of high-quality responses. Third, rejection of the possibility of low-quality responses. Finally, rejection of the possibility of high-quality responses. In here, high-quality responses have the capacity to think that fears that are linked to images of futures are both provisional and negotiable so that they represent opportunities for engagement, choice and purposive action. High quality responses are also including the notion that concerns about the future depend on human vision, perception and understanding not on a disembodied vision beyond human influence.

Accepting the importance of the human responses in shaping the future, Godet (2000) also distinguishes five basic attitudes to the future that people may choose:

- 1) the passive ostrich, who accepts change
- 2) the reactive firefighter, who waits for the alarm to put out fires;
- 3) the proactive insurer, who prepares for foreseeable changes because an ounce of prevention is worth a pound of cure;
- 4) the proactive conspirator, who acts to provoke desirable change;
- 5) the *anticipactive* actor who savvily combines all of the above but adopts an anticipative attitude; a blend of the reactive, preactive and proactive attitudes.

These five attitudes can be re-described as the two strategic postures which clarify strategic intent.

### **5.3 Strategic posture to the future**

Strategically speaking, there are three different postures that a company can choose for its dealing with the future uncertainty: shaping, adopting, or reserving the right to play (Courtney, 2001). In case of taking the posture of shaping the future, a company intends to play a leadership role in establishing how the industry operates by setting standards or

creating demands. Because its strategy is about creating new opportunities in a market, the company often gets the inspiration for its radical concept usually from a vision that is formulated through a forward sensing instead of being inspired by traditional market research as conventional wisdom recommends. And the company also needs to teach potential customers to consume its discontinuous value proposition rather than learn from existing customers (Kumar, et al, 2000).

In contrast, adapters take the current industry structure and its future evolution as givens, and they react to the opportunities the market offers. Because they often compete in the market through speed, agility, and flexibility in recognising and capturing opportunities in existing markets, market research which focuses on market or customer sensing (what does the market or customer want?) is emphasised to use. Lastly, the strategic posture of reserving the right to play is a special form of adopting which invests sufficiently to stay in the market competition. It focuses on incremental investments to put a company in a privileged position through either superior information, cost structures, or relationships between customers and suppliers. That, however, avoids premature commitments by allowing the company to wait until the environment becomes less uncertain before formulating a strategy.

Because these postures are not complete strategies which clarify the actions required to fulfil strategic intent, Courtney et al (1999) asserted a portfolio of actions through which the company's strategies are implemented under the conditions of uncertainty: big bets, options, and no-regrets moves. Firstly, big bets are the focused strategies which result in both large payoffs in one or more scenarios and large losses in others but give a negative effect in others. These moves are usually used in shaping strategy. Secondly, options lead a company to wait to see the market evolvment before it makes a decision on its initial investments. These both secure the big payoffs of the best-case scenarios and minimise losses in the worst-case scenarios. In terms of conducting pilot trials before the full-scale introduction of a new product into new markets and making a decision of entering when it is proved that the risk of breaking into the market is minimised, adopting strategy

heavily depends on options. Finally, no-regrets moves are strategic decisions that will pay off in any scenario. These moves are mostly chosen by managers to operate in highly uncertain environments.

The choice of a strategic attitude and the moves of implementing strategy are depending of the level of uncertainty that companies are faced with. However, because competition for the future is a matter of competition to create and dominate emerging opportunities-to stake out new competitive space, not simply to benchmark a competitor's products and processes and imitate its methods (Hamel and Prahalad,1992), shaping the future that is an independent point of view about tomorrow's opportunities, is more challenging than playing catch up. They must compete to shape the structure of future industries. In this sense, taking charge of the future by shaping rather than responding to it is how companies should make sense of the future.

#### **5.4 Definition of Future Vision**

According to Hodgson and White (2001), vision can have one of two meanings. Firstly, a vision is a social construction of reality made in the present and, as often as not, a contradiction of the likely trends of the future so that it can be a device to create the possibility of a new and different future that is deliberately different from what might otherwise happen. In this meaning, Parikh and Neubauer (1993) define a vision as an image of a desired future state, an answer to the question "what do we want to create?" They argue that, "unlike traditional strategic planning approaches, a vision is a future to be created, and not a forecast". Sharing this view, Nanus (1996) argues that a vision is a carefully formulated and clearly articulated statement of intentions that defines a destination or future state of affairs that an individual, community or company find desirable. Visioning in this context is about driving through to a new future, and the vision may not change, even though the circumstances do.

A vision can underpin and promote changes by setting the agenda for the organisation, and giving direction and purpose (Kouzes and Posner,1996). It is a necessary precondition for strategic planning, and provides the key criteria against which all

strategic options should be evaluated. Lipton (1996) argues that the vision statements of highly effective organisations communicate three principal themes: the mission or purpose of the organisation, the strategy for achieving the mission and the elements of the organisational culture that seem necessary to achieve the mission and support the strategy. A vision helps the organisation to focus on and enhance key determinants of performance. A company which builds a unique and distinctive vision is capable of enduring changes in leadership as well as market conditions.

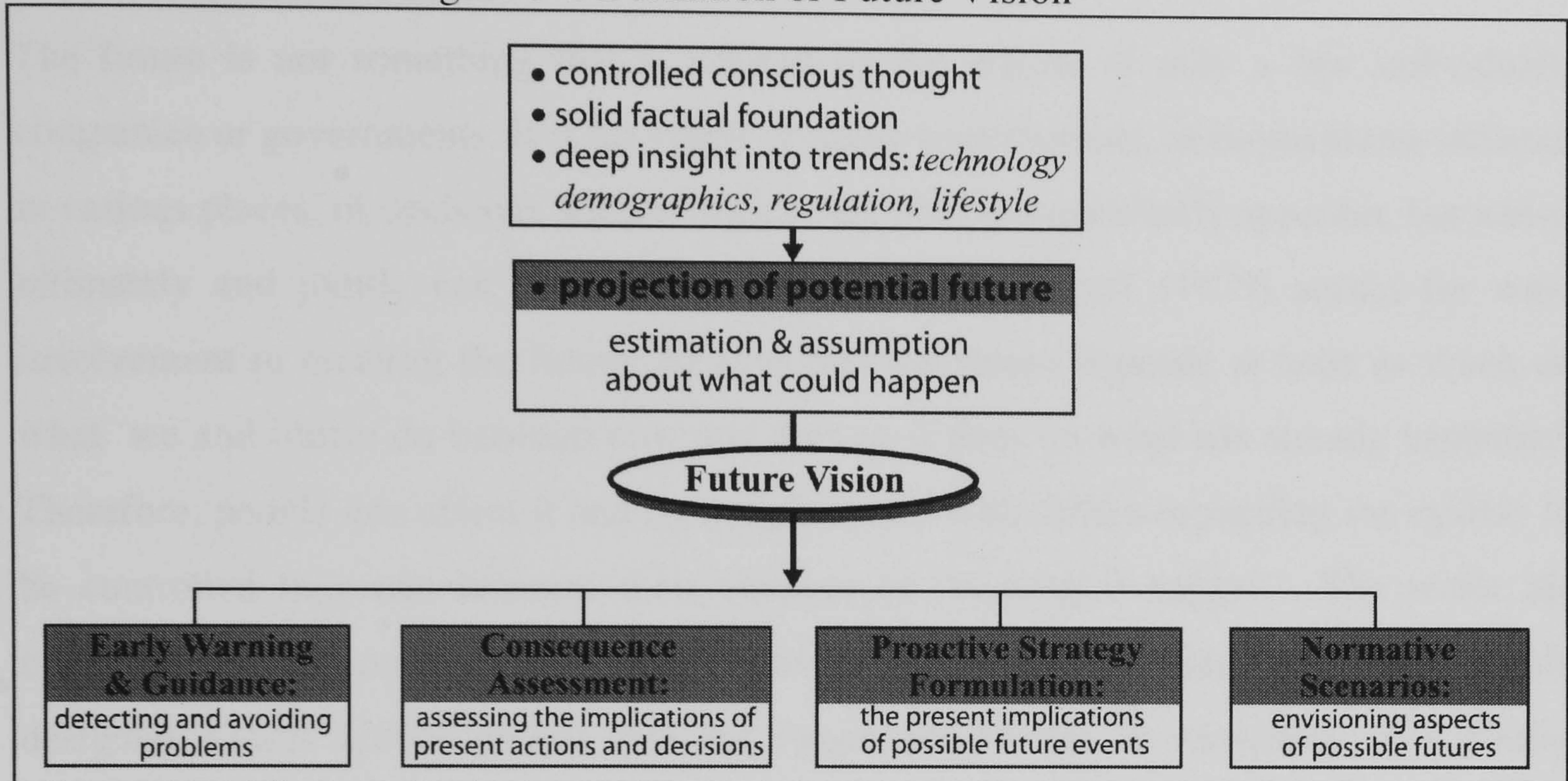
Secondly, vision is a projection of where we think we will be if we continue down these particular pathways and apply the current strategies. Visioning in this context is about understanding and preparing for the likely future, whatever that might be. In similar attitude, Fahey and Randall (1998) define vision as a projection of a potential future which is a combination of estimations of what might happen and assumptions about what could happen. As Slaughter (1996) point out, attributes of a vision include: consequence assessment (assessing the implications of present actions and decisions); Early warning and guidance (detecting and avoiding problems before they occur); Pro-active strategy formulation (considering the present implications of possible future events); Normative Scenarios(envisioning aspects of possible or desired futures).

Some visions are created deliberately, through controlled conscious thought; others emerge through a less conscious learning process (Parikh and Newbauer, 1993). Some visions appear suddenly while others build up gradually over time in an incremental process (Westley and Mintzberg, 1989). However, as Hamel and Prahalad(1994) argued, vision which is built not on a solid factual foundation is likely to be fantastical which lead organisation or company down a blind alley toward the future. Therefore, vision must be developed with deep insights into the trends in technology, demographics, regulation, and lifestyles that can be harnessed to rewrite industry rules and create new competitive space.

Considering that future visioning in this research work is for the creation of new product ideas, definition of vision falls into this category. Because the ultimate purpose of future

visioning in this discussion is to generate new product ideas which are plausible to realize, vision should provide a broad picture of the future through which emerging future can be seen (Figure 5-1).

Figure 5-1 Definition of Future Vision



However, in the future visioning whose purpose is to develop new product concepts that can be realised through a product development process requiring contributions from a range of different disciplines in the organisation, the future vision should play not just as a scanning ahead which predict possible futures but also as a revolutionary tool defining the image of desirable future state to generate commitment and motivate performance in the organisation. A clear lofty vision can provide direction to a company and can positively impact on new product success if future vision is effective by having the three components: vision clarity, vision agreement/support and vision stability (Hamel and Prahalad1989; Lynn and Akgun, 2001). The first component, vision clarity, provides a well-articulated, easy-to-understand target-a very specific goal that creates a clear image of what the organization is trying to do. Without providing a clear vision, it is hard to induce support from others in an organisation because they do not know what they are supporting (Niemes, 1996). The second vision component, support, implies securing the commitment from people throughout an organisation for that which the company is trying to do. It indicates that people are willing to pitch in to help accomplish the vision (Vaughan,1997; McAlister1998). The third component, vision stability reduces confusion

within an organisation so that people can avoid getting frustrated and confused about what they are supposed to do.

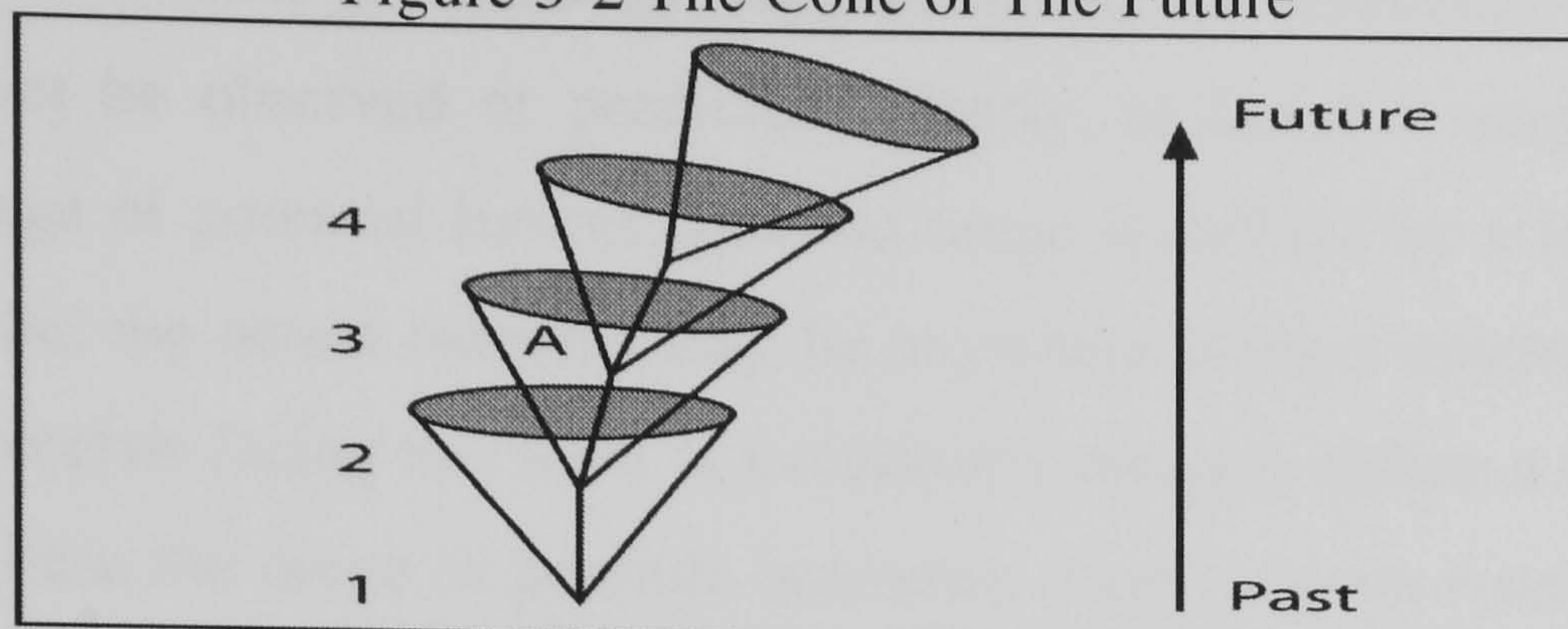
### **5.5 Formulation of Future**

The future is not something that is created by the efforts of only a few individuals, companies or governments. It is the result of many contributions, of momentums initiated in various places, of decisions whose impact may not be immediately apparent, but which ultimately and jointly can become highly significant. Ackoff (1979) argues for wide involvement in creating the future, he says that the future depends at least as much on what we and others do between now and then as it does on what has already happened. Therefore, people can affect it and by collaboration with others-expanding the system to be controlled they can increase their chances of “making it happen”. The wider the collaboration, the more closely people can approximate the future they have jointly designed. Godet (2001) asserts that the future should not be envisaged as a single, pretraced line extending from the past because the future is far from neutral.

The future depends on subjective choices related to how problems are approached, which hypotheses are tested and what goals are pursued in the present so that it can be considered to be a cone, which as a three-dimensional concept, gives a clear image of the range of possibilities. It must not be forgotten that the present, represented by the vertex of the cone, moves forward with the passing of time. People are always living at the vertex, where there is relatively little room for manoeuvre. The room, if it exists, is in the future, in our ability to envisage what may be possible years ahead and to move towards it by making the necessary adjustments now.

Figure 5-2 shows possible alternative futures fanning out from the present at times 1-4. To reach point “A” of the future the necessary decisions should be made and the action taken in the limited present time period in which the sufficient flexibility is provided. If the time period is passed, it is no longer possible to reach it even though it is still in the future.

Figure 5-2 The Cone of The Future



Adapted from May (1996)

Gibson (1998) also argues that the future is not a continuation of past and it does not follow the old mindset- the idea that we could to some extent control, order and predict the future because the world is changing and the direction of that change is not certain. Shifts and transfers of business environment trigger social, economic, and technological uncertainty that people and corporations have to integrate into their strategies for the future. However, even the most uncertain business environments contain a lot of strategically relevant information so that the opportunities the future breeds would be identifiable. Courtney, et al. (1999) explain this in two aspects. Firstly, it is often possible to identify clear trends, such as market demographics, that can help define potential demand for future products or services. Secondly, there is usually a host of factors that are currently unknown but that are in fact knowable- that could be known if the right analysis were done.

According to their work, the residual uncertainty which remains after the best possible analysis is done, defines four different categories of the future. Firstly, level 1 in which the future path of every key value driver is clear enough, is increasingly uncommon in today's economy. This level of uncertainty usually occur in well-established markets that are not prone to external shocks or internal upheaval. It tends to be in industries with stable regulatory and legislative structures, in lower-tech markets with incremental innovation rates, and in industries with relatively high entry barriers that limits new entrants, competition from incumbents, and great changes in the purchasing behaviour of customers. Secondly, at level 2 uncertainty, the futures are alternative because analysis cannot identify which outcome will occur, although it may help establish probabilities. Many businesses facing major regulatory or legislative change confront this level of



uncertainty and the value of a strategy depends mainly on competitors' strategies, and those cannot yet be observed or predicted. Thirdly, at Level 3 uncertainty, one can identify the range of potential futures, and that range is defined by a limited number of key variables, but the actual outcome may lie anywhere along a continuum bounded by that range. Strategists facing this level of uncertainty can only define a representative set of outcomes within the range of possible outcomes. Lastly, future outcomes for Level 4 uncertainties are both unknown and unknowable. Analysis cannot even identify the range of potential future outcomes, let alone scenarios within that range. Frequently, they occur in markets during and immediately after major technological, economic, or social discontinuities, as well as in markets that are just beginning to form. Table 5-2 shows sources of uncertainty.

**Table 5-2 Level of Uncertainty**

	Level of Uncertainty			
	Level 1	Level 2	Level 3	Level 4
<b>Source of Uncertainty</b>	<ul style="list-style-type: none"> <li>• Returns on "common" investments in mature, stable markets</li> <li>• Customer and competitor reactions to strategies that reposition well-established brands</li> <li>• Returns on "uncommon" investments in mature stable markets</li> </ul>	<ul style="list-style-type: none"> <li>• Potential regulatory, legislative, or judicial changes</li> <li>• Unpredictable competitor moves and countermoves</li> <li>• All-or-nothing industry standards competition</li> </ul>	<ul style="list-style-type: none"> <li>• Customer demand for new products or services</li> <li>• The relative performance of and customer preference for new, competing technologies, business models, or processes</li> <li>• Unstable macroeconomic conditions</li> </ul>	<ul style="list-style-type: none"> <li>• The outcomes of major technological, economic, or social discontinuities</li> <li>• Market evolution in markets that are just beginning to form</li> <li>• Extraordinarily long time frames required to evaluate potential strategies</li> </ul>

## 5.6 Methods and Practice

Future visioning is a way of thinking about the future and a framework that can be applied in a wide range of circumstances to improve thinking about future change. In general, a human predicts the future as he knows the past and the present, namely by logical deduction (van der Heijden, 2000). When unfolding events are observed he is quickly inclined to discern trends. Once things are going up, they seem to continue doing so for a while. Or certain events always seem to come together. A vision of the future is formed through these observations and the forecasts on these probabilistically observed phenomena. Furthermore, a human looks for causality and wonder why the observed patterns happen, then tries to explain them. This is done by imposing an underlying structure of cause-and-effect linking events together. Typical cues (Einhorn and Hogarth,

1982) for the existence of such causality connections are: (a) related behaviour, or covariance, among variables; (b) spatial or temporal closeness; and (c) similarity in form or pattern.

There are some methods of making the future vision identified as the strategic management tool for organisations. The future visions developed by these methods provide descriptions of the possible future states that are formulated depending what decisions the organisations make under both internal and external environment situation today, and what actions they take. The discussion about these methods by the comparison of them provides a basic structure of future vision development process and derives out of the points that would be the reasons for revising it further.

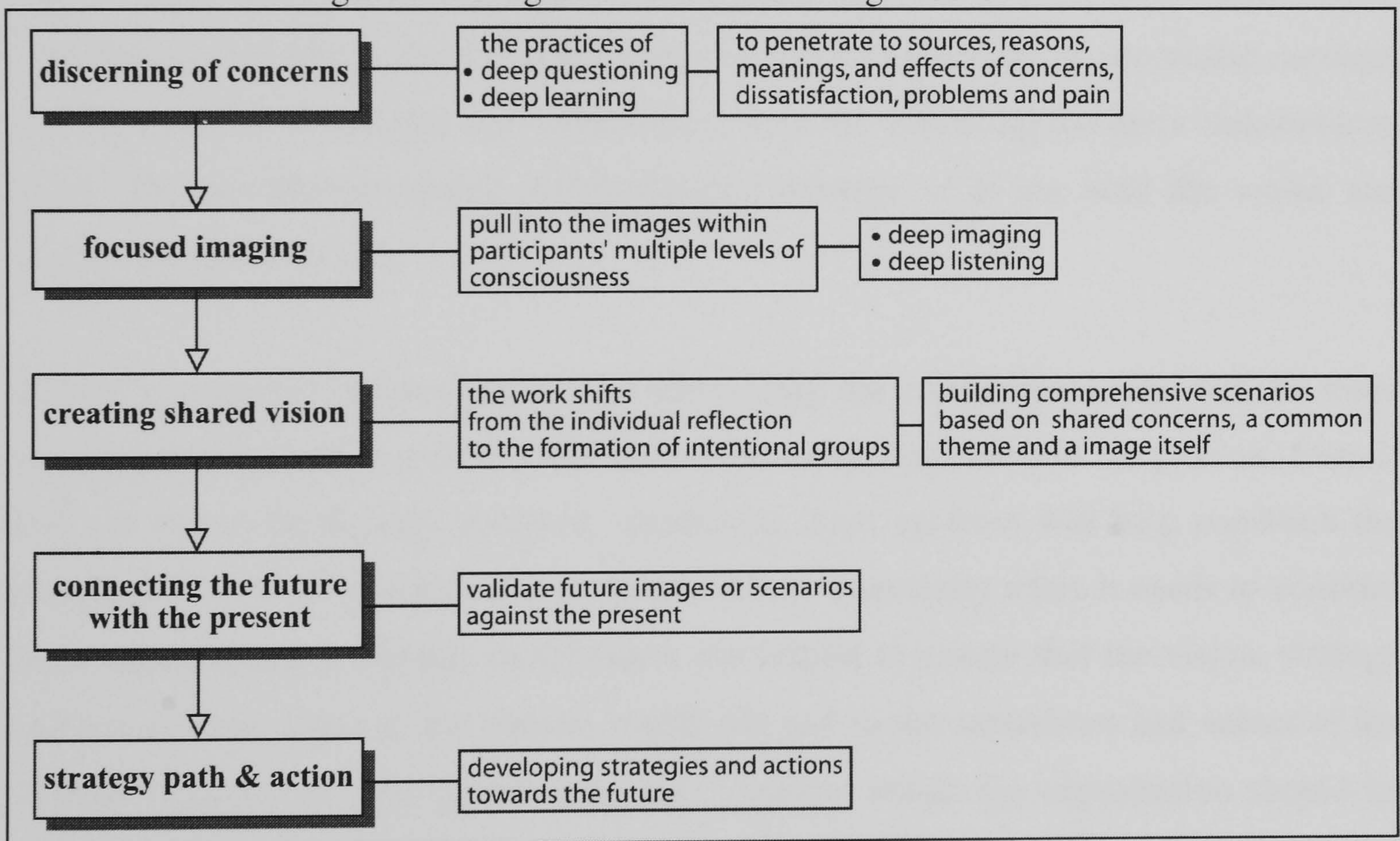
### **5.6.1 Ziegler's Future Visioning Process**

Ziegler (1991) asserted that future visioning is not like making a wish-list but a discipline which invites and requires shared inner work-deep imaging, deep questioning, deep listening and deep learning, each of which has its own practicum. Based on this thought he introduced the future visioning process which involves five stages: the discerning of concerns; focused imaging; creating shared vision; connecting the future with the present; and discovering strategy paths and formulating action. In this process, firstly, practitioners discern concerns through learning the practices of deep questioning and deep learning. They are introduced to the problematique of using language to obscure and falsify rather than to penetrate to the sources, reasons, meanings, and effects of their concerns, dissatisfaction, problems and pain. Secondly, on the focused imaging stage, those images that lie deep within the multiple levels of consciousness, images that compel and commit, are searched through deep imaging as well as deep listening both to the practitioners themselves and to the colleagues.

Among five degrees or levels of focused imaging included in this exercise, the first three enable the imager to lay out the indicators and the positive and negative consequences of the images as achieved states of affairs. At the fourth level of focused imaging participants are asked to dig out their underlying assumptions without which their images would make no sense, to examine the values implicit in living out those images, and to

provide themselves and their colleagues with the rationales behind their images. As the final degree of focused imaging, an inner search to discover the compelling image is undertaken by the participants. Thirdly, all the individual work of the participants is shared in a plenary session to find one or more colleagues who share at a minimum a focus of concern, possibly a common theme visible in their compelling images, and sometimes even the image itself. Each member who shares the images then build a comprehensive scenario of the future together by participating in generating a shared vision while maintaining the integrity of their own compelling images. Fourthly, the generated futures are connected with the present through living the images as achieved and actualised, and remembering how that happened. Lastly, strategy paths and action which will lead them into the future are sought by the participants. Figure 5-3 illustrates the process of Ziegler's future visioning process.

Figure 5-3 Ziegler's Future Visioning Process



Source: Ziegler(1991)

In this process of the future visioning, it is stressed that individuals with common values formulate candidate ideal visions that are later shared with the whole group as part of the vision forming process. Such an approach maintains the diversity of opinion and thus choice further into the process. It is also argued that the diversity of participants in the process is a justification for robustness; the more diverse the experiences of the

participants, the more robust is the “environment of images which they create, i.e., the range and diversity of alternative futures they generate will be larger.” (Ziegler, 1991)

### **5.6.2 Stewart’s Future Visioning Process and Its Imperatives**

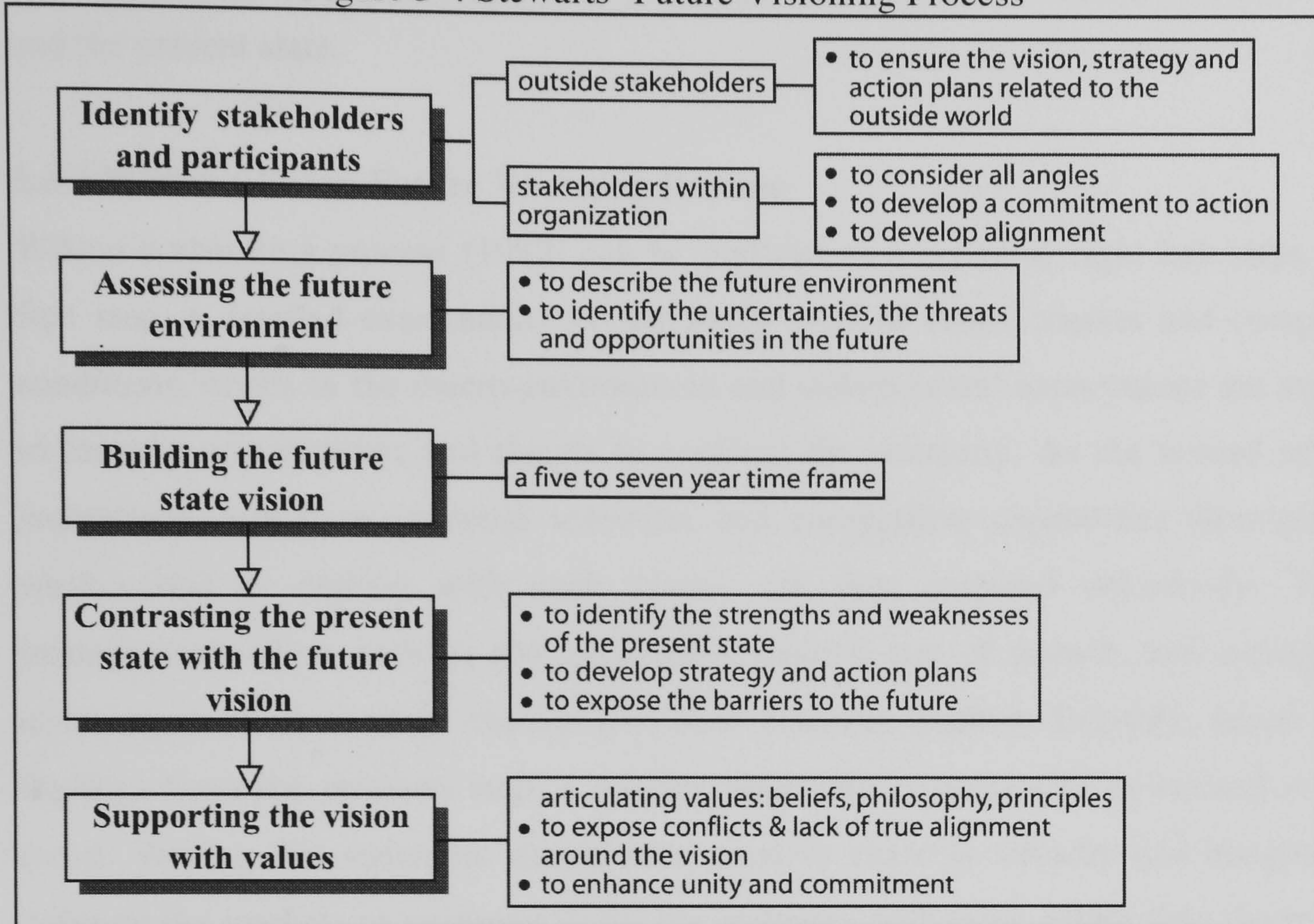
Stewart (1993), a former senior Vice-President of Du Pont Canada Inc., defines future visioning as “the concept of creating a description of what we could be in the future, before becoming mentally trapped by an exhaustive analysis of where we are now.” He suggested that there are the main imperatives which the visioning practitioner should follow. Firstly they must develop a comprehensive list of stakeholders and try to view the future state and the present state through their eyes. Secondly, develop a broad description of the likely future environment from which a comprehensive vision of what we could be is derived. Thirdly, contrast the future vision with the present state and express the values which will guide the organisation as it seeks to achieve its vision. Fourthly, it should be ensured that the vision is expressed in terms of actionable concepts and the vision is developed in a participative way by involving the main stakeholders. Lastly, the practitioner should avoid planning strategy or action until the vision and values have been created.

Stewart’s visioning process starts with identifying the stakeholders who will be more committed to the outcome if they are involved from the beginning of the process. Even if they are not to be directly involved, identifying them up front will help condition the participants to think in terms of stakeholder values. Especially when it needs to consider far-reaching changes, outside stakeholders are helpful to ensure that the vision, strategy and action plans relate to the outside world, not just to the aspirations and values of the internal organisation. The people who lead opinions within the organisation should be also involved in the visioning process as part of the stakeholders because they become committed to the vision throughout the participation, and develop alignment by spreading the knowledge of the background of the vision, of its uncertainties and compromises, and of the values that underlie it. Otherwise they may obstruct the pursuit of the vision or put little stock in the outcome even if it is a very good outcome. For these reasons, participation should be broad and it should occur from the start.

As the second step of the future visioning process, the future environment is assessed. To achieve this, futurologists and experts are often involved with their views on the future environment. But the purpose of the assessment should not only be describing the future environment, but sensitising the participants to the uncertainties, the threats and opportunities that will surely arise in the future. For securing the flexibility in planning to cope with unexpected future change, the assessing of the future environment should also be carried out on the notion that the future would not be the same as the present, nor simply a result of present trends. In addition, because such an exploration of the future environment is not brainstorming, the assessment of the future environment should be organized around specific topics and based on information from a variety of sources. After the views and opinions from stakeholders and experts are gathered, the future vision is described in terms of actionable concepts that expose the contrast with existing practices. It is built as the subject is broken down into segments, future state of each segment assessed and then the whole integrated. In this step of the future visioning process, setting goals based on known issues, planning incrementally from today and moving to action without a clear vision must be avoided by directing attention to a state of being at a time in the future, far enough away that thinking is less influenced by today's barriers, yet close enough that a sense of reality is maintained.

To achieve this well, participants must consciously try to divorce their thinking from the present situation. Next step of the future visioning is to contrast the present state with the future vision. Because the vision constructed enables the participant to have a clear understanding of the true present state, it become possible to contrast between the present and future states. The detailed contrast provides a fine base from which strategy and action plan are formulated, and become a natural starting point for more detailed consideration of the strengths and weaknesses of the present state and for determination of those that need to be addressed. Contrasting the present state with the future vision also helps expose the barriers to achievement of the desired future, so that they can be explicitly assessed in formulating strategy. Figure 5-4 illustrates the structure of the Stewarts's future visioning process.

Figure 5-4 Stewarts' Future Visioning Process



Source: Stewart (1993)

In Stewart's future visioning process, the future vision needs to be reflected to the values of the organisation even if these values are seldom explicitly stated or discussed. Because people agree on strategy or be committed to action when they are aligned on their beliefs and principles, the future vision needs to be supported by the articulation of the specific organisational and personal values for its success. The articulation of values can enhance unity and commitment at virtually all levels of an organisation and around virtually any important subject. As with visions, people are much more turned on by values that they help to express, rather than ones imposed on them by others. In addition, articulating values also helps exposing conflicts and lack of true alignment around the vision. Stewart's future visioning seems deceptively simple and not much different from the way people instinctively think. However, its process becomes quite different from usual planning and the results more comprehensive when the principles are perceptively observed. The assessment of the present state by contrasting with the future vision delivers the description of core competencies and of strengths and weaknesses. And what interim goals and resources will be required and what the future vision will provide can

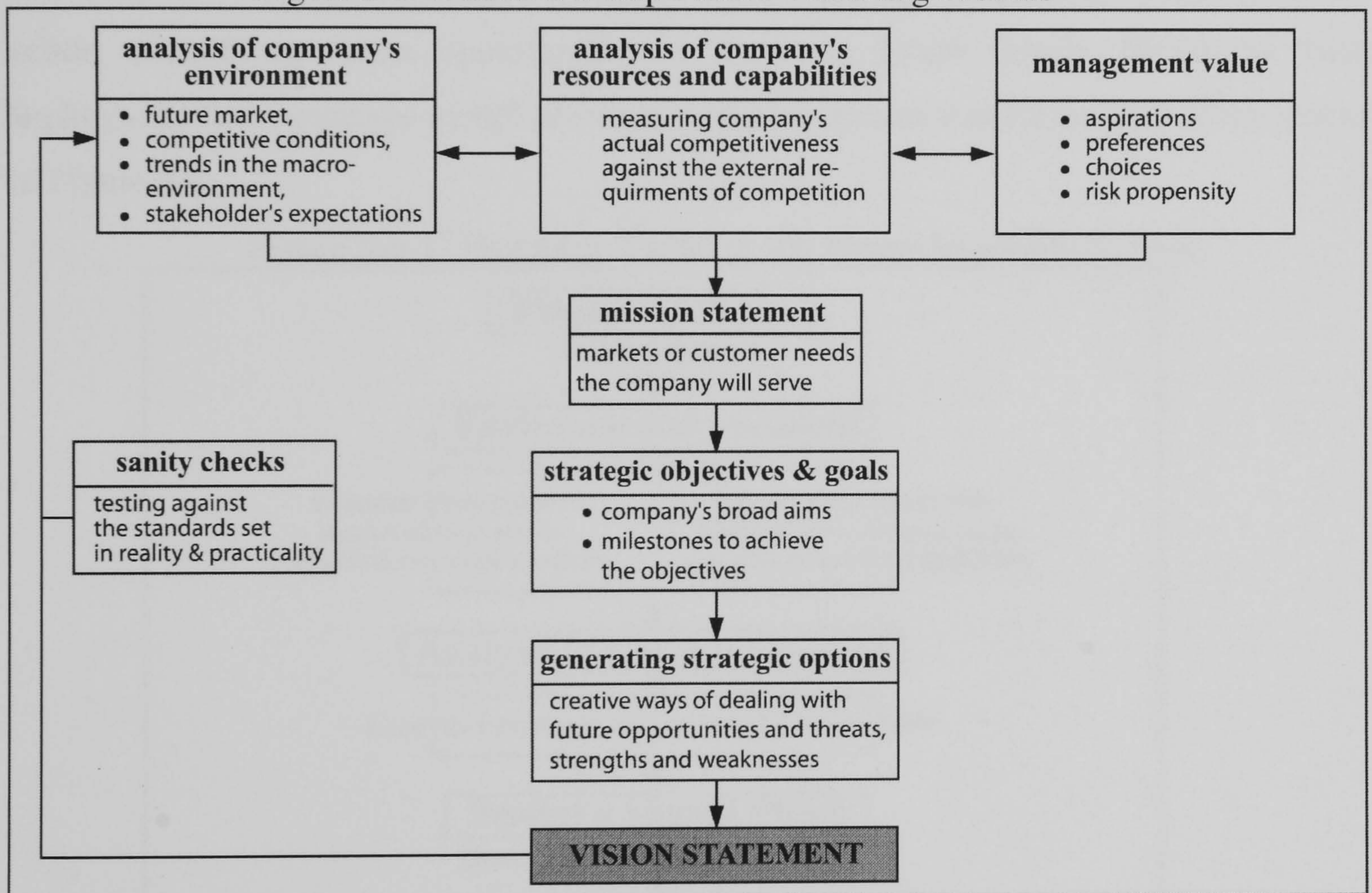
be reachable from here and become clearer by working backwards from the future state and the present state.

### **5.6.3 Wilson's 8-step Future Visioning Process**

Wilson's visioning process (1992) can be outlined as a series of eight key steps. In its first step, a detailed examination of the likely state of future market and competitive conditions, trends in the macro-environment and stakeholders' expectations are analysed to identify opportunities and threats to confront the company. As the second step, the company's actual or potential resources and competitive capabilities (strengths and weaknesses) in dealing with such futures are then assessed objectively. Thirdly, management values such as risk propensity, desired rate of growth, and management style are clarified to make choices and their rationale explicit. Fourthly, based on the findings from the previous step, a mission statement is developed or revised in broad terms. Writing this statement should be a creative exercise, broadly and imaginatively defining the markets or customer needs the company will serve, rather than the products and services it will offer. After a mission statement is completed strategic objectives which define a company's broad aims in pursuit of its mission and goals which mark the milestones along the road to achieving these objectives, are identified to make the future agenda of the company. As the next step, strategic options of dealing with future opportunities and threats, strengths and weaknesses should be generated or selected by stretching their imaginations. Then the vision statement is developed as the description of the final product which contains the six key elements of strategic vision such as business scope, scale of activities, product and market focus, competitive focus, image and relationships, organisation and culture. Finally, the final vision statement should be tested against the standards set by the earlier detailed analyses of future markets, competition, resources, capabilities. This sanity check ensures that the final vision is well grounded in reality and practicality which are critical elements of the future vision. In Wilson's future visioning process, vision is understood as the product of process which is part rational (the product of analysis) and part emotional (the product of imagination, hunches, and values) so that it is recommended that the visioning process should involve a series of workshops and incorporates key steps of strategic thinking from which the process is injected with

somewhat more structure. Addressing each of six key elements of vision (business scope, scale of activities, product and market focus, competitive focus, image, and relationships) is also emphasised as to what they are desired to be in 5-10 years time. Wilson's vision development process is typically iterative. A future vision is formed from analysis of the future environment and it inspires the exploration of strategic options. Then, the vision becomes the milestone of strategic thinking, embodying the company's goals and aspirations and serving as the central driver of action. Finally the vision gains clarity and strength from sanity checking which proceeds through revisiting the earlier analysis of future environment, testing against it and revising. The structure of the Wilson's 8-step future visioning process can be illustrated as Figure 5-5

Figure 5-5 Wilson's 8-step Future Visioning Process



Adapted from Wilson(1992)

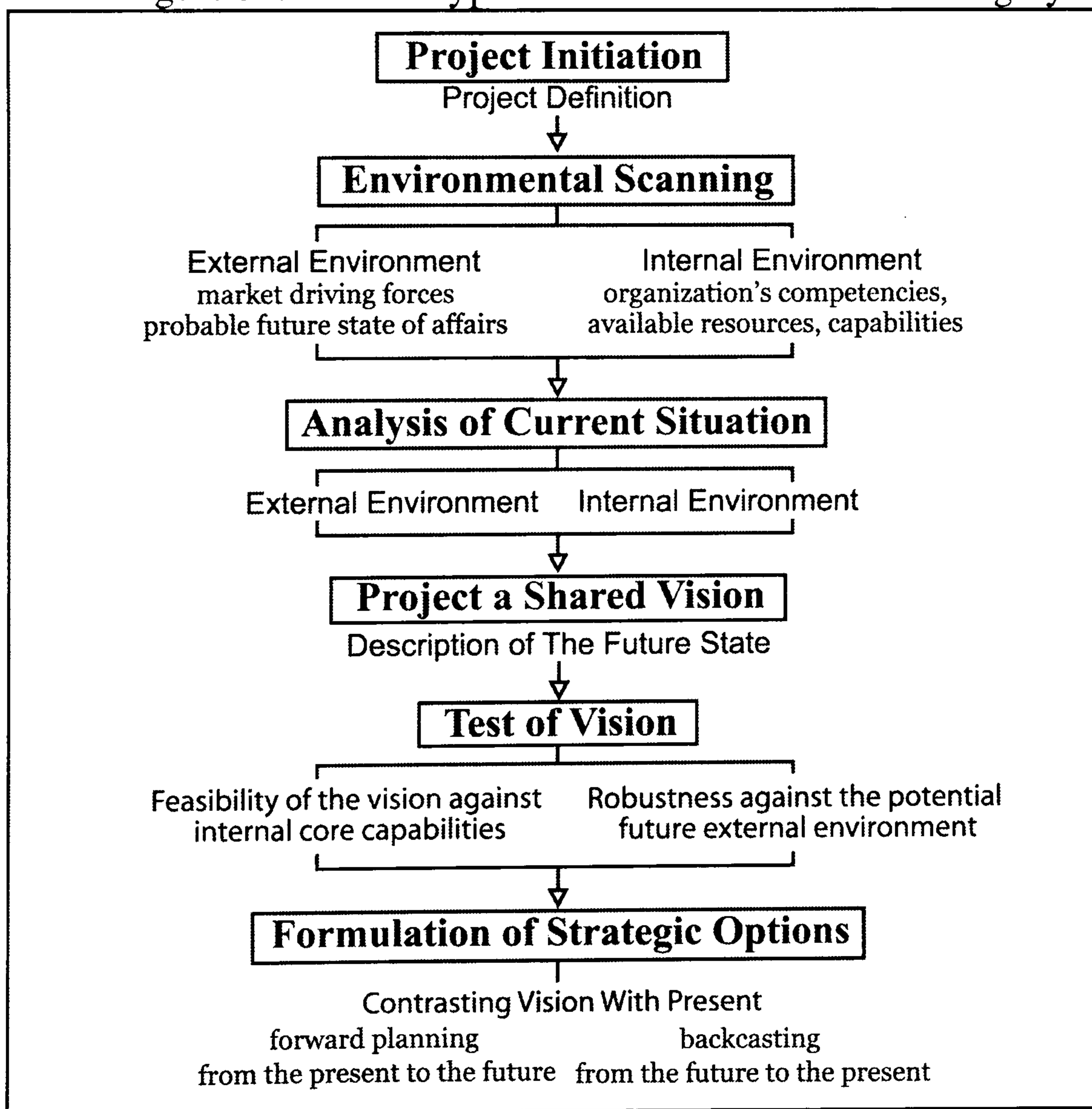
#### 5.6.4 Formulation of the Future Visioning System Model

Based on the analysis of the academic models of the future visioning process described in the preceding part, the essential structure and contents of the future visioning system model were formulated. In methodological terms, the academic models were compared and overlapped each other to draw out commonly shared features which became the



important considerations for formulating the structural order and procedure of the future visioning system model. Each of the three academic models, for example, are structured into three distinctive stages of activities. Firstly, information scanning as an inception stage of the future visioning process gathers environmental information and provides its analysis. Outcomes of this stage become objective evidence for the logic of formulating of a future vision and practical sources that constitute the shape of future vision. Secondly, an actual process of formulating future vision starts with integrating the outcomes of the information analysis. In this stage future vision is described in detail based on the interpretation and understanding of the information integrated. Lastly, the future vision is utilised according to the specific purposes of the use of the future visioning tool. For instance, future visions are often used for projecting strategy path and action, identifying future opportunities or detecting future threats. Based on these findings the first prototype model of future visioning system was formulated as illustrated in Figure 5-6.

Figure 5-6 1<sup>st</sup> Prototype Model of the Future Visioning System.



The process starts with defining the project definition followed by analysis of internal and external environment of the organisation. The analysis of the organisation's current situation is conducted both to ground the vision in reality and practicality and to provide an understanding of the "starting block" when looking forward to the future. The organisation's competencies, available resources, and capabilities (strengths and weaknesses) are reviewed through the analysis. The assessment of the external environment is also conducted both to identify market driving forces which affect an organisation's functions or competences, and to indicate a probable future state of affairs of relevance to the organisation. The key uncertainties in the future that the organisation may face are also identified in this stage.

Next, based on the outcomes of both analysis of organisation's current situation and the external environment, the future state is projected as a form of vision. Then, vision is tested to check that it is feasible given internal core capabilities, and robustness given the potential future external environment. Finally, actions and strategic options that are required for the organisation to achieve its vision, are formulated by contrasting the vision with the present state. Both techniques of forward planning from the present to the future, and backcasting from the future to the present, can be adopted to use for this step.

Areas of differences in methodologies or mode of execution were also considered in the formulation of the structure and procedure for the future visioning system model. In terms of validating the future vision, Ziegler's model (Figure 5-3) and Stewarts' process (Figure 5-4) conduct their process once only according in a linear progression by contrasting the future vision with the present before projecting strategic options and action plans from the future vision: while Wilson's process (Figure 5-5) iteratively validate the future vision as it contrasts the strategic options formulated from the future vision against the outcomes of the information analysis. This difference pointed out two things that should be considered when the future visioning system model is constructed: deciding the execution point of validation of future vision and accruing objectiveness of the validation process. For example, if the validation process is conducted iteratively against the same information and its analysis within the system itself, the result of each

validation would be similar so that it would be difficult to assess the objectiveness of the future vision and it would not be clear to know when the validation process should be stopped. Furthermore, if the validation process is executed in the form of examining strategic options there would be a risk of having to redevelop the whole future vision each time whenever the strategic options are identified as inappropriate against the standards set in reality and practicality. For this reason, the future visioning system model conducts the validation process in a linear procedure and adopts the scenario planning process as its validation tool to increase objectiveness of validating the future vision. Because of these structural changes the future visioning system model is structured as illustrated in Figure 5-10. In this 2<sup>nd</sup> prototype model, validating the future vision starts with developing scenarios so that the future vision is assessed by contrasting it against the scenarios in terms of robustness and feasibility.

Three academic models also provided elemental factors that constitute the contents of the environmental information scanning process at the initial stage of the future visioning process. Combining with other findings from the investigation about environmental scanning in the later part of this chapter, the elemental factors provided from the academic model were applied to the 2<sup>nd</sup> prototype model so that the 3<sup>rd</sup> prototype model of future visioning system was formulated as illustrated in Figure 5-11.

#### **5.6.5 Additional Finding from the Investigation of the Academic Models**

What is commonly emphasised in conducting future visioning is the balance between the use of rational, logical analysis and intuitive, creative thinking (Ziegler, 1991; El-Namaki, 1992; Collins and Porras 1996). If vision is completely rational then it is prematurely constrained by current thinking and knowledge, while intuitive vision may be unrealistic and not robust. It is thus important that a combination of the two types of thinking should include the assessment of the current situation and the recognition of the range of uncertainty about the future environment (O'Brien and Meadows, 2001).

In terms of providing vision with the reality and robustness by the wide range of information from the current situation, Ziegler (1992) recommends that the diversity of

participants must be secured in the future vision development process; “ the more diverse are the biographies, experiences and dispositions of the participants, the more robust is the environment of images which they create.” Stewart’s process (1993) also tackles this issue by suggesting that the stakeholders in a particular situation (or their representatives) including the people within the organisation should participate in developing the vision for reflecting a wide range of opinions and information onto the vision so that the vision is grounded in reality. In Wilson’s 8-step visioning process a detailed examination of the market is conducted and competitive conditions, trends in the macro-environment and stakeholders’ expectations are scanned to reinforce the reality and practicality of vision.

These approaches imply that it is essential for future visioning to carry out intensive environmental information scanning right from the start such as observing trends which indicate the current situation, monitoring the interactions among environmental factors which may affect the formulation of future market, and gathering the opinions and thoughts about the future from the people including stakeholders and experts. Based on the understanding that the future is something that is created as the result of many contributions and decisions of individuals, organisations and government, the environmental information scanning detecting the signals from the environmental factors which influences on those contribution and decisions, is considered the way to increase the feasibility of future vision.

Furthermore, in terms of our world becoming more complex and interdependent, and changes becoming increasingly non-linear, discontinuous and unpredictable, the environmental information scanning to understand emerging paradigms of interactions between environmental factors and attitudes towards the future is becoming an important requirement for building a better future vision. The implications of the environmental information scanning will be discussed in later section of this chapter.

## **5.7 Scenario Planning**

For capturing uncertainty of the future environment, Wilson (1992) suggests the development of multiple scenarios of the future external environment, acknowledging

that using scenarios in the first step orients the developers' thinking toward alternative possible future so that their openness to possible future can be increased. Providing a range of alternative choices of possible future development, multiple scenarios can help the decision makers to deal with a number of paths the future may develop in. The future uncertainties can be examined as the decision makers look through all the alternative possible choices.

### **5.7.1 Definition of Scenarios**

Before the main discussions about the complete process of scenario development, it is worth reviewing the definition and origins of the scenario methods. Scenarios are commonly formed by the description of a future situation and the course of events that enables one to progress from the original situation to the future situation and then help to take better decisions about the future in the presence of uncertainty. In this perspective, Schwartz (1992) defined scenarios as 'a tool for ordering one's perceptions about future environments in which one's decisions might be played out.' Van Der Haijden (2000) called them 'multiple equally plausible futures' which aim to separate the predictable from the uncertain for challenging one's own 'mental model of the future' often called the "business as usual" future. Kahn and Wiener (1969) defined a scenario as 'a hypothetical sequence of events constructed for the purpose of focusing attention on causal processes and decision points.' Warfield (quoted in Coates et al. 1986) defined 'a narrative description of a possible state of affairs or development over time.'

### **5.7.2 Categories of Scenarios**

According to Godet (2000) scenarios are categorised into two major types: exploratory scenarios which starts from past and present trends and leads to likely futures, and anticipatory or normative scenarios which is built on the basis of alternative visions of the future that may be desired or, on the contrary, feared. Because of its objectivity and factual base, exploratory scenarios are commonly used in the assessment of future uncertainties concerning the future environment while normative scenarios are often used to address the deep concerns of participating stakeholders in a visioning process (O'Brien and Meadows, 1997). These two types of scenarios can indicate a trend or be contrasted,

depending on whether they take into account the most likely or extreme developments. However, there is not any single approach regarding scenarios because the phases of development methods have many similarities.

### **5.7.3 Use of Scenarios in Public Discourse**

In the study on Britain in 2010, by the Policy Studies Institute (PSI)(1990), alternative scenarios were constructed to provide a realistic context of the future of the UK over the two decades to 2010, in which long-term decisions can be taken and to highlight areas where there is potential for choice to make the future better than it would otherwise have been. The project was started from selecting the range of areas the project covers and then organising a team which consisted of a group of experienced researchers from both inside and outside PSI for undertaking the coverage of the particular areas rigorously selected.

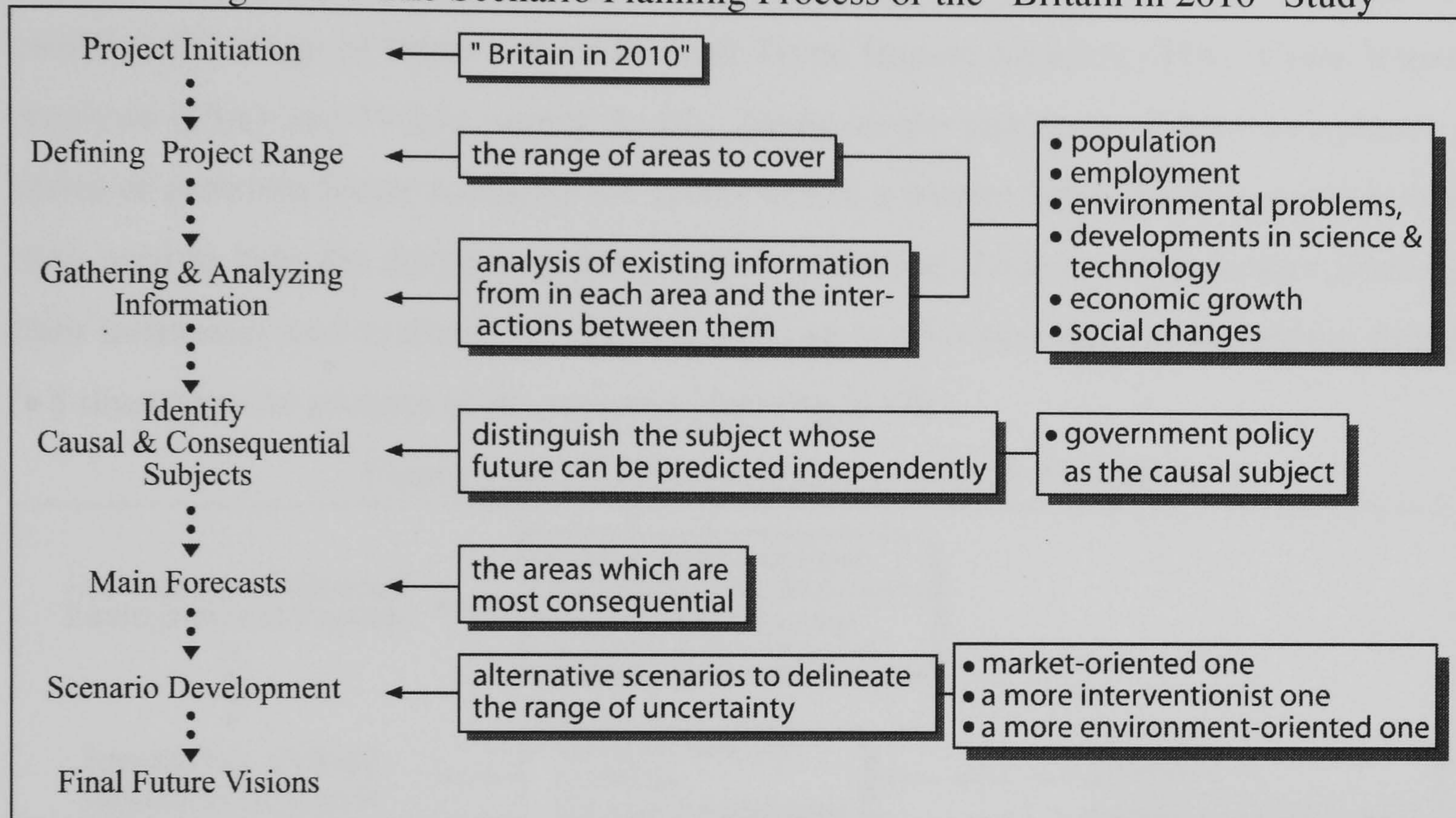
Then, the information that had been already available in each particular area was gathered to identify the developments of greatest significance and analyse the interactions between them. In next phase of the process, the subjects that had been dealt with were classified as causes if their future is sufficiently autonomous to be usefully predicted independently or effects if their future can be predicted as the consequence of changes in the causal ones. Then, the main forecasts in the areas where outcomes are particularly dependent on the causal subject were made on the basis of assumptions about the causal one that will most likely be followed in the future.

For helping the decision makers to delineate the range of uncertainty about the future and set out the factors to determine where within this range the actual future will lie, three alternative scenarios were set. These scenarios postulated viable sets of alternatives and brought out the implications of their adoptions. In this phase, attention was focused on a limited number of alternatives to indicate the high and low extremes within which the outcome is considered likely to fall, and a value somewhere between them considered to be the most probable one. However, to avoid a number of alternatives which are too large to handle if there is a series of different variables to be considered with separate high, low and most probable values for each, the only practicable course was to come to a view of

the most probable outcome and to use that as the basic assumption to be carried forward into the consideration of other areas.

Lastly, after the decision taker acquired the informed basis on which to make decisions that will influence the future through reviewing the implication of the viable sets of alternative scenarios, the main future vision was finally developed. Figure 5-7 illustrates the process of scenario planning by PSI

Figure 5-7 The Scenario Planning Process of the "Britain in 2010" Study



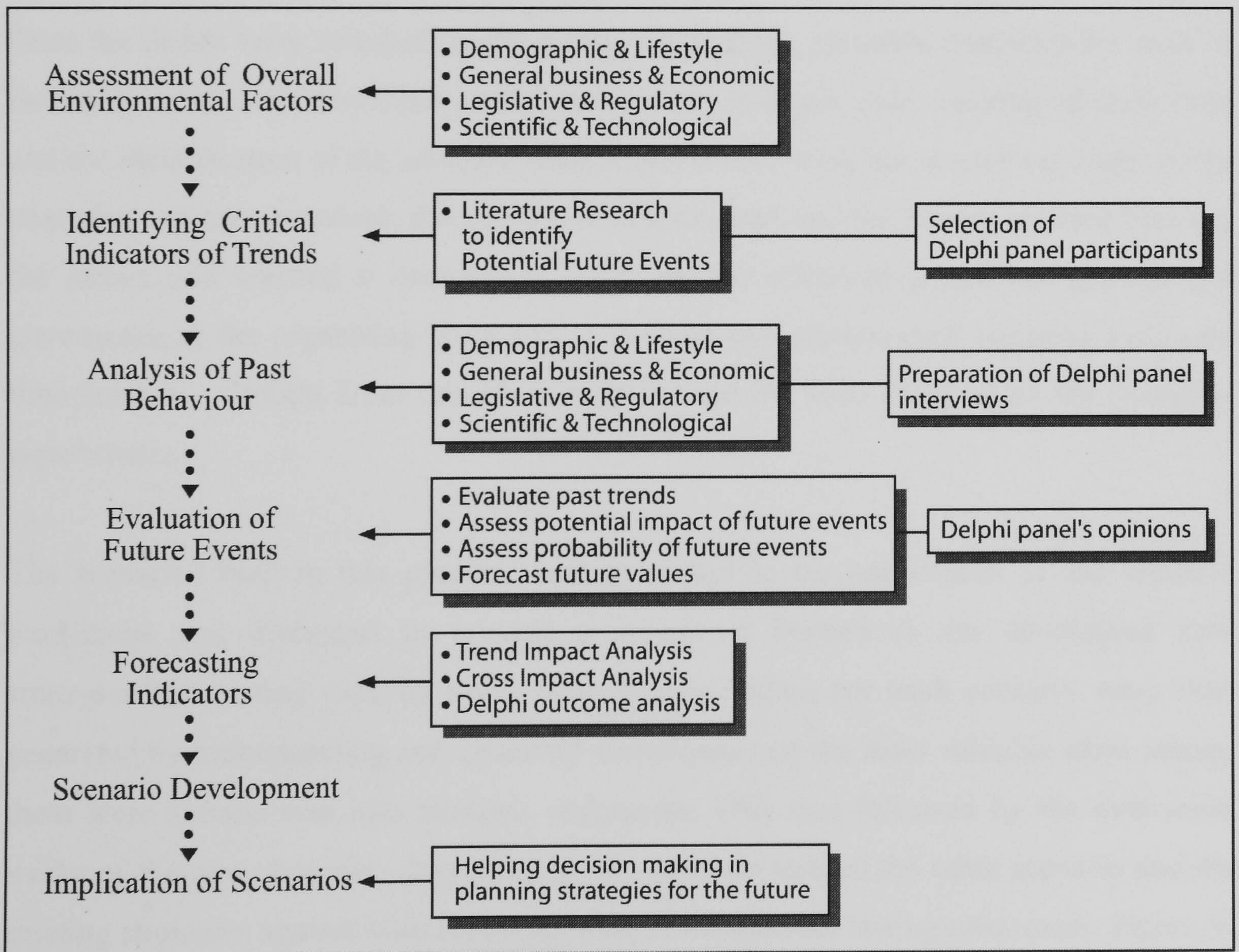
Source: Policy Studies Institute (PSI)

#### 5.7.4 General Electric's Process

In early 1980s, General Electric(GE) used scenarios as part of their planning process to think about the future environmental factors affecting their businesses. Their scenario development was built by applying a Delphi expert panel, trend-impact and cross-impact analyses. Delphi panels were used to establish and verify critical variables and indicators, while both trend-impact analysis and cross-impact analysis were used to assess the implications of the interactions among critical variables and indicators. According to the analysis by Georgantzas and Acar (1995), the procedure of their scenario development can be defined as a six-stage process. Firstly, overall environmental factors for the industrial sector under investigation such as demographic and lifestyle, general business and economic, legislative and regulatory, and scientific and technological factors are assessed for preparing the background. Secondly, critical indicators of the industry's

trends are selected by undertaking a literature search to identify potential future events impacting on the key trends. Delphi panel participants are nominated in this phase for the evaluation of the industry's future in later phase of the process. Thirdly, past behaviours for each indicator such as demographic and social, economic, political and legislative, and technology are established and reasons for the behaviours are analysed. Fourthly, the Delphi panel are interrogated to evaluate past trends, potential impact of future events, probability of future event and future values. Fifthly, they forecast each indicator to establish the range of future values through Trend Impact Analysis (TIA), Cross Impact Analysis (CIA) and Delphi output. Lastly, based on the outcomes of previous phases a series of probable future scenarios are composed in a written form. These scenarios were then used to help the decision maker to think about the environmental factors affecting their businesses and to direct the decision-making in their planning for the future. Figure 5-8 illustrates the process of the scenario planning in GE.

Figure 5-8 GE's Environmental Analysis Procedure



Source: General Electronic Company



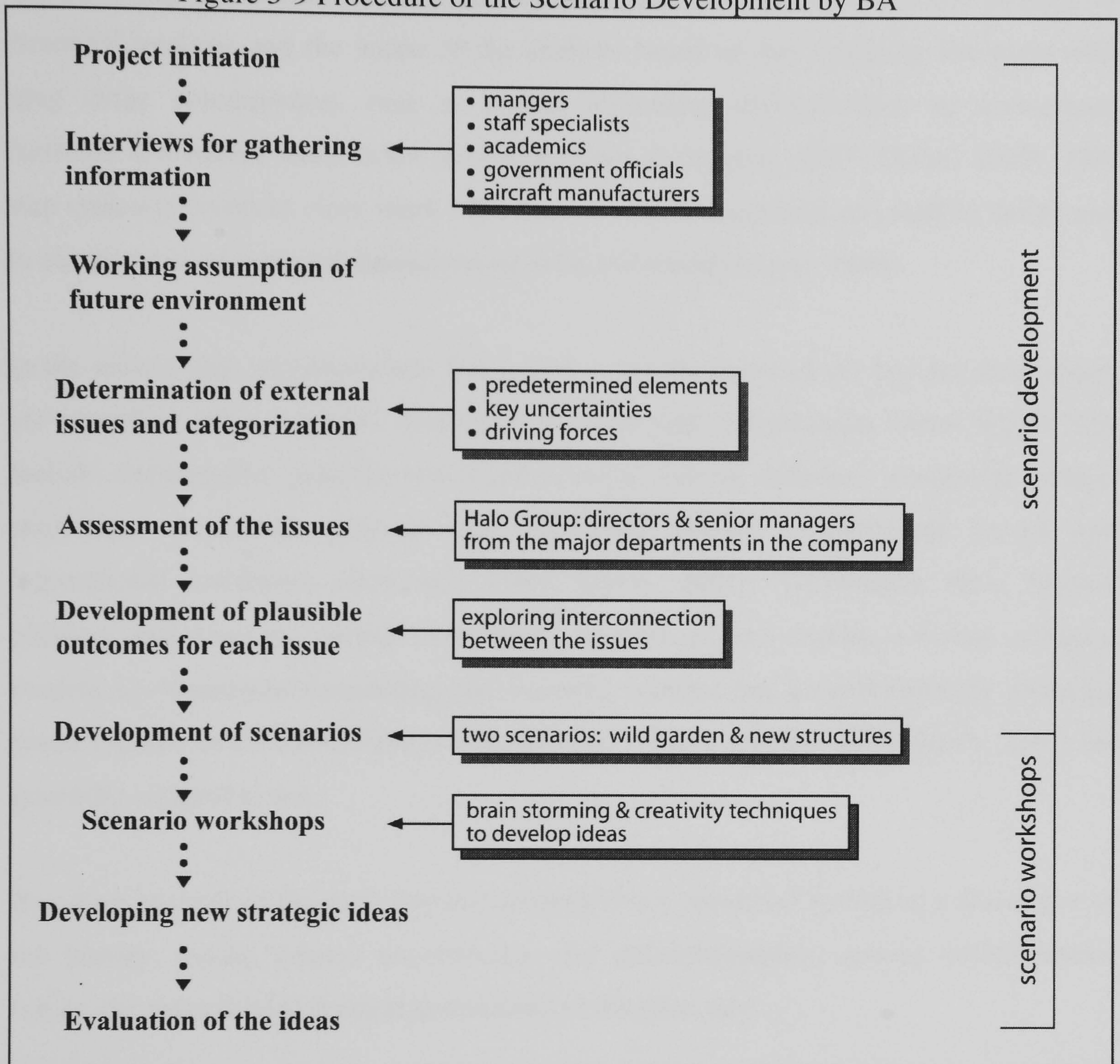
### **5.7.5 Scenarios Development in British Air Line.**

In 1994, British Airways, the world's largest international passenger airline, adopted future thinking through scenario planning in order to develop further its strategic thinking in the light of an uncertain future. Their scenario development procedure began with determining external issues which were facing the airline by intensive interviews with managers, staff specialists, academics, government officials and aircraft manufacturers. From the interview results, a story that summarised the managers' working assumptions about the future environment, was composed and important external issues were identified. These were classified into three categories: predetermined elements, key uncertainties and driving forces. They were later narrowed down to eleven and presented to the 'Halo Group' that consists of fourteen directors and senior managers who represented the major departments in the company.

Once the issues were assessed by the group, challenging plausible outcomes for each of the issues were then developed on the basis of an in-depth understanding of each issue and the identification of the critical events which would bring about each outcome. In the next phase of the procedure, the development team explored the interconnection between the issues and reached a decision to focus on the relationship between growth and governance as the organising issue and to develop two stories, each covering a 10-year time horizon. Outputs from this phase later formed the basis from which the scenarios were written.

The scenarios built in this process were presented to the participants of the scenario workshops and discussed to provide a structured framework for developing new strategies and testing existing ones. New strategic ideas for each scenario were then generated by brainstorming and creativity techniques and the most valuable ideas among them were summarised into strategic statements. This was followed by the evaluation works of the new strategies developed in one scenario against the other scenario and the existing strategies against both scenarios were conducted for testing robustness. Figure 5-9 demonstrates the scenario planning procedure taken by British Air Line.

Figure 5-9 Procedure of the Scenario Development by BA



Source: Moyer (1996)

Based on the reviews and analysis on the scenario development processes, the six key dimensions of scenario development that are commonly shared by the models, are identified as follow.

Step 1- Identify and analyse the key issue, the decisions and strategic concerns

Step 2- Identify the key decision factors in the micro and macro-environment

Step 3- Determine the main driving force (driver)

Step 4- Defining scenario logics or rationale

Step 5- Composing scenarios

## Step 6- Implications for decisions and strategies

The first step defines the internal and external key variables which is the purpose of structural analysis and the scope of the analysis based on key company decisions with long range consequences such as capital allocation, diversification or divestment, facilities investment and market strategies (Huss & Honton, 1987; Godet, 2000). This step typically involves close work with the relevant management and staff to define and to clarify what decisions and concerns need be addressed (Mayer, 1996)

In the second step, environmental forces that shape the status of the key decision factors are identified such as social, economic, political and technological forces which may include demographic patterns, social and lifestyle factors, economic conditions, natural resources, ecosystem, political and regulatory forces, technological forces and international conditions (Schwartz, 1999; Davis, 2001). To identify these factors, planners and analysts, outside consultants, specialized information services, business models, environmental monitoring and scanning systems, and general literature about the future (Aaker, et al., 1998; Ahituv and Machlin, 1998; Michman, 1998; Davis, 2001) are generally adopted to use.

Based on analysis of the each key environment force identified including a discussion of the history, trends, critical uncertainties and interrelationships among environmental forces, the main driving force is determined as the third step.

Next, in the fourth step scenarios logics are defined to organise themes, principles, or assumptions that provide each scenario with a coherent, consistent and plausible logical underpinning (Wack, 1985; Schwartz, 1992). These scenario logics should describe alternative futures and present opportunities and threats to the user company by encompassing most of the condition and uncertainties in preceding steps (Huss and Honton, 1987).

In the fifth step, scenarios are composed remaining explicit about underlying logics and associated key assumptions. The content, organisation and length of the manuscripts are

dependent on the intended use and audience. Scenarios are structured by three different ways: inductive, deductive, and incremental methods (van der Heijden, 1996). In the inductive method scenarios are built step by step on the data available and structured by themselves. While the deductive method builds scenarios depending on a framework the analyst infers to start with, into which pieces of data are fitted.

The incremental method aims lower and is useful if the client team still needs to be convinced that the scenario approach offers an opportunity to enhance the strategic conversation. The first step in this approach is for the scenario team to analyse carefully the official future scenario by using 'trend analysis' which helps to identify any trends in a direction that can undermine the structure on which the forecast is based on and 'actor logic' which contributes to identify the most important stakeholders in the official future from whose perspectives the forecast is analysed.

The sixth step analyses if information about the future validates the original assumptions supporting strategies or proposed decisions and the scenarios imply for the design and timing of particular strategies. What kind of flexibility and resilience the scenarios suggest and what factors and forces deserve monitoring in light of information from the scenarios are also important factors to be analysed in this step.

Scenarios are typically developed in sets to effectively tackle the range of possible future developments in key uncertainty areas and describe the behaviour of a collection of key uncertain factors. There are several opinions for the number of scenarios that should be prepared. Zentner (1975), for instance, suggested that three is about right as he noted that in a situation where six scenarios were developed, three were ignored and only one used. Schwartz (1992) and Wagar (1992) also supported that three is a common number of scenarios to be developed. British Airways developed two scenarios to provide the extremes of the range of possible futures (Moyer, 1996). McNulty (1992) also considered two scenarios to avoid the danger of developing three scenarios in which one will be seen as the middle, most likely, and the other two rejected as extremes so that the purpose of developing the scenarios is lost. However, the number of scenarios should be decided

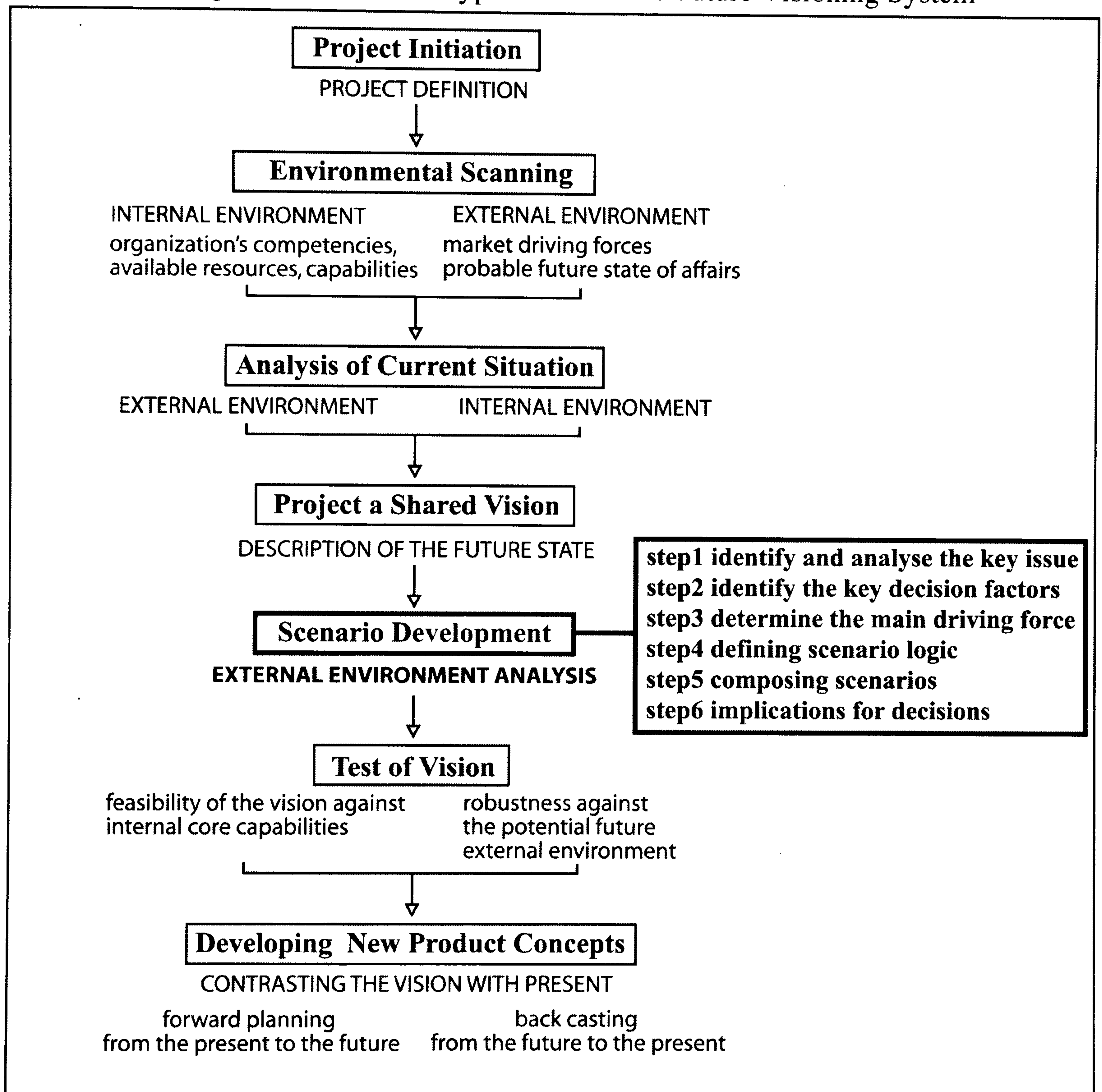
depending on the circumstances between two and four to realise the potential of the technique by emphasising the uncertainty of the future because to provide alternatives there must be more than one and to avoid organisational impracticality and the confusion of too many alternatives there cannot be more than four (May, 1996; van der Heijden, 1996). According to what Shell found through its experiments with four, three and two scenarios, there are some of differences between four, three and two scenarios: four scenarios encourage divergent thinking and are useful for creating vision; three scenarios lead to the expectation that one is “ the forecast”; two scenarios allow two very distinct ones to be developed (Ringland, 1998). It is not, of course, guaranteed that the chosen scenarios will pinpoint out what the eventual future is like because they are not intended as accurate forecasts, but as tools to help us deal with the inherent uncertainty of the future.

There are some prerequisites for the scenario approach to be credible and useful. Scenarios must grow logically in a cause/effect way from the past and the present so that each scenario is equipped with plausibility (Van der Heijden, 1996). Porter (1985) and Millet (1988) argued that internal consistency within each scenario also should be assured so that events within a scenario are related through cause/effect lines of argument. Foster (1993) identified that good scenarios focus on different futures rather than variations on one theme and will last for some length of time. Schoemaker (1991) states that good scenarios should stretch people’s beliefs, degrees of confidence, and problem perception so as to increase the effectiveness of decision making. In addition to these general requirements, Van der Heijden (1996) adds that the scenarios should be built on the scenario planner’s flexibility about deciding how the stories will be built, what ends up in which story, and what organising principles will be applied to cut up the territory into individual story lines.

When the scenario development process is added into the visioning process that was figured out in the previous section in this chapter for the enhancement in the light of both dealing with uncertainties of the future and ensuring the robustness of the vision at the stage of testing the vision. The enhanced process would proceed with analysing the

current situation by information scanning about the internal and external environment. This analysis results in projecting the future state vision. Then, scenarios are developed on the basis of external environment analysis to test the vision against them. Once feasibility and robustness of the vision is validated through the future scenarios, the vision is contrasted with present state to provide the actions and strategic options. The process of the revised visioning methodology is as follows (Figure 5-10).

Figure 5-10 2<sup>nd</sup> Prototype Model of the Future Visioning System



### 5.8 Environmental Scanning for Gathering Information

In the future visioning process there are needs for an effective management in gathering information from both external and internal environment to ensure that the resultant

vision is well grounded in reality and practicality and the scenarios in credibility. Godet (2001) argues, in this sense, that because insufficient information or misinformation is one of the main causes of error in development of future vision, it is required that the right amount of information should be gathered and information must always be checked against the source and the channel. In other words, gathering information should be conducted in a systematic way that has a methodical and organised manner. In this section it is discussed how information gathering in the visioning process can be conducted and managed to provide the right information required and enhance efficiency in the visioning procedure.

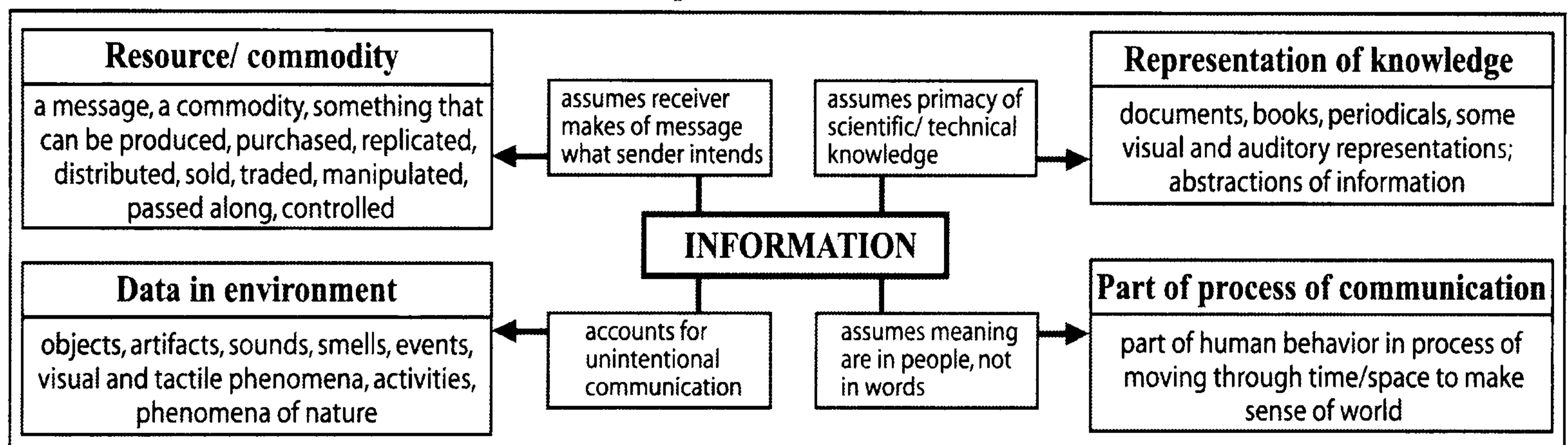
### **5.8.1 Conceptualisations of Information**

Information is meant by a thing or resource, a commodity that can be produced, purchased, replicated, distributed, manipulated, passed along, controlled, traded and sold (Buckland, 1991; Hirschleifer & Riley, 1992; McCreddie & Rice, 1999). This conceptualisation is consistent with a model of sending information as a message from sender to receiver. This assumes that receiver makes of message what sender intends and value can be added as the information is disseminated or exchanged. In its broad meaning, information can be defined as data in the environment available for interaction with human information processing capabilities. This conceptualisation of information is an economic treatment of information as an indication of value of some object or the objective basis for subjective beliefs on which decision are actually based (Hirschleifer & Riley, 1992). This environmental approach assumes that information environments involve intersections of sets of people, classes of problems, work settings and what constitutes problem resolution which are contexts for various kinds of information needs, with constraints on, habitual patterns of and resources for, accessing information (Taylor, 1996; Katzer & Fletcher, 1996).

In the tradition of scientific method and scholarly publication, information is viewed as a representation of, or pointer to, knowledge (Lievrrouw, 1988). This approach assumes that the printed document is the primary representation of knowledge and the alternatives to print such as representations of knowledge available on video- or audio-tape, videodisc,

CD-ROM, Internet or other electronic and computer media (McCreadie & Rice, 1999). According to Atwood and Dervin (1982), information is also defined as part of the communication process as part of human behaviour in the process of moving through space/time to make sense of one's world. In this sense, Solomon (1997) asserted that information gathering and processing are inherent regular activities that constitute the very nature of what people in organisations do rather than physical or cognitive activities separate from work. These depend heavily on personal interactions inside and outside of the agency, action deadlines, emergence of other priorities, satisfaction, self-interest, privacy, diversity in information processing styles and separate and joint situational sense-making (McCreadie & Rice, 1999). An assumption in this approach is that understanding must be based on observation of human behaviour in the information seeking and sense making processes and on the meanings intended and interpreted by the participants. Figure 5-11 sums up the concepts of information discussed above.

Figure 5-11 Conceptualizations of information



### 5.8.2 Distinguishing Terminology

To prevent misuses of terms such as 'knowledge' and 'data' against information in the context of managing information and give more clear idea about information, it is necessary to distinguish the definitions of knowledge and data from that of information. Marsh (1997) argues that data is used to describe facts and quantities as stored in a computational format without a wider sense of meaning, context or interpretation. When data is organised or given structure and endowed with meaning, it can be defined as information. While, knowledge is considered to consist of an awareness of facts and comprises an assimilation of related information addressed in the context of a frame of reference (Rodgers & Clarkson, 2000). Nonaka & Takeuchi (1995) argued that



knowledge is essentially related to human action and affected by information which makes visible previously invisible meanings or sheds light on unexpected connections. Knowledge comes in two main kinds: knowledge about things, and know-how which are available to us at various levels from 'tacit'-what we know and use without expressing it in words, to 'explicit'-what we can readily formulate and explain. It also depends on memory which comes in two kinds: internal- inside our heads, and external-knowledge put into external stores like libraries or databases or reference books (Orna, 1999)

### **5.8.3 Characteristic of Information**

Several researchers (Gordon & Narayanan, 1984; Chenhall & Morris, 1986; Mangaliso, 1995,) suggested that each item of information has a source (where information is originated from; external or internal sources), scope (the range of events, places, people, and things information does represent), level of aggregation (the degree of summarisation performed on information), time-horizon (information may report what has happened or what is expected to occur), currency (the age of the information appropriate for decision making, the length of time between something occurring and the event being reflected in the information), required accuracy (the extent to which the output information is sufficiently correct to satisfy its intended use), and frequency of use (how frequently information is used). Basing upon these characteristics, it is suggested that there are some requirements for good information. Firstly it should be broad and wide scope in its representation to facilitate decision making (Gorry & Scott-Morton, 1971; Senn, 1987). Secondly, information should be timely in receiving quickly and on time (Mangaliso, 1995). Thirdly, it should cover current or the most recent events for appropriate decision making (Senn, 1987; Li, 1997). Fourthly, good information needs to be aggregated and not overly complex since sophisticated and detailed information may cause information overload (Ashill & Jobber, 2001). Fifthly, information should be accurate and correct to be error free in their intended use (Li, 1997). Finally, information should be verifiable by checking many sources for the same information (Stair, 1992).

#### **5.8.4 Basic Methods of Information Scanning**

To capture information it is important to decide where to look and what to look for. It requires specific research and its methods. In this respect, there are three basic methods of getting information which indicates the key factors: reading, discussions and thinking (Davis, 2001).

- a) Reading: Reading published materials is a useful tool to find surprises-perceptions that are new and then become part of existing perceptions. Newspapers, books, magazines, and articles are important mediums to get information which are currently prevailing and emerging. In reading these four parts serendipity plays as much of a role as do scans of tables of contents and search engines. Reading across as many disciplines, subjects, and social strata as possible is also vital to broaden ranges of information and to seek out things that would not ordinarily be the idea of interesting reading matter.

Because our own preconceptions sometimes keep us from paying attention to ideas that challenge conventional wisdom, it is necessary to break through them without opening ourselves completely to new ideas. If we open up completely, we will drown in trivia. Every good magazine editor is a clarifier who wades into a muck of new ideas and fringe suggestions and reshapes it in a coherent form, filtered for readers to use. They act on our behalf, discarding everything but the information that might be of interest to us. This kind of mediation, traditionally performed by editors and publishers of newspapers, books, and magazines, is one way of getting objective information or opinions discussing the differences.

- b) Discussion: People are a key source of information. Talking to people who have unconventional thinking leads to open exploration of ideas and articulation of the ideas. Sometimes they are specialists whose insight illuminates vistas outside their specialty. Interactions with these experts is particularly useful when the kernel of an idea needs to be worked out more clearly. Attending conferences is also one of methods to listen to people and get the ideas. Conversation in the conferences or outside the meeting rooms provides lots of hits and information.

However, they are the source not just of facts, but of judgement so that it is required not to evaluate such people by how often they are right, but how often they bring a new way of looking at something. To catch any remarks from people that catalyses better understanding should be the purpose of having conversation.

- c) **Thinking:** The thinking process is the activity where meaning is assigned to the information gathered, thereby transforming it into knowledge. The process takes place concurrently with information gathering process, i.e. meaning is assigned to information the moment it is received from the data sources. This transformation activity may also continue after the information has been gathered. For instance, when two or more individuals interact, discussing and debating the meaning of information, or when individuals are brought together specifically to work on a development project. When this transformation process takes place in an individual or group setting, such soft factors as group dynamics, strength of character or seniority as well as the social and political environment of the group may affect the outcomes. In this sense, how to control those factors is important to lead the transformation process onto the right track. Three principles of the transformation activity identified by Bruce and Cooper (2000) are below.
- identification of significant new and existing transformation mechanisms- firms need to identify and attach significance to those mechanisms that allow them to translate successfully requirements knowledge into products and services.
  - the development of new and existing transformation mechanisms- knowing which mechanisms are more useful than others will allow firms to focus their efforts on developing interaction with the origins of requirements knowledge.
  - the strategic placement of transformation mechanisms- once transformation mechanisms have been identified, firms should strategically place such mechanisms according to the type and nature of product development projects.

### **5.8.5 Assessing Information**

It is important for individuals who conduct information scanning to set tools that will enable them instantly to check the robustness and veracity of incoming information.

Regarding this matter, Smith and Fletcher (2001) provides 'twelve-point checklist' to help establish whether a piece of incoming information is sufficiently robust for further consideration.

First, *the believability check*: information should be assessed by undertaking a straightforward, common sense, face value 'believability check' to examine both an efforts to imitate what has gone before and whether new ideas can still be embraced as long as they do not fly totally in the face of existing knowledge, ideas and value.

Second, *Twyman's Law*: any remarkable piece of information that look particularly exciting should be checked to prevent that it turns out later to be wrong and a mistake.

Third, *Internal consistency check*: it should be checked that the information are internally consistent with other information in the information-sets.

Fourth, *the underlying assumptions*: any assumptions that underpin the information being presented must be evaluated.

Fifth, *the professionalism check*: robustness of a piece of information can be checked by establishing how much precision and attention to detail has been demonstrated by those who provided the information. If the detail is right, the information can be validated to trust. The level of detail and precision of information are assessed through specifically checking 'definitions', 'ambiguities', 'biases', 'reliability'.

Sixth, *He would say that wouldn't he?*: information can also validated through checking the motivation of the information providers or an investigation. If there is any suspicion that there is anything untoward in this area, then it is worth going back and revisiting this issue.

Seventh, *Chinese whispers*: it should be checked whether any embellishment or critiques are added on to information as information is delivered by the information provider.

Eighth, *Spin*: over-simplistication or reassembling of information which causes a major difference between at the time of the event and the time of receiving information, should be noticed to prevent contaminating decision.

Ninth, *Norms and benchmarks*: another way of establishing the robustness of a piece of information is to see where it fits into the wider, normative context of the area investigated.

Tenth, *Corroboration*: check whether there is anything anyone else knows or can find out from other sources, that will confirm the figure or data being presented and the interpretation subsequently placed upon them

Eleventh, *Back to the core evidence*: to check the robustness of an item of evidence and to dig into any aspects of the problem which is unsure, it may be useful to go back to the investigation evidence and inspect them such as the audio tapes or video tapes of in-depth interviews.

Last, *Confirmation*: checking whether the interpretation that has initially been placed on a particular piece of information can be fed back to the person who originally collected that information to know whether the originator agrees with the subsequent third-party interpretation which is conducted by different experts.

However, the information assessment should be conducted in an effective way to make flexible decisions because of the evolution of changes in the environment which may make the information outdated by the time sufficient information has been collected to enable an analysis to be made (Brownile, 1992). In this sense, Ansoff (1984) argued that the assessment of information should be carried out as the scanning process goes on instead of waiting for sufficient information or certain amount of information to accumulate.

### **5.8.6 Target Information**

In the future visioning process model, information scanning is required at both vision and scenarios development stages. In the development of a future vision, information scanning starts from accessing into the internal environments to identify the organisation's present state and analyse its resources and capability. This enables the firm to figure out its internal strategic factors which are likely to determine if the firm will be able to take advantage of the opportunities identified through the future vision which will be developed in the later stage of the future visioning process. When the internal strategic factors are contrasted against the future vision, and approved to be enough to tackle the level of standards the future vision requires, those then become a fine basis for developing new product ideas.

To identify internal strategic factors, information scanning in the internal environment should be concerned with identifying and developing an organisation's resources. According to Johnson and Scholes (2002), an organisation's resource can be classified under four headings which the contents the information scanning process aims to detect: 'Physical Resources' - such as machines, buildings or production capacity whose nature including the age, condition, capability and location of each resources, will determine the usefulness of the resources; 'Human Resources' - including knowledge, skills of people and adaptability of human resources; 'Financial Resources' - such as capital, cash, debtors and creditors and suppliers of money; 'Intellectual Capital' - the intangible resources of an organisation including the knowledge that has been captured in patents, brands, business systems, customer databases and relationships with partners. When these available resources are identified, the current state of the organisation and its strategic capability can be underpinned since it is resources that are deployed into the activities of the organisation to create competences.

Furthermore, to distinguish the unique resources which have the most strategic value, these available resources should be then examined. For the examination of the resources, Pearce and Robinson (2000) suggested four guidelines helpful to undertake: Disaggregate resources-break them down into more specific competencies rather than stay with broad categorization; Utilise a functional perspective- look at different functional areas of the firm; Look at organisational possesses and combinations of resources and not only at isolated assets or capabilities; Use the value chain approach which uncovers organisational capabilities, activities and processes that are valuable potential sources of competitive advantage.

In the development process of future vision, information scanning in external-environments of organisation is also required for the examination of the organisation's future environment such as future market, competitive conditions, and cultural trends, which becomes a firm foundation for projecting a plausible future vision. Because what happens tomorrow depends on today's environment changes and moves, the information

scanning process should focus on detecting the changes in major environmental sectors (Campbell, 1997; Michman, 1998; Ahituv, et al., 1998): Economic, Social and Cultural, Political and Legal, and Technological sector.

For the scenario development, information scanning is required for identifying the external key variables such as economic, political, social and technological forces which influence and shape the status of the key decision factors, and determine a prior driving force among them based on the analysis of the key variables identified. However, because the information scanning process at this stage of scenario development is carried out in similar contents of the information scanning done at the early stage of the future vision development process, it should be conducted in a simplified manner to avoid spending time on the tasks that may be duplicated. For this reason, the information scanning in external environmental forces must be carried out intensively in relation to covering both developments of future vision and scenarios.

Economic changes are normally developed from movements in the direction and magnitude of various fundamental elements such as gross national product, personal income, consumer and government spending, availability of capital, interest rates, employment versus unemployment, and savings and debt patterns. These changes have influences on the formulation of the future by affecting consumer purchasing. For example, if changes in the economy are accompanied by changes in the interest rate, the changes directly affect the total price borrowers must pay for product so that the interest rate affects when they will buy. Because the global economy is connected and the effect of changes in the economy can be far-reaching and rapid due to the increases in the amount of international trade, the economic environment and the fundamental elements should be carefully watched to detect signs of change and respond immediately to them.

Social and cultural changes are normally initiated from changing consumer values and life styles and the impact of social issues such as consumerism and marketing to subcultures comprising senior citizen groups or minority groups. For instance, cultural change is invariably accompanied by innovations in the language used to describe a

particular subject, or in the meanings assigned to existing linguistic usage so that changing use of language is one of the primary signals that culture is being re-formed (Rochon, 1998). Social and cultural changes affect how and why people live and behave as they do and influence customer buying behaviour and eventually the economic, political, and legal environment. These changes are difficult to study and to be encouraged in the short run because most of the changes in basic cultural values and social attitudes take place in a highly decentralised way, largely in the invisible settings within which individuals go about their daily lives. However, cultural and social changes leave a readily observable imprint in the form of new ideas that are widely discussed because of the link between values and public discourse. Skinner (1978) observes that the surest sign that a society has entered into the secure possession of a new concept is that a new vocabulary will be developed, in terms of which the concept can then be publicly articulated and discussed. Thus, the cultural and social changes can be observed by examining the diffusion of new concepts in the mass media, in political speeches and judicial decisions, and in the writings of academia.

The changes in the political environment emanate from a country's institutional arrangements affected by the tendency in democratic states such as to have regular elections, competing political parties offering alternative policies, and a system of pressure groups, which usually help to generate a degree of discontinuity and to make predictions about the future become more uncertain. Because the nature of institutional arrangements tends to reflect certain underlying social values and philosophies which determine how decisions are made (Worthington and Britton, 2000), the changes in the political environment can be detected basically by monitoring the shifts in social values and philosophies. Changes in the political environment often lead to changes in the legal environment and in the way existing laws are enforced. The changes in legal environment affect the future by regulating the basic rules for how a business can operate such as regulating transfers of products and services, money, and people transfers, and technology transfers in international level business (Bradley, 1999).



Technology at a macro-level refers to the standards, practices, and technological know-how that is embedded in the various institutions such as universities, research centres, business firms, government organisations. At the micro level and with the help of the resource-based view of the firm, technology can be seen as a firm specific intangible resource that is embodied in a number of physical and human assets. These two dimensions are not independent because the more tacit elements one includes in the concept of technology, the more firm specific it becomes. Technology influences the future by affecting society in two basic ways: with new products and with new processes (ways of doing things). As technology develops substitute ways, it leads to the development of new or improved products that enhance the quality of life. For example, advances in electronic communications make it possible for people to exchange information over the Internet easily, and computers allow more sophisticated planning and control. At business level, technology influences every aspect of the marketing mix. It lowers production and operating costs, improves product quality, facilitates communications with customers, and improves product distribution.

Technological changes are identified into two types: continuous or incremental change, on one side, and discontinuous or breakthrough change on the other. Incremental or continuous technological change emerges from gradual, often indiscernible technological flows, that improve on existing products or processes. Discontinuous or breakthrough technological change, in contrast, comes from revolutionary technological advances due to the invention of new products or processes. However, most of technological changes have been made with specific social purposes in mind and influenced by values of culture (Pacey, 1996). Technological changes can, therefore, be noticed in terms of monitoring how present technology makes mutual adjustments with social and cultural factors.

#### **5.8.7 Interpretation of Signals and Confirmation of Potential Change**

At the stage of detecting signals of changes, signals are given meaning and their implications for the formulation of the future. when even a few indicators change in the same direction, their future implication should be examined. However, the interpretation of signals is the most central step in the entire scanning process which involves

translating data into particular meanings that are helpful in decision making. It is a highly subjective process. Therefore, the practitioner of information scanning should be disciplined to answer the questions concerning how much change is needed and how long the change should persist in order to merit serious attention.

Once the signals of changes in the environmental sectors are detected and determined to be important, indication that a particular change is likely must be confirmed. Confirmation of signals is achieved in two ways. In the first, the frequency of events or persistence of events in each subcategory is observed. The greater the frequency of occurrence, the more likely is the predicted change to occur or persist. As a second means of confirming signals, the overall trend of an environment should be assessed. Joint trends among two or more environmental categories increases the confidence that can be placed in a prediction.

#### **5.8.8 Deciding a Prior Driving Force**

The purpose of information scanning in external environment factors is to help to make the decisions about the driving forces and their application which influence the directions of the future vision and its success. According to which driving force is focused to understand the process of changes and how the driving force leads other driving factors by various interactions with them, the plot of a scenario and its structure is determined.

Robert (1998) asserted that there are five key drivers that have a significant effect on formulation of the future: Economy, Technology, Globalisation, Government, and Environment. These 'leading drivers' influence other responsive drivers such as demographics and consumer psyche. By monitoring trends in these leading drivers, shifts or changes in the future can be predicted before they occur and over a longer term. Schwartz (1998) also defines the five categories of key driving forces: society, technology, economics, politics, and environment. However, defining the categories of driving forces and deciding significant forces among them usually depends on an understanding of the nature of project and sometimes requires instincts which are part of human nature to be interested in factors that affect the decisions needed to be made.

Because driving forces often seem obvious to one person but hidden to another, deciding driving forces also requires well organised team works in order not to miss the presence of deeper, more fundamental forces behind them.

In the future visioning process which is conducted as a strategic tool of developing new product concepts, it is a prerequisite to assume that technological advance is the most crucial driver that has profound effects on the formulation of the future in terms of enabling development of new product. That is because 'future visioning process' is suggested on the basis of the market driving strategy which is to open new product market with breakthrough products rather than to respond to market needs or customer needs. The 'circuit of culture' (du Gay, et al., 1999) in this case, starts from the production of a new product. As the new product is consumed and practiced by consumers in society, new meaning is generated around the product and regulated in society. When the meaning is accepted by consumer society, which means the product has succeeded, a new circulation of the culture circuit is stimulated by initiating production of next generation of the product. In a business sense, for example, the converging technologies of telecommunications, broadcasting, digital and electronic technologies enhance how customers receive the information about goods and services and increase their shopping alternatives. These changes create new types of market competitions and require a new sense of business to respond.

In their work of future visioning, Philips Design considered technological trends as main driving forces which involve in new socio-cultural trends such as developments in miniaturization of products, increased computing power by the silicon chips, advances in software programs which are able to think for themselves and smart or interactive materials. They assumed that these technological developments and their introductions redefine meanings of time and space that we used to have, and also affect a number of other specific trends: Subjectivity, Exploration, Connectivity, Ethics and Holism. This explanation of the interaction between technological developments and the emerging socio-cultural trends formed the input information to the multidisciplinary initiation

workshops of the 'Vision of the Future' project which resulted in proposals of new products.

However, the potential of technological developments is difficult to predict because its success depends not only on its intrinsic value as an innovation but also on a wide variety of 'real-world' variables such as commercial viability, social need, governmental policies, international standards, and often other technologies which may boost its widespread acceptance. Therefore, the technologies the firm should concentrate on for the scenario development must be limited to those which have the most realistic chance of success and which are most relevant to the firms' field of operations. On this basis, the assumption about technological developments should be formulated from the focusing, refining and merging of existing technologies and their extension to more areas of our lives.

#### **5.8.9 Technological Forecasting**

Since the technology is defined as the most influential driving force that affects other environmental forces in terms of formation of the future, it is necessary for the information scanning process to focus on forecasting technological development and analysing the influence of technological development for helping the development of scenario logics and rationale. Technological forecasting is normally thought of as a set of tools that generate results as the raw material of technology strategies (Ettlie, 2000). A technological forecast should contain four elements (Martino, 1993): the technology that is being forecast; the time of the forecast; a statement of the characteristics of the technology; a statement of the probability associated with the forecast.

#### **5.8.10 Tools for Technological forecasting**

One of the methods is the technology S-curve (Martino, 1993) which represents actual behaviour and a characteristic pattern: a first phase of trial and error, which can take several decades; a second phase of rapid improvement, with multiple breakthroughs; a final, mature phase of incremental improvement and consolidation. This shows how a new technology can create a step improvement in performance. Delphi technique is also

one of the most commonly known technological forecasting methods which is conducted on the assumption that collective expert judgement is a valuable method of forecasting when no data on a technology exists (May, 1996). It systematically captures and uses expert opinions on committees or panels. These special panels do not meet face-to-face; they are characterised by three important conditions: anonymity, iteration with controlled feedback, and statistical response. This method forecasts technological development by systematically asking and summarizing expert judgment through “rounds” of questionnaires interspersed by controlled opinion-feedback.

Monitoring is a particular category of technological forecasting in ease of use. This method leads to a checklist of technology mileposts, especially early in the product development cycle (Hertmann and Lakatos, 1998). Technology scenarios often result from monitoring exercises (Bers, Lynn, and Spurling, 1997). Scenario analysis appears to be an appropriate planning tool for emerging technologies or emerging markets. Scenarios have been used for many years, generally in strategic planning, but the unique focus on technology for forecasting and planning is relatively new to most firms.

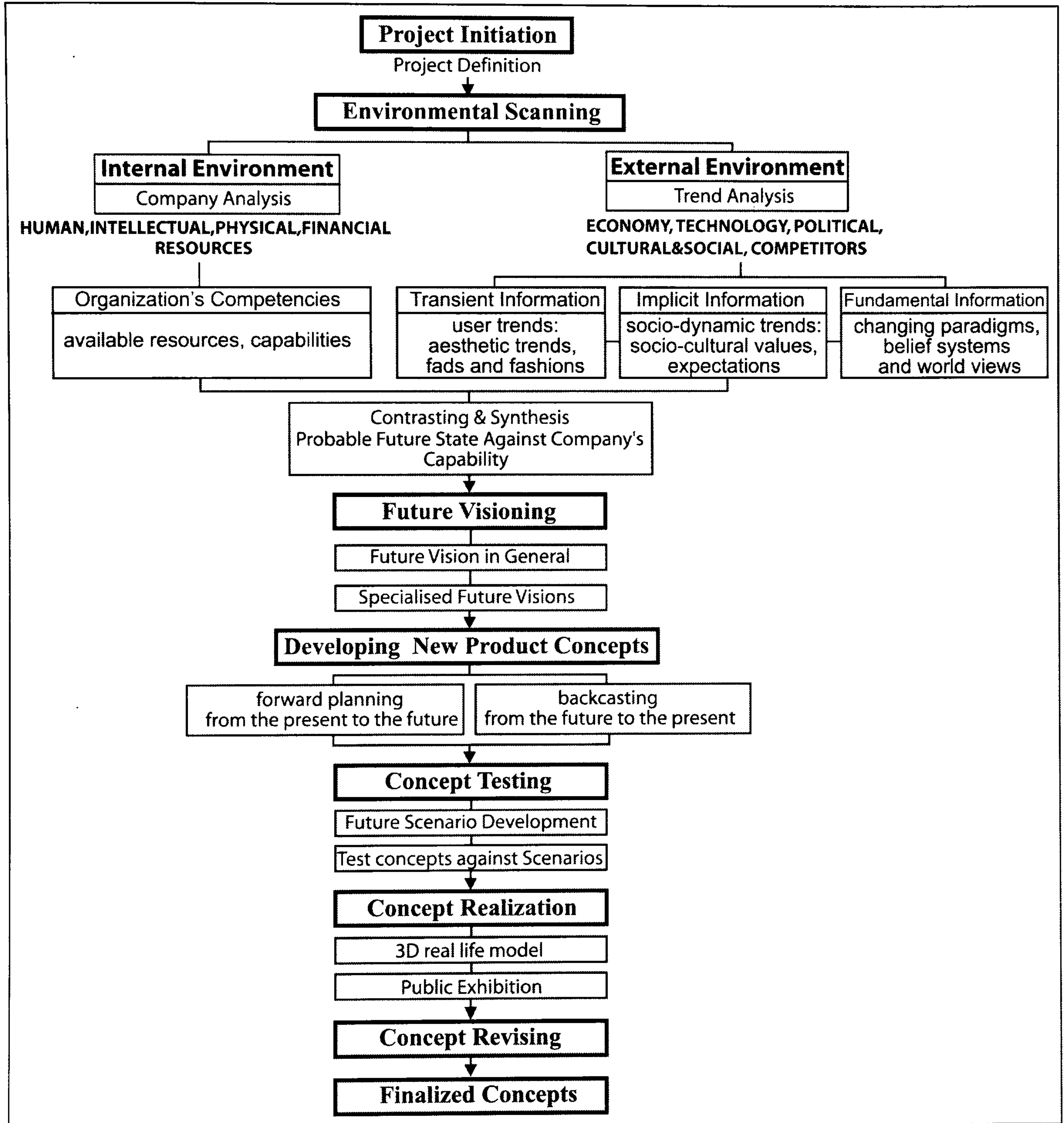
However, Ettlé (2000) argues that there are needs to use multiple forecasting methods and to match the appropriate methods to the situation to avoid gross forecasting errors. Choosing the right technological forecasting method depends on a few important factors. Levary and Han (1995) suggested the choice of technology forecasting methods depends in various circumstances as follows:

1. Money availability-money for development allows for relatively more effort in forecasting, but might also shorten the development cycle.
2. Data availability- Delphi requires little data; trend extrapolation requires more data
3. Data validity-some methods require exacting standards; others are robust
4. Uncertainty of success-some methods handle uncertainty better than others
5. Similarity of proposed and existing technologies-the greater the likelihood of realizing the outcome.

- Number of variables affecting development- some methods incorporate multiple factors better than others.

The findings from the discussion of the environmental scanning above provide the specified content of the information gathering. The structure of the 2<sup>nd</sup> prototype model (Figure 5-10) is revised as below if the findings are applied (Figure 5-12).

Figure 5-12 3<sup>rd</sup> Prototype Model of Future Visioning System



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## **Part II. Company Research**

### **II.1 Introduction**

As discussed in previous chapters adopting a proactive new product strategy which enables the firms to have market domination through developing breakthrough products, can be a strategic tool for companies operating in a highly competitive market where technological advances and consumer expectations are driving change. In this perspective, future visioning is suggested as a method for the development of new product concept that implements a proactive new product strategy.

In this chapter validity of these hypothetical suggestions are assessed through exploring cases of four companies: Sony, Philips, Samsung and LG. The discussion about Sony is evolved in some points: (1) how does Sony cope with the hostile market environment through their 'one step ahead' new product strategy?; (2) what makes them to maintain their market domination over their competitors? (3) what are the elemental activities that help implement the strategy? For the implementation of the proactive product strategy it is suggested to devise a new approach to developing new product concepts in terms of improving time efficiency of new product development process and developing quality product concepts of breakthrough products. The case of Philips also discusses this matter and provides evidences of how the concept development through anticipating the future can be adapted as a tool of new product concept development in practice. In this discussion their 'vision of the future' project is analysed from project background to application of its outcomes for providing a mechanism of how the future visioning process can be organised for generating new product concepts. The case of Samsung electronics discusses their 'Grand Map' approach and suggests an experimental way of understanding logics of history evolution that enables designers to anticipate the direction of the future. The case of LG provides a ways that company should conduct information scanning and information management by discussing LG's information infrastructure including global design monitoring system, design library system, design collaboration system and design management system.

With the outcomes of these case studies, the first model of the future visioning system is revised in structural points and some suggestions for managing operation of the future visioning system model are made.

## Chapter 6. Sony: Digital Dream

### 6.1 Company Business Overview

Sony is the 30<sup>th</sup> biggest company in the world, with global sales of more than 51 US billion dollars and worldwide employment of 170,000 people. It faces a challenging environment where competition is intense on a price platform and on a platform of innovation, and where the potential of true multimedia technology is only beginning to be recognised. In response the company restructured its organisation in order to reduce its costs and to improve its responsiveness to a rapidly changing market. Since the restructuring in 2000 they have been six distinct business group operating: Electronics, Games, Music, Pictures, Insurance and Other. Among the business groups Electronics is by far the largest division at Sony, accounting for 64% of total sales in 1999. This division forms the backbone of Sony, with other areas holding a complementary role which extends the profitability of the Electronics division (Table 6-1).

Table 6-1 Sony Corp: Net Sales and Operating Profits by Division 1999/2001

Billion Yen	1999		2000		2001	
	Sales	Profits	Sales	Profits	Sales	Profits
Electronics	4,670	121	4,720	101	5,524	249
Game	784	136	655	77	661	-51
Music	759	37	707	28	612	21
Pictures	546	39	495	36	555	4
Insurance	339	18	380	21	427	18
Other	291	0	361	-10	405	-11

Source: Sony(2001) : Annual Report 2001

### 6.2 Structure of Sony Electronics

Before restructuring the electronics division consisted of five sub-groupings which is product-centred units, namely Audio, Video, Televisions, Information & Communications and Electronic Components & Other (Table 6-2).

Table 6-2 Product Lines according to the five product categories.

Audio	MD systems, CD players, headphone stereos, personal component stereos, hi-fi components, radio-cassette tape recorders, tape recorders, IC recorders, radios, headphones, car audio, professional-use audio equipment, audiotapes and recordable MDs
Video	8mm/Digital8, DV-and VHS-format VTRs, DVD-Video players, digital still cameras, broadcast- and professional-use video equipment, and videotapes.
Televisions	TVs, projection TVs, flat display panels, personal LCD monitors,

	car TVs, and professional use monitors/projectors
Information & communications	Computer displays, personal computers, computer peripherals, satellite broadcasting reception systems, cellular phones, telephones, car navigation systems, and video printers
Electronic components & other	Semiconductors, LCDs, electronic components, CRTs, optical pickups, batteries, and FA systems

Source: Sony(1999): Annual Report 1999

Sony reorganized the five divisions into three Network Companies which is a more fluid structure based around the concept of multimedia “networks” in order to reflect the needs of a multimedia market place, where the lines between audio, video, PC and gaming equipment is becoming increasingly blurred:

Home Network Company: responsible for developing hardware including colour TVs, Video decks, audio products, and related business.

Personal IT Network Company: responsible for telecommunication products, home-use PCs, digital imaging devices, and related business

Core Technology & Network Company: responsible for semiconductors, storage media, batteries, electronic components, circuit boards, factory automation systems and related business.

### **6.3 Sony Electronics’ Corporate Strategies**

In the field of electronics, digitisation has improved dramatically both the performance and functions of products while at the same time promoting their networking capability. Furthermore, in addition to altering the very nature of products, digitisation and the spread of networks are also transforming the entire spectrum of business processes, from development and production to marketing. In this environment, Sony believes the key factors are to maintain its brand value in the market and to accelerate the pace of changes within Sony.

In terms of maintaining brand value, Sony intends to enhance research and development activities and streamline the manufacturing system, with the goal of enhancing the value of products and expanding market share. In addition, because Sony management

recognises that the Sony name itself gives the most important brand values for the company since the early history of the company, they also operate a number of unifying marketing techniques which work to reinforce the identity of Sony as innovative, youth-focused, exciting and dynamic. These include:

- Company advertising themes “Do you dream in Sony?” and “Digital Dream Kids”: the “Do you dream in Sony” concept looks at the world of technology through a child’s vision of the future, trying an emotional angle gained through ideas such as dream achievement, imagination and fantasy with a practical reinforcement of the company’s technological ability.
- Sponsorships under the Sony brand, including Robot World Cup through which the company positions itself as innovative, cutting edge and visionary, and moves away from a cold and distancing scientific image.

In terms of acceleration of changes, Sony management focused on restructuring the organisation to increase the efficiency and flexibility of the division which allow the company to be more responsive to the fast moving industry in the digital age. The restructuring was conducted through the following strategies:

- Transfer of research and support functions from head office to the newly created Network business units;
- Transfer of management authority to the Network units;
- Transfer of authority to create new joint ventures to the Network units.

#### **6.4 New Product Development Strategy: ‘First in the Market’**

From Sony’s earliest days, the company has been focusing on the ‘First in the Market’ strategy which applies the most advanced technology to the area of consumer products and create unique products that would, in turn, create new markets. Translating this strategy into practice has given the company the freedom to make bold moves, pursue markets with products that no one else had, invent rules rather than follow them and develop a management structure that values talent and initiative. To achieve this they define the best technology to use, refine that product and try to create a market for it by educating and communicating with the public instead of doing market research or asking

what kind of products people want. As a result, Sony's successes have come from products for which there was no proven demand (Appendix 3).

This first in the field is sometimes called an 'offensive marketing strategy' as it is one that aims either to create a new market or to capture a market from rivals with a product that is a significant advance over previous ones. This offensive marketing strategy generally implies highest level of risk taking for following reasons:

- The highest levels of R&D expenditures are associated with novel products as the greatest degrees of uncertainty exist.
- Unproven technology may show itself to have inherent drawbacks that either render it unsuitable for its intended use or are prohibitively expensive to eliminate.
- Market acceptability may not be established at the outset and preferences may change during the development cycle.

However, the first in the field strategy gives Sony some significant advantages. Due to the absence of competition, higher profits can be expected from the products as they are first introduced into the market which is growing rapidly. Sony's profile may result from it being perceived as a market leader and could lead to increased sales of other products in their range. And opportunities may exist for licensing the product and thus reaping additional profits for little extra outlay.

By virtue of its strategy as a fast developer of new products, for instance, Sony established its technology as the audio industry standard for the compact disc which enabled them to beat their competitors in high quality digital audio sound market such as Philips, Telefunken, and Victor. In 1982, Sony introduced its first compact disc player and, within four months, introduced four more versions at different prices in an effort to capture a greater share of the market. As a result, Sony has dominated the compact disc market and become a world leader in that market (Table 6-3).



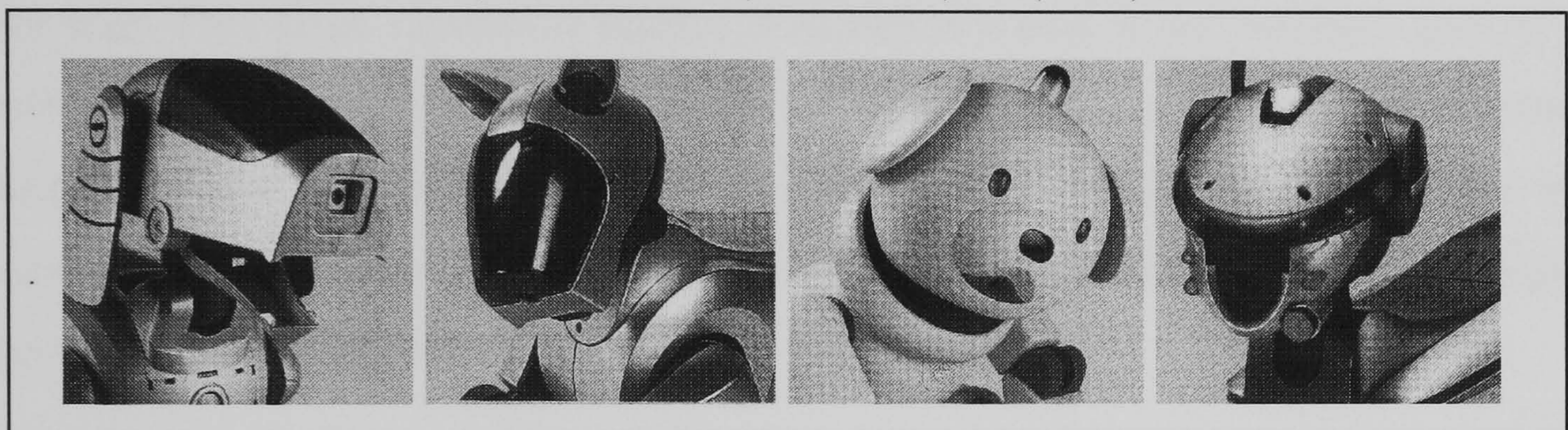
Table 6-3 Top Compact Disc Player Makers, 1999

Makers	Sony	N.A.P	Pioneer	Matsushita	Kenwood	Yamaha	RCA	Other
Share(%)	28	13.0	11.0	10.0	10.0	6.0	6.0	16.0

Source: Appliance(2000)

AIBO robot dog development (Picture 6-1) is one of the recent examples that keeps this principle in its development process like other Sony’s “first products” such as Japan’s first tape recorder in 1950, the world’s first transistorised television in 1960, the first triniton television in 1968, the first home video system in 1975, the walkman in 1979, the first home compact disc player in 1982, the first handhold 8mm video camera in 1985, the first portable compact disc player and MiniDisk player, the first flat-screen television.

Picture 6-1, AIBO Series, ERS-110, 210, 310, 220



As a product which integrates Sony’s AV technology and IT, AIBO opened totally new markets of “home entertainment robots” and also brought a chance to reveal a whole new arm of its consumer electronics business.

### 6.5 Implementation of New Product Development Strategy

To produce ‘one step ahead product’ Sony activates a product development strategy called ‘Sunrise /Sunset’ which has an eight-step process for all products (Figure 6-1). The concept is an assumption that an entire product line evolves, from first appearance to final design, within a single day divided into seven phases (Kunkel, 1999):

First step: this stage represents market creation. Based on emerging new technology engineers and designers work together to develop a product, which is released as a first product in the market. No more than a few thousand first-generation products are made to gain attention from the most curious customers known as “early adopters.”

Second step: this stage is the most important phase of the product cycle. The second generation product is released with new design using more matured mechanism, and determines whether the product line as whole will success. The design of second generation product influences on the next design which will appear at a later stage of product cycle such as late morning products, and the “high-noon” design.

Third step: third generation of product is launched into the market with full design expression targeting opinion and fashion leaders, professionals, and mainstream customers. Ultimate design and technology for the next generation products receive further attention.

Fourth step: This stage represents market domination which is the essential goal of the ultimate version of the product. Product size, performance, price, product statement, functionality, relationship of the product to the media are fully matured so that later versions continues in finer, smaller, and more expressive or elaborate style. The design of the product is seen as the best.

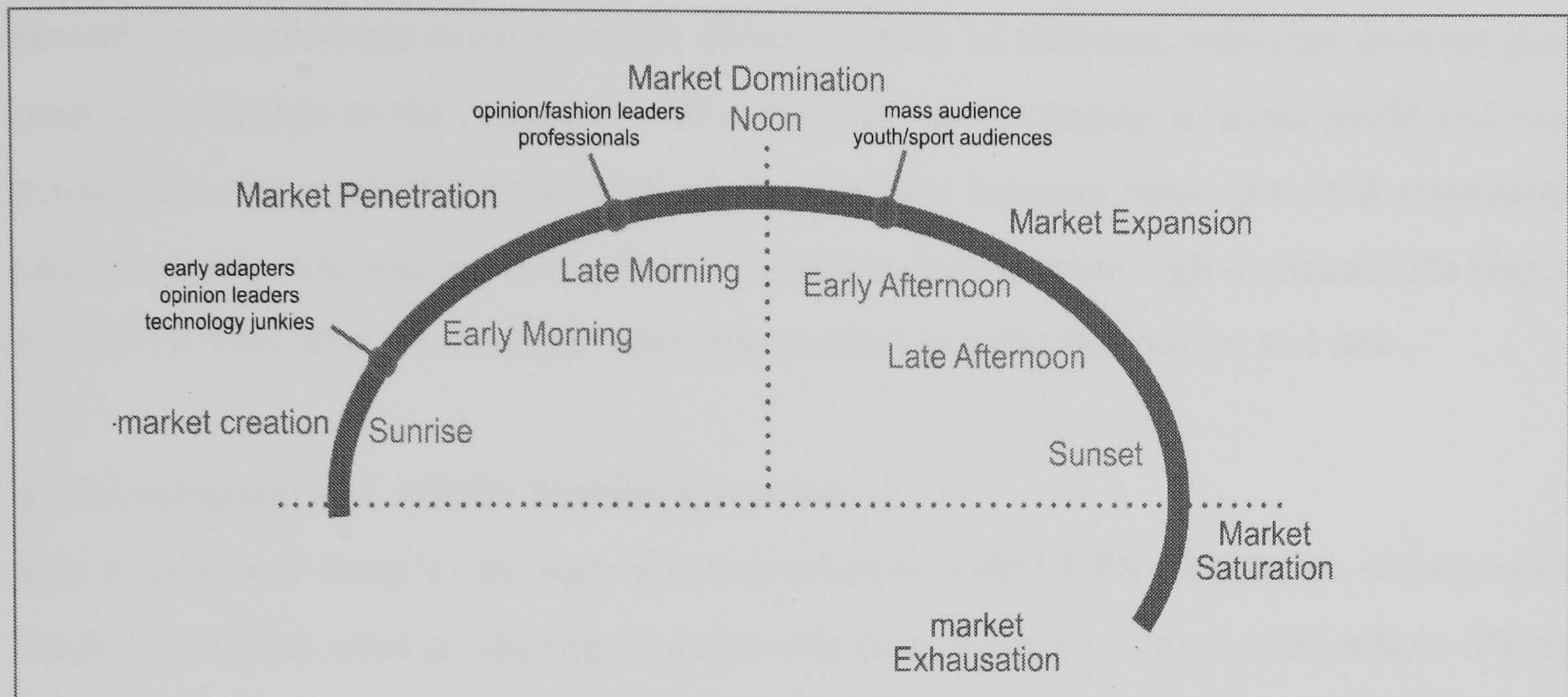
Fifth step: product differentiation is started for sophisticated users, conservative “ middle of the road” types, the fashion-conscious and youth sport audiences.

Sixth step: as product differentiation continues the designs lose their expression and become purely functional. Products are diversified by colour, differences in shape, and cultural/ generational/sexual distinctions. Size of audience reaches the peak prior to sunset stage.

Seventh step: the market is in its maximum size. As product mechanism reaches the ultimate in performance and low cost, sophistication and differentiation of product approaches its logical ends. Design is also replaced by myth-making and image overtakes reality.

Eighth step: market saturation evolves at a measurable rate. Old ideas are recycled for designing products. Sales of the product need to be accelerated before the technology becomes obsolete. The product line dies when the underlying technology is obsolete. As total numbers of audience declines quickly the market becomes exhausted.

Figure 6-1 What Time is it? : Sunrise Sunset Strategy



Source: Sony Corporation

In this strategy technology is a core element that triggers the development project. As a new technology is developed engineer and designer are forced to develop a 'first product' and release it to market quickly so that they create a new market and dominate the market leadership. The subsequent phases are assigned unique tasks which prepares in advance for what happening next in each of the phases.

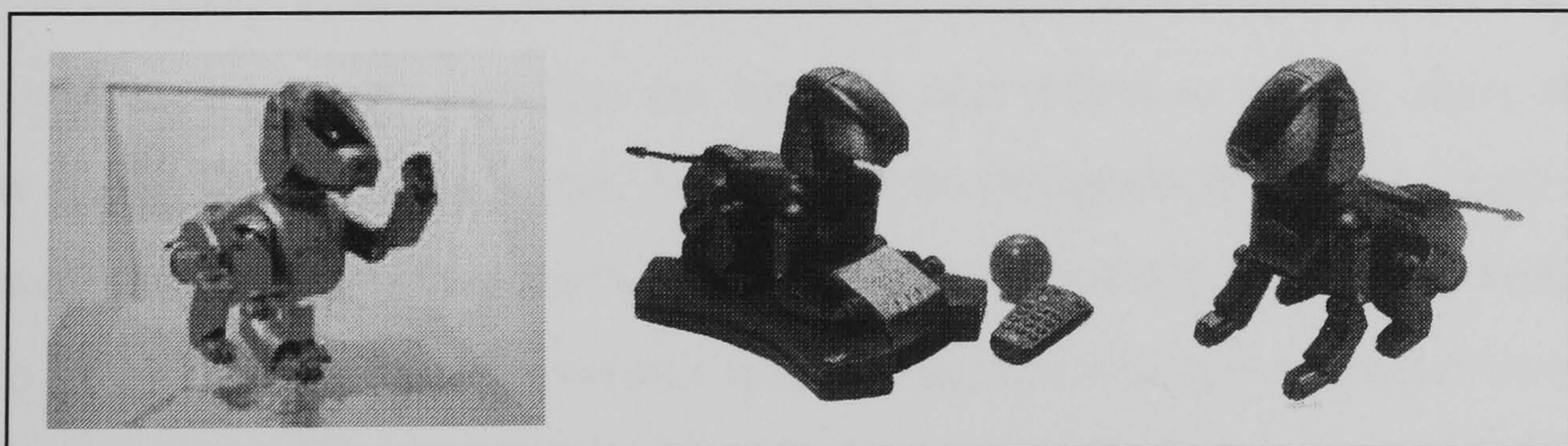
This approach has quite high level of failure risks when its development direction is set by the developer's intuition or prejudices about technology, and it is too large and too expensive to attract any but innovators or early adopters. However, Sony claims that it may still be effective new product development strategy for the technology driving society where new consumers are emerging from the overclass namely high-achieving people with technical knowledge. Because they are better educated, better travelled, better informed and highly paid for their knowledge, new overclass consumers demand high-quality products and personalised service regardless of price of product they want (Kotler, 1996).

The 'one step ahead' products of Sony target these new consumers. Even though percentage of innovators and early adopters in target market is lower than other target market categories such as early majority, late majority, laggards, same or more profits can be earned even with minimum productions because of high prices advantage that breakthrough products usually enjoys (Webb, 2000). In addition, when the product gives positive meanings to the consumer's life, there are more chances to make profit and more possibilities for a second generation of the products because more potential mainstream customers who are waiting come to real purchase and increase high demands (Du Gay, et al., 1997). This effect is stronger when the product is more innovative and new.

### **6.6 Development of AIBO: Market Creation**

One example of Sony's one step ahead product is AIBO ERS-110, home entertainment robot dog which aims at sharing an enjoyable time between humans and robots (Picture 6-2). Sony launched their first AIBO ERS-110, into market in June 1999. They sold 5,000 units of a limited edition AIBO ERS-110, including 3,000 in Japan and 2,000 in the U.S. This initial sales offering was met with an overwhelming response and all available units were sold in Japan and U.S. To respond to the frenzied consumer demand, in November 1999, Sony launched a special edition AIBO ERS-111, and offered 10,000 units for sale in Japan, the U.S. and Europe. This special edition launch was also met with huge responses from customers. The 135,000 orders Sony received during that second order period far exceeded the number of units available, so that 10,000 customers were selected at random.

Picture 6-2 AIBO ERS-110 Series



### 6.6.1 Strategic aims of the development

Original idea of AIBO was to develop a product which can encourage communication between man and machine, and incorporate all of Sony's technology in one product (Babin,2002). As they were developing AIBO, Sony strategically aimed to create opportunities to open a new market in home entertainment product sectors and establish a vertically integrated business, complete with product manufacturing, marketing and customer support. They defined the 21<sup>st</sup> Century as the Age of Digital Creatures and predicted that a whole industry of software and peripheral developers will spring up around the mechanical animals, eventually eclipsing today's PC market in size. This vision about the future accelerated the research and development in the robotic technology to create a whole new arm of its consumer electronics business.

Table 6-4 Sales history of AIBO series



Source: Sony Corporation

### 6.6.2 Design concept and Design process of AIBO

The basic design concept for AIBO was to create an endearing design based on considerations of coexisting with humans, and to develop a robot with which people could have empathy. However, it was not aimed to model after a specific animal. AIBO's mission was to create opportunities for humans and robots to simply share the joyful moments of life. To realise this goal, Sony called on designers to create a shape to which intelligence and movement are embodied. To solve a problem that design needed to be altered to give flexible moves in various ways, designers and engineers had co-operation meetings repeatedly and revised the style sketches. Once the functions and features were enhanced and added into the robot by engineers' side, then stylish and strong impression

were incorporated in the image of the robot by the designers' side. The current design for ERS-210 series emphasises a sporty elegance.

### **6.6.3 Development Process of AIBO**

AIBO ERS-110 development project, like many other Sony's technological offspring products, was motivated by an advanced technology research work of autonomic robots in Sony D21 laboratory of Sony Corporation. The first trial piece was an insect-shaped six-legged robot made of aluminium board with a microchip, a motor for a radio-controlled model car and batteries. Resulting from the appeal of this trial model to company management, the robot research group was officially approved in the company as an independent business division which is not a merely supporter of the business department. After this approval, the purpose to do automatic entertainment robot business becomes clear and there had been steady development. The first trial piece was developed into the four-legged mammal like prototype robot with a camera, a microphone and batteries and it was presented at the company 3 years after the development was initiated in 1993 (Picture 6-3).

After a series of improvements, the final prototype model of AIBO was designed in 1998, on the base of "OPEN-R" which is architecture for entertainment robot where their functions and shapes can be changed by exchanging the hardware module such as legs or their actions, and response patterns by changing the software module (Fujita, et al., 1999) (Picture 6- 4). Because the entertainment robots are different from industrial robot in terms of the purpose such as amusement use, the new type robot AIBO was accomplished by applying the "Open-R" providing a module structure between software and hardware which existing industrial robots do not have.

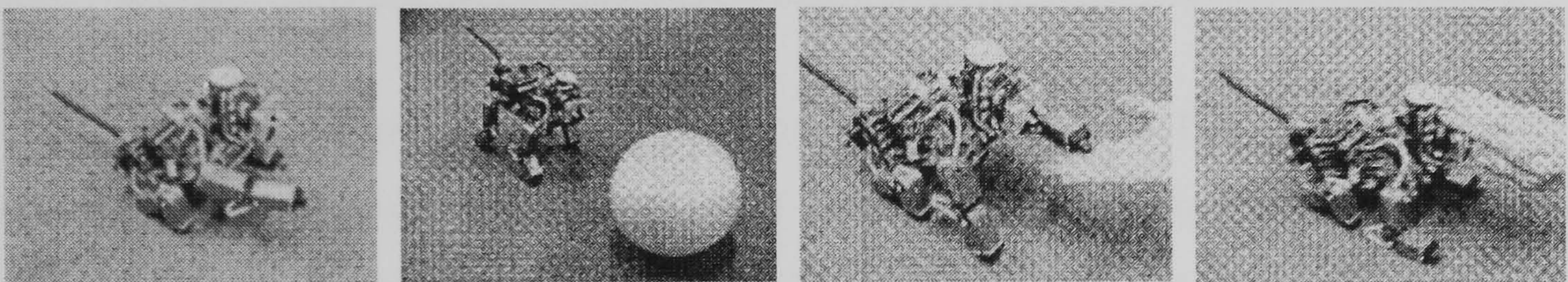
When they demonstrated this prototype model in public, Sony announced that they would start the business on a full scale within the twentieth century. In 1999, the sale of AIBO ERS-110, was announced with the catch phrase of "AIBO are not made in Sony, they are Sony born." Table 6-5 is the brief history of AIBO development.

Table 6-5 Development History of AIBO

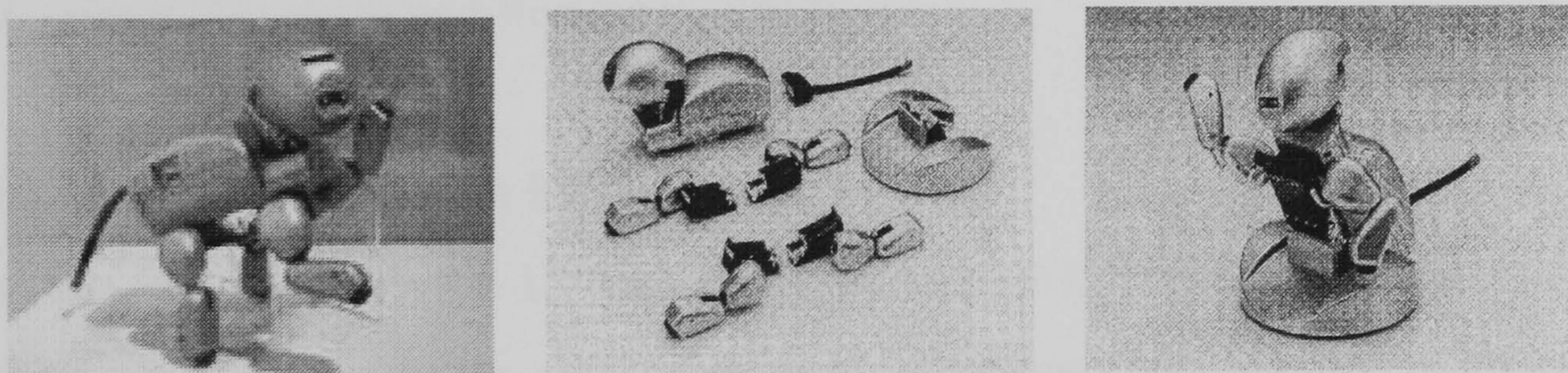
• 1993 Fall	First trial machine - 6 legged robot
• 1996	4 legged trial machine with CCD camera, microphone, speaker (announced inside Sony only)
• 1997 July	Trial machine announced outside Sony Trial model was demonstrated and played foot ball in the first football world cup for robots, "Robo Cup '97"
• 1998	Trial machine with OPEN-R Architecture Sony announced its full scale entertainment robot business
• 1999 May	Sales start announcement of AIBO ERS-110
• 2000	Sales start announcement of AIBO ERS-210
• 2001	Sony launched AIBO ERS-311, 312 in the market
• 2001 Dec	Sony announced market launch of ERS-220

Source: Sony Corporation

Picture 6-3 First Trial Model of ERS-110



Picture 6-4 Final Trial Model of ERS-110



#### **6.6.4 Product Succession Strategy: Launching Second Generation AIBO ERS-210**

Stimulated by the success of the first generation of AIBO ERS-110, Sony accelerated development of next generation of the product. They launched a completely redesigned model of AIBO with a host of new features in 2000. To further develop the "AIBO" world, there were some advanced technology features and enhanced functions adopted for the second generation of AIBO. Marked style and unabated impact were built into the design of the new model. Name registration via speech recognition technology, development of AIBO's own language, an internal digital camera, were added to

strengthen the entertainment constituency of the product. Through a laboratory breakthrough AIBO's body heat was reduced, allowing the removal of a heat vent on AIBO's torso. The removal of this vent offered more flexibility in design. Collaboration between hardware, software and design was an undeniable factor in completing the new generation of AIBO. In addition, the "Memory Stick" for AIBO was specially produced in the colour pink, and a new package was proposed, helping to perfect the total design of the product (Picture 6-5).

Picture 6-5 ERS-210 & Memory Stick



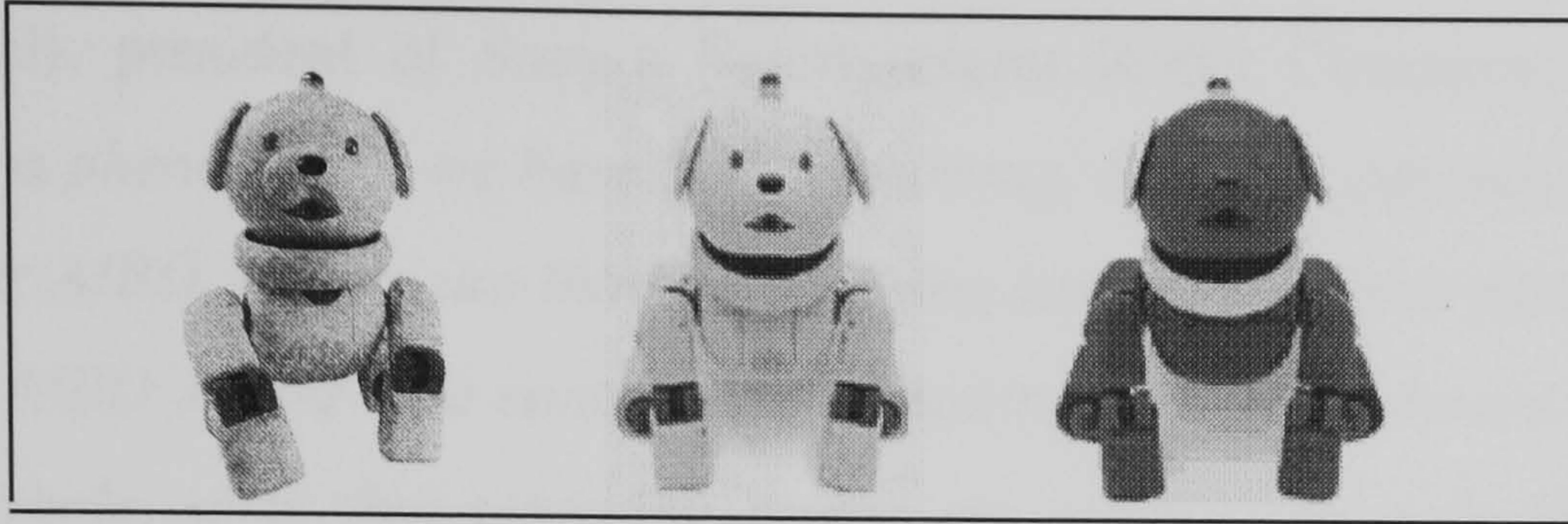
As the succession product of the first generation AIBO ERS-110, ERS-210 played an important role for Sony entertainment robot business in that it proved whether the product line as a whole would succeed. ERS-210 accelerated the expansion of entertainment robot market by increasing number of sales units of the product and varying the product choice in colour (Guerrero and Renshaw, 2000)

#### **6.6.5 Market Penetration with ERS-311, 312**

Based on the sales of both the 1st and 2nd generation AIBO, Sony grasped customers' motivations for their purchase and understand their requirements. In addition, Sony identified the expectations from the market for an even more interactive and "softer" character of AIBO, alongside the current models. With confidence that the new series would significantly contribute to deliver their vision of enhancing the world of entertainment robots, Sony launched new ERS 311 and 312 in 2001. As they apply more lovable and cutesy design than their grown-up predecessors, and lowered product price, Sony targeted to reach a wider audience such as fashion leaders, teenagers and females.



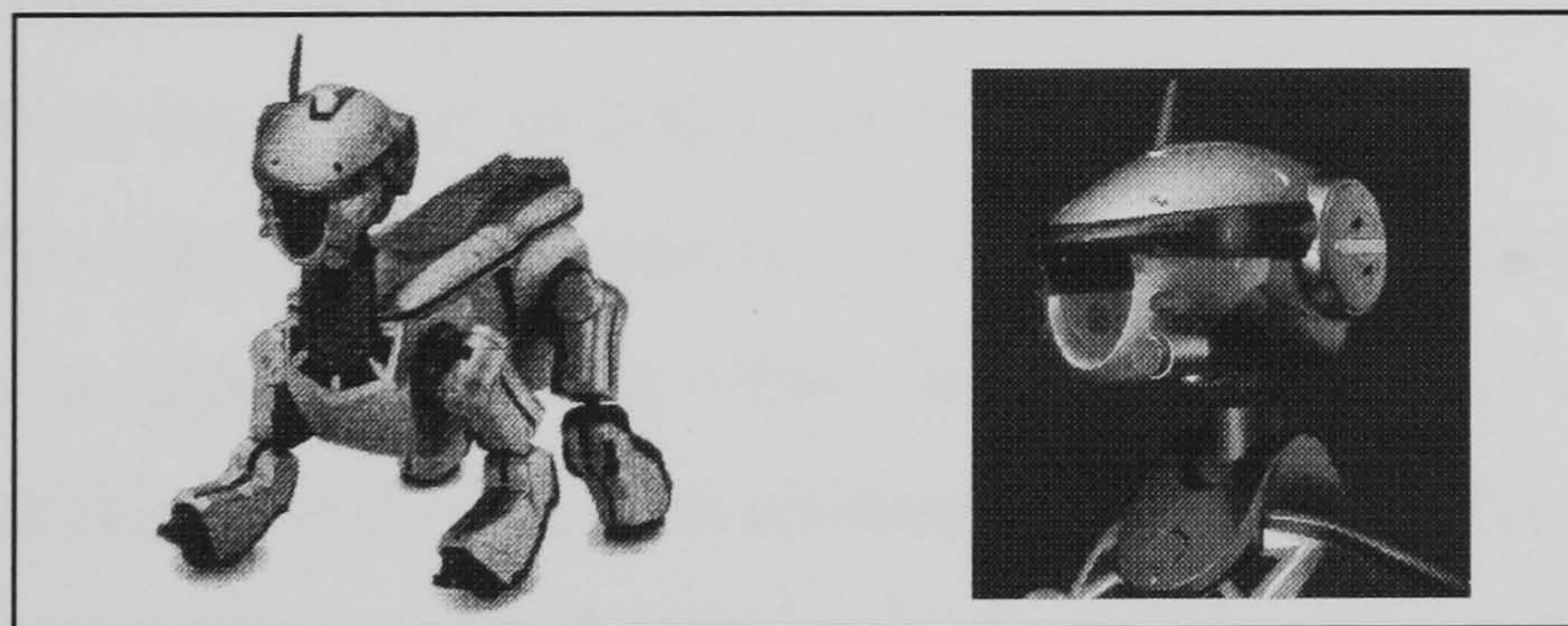
Picture 6- 6 ERS-311, 312



### **6.6.6 Market Domination with ERS-220: Expansion of Product Line**

Sony's market domination in entertainment robot industry further proceeded with the market launch of ERS-220 in 2001. While the development of the predecessor products were directed by the company's specification and the designers' intentions, ERS-220 was developed by reflecting the market demands. To respond to a rallying call from the market Sony gave the AIBO a futuristic makeover (Picture 6-7 ) and applied some of updated features such as the boost mode which can express status of communication with owner and the increased voice recognition ability from 50 to 75 words. The demeanour of ERS-220, especially its sleek space-age guise was a new major aesthetic departure for Sony. Launching ERS-220 was intended to appeal to owners of the 210 and IT-aware males aged between 25-45 and attract more of the female IT literate crowd (Babin, 2002).

Picture 6- 7, ERS-220



### **6.6.7 Market Environment of AIBO**

Since Sony introduced their first entertainment robot AIBO ERS-110 in 1999, there has been some competitors emerged into the entertainment robot market. These competitors influenced the formation of the entertainment robot market by encroaching on Sony's market share. Emergence of imitators with similar outward appearance or mimicked functions also affected the market as their low-priced imitation products attracted customers. Sony considered the emergence of the imitators as a phenomenon that may

bring some positive effects for the market formation of their entertainment robots. Amagai (2000), president of Sony's Entertainment Robot Company, asserted in this matter, *"It is a phenomenon we have been observing. Some people may mistake the fake AIBOs for our AIBO, but we are thinking of doing something about that. However, some of these fake AIBO's have also contributed to making consumers aware of entertainment robots as a whole, so in that sense these guys are welcome to make these products. In Japan, many AIBO owners also have fake AIBOs so they can create an AIBO family"*

In broad sense, the personal robots that are developed for different purposes such as for household tasks or personal assistance are also potential competitors that constitute the market environment. These products usually apply the same technologies that AIBO do such as sensors, voice recognition and simple learning algorithms that create complex behaviour because of the same environment in which the products are used. Since advances in the existing technologies or development of new technologies to improve product capabilities have been made rapidly, the market environment is getting more competitive for Sony's line-ups.

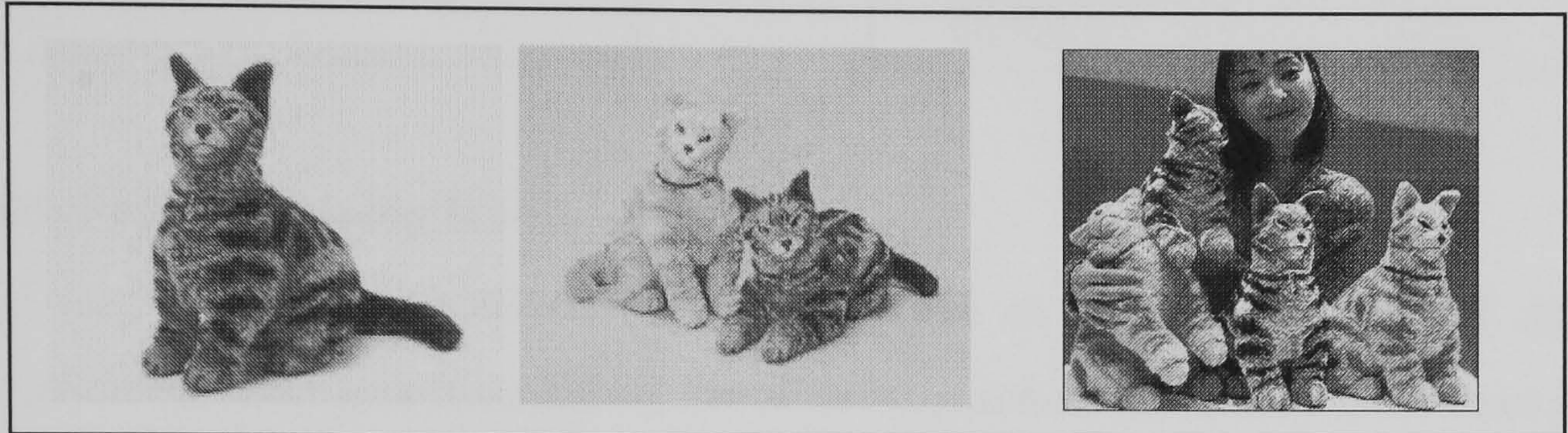
#### **6.6.7.1 Omron's cat type communication robot: 'NeCoRo'**

Omron, one of its biggest makers of automated factory systems in Japan, introduced a cat type robot NeCoRo in the market in 2001(Picture 6-8). Unlike Sony AIBO' unrealistic appearance, NeCoRo takes different approaches such that the product is with synthetic fur giving it a feline appearance. This robot cat perceives human action/thoughts via internal sensors of touch, sound, sight, and orientation. It also expresses its desire to sleep or cuddle based on its own physiological rhythms by perking up its ears or stretching its legs, and develops personality traits based on how it is treated by its owner. For the company focused on developing a robot that is gentle to humans and responds appropriately to an individual's need, individual contact and communication are its priority.

The pricing and limited-edition strategy and marketing plan resembled Sony's marketing for AIBO. Omron marketed the cat robot with sales limited to 5,000 units and the orders

were taken only through Internet or telephone. In comparison, the product cost twice as much as AIBO. Because of this high risk of competitiveness in price, they needed to see customers' reaction to the product before they could make a decision on the future development of NeCoRo.

Picture 6-8 Omron's 'NeCoRo'

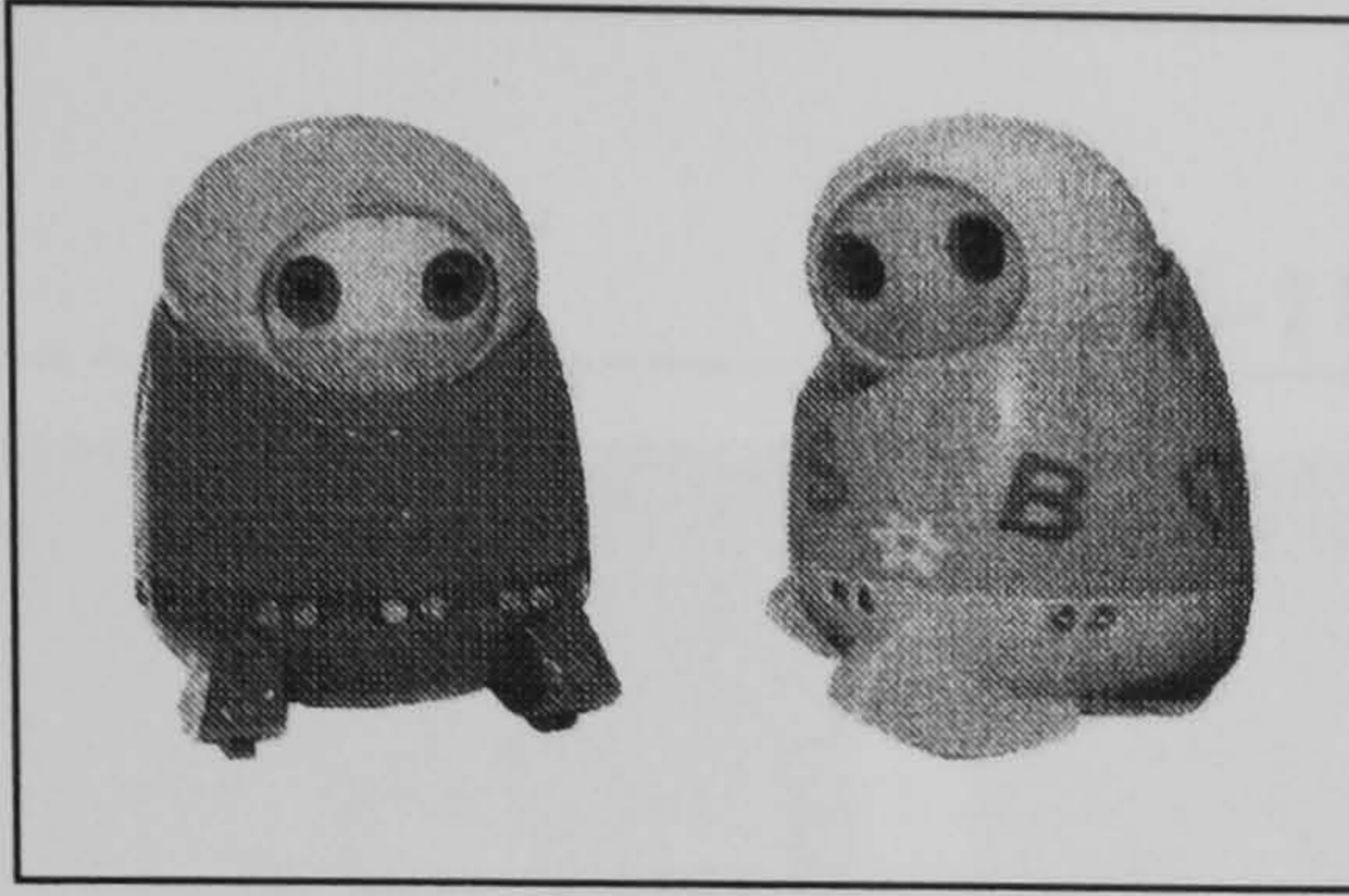


#### **6.6.7.2 NEC: 'R-100'**

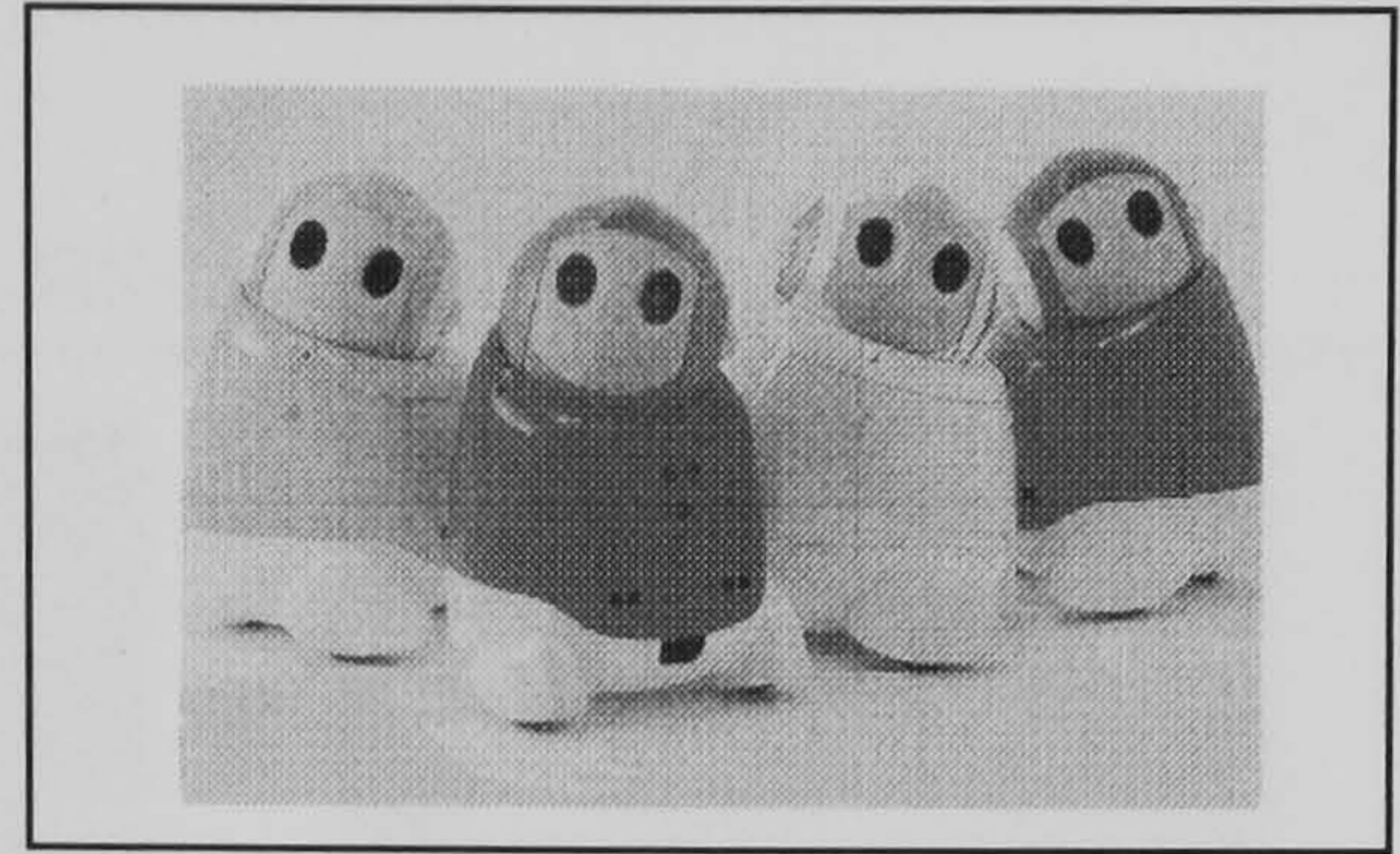
In January 1997, NEC commenced the 'Personal Robot Project' to seek out the possibilities of developing personal robots for use in the home, and produced the first generation of the personal robot, R100 in July 1999 (Picture 6-9). This intensive research based R100 has the ability to recognise people, understand voice commands and communicate with its users. With the built in, full-time Internet connection, it also provides Internet access to users. The robot is designed around software modules that can be easily expanded or enhanced. The software-based approach module makes it easy to modify or add to the functions of sensors and the varieties of movement.

After development of first generation P-100, NEC focused on the interaction between human and robots and completed the next generation prototype, 'Personal Robot PaPeRo' in January 2001 (6-10). Using the latest in semiconductor and mechatronics technologies PaPeRo is developed in a smaller, lighter shape with highly advanced reliability, safety and communication capability functions. Compared with the previous P-100, Pa Pe Ro has better capability in recognizing phrases (100 to 650), and speaking phrases (300 to more than 3000). Its variation of interaction is also more diverse due to its human affinity grades, preference grades for each family, and memory and emotion technologies.

Picture 6-9, R-100



Picture 6-10, PePeRo



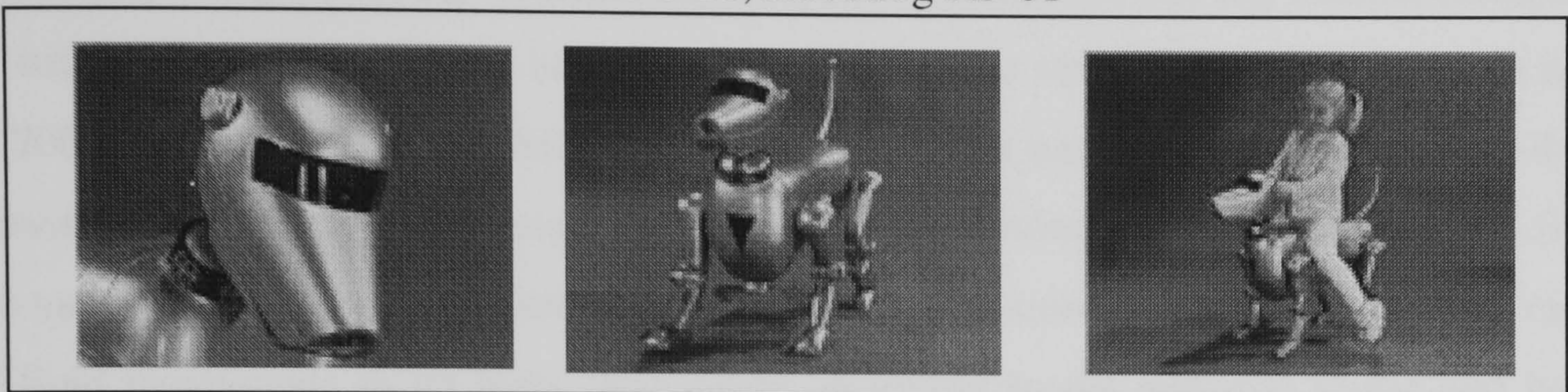
### **6.6.7.3 RoboScience: Robodog RS-01**

RoboScience is a British independent engineering firm in the development of next-generation robotic technologies founded on the belief that robots should be more than just toys or entertainment devices. RoboScience released a domestic quadruped robot RS-01, May 2001(Picture 6-11). This product is a Windows powered commercial robot dog which can be controlled wirelessly via Internet or through 60 voice activated commands. It uses wireless networking to link to its owners' PC, allowing it to be permanently on-line, giving it the versatility and functionality that consumers want from future domestic robots. RS-01 has a wide range of 'senses' that allow it to balance, give it a sense of position and give it hearing and sight. With 16 hi-tech joint motors, RS-01 can climb obstacles and perform athletic handstands while using its positional sensors and artificial intelligence to safely negotiate its environment.

ES-01 was designed from the outset to be fun to own and developed to respond to the proven demand for such products. Comparing its market competitiveness with Sony AIBO, ES-01 takes similar feature in shape and functions but its larger size is enough to carry a small child on its back. In the cost, however, it is priced at £20,000 while ERS-220 is at £1,200 and ERS-310 at £700 in the market in 2001. In product availability, ES-01 is limited to only 200 of special editions while Sony's ERS-310 is on mass production. To consider the point of market launch, ER-01 was only available for sale in 2001 when Sony started dominating the market by announcing ERS-220 to be on the market. For these reasons, ES-01 has not got enough competitiveness against Sony's. However, the potential of its future market competitiveness is still high as the company keeps further

developing its next model which may bring the cost down and come with more advanced features.

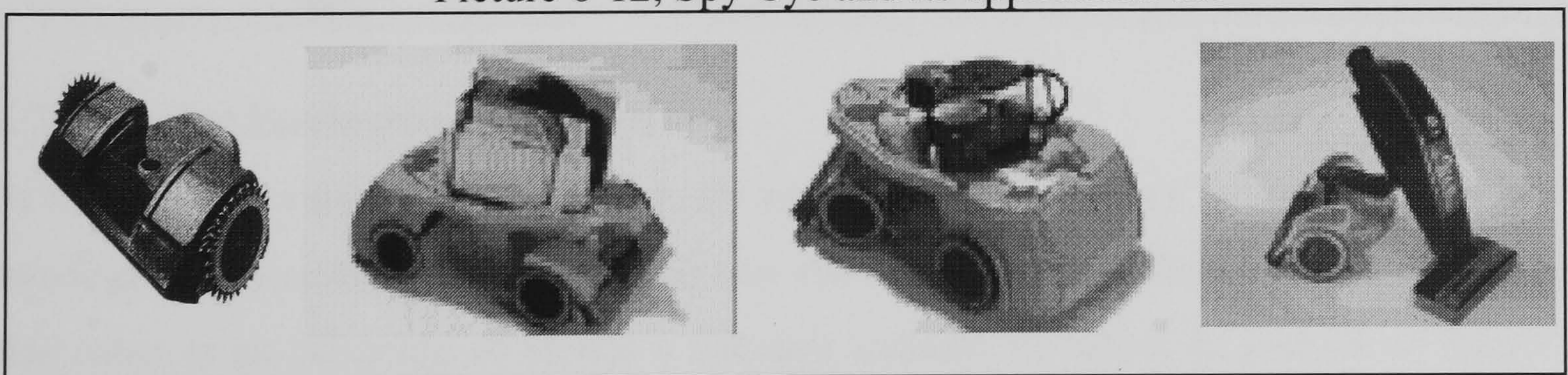
Picture 6-11, Robodog RS-01



#### **6.6.7.4 Probotics: Spy Cye**

Spy Cye is a personal robot mainly developed for household tasks. It was released in the market in 1999. Spy Cye communicates via a wireless link and can be controlled from a web browser. A smaller radio antenna plugs into the PC's communications part and, with the help of Cye's Map-N-Zap software, beams instructions to the robot. The Cye robot is composed of the base body of the robot and two large wheels, one on each side (Picture 6-12). The company aimed to make it a versatile and expansion friendly robot. It can be attached with extra equipment through a mounting hole in the centre of the Cye for further functionality. A cordless vacuum cleaner and a wagon which can carry something that will fit in the tray extend the robot's capabilities. For further functions Probotics added an expansion port located on the front of the Cye. With the expansion port, the user can power lights, sirens, and sensors, and receive input from both digital and analogue devices.

Picture 6-12, Spy Cye and its application use



#### **6.7 Sony's Dream Robot Project : SDR-3X and SDR-4X**

After Sony launched their first home entertainment robot dog, in 1999, they showed off a robot man, the SDR-3X in 2000, which is developed on the OEPN-R architecture that

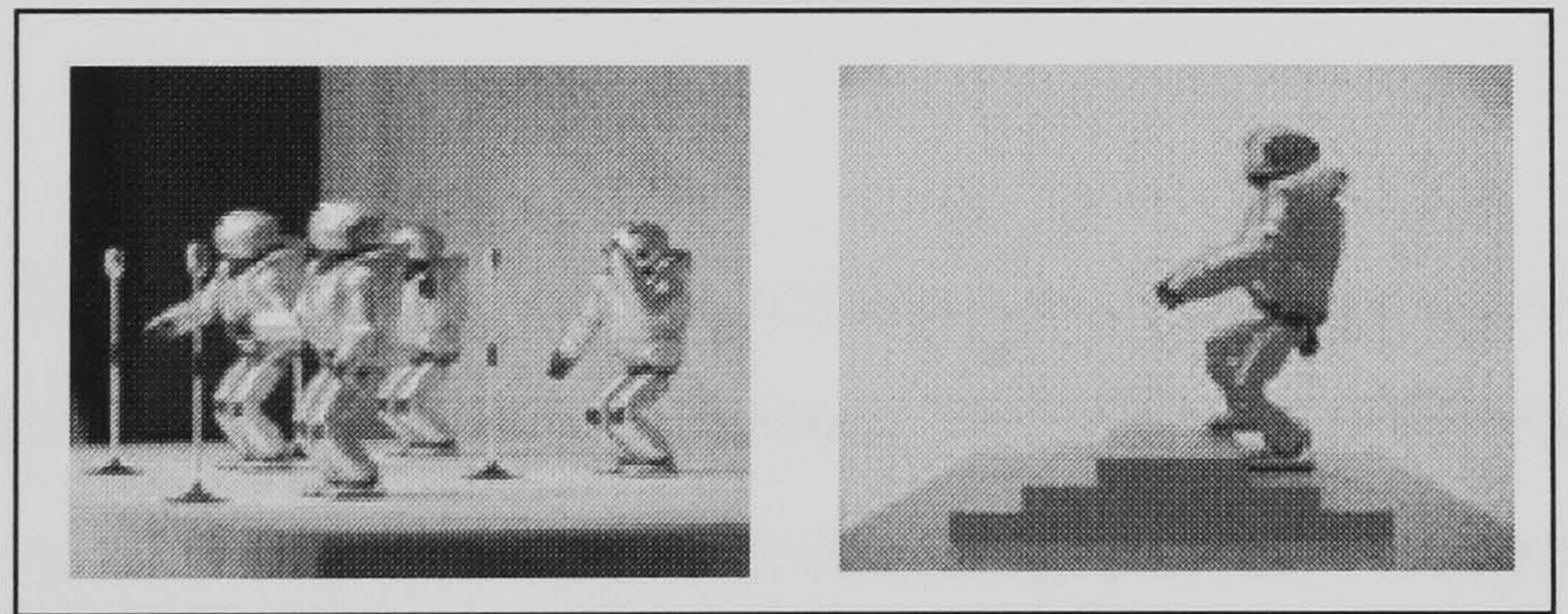
made AIBO a reality (Picture 6-13). Standing at 500 mm tall, the SDR-3x is powered by a 64-bit RISC processor with 16Mb MemoryStick and battery. This robot stands and walks on two legs, pausing to either strut his stuff or stand on one leg without collapsing by using the upper half of his body for counteracting the swinging movement of his legs. In 2002, Sony modified this SDR-3x and revealed it as named SDR-4x. The SDR-4x is sensor-loaded and operates using 38 independently moving joints fed information from the unit's real-time control system. It also expresses emotion through an advanced range of fluid movements in its body, and dance according to the different music and lyrics programmed into its software (Picture 6-14).

This robot man project was initiated by technicians of the Sony's Digital Creature Laboratory under the concept of producing something more complex than an android that could totter along on four legs. Sony strategically carried out this project to produce a product which would be backing up their first entertainment robot AIBO by creating another product range in their home entertainment robot product line. They also aimed to take the lead in the robot market in advance of their competitors which had already started a two legged human image robot development.

Picture 6-13, SDR-3X



Picture 6-14, SDR-4X



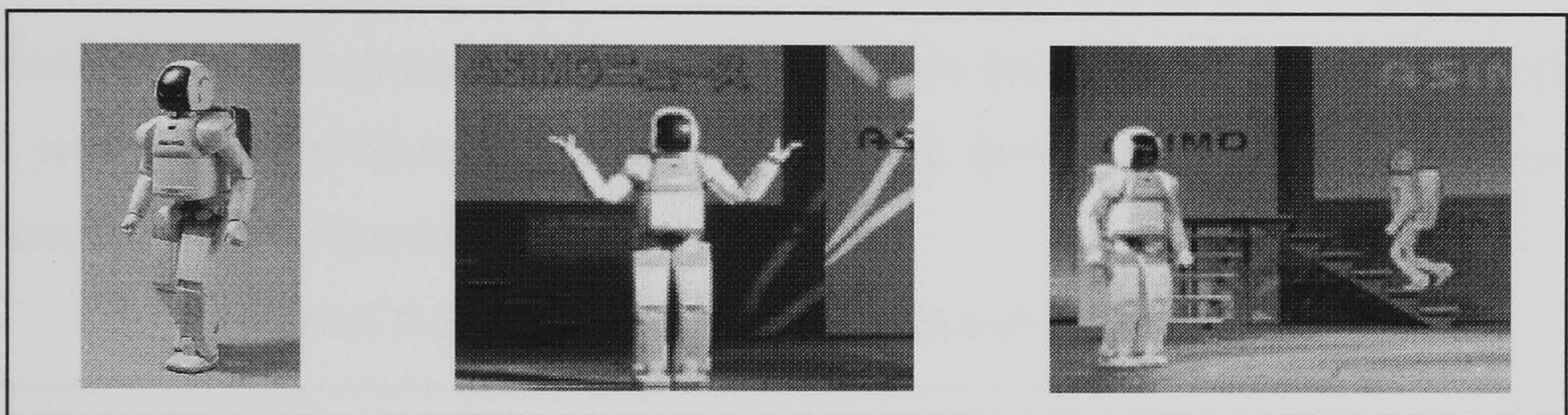
### **6.7.1 Market Environment of SDR-4X**

In the robot man product range, there are not many rivals to Sony SDR-4X but Honda's two legged human image robot ASIMO was shown off in 2000 (Picture 6-15). Originally, this robot is an offspring of Honda's full-size android P3 which is a result of Honda's basic research and development in humanoid robotics which began in 1986 with the goal of developing an autonomous walking robot. Compared to the predecessor model P3, ASIMO has a smoother stride and more advanced programming. In commercialisation,

however, Honda ASIMO was not available in the market until the company announced its rental business plan for ASIMO in 2001(Honda, 2001).

To compare Sony SDR-4X and Honda ASIMO, the concepts of both products are different from the start. Sony began the project with a clear concept of designing a human image entertainment robot which has a need to give a performance (Scott, 2001). Because of this clear proposition, Sony could focus on the entire body and achieve flexibility, mobility and full body controls as whole. While, because Honda's concept was just to design a walking robot, they only focused on lower limb control. This caused delays for achievement of independent movement within the human living environment. However, Honda ASIMO will not be competing with Sony SDR-4X in the entertainment market since the company decided to offers it to corporations for use as promotional aids.

Picture 6-15, Honda ASIMO



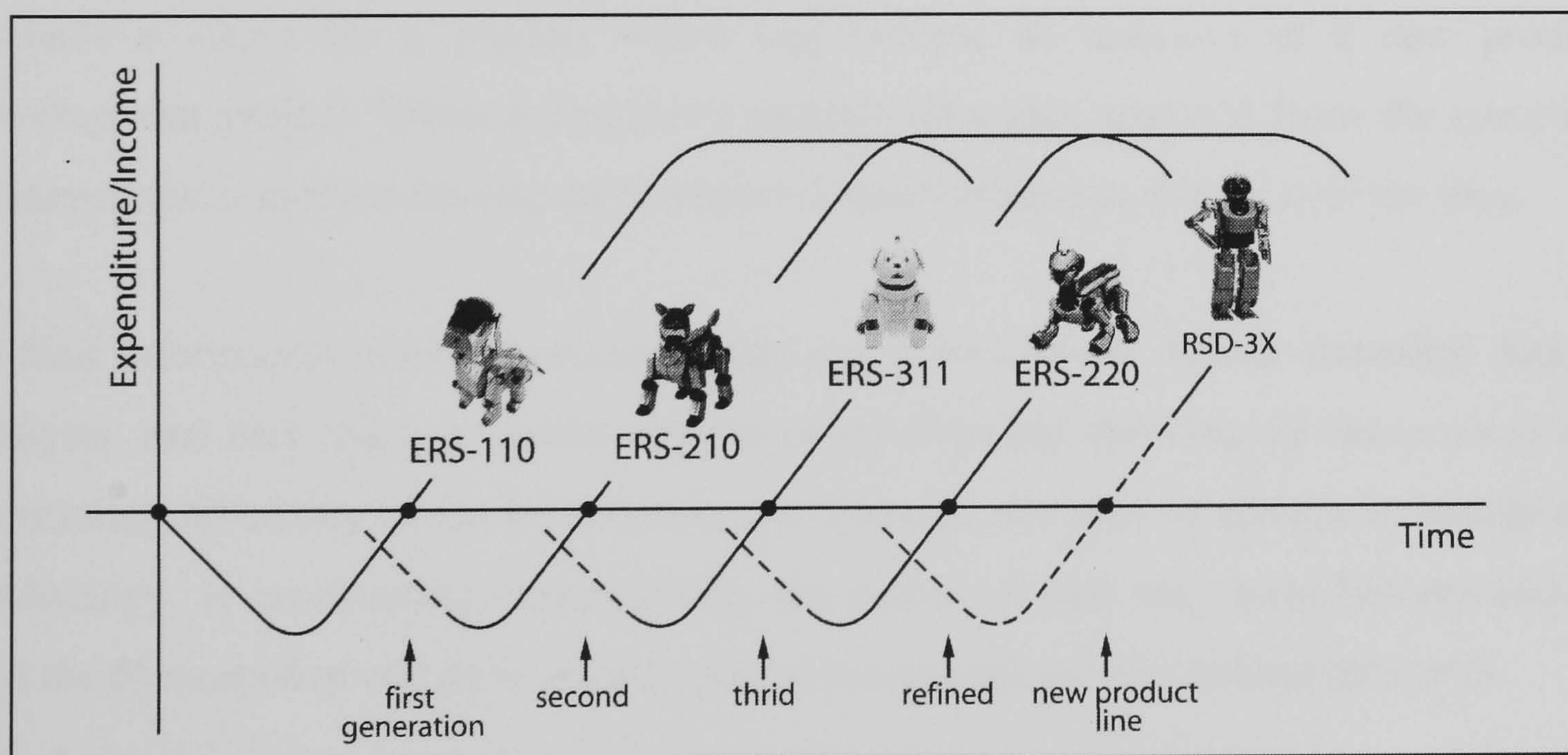
## 6.8 Discussion and Implications

Sony managements understand that they are in the dynamic environment where high rates of technological change make possible accelerated evolutions of product concepts, manufacturing process capabilities and technologies for coordinating product creation process (Stringer, 1999). They anticipate that digital technology will allow hundreds of new options and hundreds of new products to bloom so that the value of the relationship between hardware, new digital platforms, and creative content, will finally be realised. The more platforms that can be linked by content through exploding digital bandwidth, the more consumer products will be created, and the more content will be demanded. In this environment Sony strategically transformed their organisation into one which can rapidly respond to the sophisticated customer' particular needs and changing market

opportunities to mature their market driving strategy which they had adopted to continue taking the market lead.

From the discussions of previous section it becomes clear that the 'first in the market' strategy which use the best technology to create something that excites the customer, refine that product and try to create a market for it, enables Sony to create a new a market ahead of its competitors and enjoy the early domination of the market. This strategy was effective for Sony competing in the highly saturated consumer electronics market in terms of opening a new product range. As mentioned earlier, the entertainment robot AIBO project was one of their latest examples that followed this strategy. It was motivated by Sony's advanced robotic technologies and opened a new product range of consumer electronics market in which the company takes the market domination and lead. Then they effectively maintain their market domination and deal with the emergence of new competitors in the market through the strategic operation of multiple project which helps reducing the time gaps among the first launched product and its succession products (Figure 6-2).

Figure 6-2 Sony's Multiple Project and Back-up Project



In addition, Sony usually initiates a back-up project that can create a different product range in the same product line as they start a new product development project for a product from which they expect a new market creation. For example, Dream Robot



project was carried out with AIBO project at the same time as a back-up project. This helps Sony AIBO to keep its dominance in the entertainment robot market against its market competitor developing products which can create another product range because potential impact of the competitors' product market launch is reduced as Dream Robot project introduces its product at the same pace.

Since new product development in Sony mostly begins from technological developments and applications, engineers take leading roles throughout the whole process. However, Sony designers get involved in the inception phase of the development process by offering new concepts and product ideas. This implies that designers' role can be increased in the inception phase of new product development process where primary market research and research and development take the major roles. To get an idea for a new product which fulfils the aims of 'first in the market' strategy, Sony designers firstly scan information on emerging trends and shifts in technology and figure out what will shape the next round of products. Putting the information together, they make educated guesses that result in products that remain ahead of the curve and pull the market in their direction. The outcomes of information scanning and analysing lead a particular designer to have a vision for a product which can become an initiative of a new product development project. When a designer's product idea gets approval from the company management, a product development project is then initiated on the basis of the idea.

In their information scanning process, Sony sometimes do not include statistical data or analysis, and they allow a certain amount of intuition for speeding up the process and increasing efficiency of the information use. Because the pace of change in society and technology is accelerating exponentially, the statistical data may soon become history and the phenomenon will have already passed leaving the product behind the curve.

However, this individual initiative process has a risk of failure when there is an absence of a formal mechanism for testing new product ideas. To increase the success rate of new product ideas Sony Design Centre focus on using analysis of tomorrow's societal change and anticipation of future technology. They divide their audience into five distinct user

groups such as Arbiters of style, Virtual Professional, Homelander, Active senior citizens and Reactors, and write life-scenarios and use-scenarios based on the defined groups. These scenarios describe the future of each user group in lifestyle, technological needs and purchasing style. New product ideas are then screened and tested through overlapping of these scenarios. Because product ideas are approved through the scenarios which are composed upon the future bases, the new products generated from those ideas fulfil specific needs in the future.

To conclude there are some findings from the analysis of Sony that are implicated in development of the future visioning system model. Firstly, it is found that proactive product development strategy that constitutes hypothetical background for the future visioning system model can be effectively adopted by the consumer electronics companies as the companies implement it with operating multiple project and back-up project at the same pace. In terms of introducing succession products without any pause, the operation of multiple project and back-up project ensures the market domination against the uncertain impacts of potential competitors with similar products when the actual customers of the first product are growing.

Secondly, new product concepts for the breakthrough products in Sony are mostly developed by designers and engineers who initiate their ideas from the understanding of current technological development and the anticipation about the future direction of technological progress. In this sense, it can be figured out that designers can be the ones who operate the future visioning model as an information integrator. This implies that designers should be disciplined with information scanning especially in the technological sector.

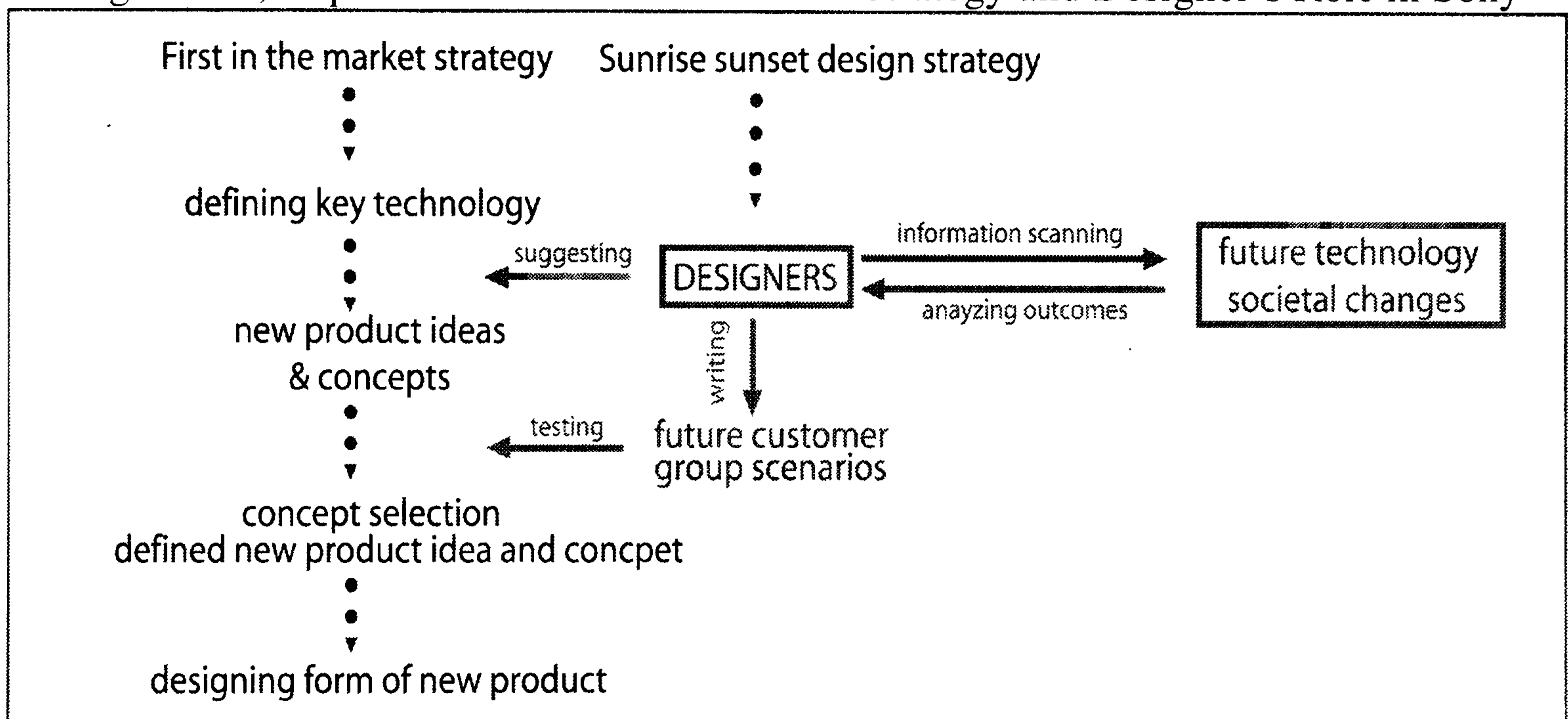
Thirdly, once information scanning in environmental sectors is conducted, Sony designers put the environmental information together and form a vision of the future states of technology, from which designers make educated guesses of plausible products in the future. This indicates how the future visioning process model can be embedded into the concept development process as a disciplined method. However, since the future vision is used as the ultimate source for generating product concept, it should be

composed based on confidential information and describe the future in detail. Therefore, environmental information scanning and composing the future vision should be conducted in a formal manner to generate quality concepts.

Fourthly, the application of scenario planning in the new product development process is adopted as a mechanism for testing new product concepts in Sony. Because their scenarios are composed according to each user group they defined, the new product concepts can be verified from versatile perspectives of future customers. This proves the validity of adopting scenario planning as a concept test tool in the future visioning process model and provides a norm for scenario development that suggests what scenarios are composed of and how they are used as a concept validation tool.

Figure 6-3 illustrates how the findings from the discussions above should be implemented in practice and shows designers' role in the new product concept development process.

Figure 6-3, Implementation of New Product Strategy and Designer's Role in Sony



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## **Chapter 7. LG Electronics Digital Design Centre**

### **7.1 Company Overview**

Since its establishment in 1958, LG Electronics has primarily focused on the consumer electronics and home appliances, operating 72 subsidiaries around the world with over 55,000 employees. In recent years, this focus has been sharpened, with the company now organised into five separate companies to create a corporate structure that is paralleled with the “Digital LG” idea, the company’s long-term vision to push itself to the global forefront as a digital leader in the future. The five companies are (LG Electronics<sup>1</sup>, 2001):

- Digital Display & Media- a producer of televisions, monitors, colour picture tubes (CPTs`), colour display tubes (CDTs), and other display-related parts including wide-screen TVs, digital TVs, fully flat monitors, and plasma panels (PDPs)
- Digital Appliance- produces wide range of digital home appliances including washing machines, air conditioners, refrigerators, and their core components.
- Digital Handset- includes mobile internet phones, high-tech handsets for code division multiple access (CDMA) protocol and for wireless local loop (WLL), cordless/coded telephones and keyphones.
- Digital System-manufactures diverse switching products, transmission equipment, and personal mobile communication devices.
- Digital network-covers information processing, communication and video image products including routers, switches, adapters, hubs, and ADSL solutions

LGE’s strength derives from its diverse leading-edge products including home appliances, PC-related multimedia products and electronic products. Particularly, they are strong in the video category, with digital TV and plasma screens. Leadership in chip technology for digital TV also strengthens the company’s targeting of high-end products. As they concentrated their resources and competencies in businesses areas identified as core and main to secure their own differentiated unique leading-edge technologies, LGE pursued the development of value-added products to increase the portion of those products in their actual product lines. As a result, LGE has succeeded in obtaining world-class technology in the area of digital TV, next generation displays of PDP and LCD, and in optical storage.

## **7.2 LG Electronics' Business Strategy: Digital Vision**

In accordance with their long-term corporate vision to attain technological leadership by 2005, LGE declared "Digital LG" as their new corporate vision in 1999. In the vision they planned to focus their efforts to bring about a wide-reaching transformation in every aspect of corporate activities. "Digital LG" expresses LG Electronics' commitment to become the Digital Leader with a management system and a corporate culture that are in line with the 'digital management'.

As LGE management realised that the heart of new technology is digital technology in the new millennium that has endless potential to change the future of humanity, they defined there are three important aspects of the digital revolution which influence the management of the company (Koo.2000).

Firstly, the speed of change that is regarded as the most distinctive aspect of the digital era, is so fast that the management must find new ways to respond to the changes in customer society. For instance, due to the Internet, information can be delivered to anyone in real time and transferred freely in just a short period of time. This causes rapid changes in customers' perceptions and significant consequences on social structures and customs so that the companies must find a different approach to deal with the new business environment.

Secondly, digital technology is changing the relationships that every living thing has forged with every other. Business relationships with customers, suppliers and partners, have also been changed through technology so that business relationships must be transformed to more fluid or flexible. Thirdly, the degree of change is far reaching to the traditional factors of competition. Digital technology changes the rules of competition so that past success no longer guarantees future success.

Based on this understanding LGE set four key points in value-creation on which they redefine their management practices. First, the customer has always been at the centre of all company activities at least in principle, but it will truly be so in the future.

Second, company must know how to cooperate with their competitors in a cyber society where unlimited information can be delivered at the speed of light because it will be impossible for any single company to manage all of the changes alone. Third, company must have time-to-market capability to promptly respond to customers and to competitors. Because digital technology is discontinuous in nature and customers are generally locked into using on platform, the company that is first to market is most likely to succeed.

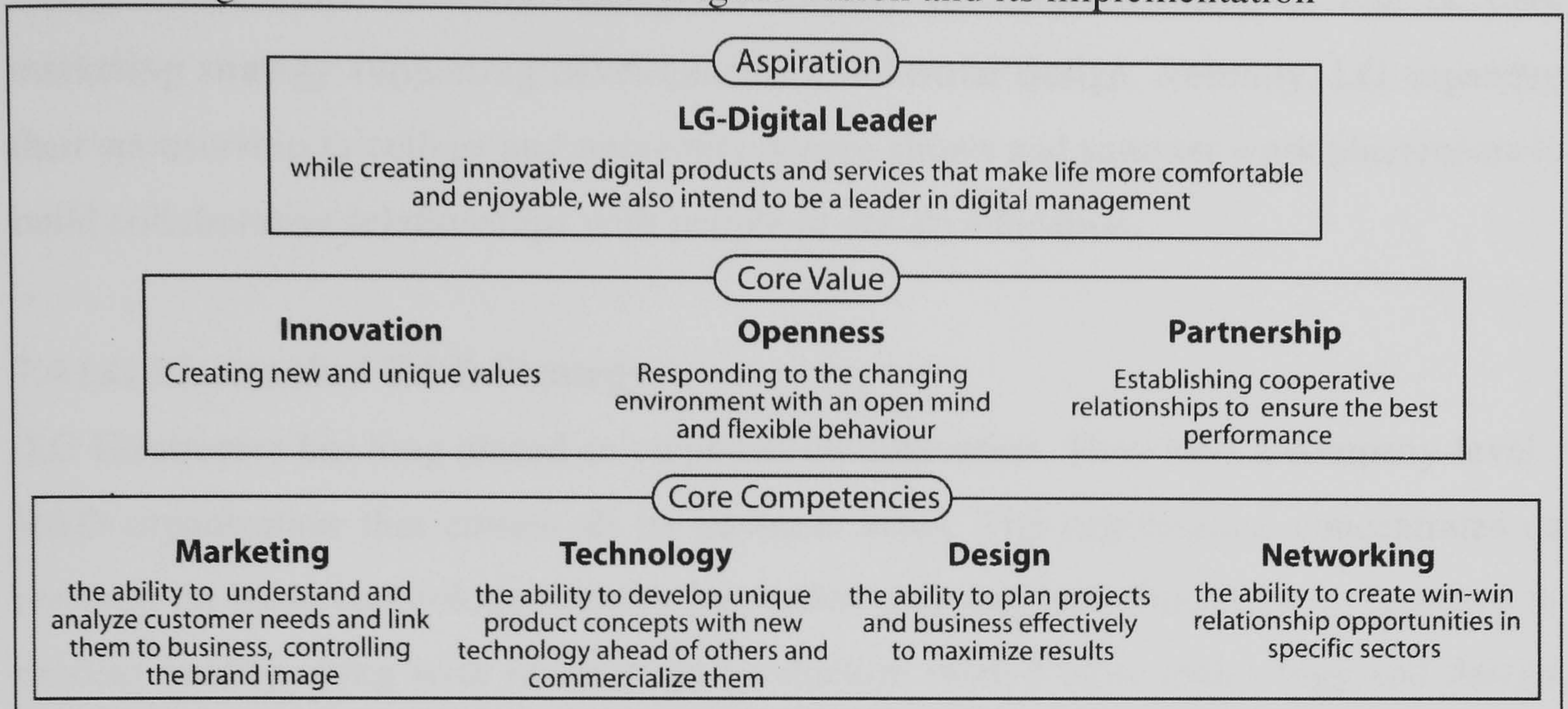
The LG digital vision has been implemented to bring actual results by several ways. Firstly, they advanced their business structure to be responsive to the fast changing digital environment based on the strategy of “Selection and Focus”. They reformed their business structure to be ready for accommodating the rapid growing e-business sector and focusing on strategic and core business areas to secure a competitive edge in the global market.

Secondly, LGE focused on improving the four core competences of Digital LG that they believe are indispensable for their growth into a global digital leader: Marketing, Technology, Design, and Networking. They strategically put more emphasis on new product development that delivers new concept based products to become the first mover in the Digital products market and to secure market dominance. LG also worked on internalizing a digital corporate culture that they believe is at the root of sustaining a company’s optimum competitive edge. To achieve this they defined the core values that all members of LG Electronics need to share: Innovation, Openness and Partnership.

Thirdly, LG focused on leveraging harmonious labour and management relations under the slogan of “Value Creating Labour-Management Relations” to create the labour relations model for the digital age.

Figure 7-1 illustrates how the LG digital vision is implemented through its core value and competences.

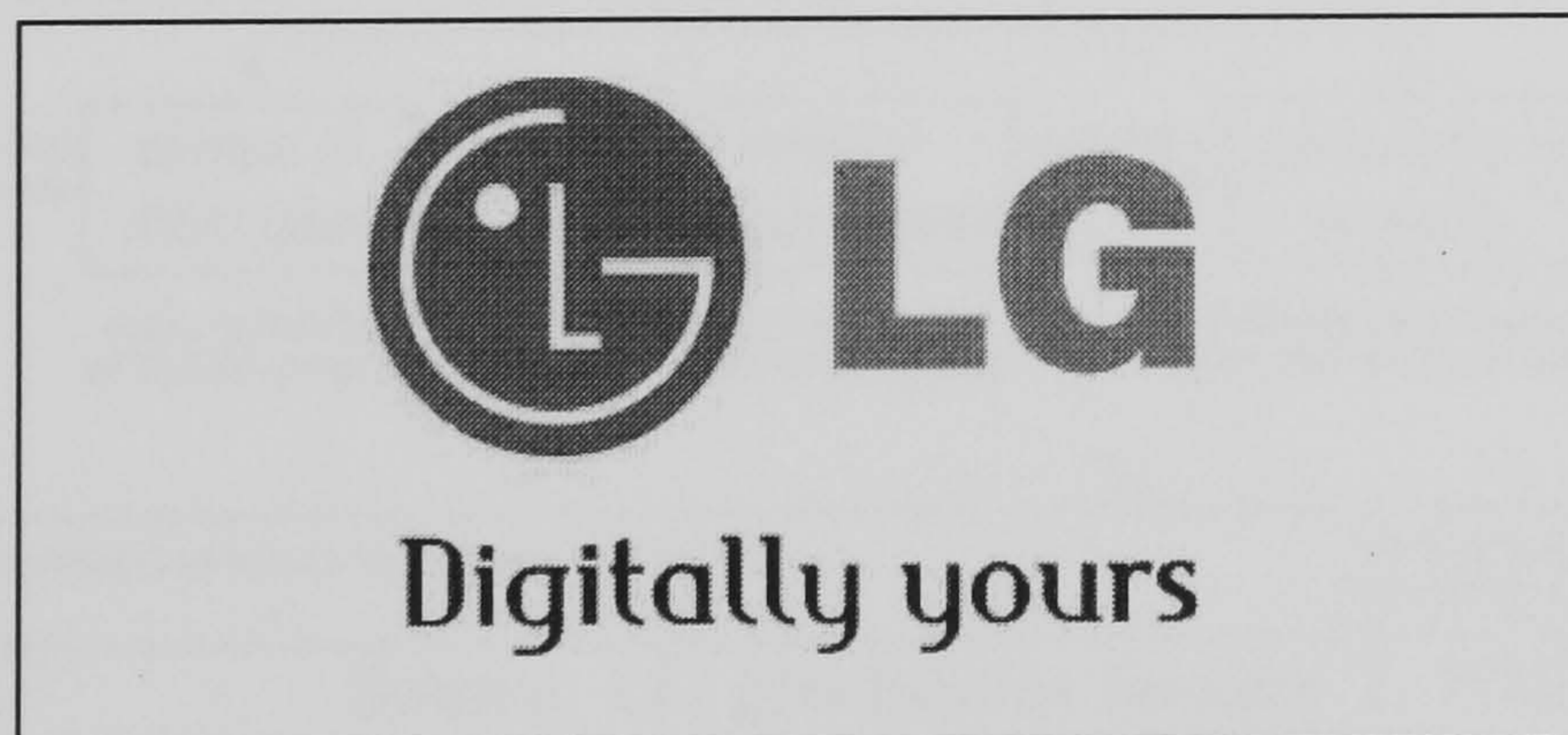
Figure 7-1 LG Electronics' Digital Vision and its implementation



### 7.3 LG Electronics' Marketing Strategy

As a part of the implementations of the corporation vision, the “Digital LG”, Marketing initiatives were aimed at strengthening the Digital LG corporate identity and smiling face LG brand. Using a cross-section of mainstream media, LG Electronics launched a new image campaign in Europe, Asia and the Americas in 2000. The current slogan, “Digitally Yours”, means that LG will strive to develop products based on digital technology to benefit its customers. The Campaign pursues the expression of a hi-tech image and a consumer-oriented language of warmth and friendliness for boosting awareness of Digital LG and building their brand internationally (Picture 7-1)

Picture 7-1, LG Digitally yours campaign



Source: LG Electronics

To promote their brand identity they also have increased their investment in sport marketing focusing on football games and multicultural and regional support programmes worldwide. Building an international relationship with international design groups and



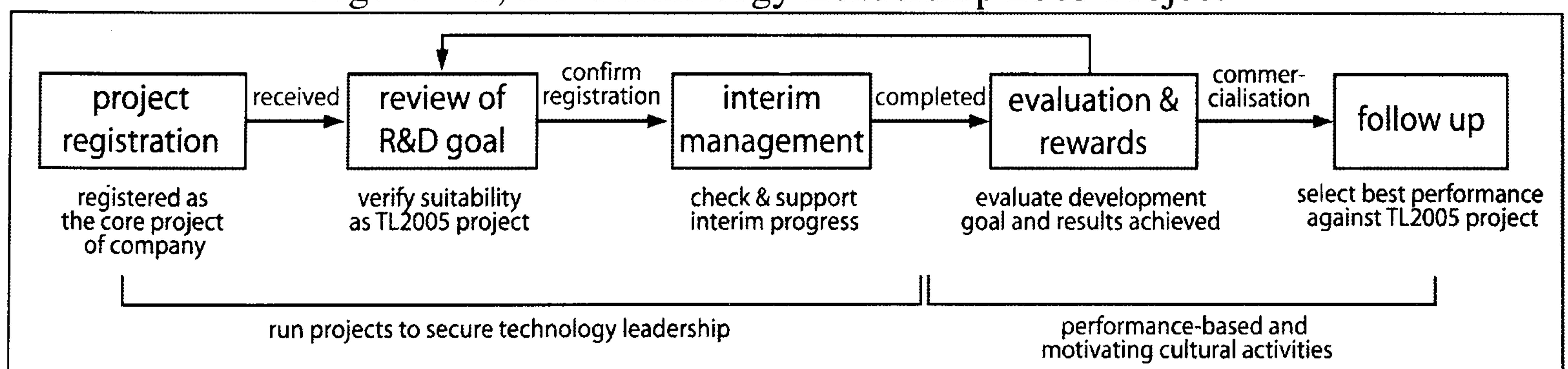
councils such as ICSID (The International Council of Societies of Industrial Design, 1990), IDSA (The Industrial Designers Society of America, 1985), is one of their marketing strategy supporting development of industrial design. Recently, LG expanded their sponsorship to college and university degree shows and summer work placements to build collaborative relationships with people in design education.

#### **7.4 LG Electronics' R&D Strategy**

LG Electronics has long placed an emphasis on innovation. They have a company-level R&D organization that covers all its business areas. The organisation concentrates on research on basic technology, quality inspection and standards fulfilment to improve its product quality along with research on production related basic technology and design. They also strategically run 25 domestic and 13 foreign-based technology institutes and research centres. These research network supports all LGE operations in the development of production technologies, core electronic parts, design concepts, and next-generation product lines.

To position itself as a global market leader by imbuing a business and profit oriented approach in R&D activities and by facilitating early realisation of futuristic cutting-edge technologies, LGE declared a technology management strategy, "Technology Leadership 2005" in 1998 (LG Electronics<sup>2</sup>, 2000). Through this "TL2005" Project they aim to let R&D lead company growth, introduce new standards in new technology and new concept products on global basis. Figure 7-2 illustrates the process of TL2005 Project.

Figure 7-2, LG Technology Leadership 2005 Project



Source: LG Electronics January 2, 2001

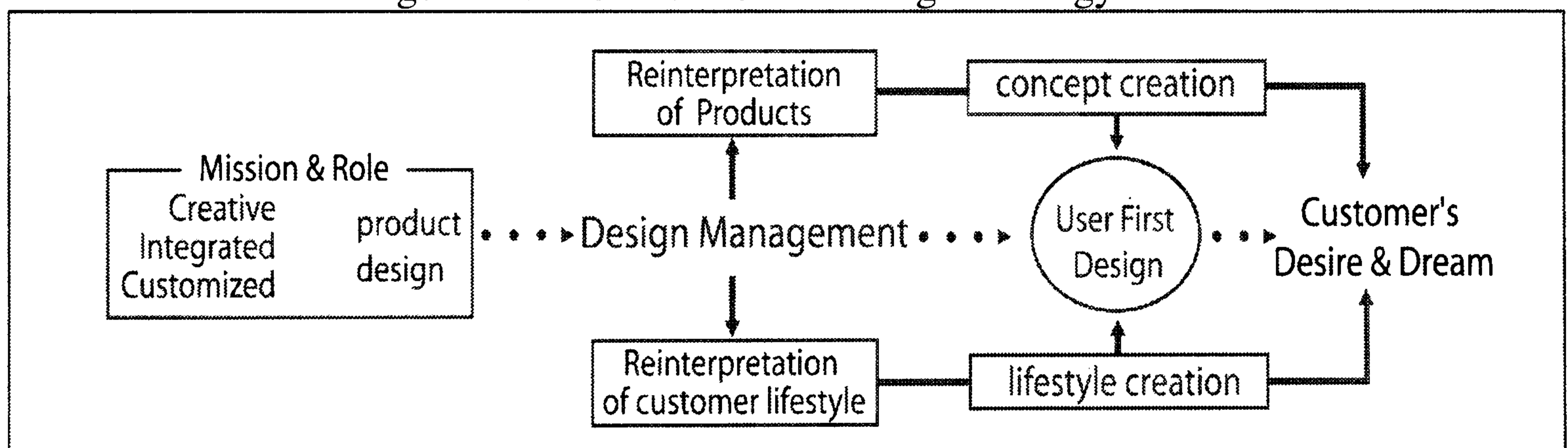
#### **7.5 LG Electronics' Design Strategy**

How to create innovative digital products which take the market lead in a time of digital convergence, is at the core of LG' design management. As the company's digital vision

suggests, design is adopted as one of the most important core competences of LG Electronics. To maximize the contribution of design in new product development, LG has defined clear missions and roles of design: “To produce Creative, Integrated and Customized User First Design which makes customer’s dream true” (LG Electronics<sup>3</sup>, 2000). To implement this object LGE takes two different approaches of new product development: concept driving and lifestyle driving. In the concept driving approach, they interpret the definition of products and create new product concepts according to the interpretation. Once they generate the quality concepts that fit into customer lifestyle and create new meanings, LGE designers transform those concepts to real products.

The other approach starts from interpretation of customers’ lives. Based on their interpretation and comprehension LGE designers identify feasible future directions of the customer trends and anticipate possible contents of future customer’s lifestyle. This process helps designers to find new customer needs for products in the future customer environment and to create new product concepts that fulfil the needs (Figure 7-3).

Figure 7-3 LG Electronics Design Strategy



## 7.6 New Product Concept Development Activities in LG Electronics

LG Digital Design Centre has been operating two major internal design activities aiming to create new product concepts and products which are in advance of customer’s expectations: DCR (Design Creative Report) and NCD (Next Concept Design)

### 7.6.1 Design Creative Report

DCR is an annual project activity in which all LGE Designers participate and develop new product concepts and products that can create new product trends and lead the

market. This project is assigned to each product design team according to product division. Each team decide the target and objectives and initiate its' own development process. Commonly, for the first step of the development process, LGE designers collect design related information and analyse them according to the requirements of their own development process to get comprehensive views about current situations in the product and customer environment. For instance, in this information scanning stage of the project development, technology institutes and research centres cooperate closely with design teams in terms of providing information of new technologies. LGE designers identify the current state of technological development and the company's internal technological resources through these information supports. This kind of technological information helps the designers at the stage of the new product concept generation by setting technological standards and limitation against which the designers can validate the feasibility of the concepts they will suggest.

Because the ideas which are not feasible in terms of technology are discarded in early stage of the concept generation process, it can avoid the outcome concept failing to meet the technological requirement for real production at the very last stage of the new product development process. In this sense of setting standard or limitation for generating concepts, information on current trends in design elements is also intensively researched to understand the present and generate innovative shape and style that can lead the trends.

This DCR project is carried out under two different types of product design category: Trend Leading Design and Style Leading Design. Each team chooses one of those categories and develops a design. In Trend Leading Design products should be developed under certain requirements. Firstly, product must react effectively to the changes in customer and product environment, and it should be a solution to emerging product needs in customers. Secondly, the company's core technologies are fully applied in the product or the product should trigger a new direction of technological development.

In this product design range, designers are needed to search information in technological development and social trend analysis. While, in Style Leading Design, emotional and

aesthetic elements are much emphasized when the product is developed. This approach needs to find latent and emotional customer needs in product forms such as colour, shape, and style. Thus, designers are required to have particular information in customer taste, preferences, and psychology.

Outcome concepts from each design teams are presented in the form of illustration and then assessed by the LGE digital design centre management. Selected ideas and products are put into the real production line after the marketing department finally proves its market feasibilities. By operating this DCR project annually LG Digital Design Centre has developed new design-led commercial products.

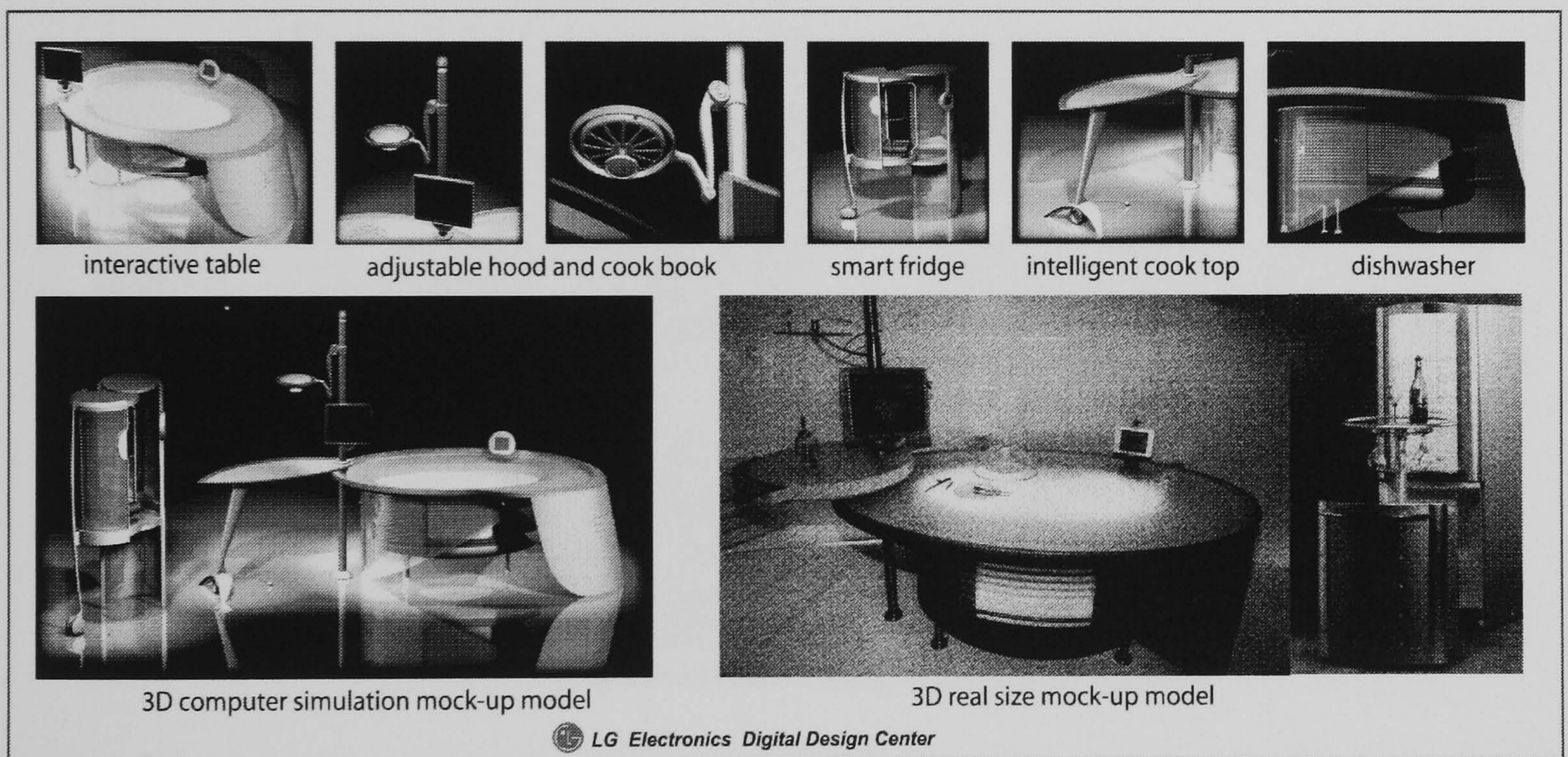
### **7.6.2 Next Concept Design**

Next Concept Design (NCD) activity is an interdisciplinary project aiming at developing long-term future products. By cooperation with other departments in the company the design team collects internal and external information and anticipates the future based on the analysis of the information. Changes in customer's lifestyle, cultural environment and technological developments are anticipated and then synthesised to find customer needs for new products. When the outcome product concept is tested and gains approval by the design centre management, the Next Concept Design team rallies other department in the company to initiate an actual new product development process with the proved product concept.

This NCD activity opens new possible business domain for the company by providing new product concepts. Through this activity the LG Digital Design Centre also aims to reinforce the company brand image as a digital leader company. LGE exhibits the outcome products to the public in the form of 3D Mock-up models through public exhibitions and the company's media advertisements. As the outcomes are presented to the public, the company's new product identity is carved into their potential customers and the messages of the future vision which LG Digital Design Centre pursues is conveyed to them.

One of recent examples is a home network system named “Good Morning E-isle” (Picture 7-2). Five designers from LG Digital Design Centre were chosen to compose a development team and conduct the development process for this future network kitchen system. In this project the members of the project team firstly investigated into two different information sources such as development of digital technology, and socio-cultural changes. Once feasible direction of cultural change and capability of digital technology were derived from the analysis of the information gathered, outcomes were then weaved together to find how these changes are implicated into customer home environment. The project team discussed the anticipated changes in the future home environment and then projected new product needs that were later transformed into new product concepts.

Picture 7-2, LG Good Morning E-isle



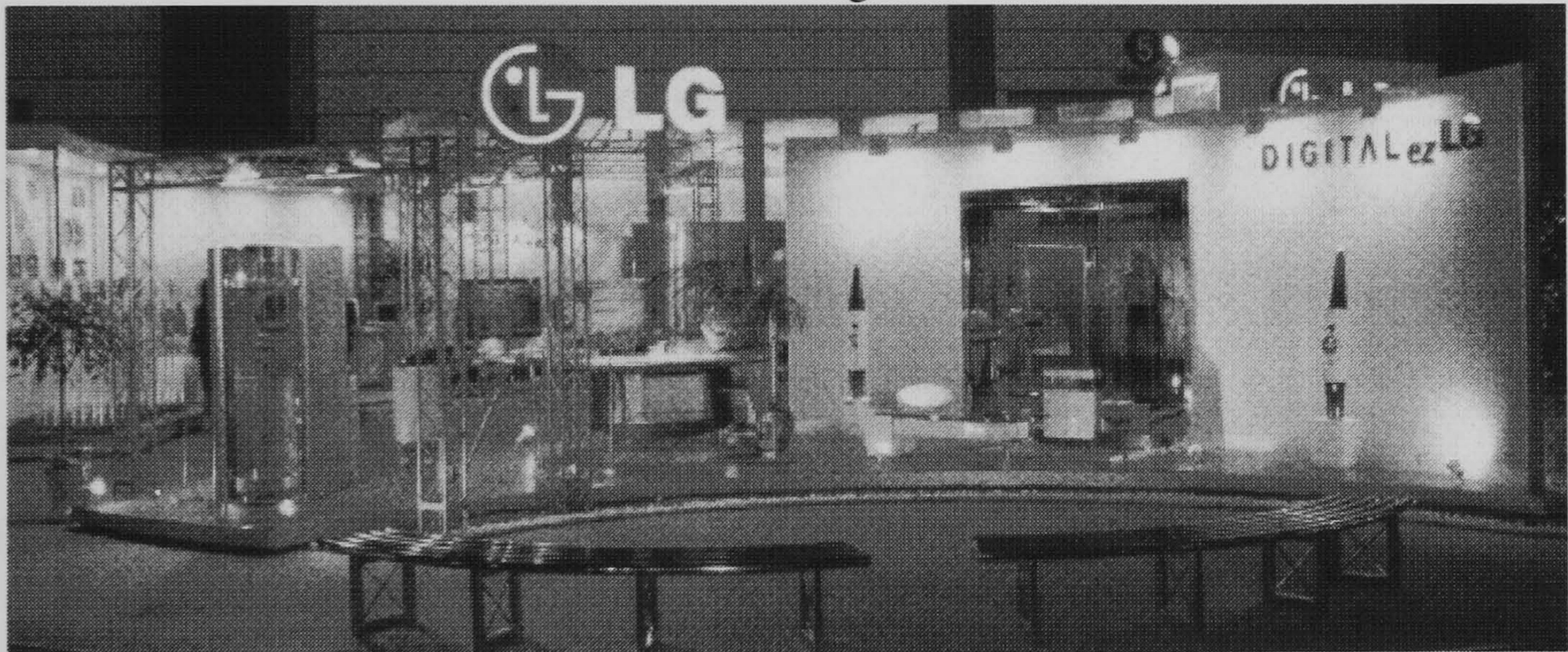
Source: LG Electronics Digital Design Centre

In this project the design team anticipate that roles in the home in the near future will be much more significant than at present as the customer lifestyle is highly influenced by technological development. People will spend more time in the house because the workspace will shift from office to home. Technological development in networking will also accelerate this conversion of human lifestyle by enhancing home network systems. Therefore, a person’s home in the future will be more emphasised as a private workplace

rather than just a resting and living place. Based on this anticipation the future changes in customer lifestyle, the team discussed how a home network system could be implemented and its' contents. They concluded that a work desk would be the hub of home network system and other facilities in house should be connected to the desk so that the person controls all the facilities from the desk. From this conclusion the team members generated the possible components of home network system as final product concepts

The designers tested this new product concept over technological availabilities which were put into the design process through which the concept is visualized. The outcome of the project was simulated into 3D computer mock-up models and presented to a design committee appointed by LG Digital Design Centre for further discussions and approval. The 3D mock-up model was finally produced and displayed for the public as a part of LG Electronics Design Exhibition Show (Picture 7-3).

Picture 7-3 LG Electronics Design Exhibition Show



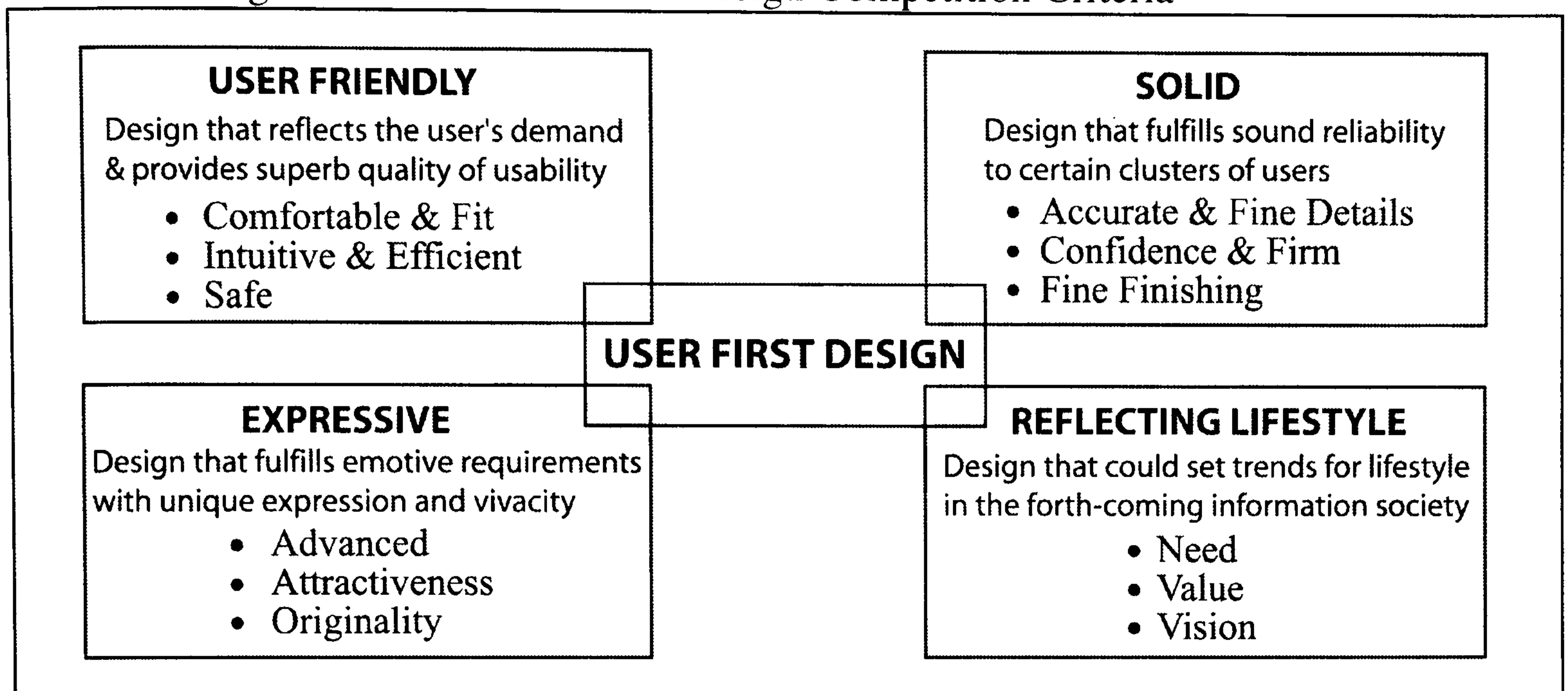
Source: LG Electronics Digital Design Centre

### **7.6.3 LG Electronics Design Competition**

LG Design Competition is one of the ways that they generate new product concepts (Choi, 2000). This biennial competition calls for entries from designers and students from over the world and the results of the competition are promoted. Works and concepts are judged by the criteria that the corporate design policy defines (Figure 7-4). The selected project concepts are used as external information that indicates potential trends or new thoughts in product design. Designers in LG Electronics review the results of the competition and openly discuss. Through this process designers experience various

different approaches to create concepts and apply what they learn from them into their concept development process.

Figure 7-4 LG Electronics Design Competition Criteria



Source: LG Electronics Digital Design Centre

### 7.7 Information Management in LG Electronics Digital Design Centre

To support the designers and their design activities with information and increase efficiencies in management of design information, LG Digital Design Centre is operating Design Planning and Administration (DPA) team as an independent division in the LGE digital design centre. The team searches for information needs from LGE designers and design activities and responds to them by delivering the right information and analysis.

To achieve this goal they consistently access to design projects and designers for identifying any needs of information support, and carry out information scanning. According to the demands from designers or identified characteristics of information needs, information scanning is conducted in several categories and sources such as market competitors, product trends, economic trends, government policy and regulations, and social phenomenon.

The DPA team classifies the collected information and analyses it for efficient uses. The processed information and the analysis are then delivered to the designers or the design

project team in the form of document and visual presentation. This information and analysis are stored in the data base system later so that all other LGE designers can share them together. This information sharing through data base system helps the designers to build a cooperative environment in the company and to achieve design coherence in their works.

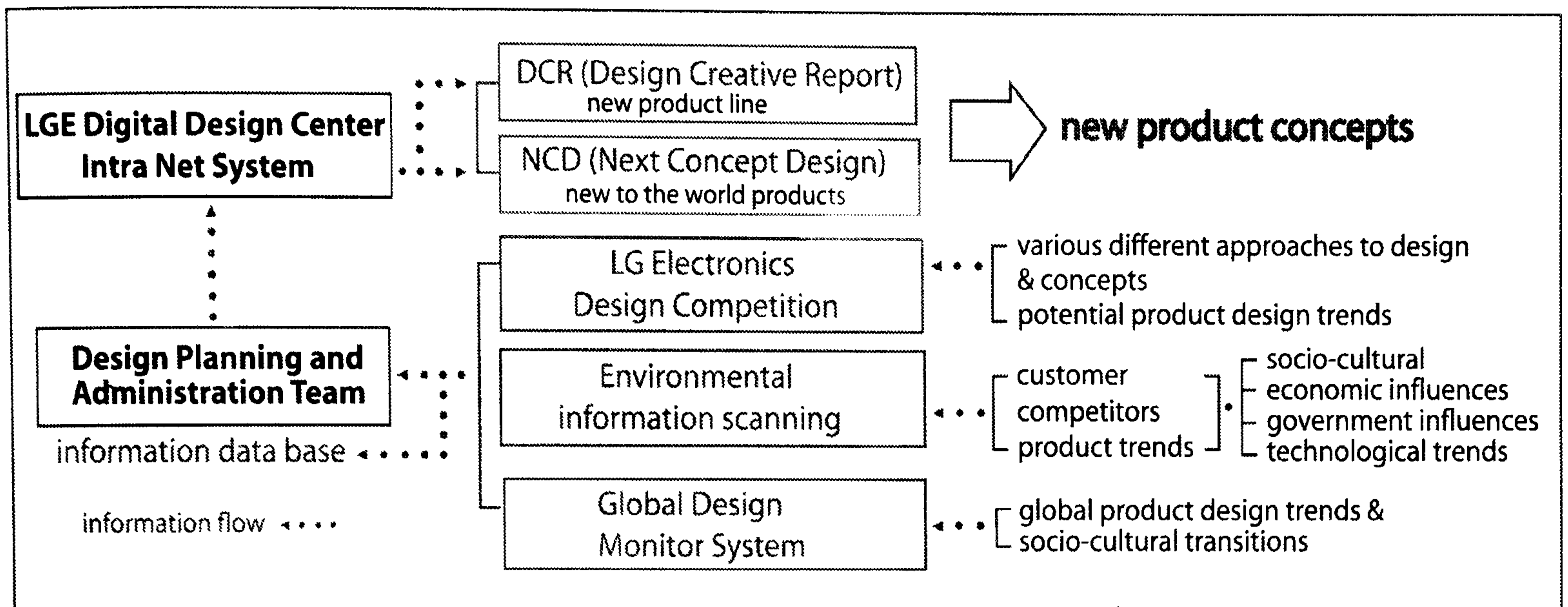
The DPA team also organises design seminars and special lectures by inviting prominent people in various fields to respond to designers' demands of information. As they attend these internal company events, designers re-educate themselves and update their information with the latest idea brought by the guests. For instance, researchers from universities and institutions are regularly invited to demonstrate their recent works and discuss with LGE designers so that the most advanced thoughts of academics are conveyed to the designers and implicated in the company's design activities. These events are also recorded and stored in the data base system by the team for further application and uses by the designers.

To handle global design information the DPA team runs the global design monitoring system that is operated by current designers and monitor personnel who are specially selected and appointed in eight regions of different counties. Design information and any other design related information are collected through this monitoring system on the demands from DPA team and this information is delivered to LG Digital Design Centre with local level perspectives and analysis. This information is then synthesised and re-analysed by the DPA team for the specific uses and purposes. Information is collected in the form of moving or picture images, documents, cassette recording and published prints.

This information system is effective in terms of scanning diverse local information regularly that provides more opportunities for designers to keep up with global product design trends and cultural transitions. Figure 7-5 shows the sources and flows of information and illustrates the role of DPA team in collecting and integrating information for the new product concept development process of LGE.



Figure 7-5, Information Management by DPA Team



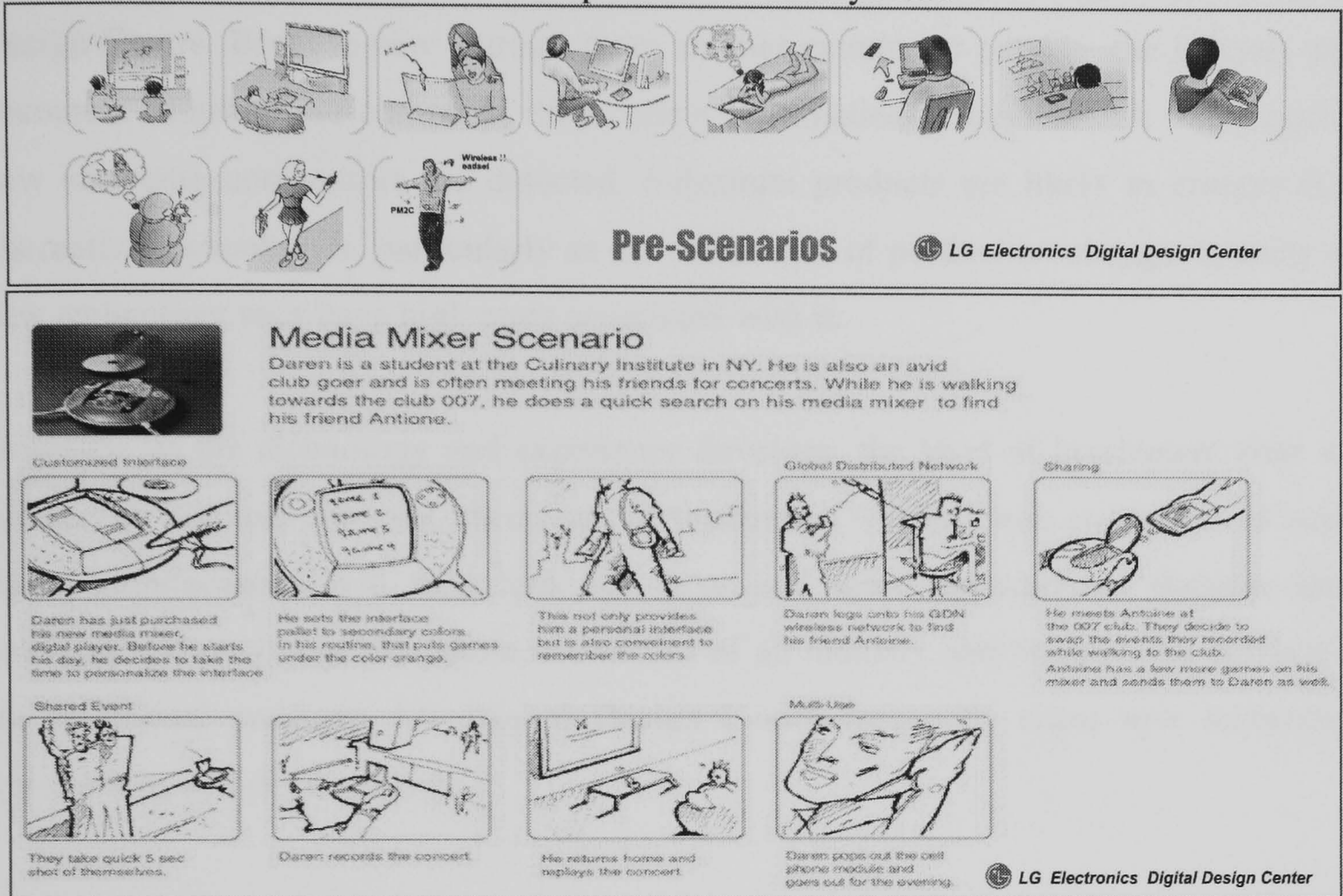
### 7.7.1 Consumer Information

Finding out the nature of consumers is at the basis of consumer information. LG Digital Design Centre categorises modern consumers into four different types according to their desires for products and researches how the desires are changed by interacting with customer's own experiments about products, technological availability and maturity of design. They also examine consumer reactions to new products, how consumers approach new products and make decisions about their purchases. This information helps designers to measure levels of consumers' desire for a product and to anticipate customers' reaction to a new product so that designers can effectively set the right direction for a new product development.

Outcomes of consumer analysis are often presented to designers in the form of simple scenario storyboard (Picture7-4). For example, LG Digital Design Centre researched about the nature and characteristics of N- generation for developing a new product design concepts. Based on the research outcomes, they deployed future life patterns that the N-generation will be living in and analysed them for finding new product needs. The future life patterns were then illustrated and presented to the LGE designers, who generated new product concepts through further discussions about the new product needs figured out by analysis of the future life patterns. This visualised information helps LGE designers' and

the information recipients' to effectively understand the outcomes of the consumer analysis and accelerates the new product concept development process (Kang, 2000)

Picture 7-4 Simple Scenario Storyboard



Source: LG Electronics Digital Design Centre

### 7.7.2 Competitor Information

Intensity of rivalry between competing firms is frequently checked in every respect of competitors' new product development, new product market launch, and market shares. To gather the information, LG Electronics constantly monitors movements of major competitors all over the world through the global design monitoring system and analyses the gathered information for figuring out the competitor's future movements and LGE's counter-plan against those movements.

The staff of the global design monitor system collect the information by accessing published materials such as company annual reports, independent analysts' reports, mainstream press coverage and consumer product magazines. Attending product expositions and trading fairs is the source of information which provides visual images of competitors' latest products.

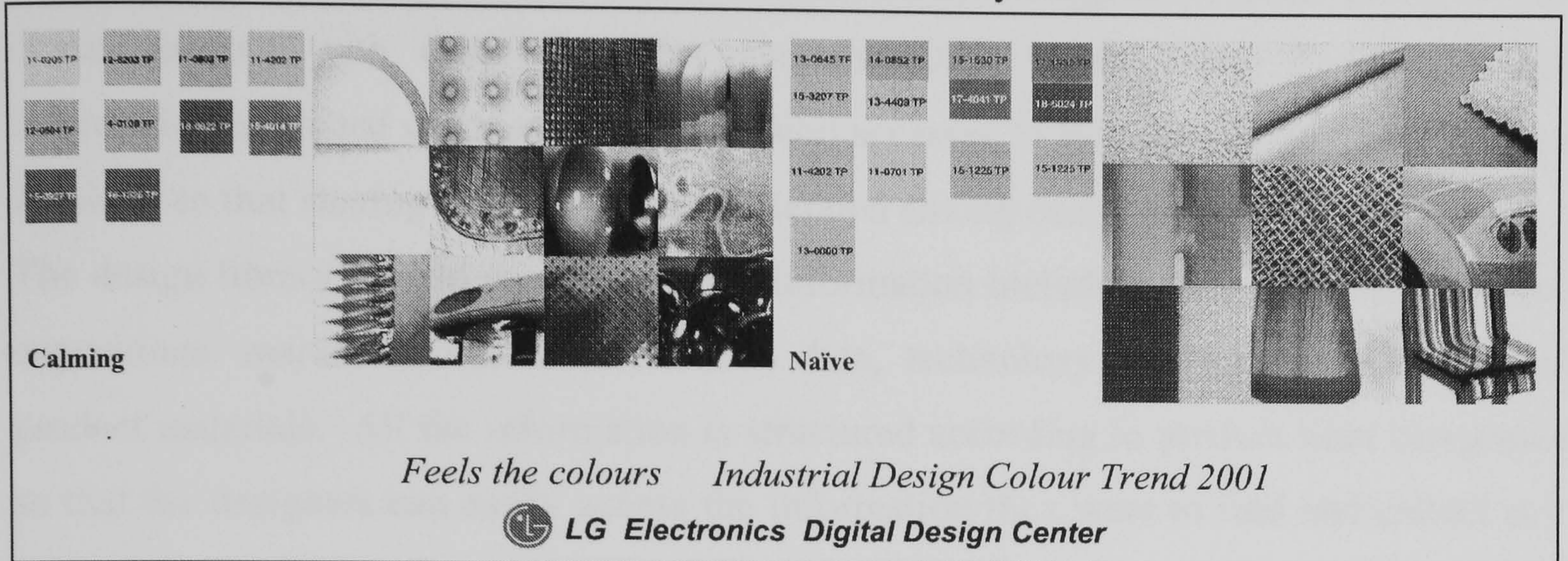
New entrants and appearances of substitute products are also constantly observed by LG Design Centre. Because new entrants from another country or outside the industry may become a threat to the company, they collect information through which any signs of new emerging competitors are detected. Substitute products are likely to emerge from alternative technologies, particularly as the economics of production change. Initially the new technology may have high costs associated with it.

However, as the technology and experience develops, the level of investment rises and production volumes increase, then costs of production will fall with economics of scale. Most manufacturers will then look for more and more applications. Because these substitutes may change the whole economics of an industry and threaten the survival of the traditional products, LG Digital Design Centre frequently scans new technology applications and development.

### **7.7.3 Products Trends Information**

Newly launched products and successful products in markets are usually analysed from design perspectives. Products are classified by product categories, company, price and target markets. Then, each product's concepts, strong points, style, unique functions are extracted and compared. To gain the specialised information related to product elements such as colour, shape, materials of products, LGE Digital Design Centre does outsourcing. For instance, research works and analysis of colour trends from JAFCA (Japan Fashion Colour Association) are regularly imported to LGE Digital Design Centre and processed for further practical applications in LGE products. Picture 7-5 shows the form of the colour analysis that LGE designers receive the information about the colour trends. The outsourcing helps the company to save time and costs in information management and to obtain a high standard level information. Based on the information LGE designers figure out what the current trends are and anticipate future trends in each product category (Kang, 2000).

Picture 7-5, Colour Trend Analysis Form



Source: LG Electronics Digital Design Centre

#### **7.7.4 Socio-cultural Information**

LGE Digital Design Centre also monitors social and cultural changes centering around changing consumer values and life styles because these directly affect customer buying behaviour and eventually the economic, political, and legal environment in which the company operates. As social issues and trends such as increasing environmental awareness, diversity of workforce and markets and changing household are identified, their impacts on customer life and culture are anticipated and analysed. The analysis of the information is then conveyed to the designers in practice who need to envision for developing new product concepts and design. The specially assigned LGE designers and the DPA team usually conduct this information scanning and analysis process. Information about socio-cultural changes at the international level are gathered through the Global Design Monitor System. In addition, the opinions and perspectives of experts in socio-cultural studies are often reviewed and borrowed to get high standard level analysis.

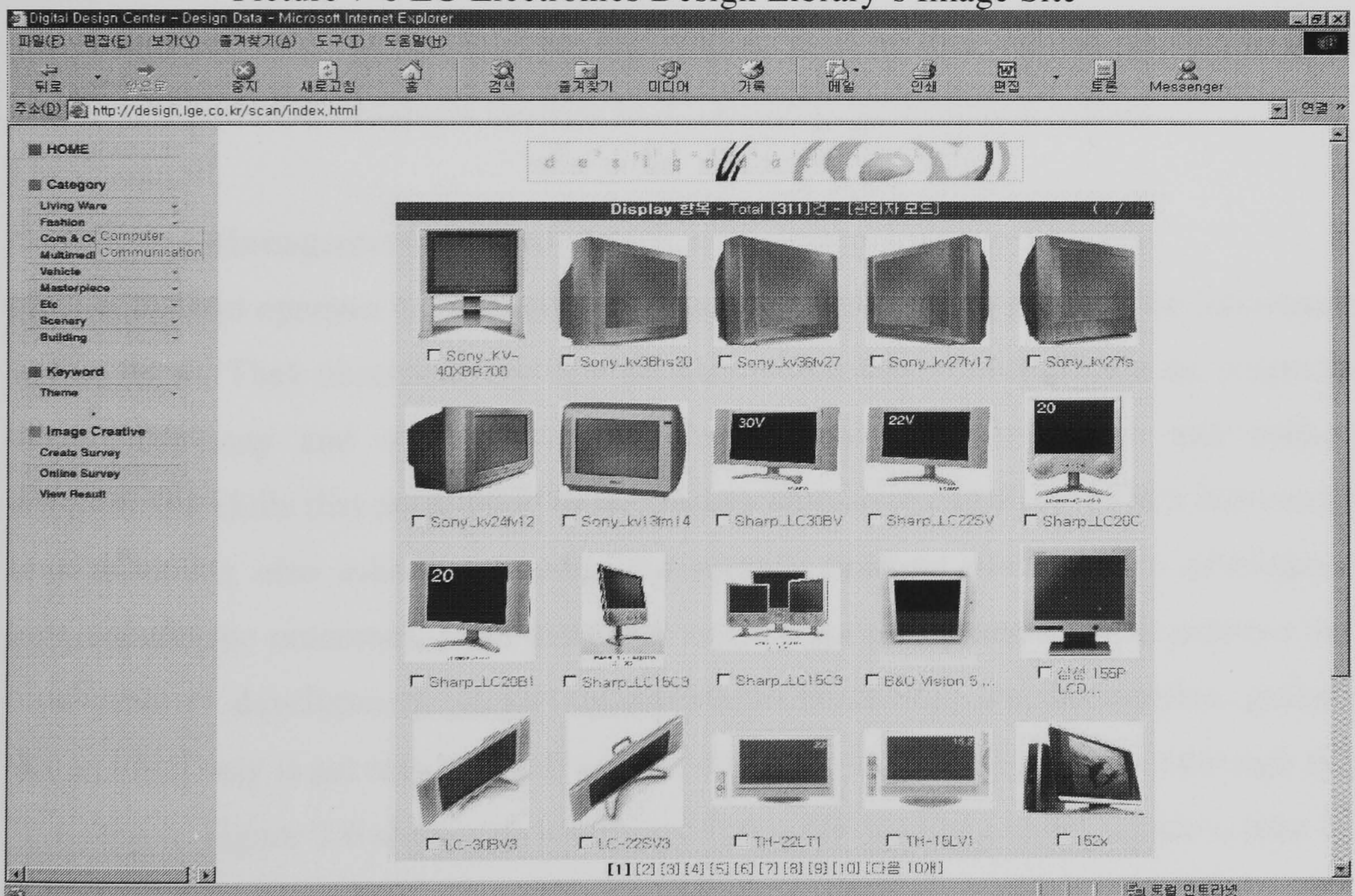
#### **7.8 LGE's Design Library System**

The DPA team is in charge of information management. In the company's Intranet System, the team creates the design library system in which design information is classified and stored. As a design development supporting tool, the design library helps the designers to efficiently obtain the information that are needed for design development projects. Because the design library also provides an information storage space for the visitors, the designers who access the site can put in their own information to allow the

other designers in the company to share the information. Designers also use this space for communicating with other designers and the DPA team. When inquiries about information are listed on this site, anyone who accesses to this site can respond to those inquiries so that sharing information is accelerated among designers.

The design library system provides design information including records of new product expositions, market & customer research data, technology development trends, and product materials. All the information is structured according to product lines categories so that the designers can easily access the information they want to find and collect any other related information. Because the design library also provides visual images covering current products in the market, customer lifestyle and simple aesthetic images, LGE designers do not need to conduct the visual image shooting which requires extra time spending for the designers especially on the inception and design stage of new product development process. Picture 7-6 shows an example of the image site in the design library system of LGE Intra Net.

Picture 7-6 LG Electronics Design Library's Image Site



Source: LG Electronics Design Administration Team

## **7.9 Design Collaboration System**

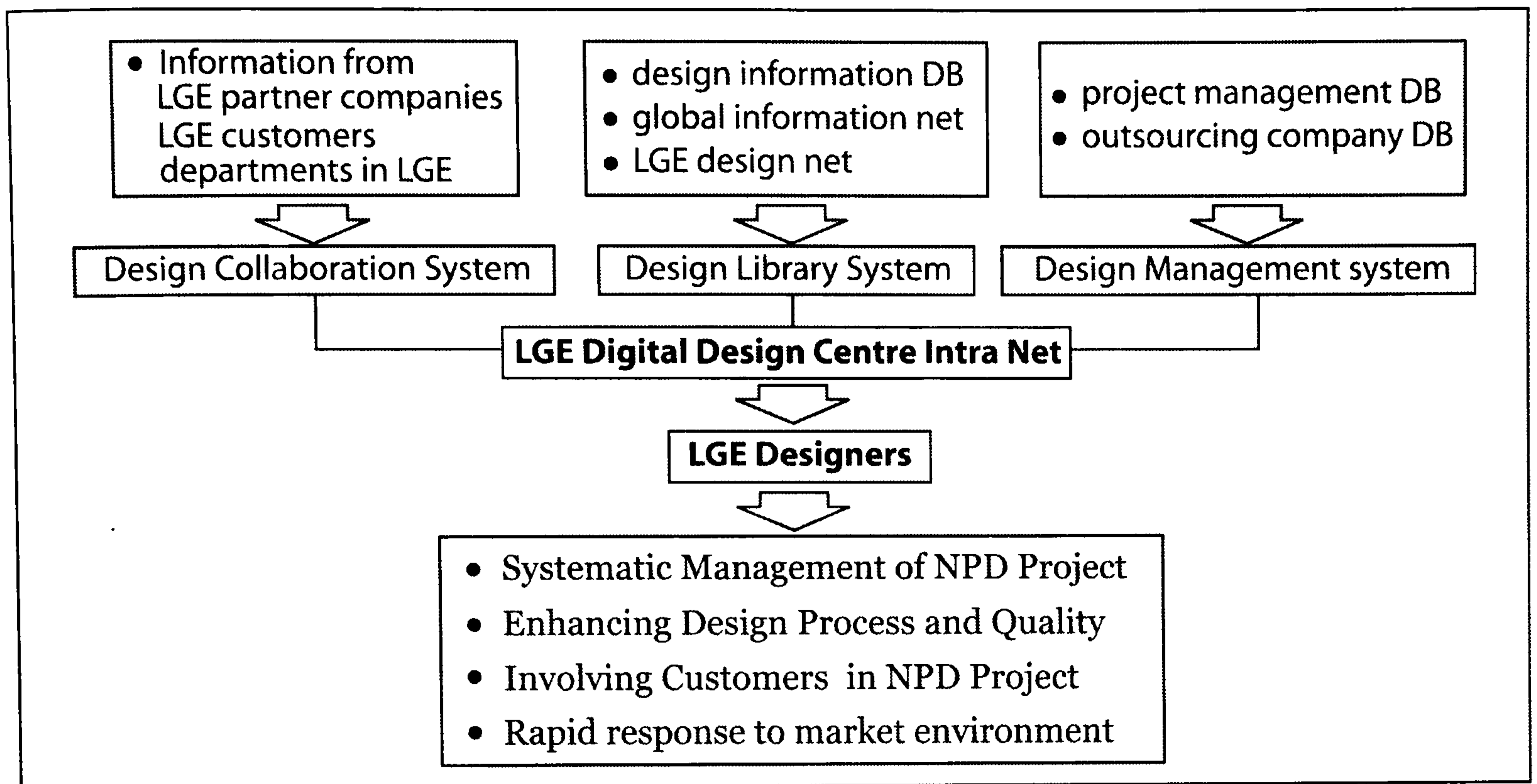
For developing an optimised information management environment, the DPA team has operated the design collaboration system in which LGE's customers and LGE's partner companies are encouraged to take part in new product development projects in terms of providing information. For each new product development project, the DPA team selects some customers and identifies their needs. This customer information is then used as main criteria for evaluation of the design process. LGE's partner companies that conduct subcontracted work also collaborate with DPA team and provide latest information in their technological developments.

The information from partner companies is mostly used in the design process for updating product materials and finishing technologies that are currently applied in product design. The DPA team also mediate the information share and collaboration work between different department to promote a coherent development process and to shorten new product development project lead-time. All the information from the participating customers, partner companies and departments is managed by the DPA team and provided to the LGE designers through LGE Design Centre Intranet system.

## **7.10 Design Management System**

DPA team also operates the Design Management System for reinforcing the information management. They observe every new product development projects that are conducted in the company and record its procedures to evaluate the projects and enhance management skills that are applied to the project process. In addition, LGE's outsourcing companies are also asked to provide the records of their new product development projects and the outcomes. LGE designers usually use this information to improve their new product development project management skills. All the information gathered through this way is put into the database and delivered to the LGE designers through Intra Net system. Figure 7-6 shows the structure of the LGE Digital Design Centre's Intra Net System and illustrates how this system contributes to design activities.

Figure 7-6 LG Electronics Intra Net System and Its Influences



### 7.11 Discussion and Implication

As LGE management recognised that digital technology is at the core of the future technology, they anticipated that the digital revolution would transform customer and business environment into more dynamic environment. In this context, LGE restructured its' organisation into one that can flexibly respond to changing market opportunities. They also adjusted their corporate strategies to the emerging digital environment. In marketing LGE strategically has stressed on expressing their hi-tech image through “digitally yours” campaign so that their customers perceive that LGE is pursuing a digital technology lead company. In R&D, they promote innovation activities that improve fundamental technologies to support all LGE operation in the development of design concepts and next-generation products. Into this strategic environment, LGE Digital Centre is shifting their new product development strategy to a more proactive one. They emphasise development of advanced concept products that create new product market.

As an implementation of the proactive new product development strategy, NCD (Next Concept Design) activity has been conducted in LGE Digital Design Centre. Through this activity, LGE designers develop future based new product concepts and products according to their own development process. However, there are some stages that most of

the development processes commonly follow. Firstly, design project team is acknowledged the themes and objectives of the NCD activities which are differently given for each time. Secondly, information scanning is carried out. Especially, technological availability in the future is anticipated based on the information about the present technology and development. Socio-cultural information is also primarily considered in this information scanning to build a foundation of anticipating the future customer environment. Thirdly, designers synthesises all the information and formulate the possible future states in the customer and technological environment. Fourthly, new product concepts are generated from analysing the future environments and put into the design process for visualisation.

Because the entire process is up to the project team, stages of the project procedure and criteria for the decision making in each phase of the process are determined by the team discussion or sometimes the one who is in the charge of the team. For this reason, the development process varies from that of each project team. However, whole procedure and activities during the process were recorded and discussed later with other design project teams so that the lessons from one project can be conveyed to other designers or project teams.

In terms of validating outcomes, LGE designers do not operate a structured system or method in the development process that test the new product concepts developed. Instead of having a concept-testing tool they focus on reliable information and steering the development process that they believe will bring adequate outcomes. However, if the outcome concepts are exhibited to the public in the form of 3D mock-up, opinions and feedback from people are sometimes used to validate marketability of the concepts.

To talk about the information supporting system in LGE, the Design Library System which is operated on the LGE Digital Design Centre Intranet System by the DPA team, has been used effectively by LGE designers. The information this system provides covers all design related areas including competitors, customer, and new product expositions.



Information is given to the designers in the forms of document and visual images. Thus, the designers conducting projects do not need to spend extra time for individual exploring of information sources.

Because the requests for information and the responses to the demands are processed openly through this intranet library system, any designer who accesses this site can share the information asked for. This helps the LGE designers to broaden their information capacities. Furthermore, designers are allowed to update the information on the site with their own latest information so that information provided through this library system is the one that contains the latest.

Both the design management system and the design collaboration system reinforce the Design Library System as they enable the designers to get information about the past development project records, and to interact with the subcontract companies and customers. These systems are useful for LGE designers to broaden their knowledge bases for the envisioning process because the information delivers a wide range of other designers' experiences in new product development projects, new technological development issues, and customers' opinion which affect the formulation of the future. In terms of covering local information in different countries, the Global Monitor System is effective. Delivering the information and analysis about global trends in local level, this monitoring system helps designer to get the understanding of current trends and to anticipate the future direction of trends in a broad sense.

In anticipating future state, LGE designers consider competitor's move as one of important factors that influences their formulation of the future. To help the designers to reflect the impact of the competitor's move on the envisioning process, the DPA team constantly monitors any changes in competitors' management, R&D and new product strategies. The information is analysed and put onto the intranet system so that designers can be effectively aware of it as they access the system. In addition, trends of design elements such as colour, product material, and shape are also understood as the factors which influence the forms of the future products. To cover this information LGE designers are asked to attend international workshops and conferences, and the DPA team

is closely cooperating with independent companies and institutions that specialise in research about the trends of design elements. All the information gathered is synthesised by the DPA team and then conveyed to the LGE designers through the Design Library System.

As an information support tool, the Design Library System on the LGE intranet system effectively contributes to the design activities in LGE (Wi, 2001). Firstly, it integrates all the information gathered through diverse channels and stores them in an organised structure so that the designers can easily access and obtain information. Secondly, because this system covers all categories of design related information, LGE designers do not necessarily conduct extra information scanning process individually. Thirdly, the Design Library system accelerates information shared among the designers, which contributes to the design coherence in their outcome products. Fourthly, it is operated by a specially organised and trained team so that the management of information is maintained in a standard level. As a whole, the Design Library System provides an optimised environment for information scanning process so that LGE designers are able to shorten the lead-time of new product development projects such as NCD and DCR activity and to enhance quality of the outcomes.

From the investigation above, it is concluded that there are some findings that can be implicated in the future visioning system model. First, the company's management strategy in which the understanding of dynamic market situation is dissolved can create the right environment for operating the future visioning system model. LGE management understood that the impact of digital technology revolution would bring new environment and rules for business, and then steered their new product development strategy to a proactive one that focuses more on technology and concept lead products. This was followed by organisation restructuring and investment increases in R&D and Design. In this environment, LGE Digital Design Centre could conduct creative and innovative design activities such as DCR and NCD.

Second, in terms of boosting the information scanning process, information should be systematically managed at the company level. LGE Digital Design Centre operates the DPA team in their organisation to support designers' information scanning activities. The team manages all the information related works that includes varying information sources, developing information network, and analysing information. They also maintain quality level of information by frequent updating. This enables LGE designers to obtain reliable information time-efficiently.

Third, the company's electronic network system such as intranet can be used for the effective distribution of information to designers since it provides quick and easy access. This method also accelerates information sharing between designers so that design coherence can be achieved in the outcome products.

Fourth, trends of design elements such as colour, product material, and shape should be carefully monitored and integrated into future visioning process because this information is required to define forms and design of future product. Without implying this kind of information the outcome product of future visioning system model could be a mere design suggestion or something that is not marketable.

Fifth, customers' opinion and thoughts about the future should be implied into the future visioning process. Because customers are the actual factors that directly influence the formulation of the future and they are the ones whom the outcome products will be targeting, customer information should be constantly scanned and delivered to the designers to generate the valid outcome products that meet customers' anticipation.

Lastly, subcontract or partner company information also should be scanned and managed because the company's capability of production in the future can be influenced by subcontract or partner companies' abilities to produce required product parts and to develop subsidiary technologies. If this kind of information were neglected, it would be harder to put the outcome concepts into the real production.

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## Chapter 8. Samsung "Digital Collection" & "The Digital Grand Map"

### 8.1 Company Overview:

Samsung Electronics is one of the world's leading manufactures of thirteen production categories including six top products in world market such as TFT-LCD, Memory Chips, wireless handsets and Microwave ovens (table8-1). It currently employs 64,000 people in 89 offices in 47 countries. Samsung Electronics undertook extensive restructuring accompanied by substantial cuts in the company's personnel and the prioritising of profitability over growth in 1998 to attain a greater focus on core areas of business and to meet 21st century global standards. After the restructuring its organisation structure was transformed into four main business units, Digital Media Network, Device Solution Network, Telecommunication Network and Digital Appliance Network business.

Table 8-1, Top Products of Samsung in World Market Share

Product	Market Share	Portion Ranking
CDMA Handsets	26%	1 <sup>st</sup>
Microwave Oven	25%	1 <sup>st</sup>
DRAMs	22.9%	1 <sup>st</sup>
TFT-LCDs	20.1%	1 <sup>st</sup>
SRAMs	20.6%	1 <sup>st</sup>
Color Monitors	14.5%	1 <sup>st</sup>

Source: Samsung Electronics

### 8.2 Company's Management Strategy

Samsung acknowledges that today's business world is marked by unrestricted competition, and successful companies must be the best, the fastest and the least expensive to prevail as Chairman Lee (2000) has observed, "Competitiveness in the future means being at the very forefront of change. It is determined by how much faster one company develops new technology and gets new products into the marketplace than the others." To transform its management into more globalisation-oriented and specialised in order to keep up with the rapidly changing global economy, Samsung declared company's new policy signaling a complete overhaul of its organisation in 1993.

### **8.3 “New Management” Policy**

“New Management”(Samsung<sup>1</sup>,2000) featured the challenge to cope with the competitive business environment. Its implementation began by transformation from production volume to product quality to change their priority in business. To accelerate the change they adopted advanced quality control methods and programmes in practice such as a Line Stop system allowing any worker to shut down production if a defect is found, and new work hours giving employees more quality time.

The “New Management” policy has enabled Samsung to create domestic value and economic value added (EVA) among Korean business and to improve the company’s growth potential on the basis of securing competitiveness in all areas of operation. The success of the implementation of ‘new management’ was recently succeeded by ‘Digital Management’ which focuses on shaping a new corporate identity and management systems to accommodate every aspect of the organisation.

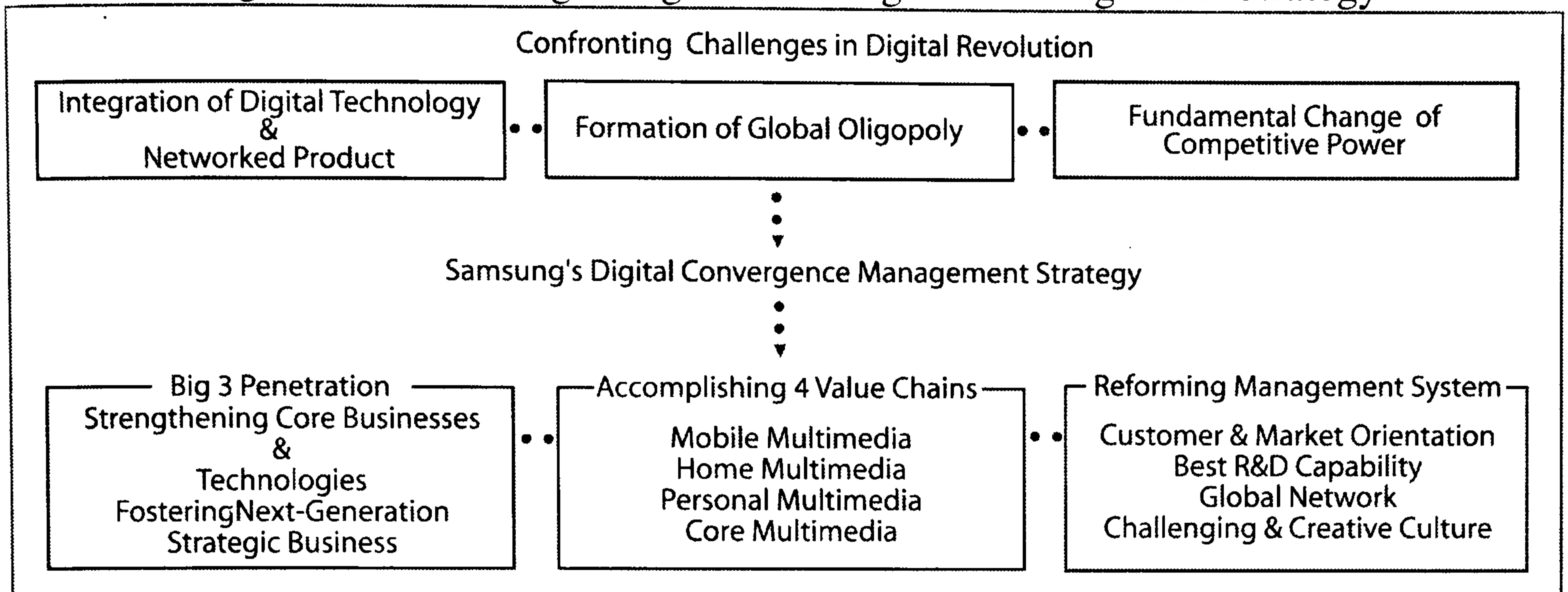
### **8.4 Digital Management**

As Samsung declared 2000 as “the starting year of Samsung Digital Management,” they announced “Digital Vision” which expresses their digital management concepts to stay ahead of the great waves of transformation of global business and culture spurred by development of digital convergence technology (Samsung<sup>2</sup>, 2000). In this digital vision Samsung set 3 goals based on their core technological competencies to seize new opportunities in the future. First, to produce more products that are best in the world. Second, to equip themselves with the basic requirements for digital convergence. Third, to make innovations in their work processes and ways of thinking.

In order to achieve those goals, Samsung strives to design and create a new generation of digital products reliant on technology that is ahead of people’s capabilities and everyday needs as they reinforce the areas in which they are already strong in terms of both quality and quantity to maximise profitability. Samsung also put their effort into creating a value chain that integrates competencies of all areas for the success of digital convergence, and

making a corporate culture where meeting challenges and utilising creativity is considered a core value (Figure 8-1).

Figure 8-1, Samsung’s Digital Convergence Management Strategy

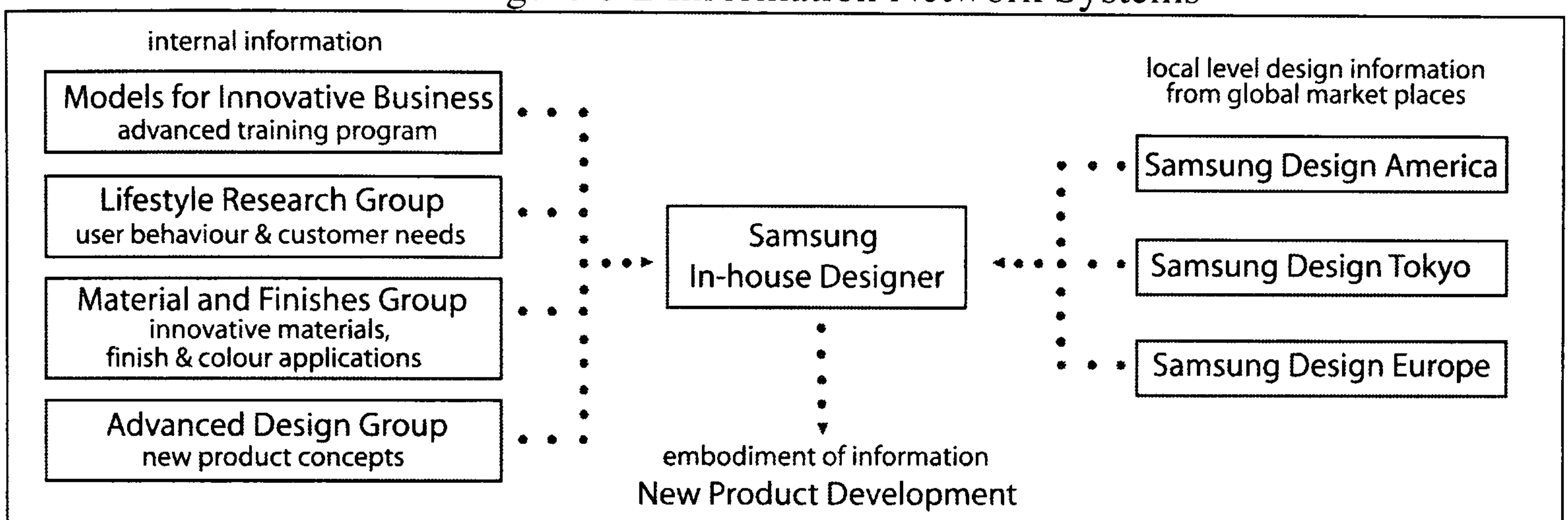


Samsung’s Design Strategies were set in accordance with the company’s digital vision and reinforced by the company management’s understandings about importance of design in their product successes. Ever since the Samsung Group chairman’s 1994 proclamation saying ‘design is the most vital asset in enterprise’, design has been considered as the most critical factor that adds value across the consumer consumption chain, with direct impact on the brand image. To motivate more creative design activities in their company, Samsung initiated comprehensive global design programs with \$126 million support from Samsung Electronics business unit and the Models for Innovative Business (MIB) program which provides advanced training for in-house Samsung designers.

As a comprehensive design programme has been implemented in the company, Samsung Electronics adds new functional groups for developing a design information network such as Lifestyle Research Group specialising in user behaviour and customer needs, Materials & Finishes Group searching innovative materials, finishes and colour applications, and Advanced Design Group exploring new product concepts for interdisciplinary teams. The research results from the subsidiary groups are synthesized through cooperative meetings with senior managements and embodied into product design through the designers who are educated with the synthesised information.

Samsung Electronics also established a number of internationally-located design offices as they completed the structuring of a design information network. These offices gather design information and data such as market trends, competitors’ moves, and customer preferences on a local level and feed them to in-house Samsung designers who integrate the information into their new product development. In terms of proficiency of information management in new product development process, this information network enables Samsung in-house designers time efficiently to have expert’s knowledge in the design related areas and to enhance their capabilities to acquire specific information from global market places. Figure 8-2 illustrates how the information system of Samsung Electronics is structured.

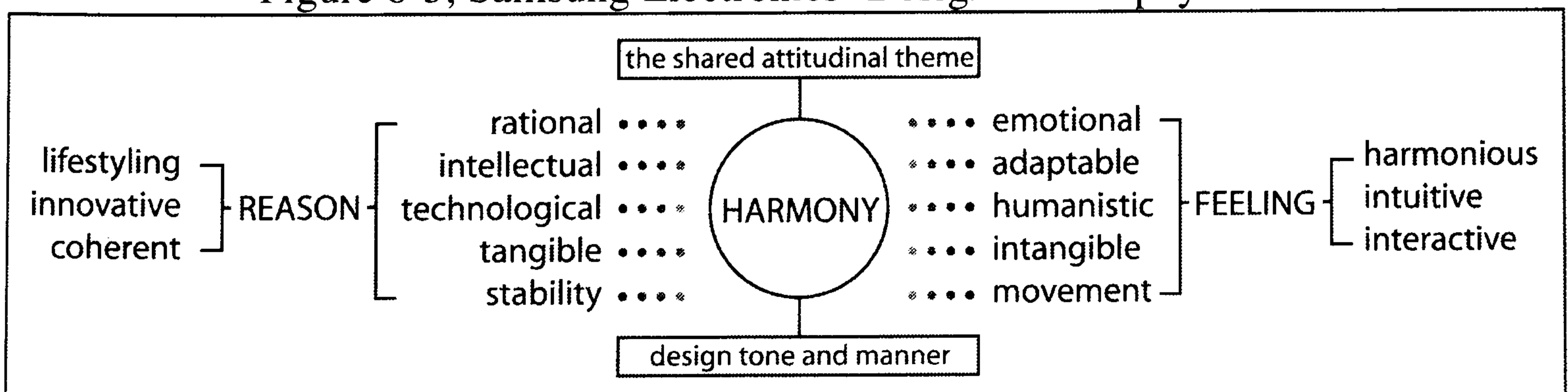
Figure 8-2 Information Network Systems



### 8.5 Samsung Electronics’ Design Strategy

To set clear a direction for the design programmes Samsung Design Centre defined their fundamental design philosophy which mainly consists of Balance of Reason and Feeling (Figure 8-3). The design philosophy implicates that design activities are evolved in the domain where feeling and reason exist as opposing forces for each other, therefore, the appropriate balancing between the two forces should be understood as the most important task to achieve an design excellence in their new product development.

Figure 8-3, Samsung Electronics’ Design Philosophy

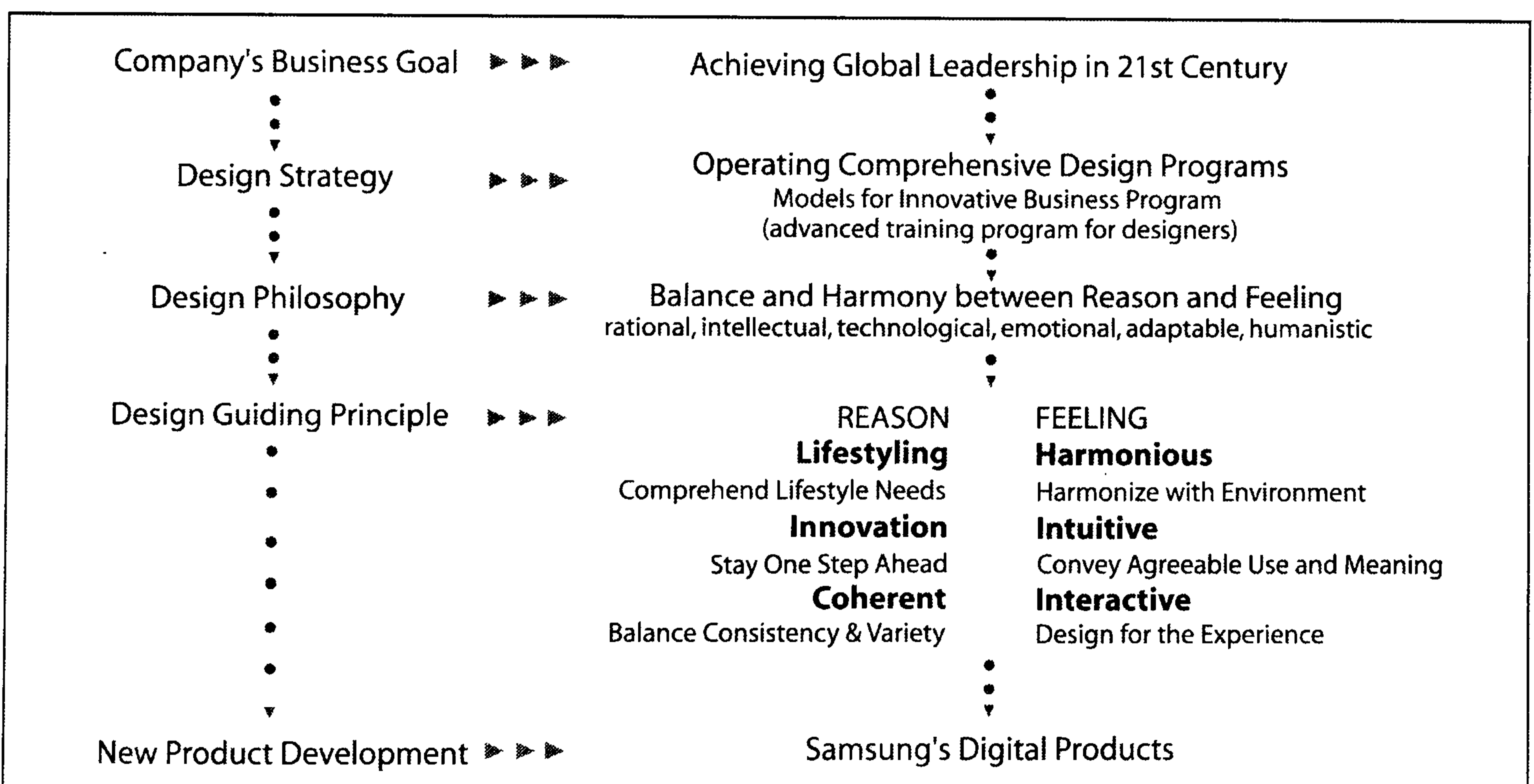




Based on the design philosophy Samsung Design Centre developed a design checklist which consists of six guiding design principles to ingrain essential design values in their new product development process. New product concepts and design suggestions are screened through this checklist to verify whether they embody the company’s essential design characteristics. To develop this checklist designers were firstly reminded of the company’s goal of global leadership and then brought to a discussion to articulate the characteristics of a company that they define as a leader.

They concluded that to be a leading design company, balancing between the two forces, reason and feeling, must be managed in an unique and appropriate way as the fundamental tone and manner philosophy for designing new product, and innovation which exceeds customers’ expectation must be the first consideration in their design activities. These conclusions were transformed to 6 guiding design principles such as lifestyling, innovative, coherent, harmonious, intuitive, and interactive (Figure 8-4)

Figure 8-4, Implementation of the Design Strategy in Samsung Electronics



### 8.6 Digital Grand Map: the Future Visioning Tool

The Samsung Design Research Centre (SDRC) developed the Digital Grand Map (SDRC,2000) (Figure 8-5) as a tool of future visioning that anticipates the changes in

human environment, technology, and new product trends in the future.

### **8.6.1 Development Background of the Digital Grand Map**

The development of the Digital Grand Map was theoretically based on the idea of ‘Directed Evolution’ that the evolution of everything—from products and services to entire markets, has been the result of natural evolution spawned by human creativity and intentions (Clarke, 2000). The directed evolution assumes that the best direction for innovation and the future state can be revealed through analysis of records of the past and the world’s technological history. The general strategy of Directed Evolution is presented in the following steps: (1) understand the current situation such as company objectives, market conditions, existing technologies evolution to date, constraints, and limitations; (2) understand the historic conditions that produce the evolution to date; (3) know the opportunities; (4) incorporate the best directions for innovation; and (5) gain market and technological superiority.

Based on the Direct Evolution, the Digital Grand Map assumes that future direction and content of human civilisation can be identified through exploring the historical record of dialectic progresses between technology and nature centring on humankind. The periodical record of progress implies a mechanism that shows how trend of each time period evolved into the next. In this sense, when the mechanism is interpreted, the future trends will be anticipated.

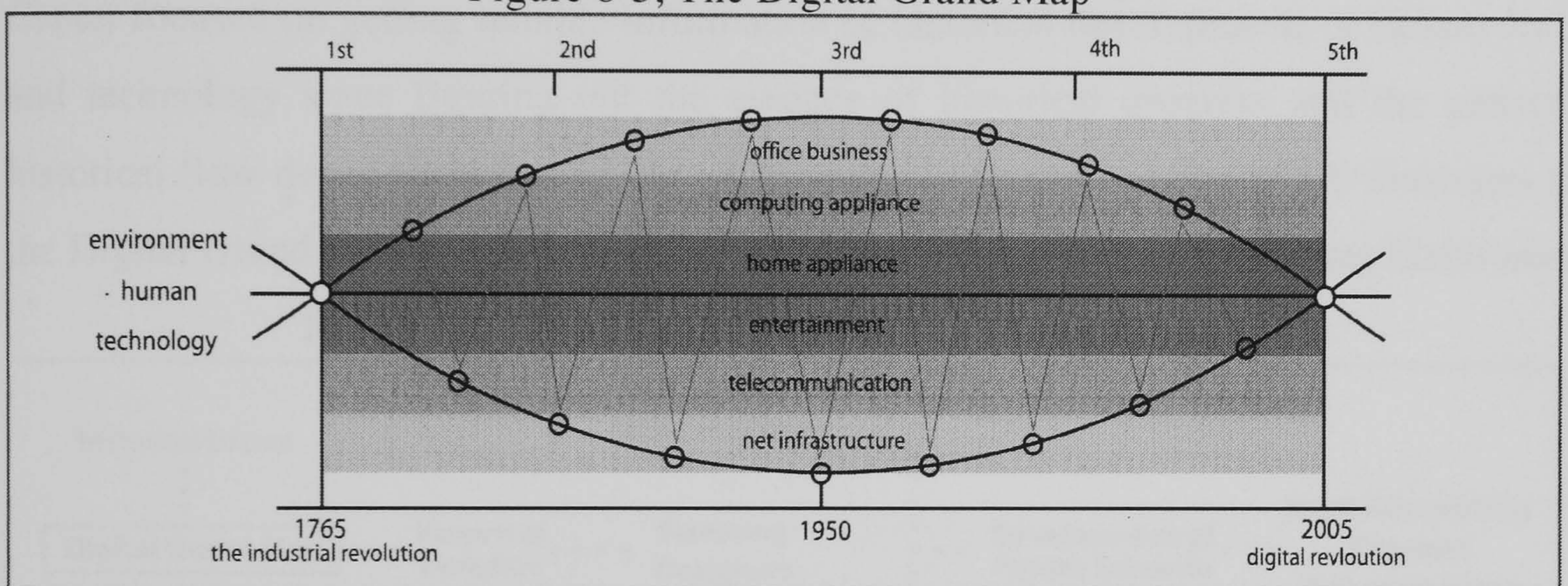
### **8.6.2 Structure of the Digital Grand Map**

To develop the Digital Grand Map, they firstly defined three main elements that have made progresses in human history by interacting with each other: technology, human society and natural environment. These elements make the fish-shape structure of the Map, in which historical events are periodically demonstrated. This map consists of six layers that represent major product categories such as office business, computing appliance, home appliance, entertainment, telecommunication and media, and Internet related products. In each product category layer historical development of the product is illustrated.

### 8.6.3 Future Visioning through the Digital Grand Map

As the historical developments in each products category are periodically contrasted against the historical events by visual pictures and explanations, designers themselves formulate a mechanism of the changes, and interrelation between product developments and historical events. They then figure out feasible product trends and changes of the industries in the future from the understanding. Based on the outcomes of this process, Samsung designers draw future scenarios from which they can derive new customer needs and new product ideas and concepts.

Figure 8-5, The Digital Grand Map



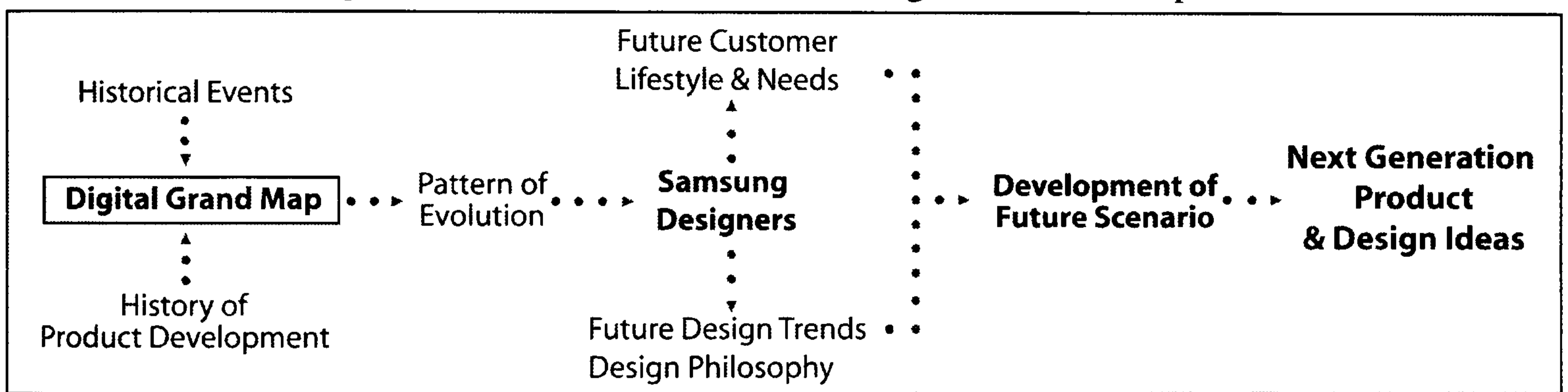
Source: Samsung Design Centre

The Digital Grand Map explains that technological innovation and new ideas in science mainly caused paradigm shifts in which human history have made evolutionary transformations in lifestyle and thoughts. For instance, the wide distribution of personal computers in 1980s paved a road to the digital age of 1990s which brought many changes in every aspect of society. Emergences of internet shopping and internet banking changed the dimensions of time and space as customer's basic parameters so that the businesses were asked to redefine definitions of business activities. Fast developments in transactions and communications through the digital network also combine the world of work and play, education and entertainment, industry and the arts, and the public and private sectors. All of these things are becoming globally integrated so that it is possible to perform many activities at the same time.

### 8.6.4 Benefits of the Digital Grand Map

According to Ahn (2000), there are some of potential benefits the Digital Grand Map provides. Firstly, it enables designers to identify the mechanism of progress through which they can figure out plausible directions of technological development and product trends by illustrating the interactions between historical events and product developments. Secondly, it leads designers to anticipate the customer environment in the future so that they can develop ideas of the next generation of products and designs. Thirdly, it provides holistic understanding about formulation of the future which becomes the element of building future scenarios. To maximise the efficiency of these benefits, Samsung Design Research Center focused on getting reliable information of historical developments in human society and technology since figuring out the essence of historical progress and the pattern of historical flow depends on the validity of historical information. Figure 8-6 illustrates how the Digital Grand Map contributes in the future visioning process of Samsung Electronics.

Figure 8-6, Contribution of the Digital Grand Map

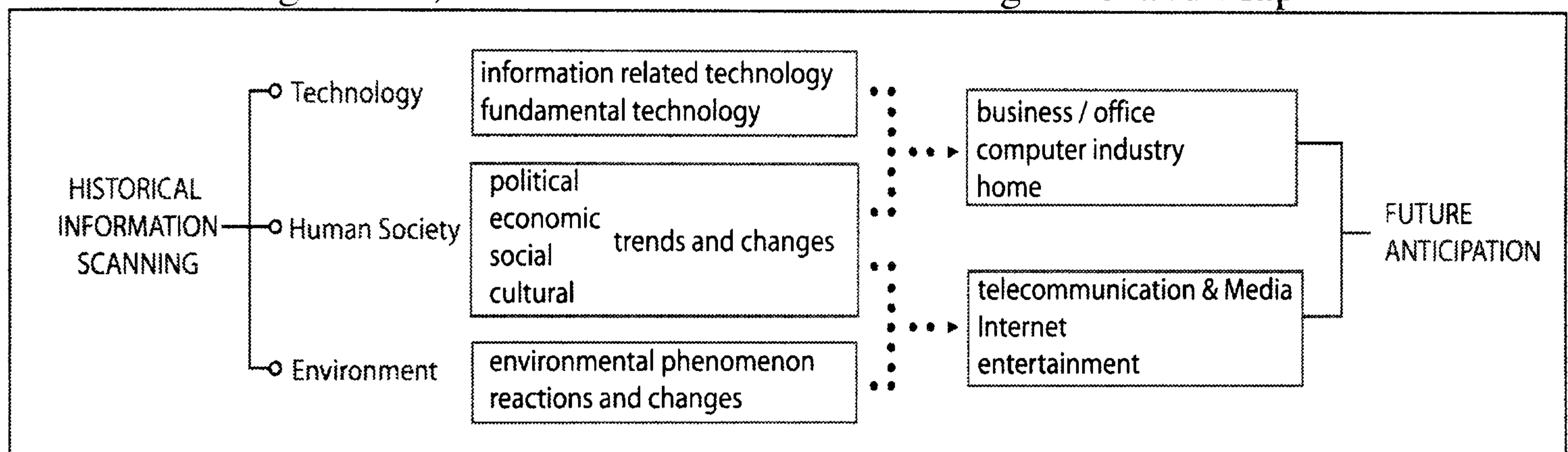


### 8.6.5 Information Sources of the Digital Grand Map

In the Digital Grand Map, the future is anticipated through analysing historical information. According to Samsung Design Centre, social phenomenon should be understood as outcomes of interactions between human, technology and natural environment. Contents of human history as social phenomenon are weaved together by cause and effect relation and those form a pattern of progress. By reading identified pattern, designers anticipate the direction of future evolution and its contents. Thus, in the information gathering process, Samsung defined three main domains of information source: technology, human society and natural environment. In scanning technology information, they defined two types of technology, information related technology and fundamental technology, and focused on finding how the two types of technology have influences on business/office, computer

industry and home. Information gathered here were then used for figuring out patterns of technological progress and product developments. In gathering human society information they searched into the political, economic and cultural trend sectors, and focused on finding how these sectors have made progress through the human history. Information about environmental phenomenon and reactions was gathered in the point that how environmental issues are inter-related with the development of technology and progresses of human society. Once the information was gathered and synthesised, a holistic view of the inter-relations among three domains was formulated through the cross-examining the each domain’s information. The holistic view helped Samsung designers amplify their understandings about the historical evolution and its mechanism. To effectively provide a comprehensive view and help designers’ understanding, visual information was also collected in accordance with the historical events and changes.

Figure 8-7, Information Sources of the Digital Grand Map



### 8.7 New Product Concept Development: “Digital Collection”

In 1999, Samsung Electronics carried out a new product development project for the future titled ‘Digital Collection’ as an implementation of the company’s strategies for the 21<sup>st</sup> century. They aimed to visualise the corporate brand value proposition by application of innovative technologies, to envision new business opportunities from user’s need and environmental perspectives and to reinforce Samsung’s design identity programme. In this project they determined that the home will be an information hub in the near future, and a family with teenagers will be their customer who are sensible brand buyers. Focusing on substantial needs of each of the family members they developed in-home and mobile devices of the future.

### **8.7.1 Project Development Process**

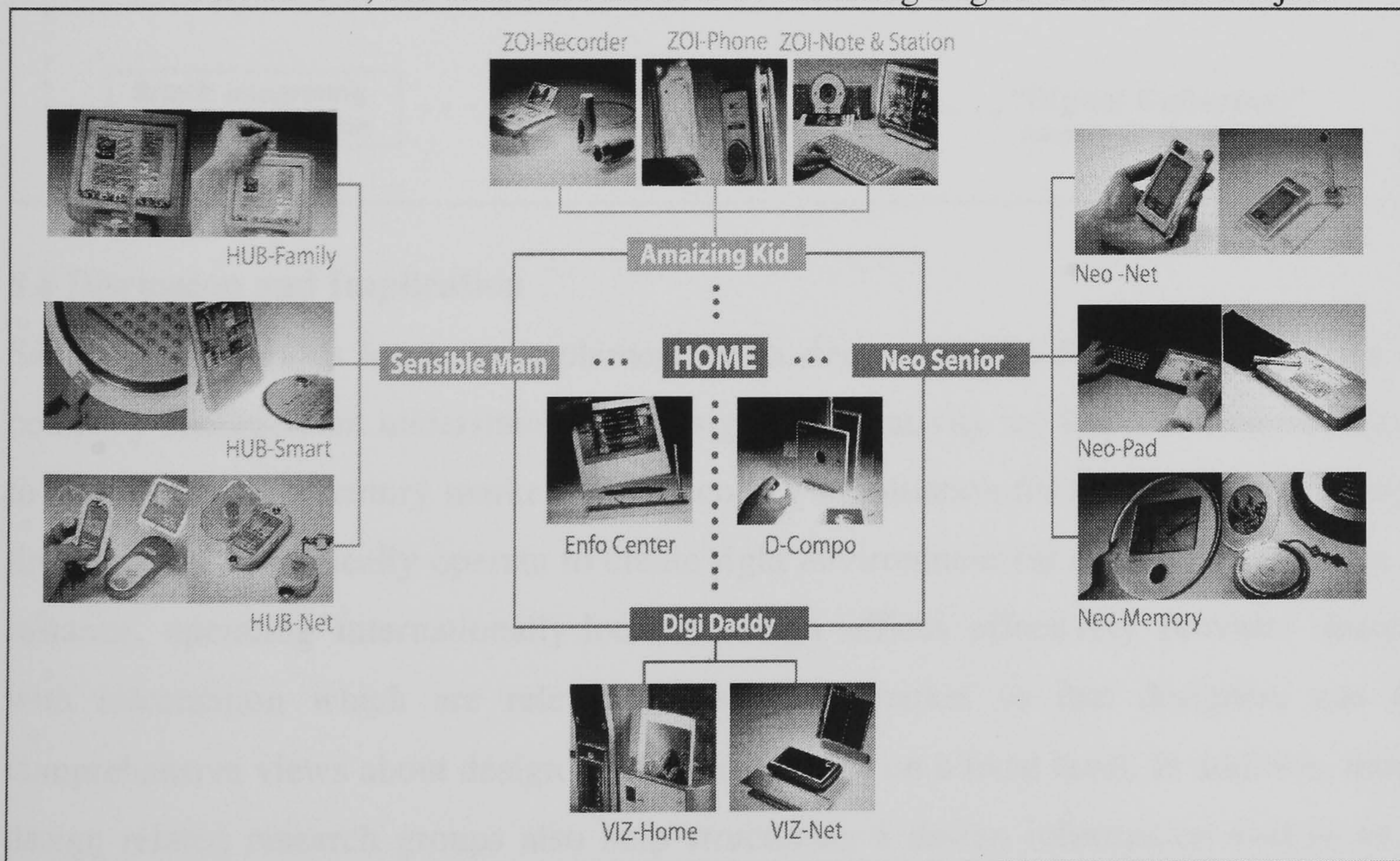
In the initial phase of the project participating designers were reminded of corporate business objectives and strategy and given a knowledge of the company's five core technologies; data compression, memory, voice recognition, and display & wireless communication. Based on the clear understanding about the company's technological resources they constructed an information scanning process which consists of internal and external information gathering activities. In the internal information scanning, the company's internal resources were identified through examining the state of R&D infrastructure to support technological development in their five core technologies and management's determination to pursue the corporate strategy for the 21<sup>st</sup> century. This provides better understanding about current state of the company which enables designers to validate the company's strategy for the future. In external information gathering, the overall character of customer society, customers' attitudes for technological developments and diffusion of technology in society were targeted to identify possible the direction of customer society and technological development. Competitors' moves in technological development was also one of the considerations in external information scanning in terms of affecting the direction of technologies.

The Digital Grand Map was effectively used in this stage by providing historical information about products and society which enables designers to have a comprehensive view about emerging product trends and future lifestyle. Collected information was then synthesised and used for projecting a feasible future vision which anticipates future customer society, available technologies and future capability of the company in technology and other internal resources. However, because the technologies applicable for the project were already limited within the boundaries of the five core technologies from the start, the future vision was developed focusing on communication product devices which are based on those technologies. In their future vision, Samsung designers determined that human society would benefit more from technological developments and customers lifestyle will be more influenced by the application of technologies. They also illustrated that family members will be closely connected through advanced future communication technology so

that their every day lives will be organised through the technological product devices. Based on this vision about the future, designers classified family members into four potential customer groups such as Digi Daddy, Sensible Mum, Neo Senior and Amazing Kid. Each family member's lifestyle which would be emerging in the future environment were then anticipated and discussed. By illustrating each family member's everyday lives, designers identified their interests and activities in three different domains: learning, working, communication (See Appendix 4).

These findings were directly transformed into new product ideas and contents. 1200 concepts were generated by the participating designers in the first stage and screened through criteria such as the user's value pattern, technological availability and the company's business objectives. The tested concepts were demonstrated for gaining final approval from management and visualised into 3D prototype models (Picture 8-1). After the final presentation was conducted the marketing department was involved to explore the market feasibilities of the new product concepts. According to the outcomes of the exploratory marketing they set both short and long-term strategies with a development plan to implement the new product concepts and ideas.

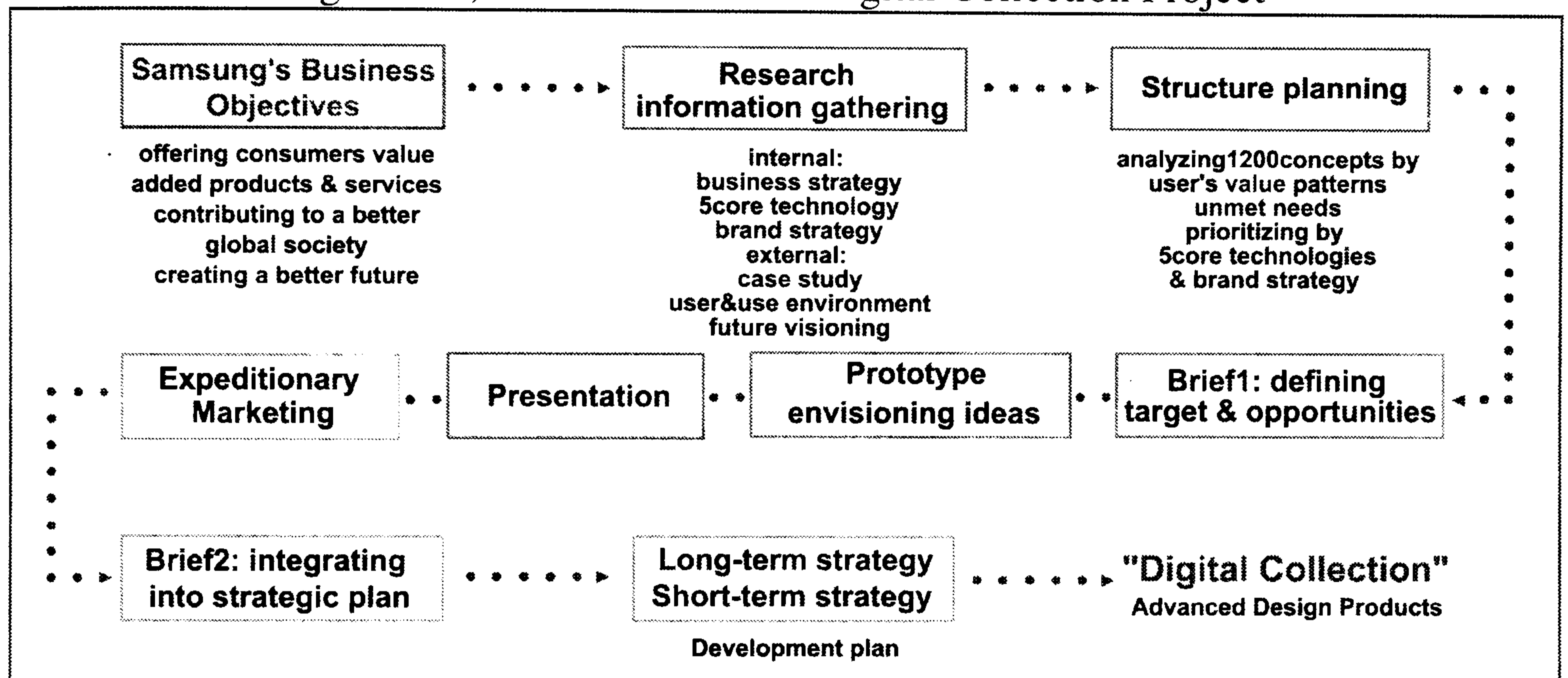
Picture 8-1, 3D Real Life Models of Samsung Digital Collection Project



Source: Samsung Design Centre

The 3D mock-up models of the new product concepts were exhibited to the public who are the potential customers of the company products. Through the demonstration of the future products Samsung aimed to carve the corporate image which is to pursue a digital product leader in the future market into the customers' mind and to educate their customers about the future of products so that the customers' loyalty to the company products will remain same or become enhanced. For the designers themselves, these visualized new product models also helped designers' understanding about the direction of company's future products and design. Figure 8-8 illustrates the entire process of the Samsung Digital Collection Project.

Figure 8-8, the Process of the Digital Collection Project



### 8.8 Discussion and Implication

Samsung Electronics has been implementing its design policies for new millennium. The company management understands that design and creativity are important business assets to compete in 21<sup>st</sup> Century market. This becomes an initiation for the design programs that the company strategically operate to create right environment for designers' activities. For instance, operating internationally-located design offices effectively provides designers with information which are relevant to specific market so that designers can have comprehensive views about design and product trends on a local level. In addition, internal design related research groups also help structuring a design information system so that designer can effectively handle technological information. Because the design offices and



the research groups are operated by the designers who are specially educated to the post, the information which this system provides effectively satisfies information needs of designers.

The company’s fundamental design tone and manner which they defined as the principles of Samsung Design, enable the company to create right environment by providing a singular and shared direction in thought and action for Samsung’s design teams, and these are used as a master checklist so that Samsung designers can validate new product concepts and designs as they develop. The design philosophy also contributes to building brand trust in the customer in terms of nurturing recognisable logotypes, corporate identity standards and effective graphic communication. These make Samsung’s new product development process proceed efficiently by preventing confusions and time delays caused by discordance in thought and action, and also help Samsung designers to achieve the coherency of product design in the company products.

As an information support system the Digital Grand Map was effectively used in Samsung Digital Design Center to increase efficiency of new product concept development process by supporting designers’ capabilities of generating new product concepts. The Digital Grand Map enabled the designers to identify the patterns of technological, social and cultural changes by demonstrating historical events and changes in visual forms to designers. And it also helped the designers to comprehend the mechanism of formulation of the future so that the designer’s envisioning process in the ‘Digital Collection’ project was accelerated.

Using the Grand Map approach to the future is beneficial for Samsung designers to deal with uncertainty of the future because it enables the designers to understand a mechanism of formulation of the future by letting them figure out how environmental factors such as events in human society, technological development and environmental issues interact with each other and what results from it. For making an accurate anticipation of the future, this understanding can be applied to forecast possible outcomes of the interactions among

environmental factors which mostly affect the formulation of the future.

In new product development strategy Samsung Electronics had adopted a market and customer driven approach in which market and customer needs mostly initiate the new product development until they declared the digital vision in which they reveal their tactics of being the “true number one” company such as to innovate products that satisfy people’s needs not just now but in the future. The company’s new product development strategy is now turning to pursuing of market driving approach which the company develop the products that is slightly ahead of people’s capabilities and everyday needs to lead the market.

In the company’s conversional environment to a new product development strategy, the ‘Digital Collection’ project provided an experimental new product development process. Its process was started from defining technology as the factor that plays important role in formulating the future of human society. This assumption set the boundaries and contents of an environmental information scanning process. Technological capability of the company and current state of technological developments were the main focus of the information scanning. Based on the analysis of the technological information, how the other environmental factors would be influenced by the technological advances was anticipated and then a possible future state of the human society was developed by synthesising the anticipations in each environmental factor. After the future vision which describes future lifestyle and environment had been developed, actual concepts of new products were extracted from the vision statement by transforming people’s interests into product needs.

Developing future vision was conducted in two stages, Firstly a holistic picture of the future was drawn to let the designers have a broad understanding of the future. Then subsidiary visions of the future which anticipate future of customers’ lifestyle were developed in detail according to the each target customer groups. Because the first future vision provided a logical basis for developing subsidiary visions as it describes the future of human society and environment in broad sense, this two step visioning system is effective

to draw reliable subsidiary pictures of customers’ lifestyle.

In the developing process, because the main theme of the future vision was defined as ‘digital connectivity’ which can be achieved through the applications of the company’s core developing technologies, each subsidiary vision could focus on describing how the future life and environment are influenced by those technologies. This helped the designers to concentrate on the main purpose of the future visioning and to stick to the target product ranges they aim to produce during the vision development procedure. Therefore, it is efficient for developing future vision to define technological resources that a future visioning project is based on and to provide a clear boundary that the future vision would cover.

To validate the concepts generated through the process, the six design principles were brought into the process. These principles checked the concepts against the consistent characteristics of Samsung product they defined and the company’s strategic pursuits. The concepts that passed through concept screening were finally validated by the expeditionary marketing process which tests market possibilities of the concepts. This two-step concept testing system is effective to discard the concepts that are not accordant with the company’s strategy and do not have feasibility of real production. From these, Digital Collection project could end with new products that are more marketable and practical.

To sum up the findings from Samsung there are some of implications for the future visioning model. Firstly, future visions should be developed on comprehensive understanding of company’s strategy and available core technological resources in order to generate product concepts that coherent to company’s strategic direction and have possibilities of real production. To achieve this information scanning in internal environment should cover company’s strategies and technological resources in an qualitative manner.

Secondly, for helping designers’ envisioning process historical information can be adopted

in terms of providing a mechanism of formulation of the future and enhancing the understanding about interactions between environmental factors and their outcomes. To achieve this historical information should be collected and synthesized into a manageable form through which designers can acquire an holistic perspective about the future.

Thirdly, future vision should be developed in the deductive way which generates a vision describing the future as a whole and then extracts subsidiary visions from it according to the specified customer sectors. This process can be effective to increase validity and reliability of future vision, and be helpful to the designers to avoid the ambiguity of developing future vision as it provides logical steps.

Fourthly, a specified theme or focusing technology should be defined for the future vision the project aims to provide the designers with clear direction and boundaries of the project. This enables the designers to efficiently produce the right concepts that are accordant with the aims of the future visioning project.

Lastly, the concept screening process should be conducted in terms of practicality in production and in accordance with corporate strategy and design so that the final concepts that passes the selection process can be used in practice.

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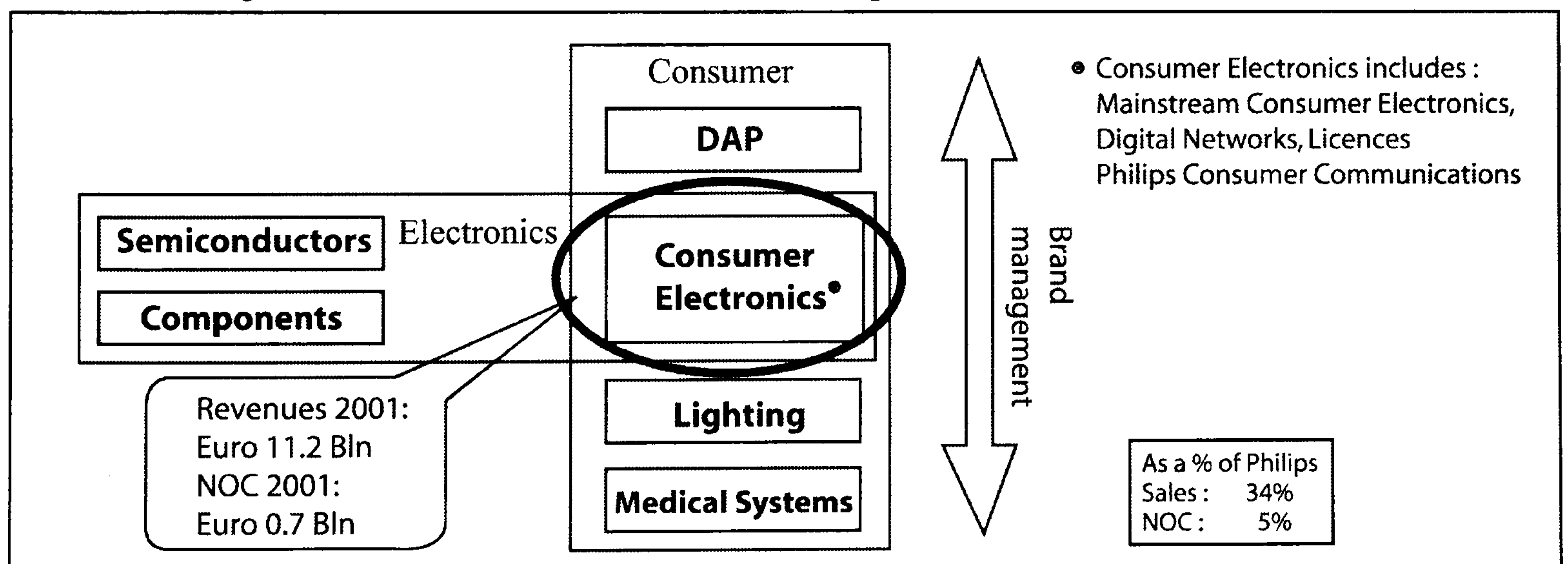
## Chapter 9. Philips : Vision of the Future

### 9.1 Company Overviews

Philips Electronics is one of the world's biggest electronics companies with a consumer electronics product portfolio pursuing to offer customers the benefits of new digital technologies. They are the market leader in the product categories of colour television sets, lighting, electronic shavers, medical diagnostic imaging and patient monitoring, and one-chip TV products.

They operate six divisional product sectors: Lighting, Consumer Electronics, Domestic Appliances & Personal care, Components, Semiconductors, and Medical Systems. The consumer electronics division, part of the overall Consumer products sector, is the centre of the organisation (Figure 9-1). Mainstream Consumer Electronics includes television sets; video recorders and TV-Video Combis; audio systems, separates, portables and Home Cinema solutions; recording media for audio/video; PC monitors, and PC-peripherals such as DVD+RW data drives, CD-ReWriters, PC video cameras (for sending video mail), LCD projectors and remote control systems for consumer electronics appliances.

Figure 9-1, Business Structure of Philips Electronics



Source: Philips Electronics

### 9.2 Philips' Business Strategy

In 1997 Philips began a major restructuring of its business to create a more flexible organisation based on the management's understandings about technology and marketing changes in 21<sup>st</sup> Century that the digital revolution would offer ample opportunities for fulfilling consumer aspirations with attractively-priced products which deliver high-

growth opportunities for the company and offer greater personalisation, interactivity, more network-enabled solutions, and increased mobility. As Philips transform their organisation focusing on their core activities and the manufacturing base, they aim to shape the digital consumer world by developing high performance, high quality and 'cool' digital products. To achieve this Philips continuously invests in the field of R&D to strengthen competitiveness in their various markets with the percentage in relation to net sales increasing from 6.7% to 7.3% between 1998 and 1999. They established their research laboratories in China, India and Belgium in 2000 with expenditures of 2,766 million euros, representing 7.3% of sales, compared to 2,284 million, or 7.3% of sales in 1999 (Philips Annual Report, 2000).

Cooperation with world leaders in their specific businesses is one of the Philips' strategic efforts that enables Philips Consumer Electronics to rapidly expand its portfolio of appealing consumer products and services. For example, a joint effort with America On line (AOL) combines Philips' technology power with AOL's strengths in interactive marketing and media application. Philips' joint ventures with other leading electronic companies are also the method to develop new technologies throughout its long history (Boonstra, 2000). They launched, for instance, a major joint venture with LG Electronics (LGE) to gain leadership in the manufacture of Active Matrix Liquid Crystal Displays (AMLCD) in 1999. The LCD market is growing at an annual rate of between 20%-25%, so it is important to Philips to strengthen further their position in this market.

### **9.3 Philips' Marketing Strategy**

Philips introduced the "Let's make things better" campaign for developing global brands in September 1995. Using mainstream media it aims to give the Philips brand a premium position while at the same time creating a direct relationship with the consumer and to further strengthen the brand image in the mind of tomorrow's consumer (Fifield and Gilligan, 1999). The words 'Let's make things better' encompass a desire to make things better for the average person through technology and innovation.

Based on an international programme of consumer market research, Philips' recent advertising concentrates on selected prestige products that will instantly be recognised as improving people's lives such as DVD recorders, flat screen televisions, handheld computing devices and Genie mobile phones.

#### **9.4 New Product Development Strategy**

Consumer Electronics' mainstream business focuses on Internet-related strategies to seize the opportunities offered by the Internet. They defined a future of 'always on' Internet accessibility and devices will become more web-connected. Based on this strategy, they recently introduced a range of web-enabled products such as the MP3 player and a family of audio products which are capable of playing back high-capacity CDs containing MP3 files.

Consumer electronics' Digital Network business focuses on enabling technologies in the areas of secure networked entertainment, developing and producing software and systems that enable digital broadcasting and Internet distribution of audio, visual and other digital contents. They created a new area of MPEG4-based Internet video, secure Internet streaming and video watermarking in 2000.

Philips Consumer Communications (PCC) group is continuously innovating and bringing new technologies to the market. They aim to expand their worldwide GSM market position, while actively preparing for the next generation of digital mobile phones based on UMTS, which will provide consumers voice, data and multimedia services. To keep pace with the rapid growth and the increase of innovative technology solutions in the wireless industry, PPC has opened up new R&D centres overseas.

Philips Broadband Networks focus on delivering leading-edge technologies that drive advanced broadband systems to new levels. They design and manufacture products employing fiber-optic and radio-frequency transmission technologies to provide video, voice and data services over hybrid fiber-optic coaxial networks which permit network operators to accelerate the adoption of interactive services such as video phone and



interactive gaming by building communication networks with massive 2-way capacity and very high speed.

### **9.5 Philips Design Studio**

Philips Electronics runs the Philips Design Studio which is financially self-supporting through the work that it carries out on a project basis for the Philips Electronics and the strategic design consultancy such as branding, new business and product creation, and e-design to its other clients amongst which Ford, Nike, Securitas, and GAP.

Philips design works according to its proprietary goal set in 1992 that seeks to improve the quality of people's lives and to promote harmony between individuals and their natural and human-made environment through a human focused, multi-disciplinary, research-based approach. To achieve this goal, Philips Design developed, together with its global team of over 500 professionals, a unique, holistic approach to design, working out its philosophical and practical implications with equal rigour, and implementing it in an enormous variety of products, services and communications.

To produce appropriate products, services and communications that fit to their high goal, Philips Design leads their designers to face up to the extraordinary complexity of the people's lives today through acquiring well established design skill with research-based skill and insights that are new to design, such as human factors, psychology, anthropology, sociology, trend analysis, technology analysis and materials science.

### **9.6 Philips Design's Design Philosophy**

In 1991, Philips decided to define a design philosophy with which all Philips designers could identify and enrich themselves and their work. By defining the design philosophy and providing a vision which is to create design focused on personal growth in harmony with each other and with their natural and artificial environment, Philips Design enabled designers to share the same vision and then to create the products which convey the same brand values for a domestic appliance (Marzano, 2000)

### **9.6.1 High Design**

High Design, the Philips Design's design philosophy, is the driving force behind Philips everyday and long-term activities that has four main practical characteristics: people-focused, research based, multidisciplinary and integration into business strategies, processes, and concerns. 'High Design' is also an integrated design process aiming at the creation of human-focused solutions which places people and their personal growth at the centre, and links them to their artificial or human-made environment (objects, buildings, infrastructures) and to their natural environment (the natural ecosystem). It is, in practice, made up of five phases: initiation, analysis, concept design, finalisation and evaluation. High Design incorporates all the skills on which design was historically based and all the human-related disciplines that people need to be able to respond to the complexity and the challenges of the present and anticipate those of the future.

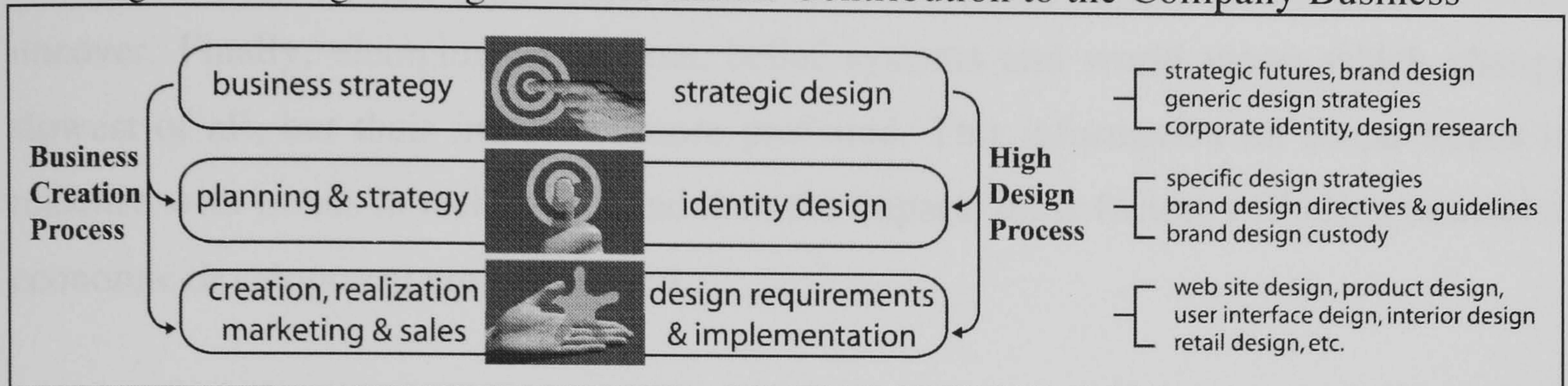
### **9.6.2 Purpose of the High Design**

The purpose of High Design is to create solutions that humanise technology by combining expertise in human sciences, technology, aesthetic disciplines and communication sciences in the creative process. High Design as a design process, guides designers in their design activities, and is fully integrated in the business creation process or company's clients. It consists of three core design capabilities which deliver different design solutions: Strategic design, Identity design and Design requirements & Implementation (Figure 9-2).

Strategic design provides strategic consulting and direction on brand design, future opportunities, business creation and design strategy by research on socio-cultural, and technology fields, and by talking to opinion leaders and experts from different disciplines. These range from the transport industry to banking and many other sectors not in direct competition with Philips. From the work for diversified customers, designers can get a wide range of design-related issues through which they can improve their knowledge and skills. This helps designers to identify opportunities and new areas of business with the clients (Ingrid, 2000).

Identity design develops specific design strategies and validated design guidelines for the articulation, deployment, control and monitoring of the brand identity as expressed in products, interfaces, services, visual communications and environments, through coordinated brand design services. Design requirements & Implementation gives design requirements and specifications for the implementation in creation, realisation, marketing and sales.

Figure 9-2 High Design Process and its Contribution to the Company Business



Source: Philips Design

### 9.7 Strategic Future: Methodology

Based on their mission that is to create a harmonious relationship among products, people and their environments, both natural and man-made, Philips Design developed a holistic four-step approach to guide their new business creation efforts. In the first step, they educated and embedded the philosophical background of design into all employees' minds through lectures, publications and introductory courses. This enabled all the members of their team to share the same vision and support the same ideals. Then, the multidisciplinary, multi-cultural team that consists of experts of socio-cultural disciplines such as sociologists, anthropologists, scientists, engineers, and marketers, is brought into to find out about what people want now-or rather, will want in the near future by making a careful analysis of emerging socio-cultural trends around the world and an inventory of emerging technologies.

This helps to create products that truly meet peoples' existing and latent needs. Working together with designers and Philips's technologists, scientists, engineers, and marketers, the team also looks at macro developments in socio-economic developments. For example, they might look at the changing relationship between home and work, trends

like people's increased concern with health, and the growth of virtual communities on the Internet.

From these searches social trends are figured out in three different levels. Firstly, user trends- aesthetic trends, fads and fashions that change and spread less quickly, but explicit and open to observation. Secondly, regional and global socio-dynamic trends- changes in socio-cultural values and expectations that is implicit and more difficult to uncover. Finally, changing paradigms, belief systems and world views which change slowest of all, but their impact is more profound. This information on social trends is matched with trends in technology and then the impacts these factors will bring to macro-economic development are anticipated.

As for second step, the multidisciplinary team convenes workshops to look at this information about emerging socio-cultural, technological and macro-economic development. They explore how these developments might interact to give rise to new products and services.

Third step is to filter the ideas by submitting them for comments to a panel of international experts-futurologists, sociologists, trend analysts and opinion leaders. This enables the team to validate the ideas against those of others, and to see whether they are sound plausible and make contribution they are intended to do.

In the last step, all the concepts are refined and transformed into life-like models and simulations to provide real sense of what such new products might be like in everyday use. These models are then demonstrated to the public through travelling exhibitions to get the public feedbacks that is supplemented by input from public debates and publicity in the media. With these feedbacks the product ideas are finally filtered and modified into better ideas that are likely to be most highly valued and should therefore be worked out and offered to the market.

## **9.8 Visionary Projects**

Using the 'Strategic Future' methodology, Philips Design conducted several projects such as Smart Connections, The Home of the Near Future, City People Light, LiMe, Connected Pl@net, and Vision of the Future. In these projects, they focus on proposing solutions that will ultimately help people move from ambient intelligence which is about interconnected, smart, anticipatory, responsive technology, to ambient culture which applies such technologies to create intelligent, adequate, relevant meaningful solutions that allow the creation of harmonious relationships between people, products, systems. These visionary projects are presented to the public to stimulate people's reactions on the ideas and direction that they propose. The feedback from the people provides vital indirect evidence that enables Philips Design to tease out the hidden wishes of people.

## **9.9 The Vision of the Future Project**

'Vision of the Future' is one of Philips's visionary projects conducted in accordance with Strategic Future Methodology. It aimed to stimulate a wide range discussion about the sorts of products and services Philips Electronics should be offering the public in the coming decade.

Based on an assumption that technological innovation have been main driving force in new product development and industrial products are just non human-related forms as the outcome of industrialization which can cause irreparable damage, they focused on finding the balance of the increasingly complex relationship between people and technology.

### **9.9.1 Project Boundary and Objectives**

Because of the focus of the project, finding balance between technology and people, they limited the boundary of their project to socio cultural developments of societies which are found in the leaders of adopting new technologies such as North America, Europe, Japan and Australia. Within this limitation of the project boundary, Philips Design defined four specific objectives (Philips, 1998):

1. To demonstrate Philips' commitment and ability to make a positive contribution to the future by offering products, services and software that enhance the quality of people's lives
2. To further stimulate the imagination and creativity of the Philips community as a whole
3. To explore the opportunities provided by merging technologies and the significance of socio-cultural developments in determining how they can be used
4. To show the benefits of shifting from the model of quantity and complexity towards a greater focus on quality, simplicity and customer satisfaction.

### **9.9.2 Initial Research**

Philips Design embarked on extensive research work in socio-cultural trends and developments in technology. Information about socio-cultural trends gives understanding of new emerging trends, new attitudes, preoccupations and concerns within society. This information was put together with trend information in technology to form the input to multidisciplinary workshops.

#### **9.9.2.1 Scanning Socio-cultural Trends : time and space**

Based on the socio-cultural information, the world trends today were identified in the perspectives of time and space. First, Philips Design identified that there are two different modes of perceiving time that people today take. According to them, people sense time as an ever-accelerating rate of living because they are constantly struggling to keep up with the demands of modern life that is growing fast. Also, people tend to away from the present as they link themselves with the past that is essentially non-existent or stay in the moment when time seems to stand still such as moment of rest, meditation or wonder.

These two opposed or incompatible senses of perceiving time are creating new types of behaviours. As time is understood as a given boundary in which people are required to do many things at the same time, human lifestyle patterns are getting faster and faster, and all aspects of human living activities are no longer strictly separated from each other. In

addition, people are starting to get quality time that allows people to seek meaning by restoring the balance between activity and rest.

Second, in perceiving space, people are defining space in narrow and local term as the resurgence of many national and ethnic identities are apparent, and a tendency for people to withdraw into the security of their own home and social group, rather than participate in community activities and projects is rising. While, in terms of cooperation through technology, physical borders and subjective experience of distance are disappearing as the advancing technologies in telephone and Internet are accelerating immediate and easy communications between people in distant places.

### **9.9.2.2 Other Specific Trends**

In addition to the perceptions of time and space that set the parameters for determining how people act and think in the near future, Philips Design defined specific trends that affect on the creation of a wide variety of human behaviour patterns.

- **Subjectivity:** people in the present age are searching for identity due to the rapid pace of modern life.
- **Sociability:** the family as the source of reaffirmation and support is being fragmented steadily as the activities outside home is increasing.
- **Exploration:** manner and extent of expressing curiosity and exploration are changing as the technology offers ways of getting into the virtual world and new ways of finding out more about our physical world.
- **Connectivity:** the sense of connectiveness is increased as people in a complex society today are required to manage the different aspects of their lives at the same time.
- **Ethics:** the needs for searching new ethics and rules are increasing because of the rapid developments in technology which bring changes in human lives.
- **Holism:** people are increasingly becoming aware that the natural world and man-made environment are as constituting a whole. The tendency of elimination of all boundaries between people and their environment in the widest sense is apparent.

### **9.9.2.3 Socio-cultural Sensitivity**

Based on the trends identified through analysing socio-cultural information, Philips Design figured out the three major sensitivities which may become parameter for people to behave in the future and potential trends affecting psychology and culture: (1) living apart together, (2) virtual communities, (3) the multi-dimensional consumer. Based on these sensitivities Philips Design structured the vision of human society in near future.

### **9.9.2.4 Scanning Technological Trends**

To match the socio-cultural trends with appropriate trends in technology, Philips Design also focused on scanning technological development and then identified three major trends which are anticipated to affect the future products:

- Miniaturisation of product and increasing computer power afforded by the silicon chip: these make voice recognition and voice synthesis for interacting with products.
- Smart or interactive materials: these can modify their behaviour under specific circumstances, changing their shape, stiffness, and position depending on temperature or electro-magnetic fields.
- Nano-technology: this technology enables the creation of tiny sensors.

In predicting technological development, Philips Design considered both intrinsic value and other real-world variables such as commercial viability, social need, governmental policies, and international standards because they assumed that the success of technology depends on how these factors are satisfied by the technology as whole. This technological information scanning was conducted focusing on existing or promising technologies which have the most realistic chance of success, and which are most relevant to Philips Electronics' divisional product sectors. However, to collect information about emerging new attitudes, preoccupations, and concerns within society in an expert level, Philips Design strategically adopt outsourcing. For instance, they worked with trend forecasting institutes such as the Research Institute for Social Change. Reference to global forecasting in technologies from Japan and Germany are also used for this purpose.



### 9.9.3 Multidisciplinary Teams and Workshops

To perform complex scenario building workshop process, Philips Design organised a multidisciplinary team that consists of cultural anthropologists, ergonomists, sociologists, engineers, product designers, interaction designers, exhibition designers, graphic designers and video and film experts. The multidisciplinary team combined the technology roadmap developed on the technological predictions and business knowledge with socio-cultural trends. They then developed more than 300 short scenarios describing a product concept and its use.

The scenarios were later filtered down to 60 concepts by using four main criteria (Philips, 1998):

- Would they clearly provide people with genuine benefits?
- Did they fit with Philips' major areas of competence and interest?
- Would they be technically feasible?
- Would they be applicable to the social and cultural area we had defined?

The 60 concept descriptions were structured into four domains that represent all aspects of everyday life for breaking the wide scope into more manageable pieces: Personal domain, Domestic domain, Public domain, and Mobile domain (Figure 9-3)

Figure 9-3, Categories of Product Domain and the Future Prediction

Categories of Domain	Future Predictions
Domestic Domain : <b>'home and family'</b>	people will become Multi-dimensional and mobile virtual communities will increase in information share people will look for balance between present and traditions
Personal Domain : <b>'mind and body'</b>	the home will be multi-functional and interconnected the home products will be more adaptable or interactive
Public Domain : <b>'the wider world'</b>	work and public life will be variable and flexible public places will be more convenient and engaging
Mobile domain : <b>'on the move'</b>	virtual travel will be available through virtual-reality equipment communication devices in car will be standard

Source: Philips Design

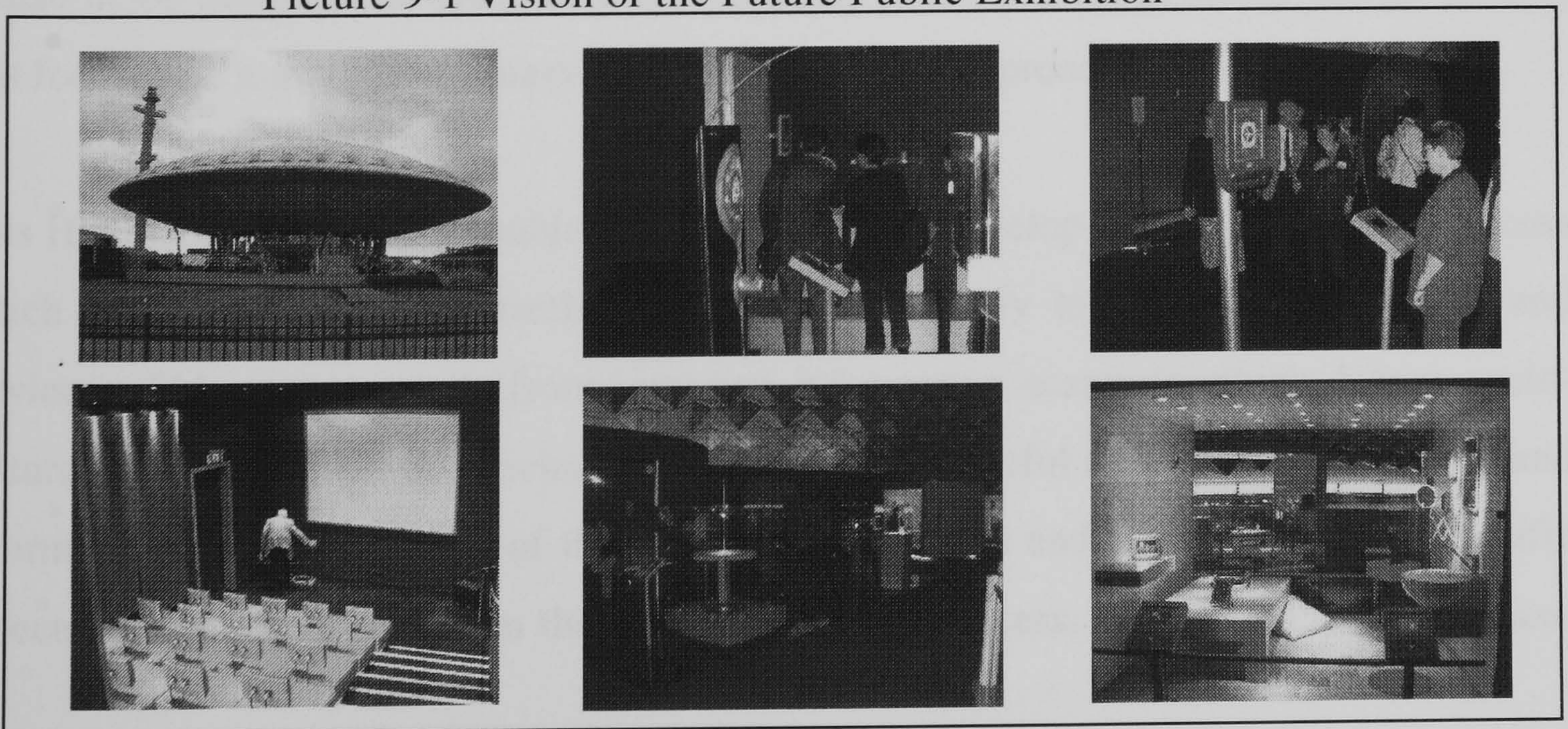
### **9.9.4 Outcome Assessment and Validation**

To assess potential ecological impact and the validity of the findings, Philips Design, in this stage, organised a panel of leading futurologists from Europe, Asia and North America. The panel reviewed the proposed scenarios about imminent socio-cultural changes and gave their comments on them. They also provided a picture of life in the year 2005 covering private and social lives, and the fields of work, leisure, home, education the media, transport, the environment and consumption. These expert views were used to refine the proposed product and service ideas.

### **9.9.5 Creating a Tangible Form of the Concepts**

Once the 60 concepts had been evaluated by the panel, they were transformed into tangible models and simulations of interfaces and short films to make them more easily understandable to a wider audience (Appendix 5). Outcomes of this process were presented to the public by using various methods such as a public exhibition, a series of communication events, a video compilation and a Website. For instance, the outcome models were presented for the actual and potential clients of Philips from around the world in a permanent exhibition staged in the Evolution, Philips Competence Centre in the Netherlands (Pictures 9-1). Visitors are introduced the purpose and structure of the vision of the future project through video clip presentation which consist of the individual future scenarios. When the viewings are completed, the visitors are often asked to give their comments on the exhibits. The feedbacks from the visitors are then analysed and used to test the feasibility of the product concepts in customers' views.

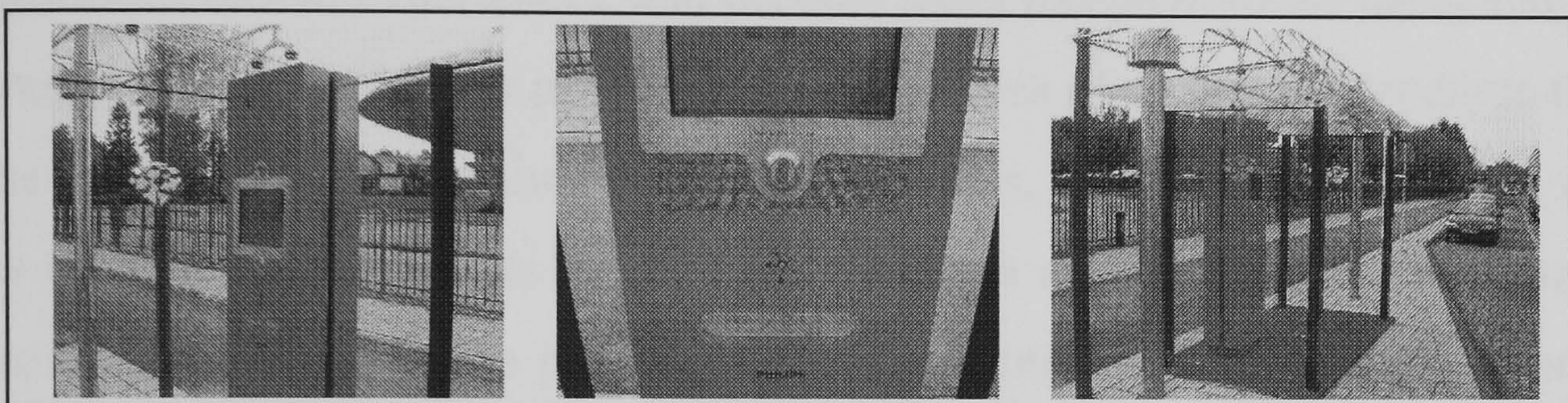
Picture 9-1 Vision of the Future Public Exhibition



### **9.9.6 Putting into Practical Use**

Some of the product concepts were put into the real production after its feasibility had been proved through the concept validation. Philips Electronics, for instance, defined the concept Multimedia Kiosks which is designed to provide communication and information service that can be realised by current technology and the public demands for the services it will provide, is matured enough, so that they put the concept into the real production. Picture 9-2 shows the Multimedia Kiosk in Use.

Picture 9-2 Multimedia Kiosk



### **9.10 Discussion and Implications**

Philips Electronics have been aiming to be a company that leads the consumer electronics product market through innovative research and design. To achieve this goal, they strategically developed the High Design that aims at the creation of human-focused solutions. As a design philosophy, the High Design provides a guiding vision that governs all the activities of Philips Design including their design work, management and support activities. Philips designers justify everything they do by reference to this vision. It also helps designers to enhance their works by providing the practical design process that focuses on a multidisciplinary and research- based approach to the design work.

This High Design approach enabled Philips Design to develop the strategic future process which becomes a standard mechanism for the company to create new products and services. This process starts from intensive information scanning which detects socio-cultural trends and emerging technologies. Based on a careful analysis of these trends and information, a general vision of the future is then drawn and hypotheses about specific aspects of it are formulated. In the next stage of the process, new products and services

concepts are derived from the examination of the hypotheses and refined by checking them against experts' views and ideas.

In terms of developing new types of benefits, new competences and new ways to interact with customer in the next 5, 10 or 15 years, the strategic future process is the new product strategy that takes a proactive approach. Through this proactive new product strategy, Philips not only follows closely on the heels of the market but also leads the market. Because the strategic future process constantly provides the customers with the plans and programmes for the future set by the company, organised along with time paths and with alternatives for various situations, customers store these plans in the brain along with their memories of real experiences, and become more receptive to the ideas and concepts the company suggests. In this process, the possibilities of the future products transform into the new market aspirations and product wants. Therefore, when the company realises the ideas and concepts into the real products and launch them into the market, customers' expectation for the product is already matured enough to rapidly formulate a market for the product.

This strategic future process has been well implemented in the vision of the future project that stimulated a wide-ranging discussion about the sorts of products and services the company should be offering the public in the coming decade. Socio-cultural trends and the inventory of emerging technology were analysed on a regional and a global basis in the first step. For this analysis an intensive information scanning was executed. Philips Design categorised information they need into the three domains: user trends, changes in socio-cultural values and expectations, and changing paradigms. This categorisation helped to clarify the objectives of the information scanning and to define the procedures for it.

Philips Design engaged with partner institutions in this information scanning stage. This involvement of the experts enabled them to effectively have high quality information about socio-cultural trends and consequently to reach reliable analysis outcomes. The analysis outcomes were then conveyed to the multidisciplinary workshops to give rise to the new product and service concepts. In effect, operating the multidisciplinary team that

consists of the experts in sociology, ergonomics, engineering and design at the concept development stage, gave the advantages of creating concepts that satisfy various considerations. Because concepts are created through the debates in which all the comments from the experts are blended, the concept can be well defined reflecting every aspect of product requirements.

In the next stage, Philips Design organised the international expert panel that consists of leading futurologists to validate the concepts created through the multidisciplinary workshops. The original 300 ideas and concepts were distilled down to 60 defined concepts by checking them against the comments and views of the panel experts. Involving international experts into the validation stage was an effective method to reinforce the concept validation process as they test the concepts against objective views and provide comments by which the concepts will be revised and enhanced.

In utilising the concepts created through the workshop process, the public exhibition was an effective method. It provided a chance for the potential and actual customers to become receptive to their product concepts, and also for the company to collect the customers' views and comments on them. In fact, the customers' views and comments became a new round of filtering and modifying so that the company could get better ideas and concepts that should be offered to the market.

As a whole, Philips Design helps the company achieve its goals by executing the strategic future project as a part of new product development process. It is one that allows the company to find new customers and designer to find non- traditional products by finding out people's unarticulated needs that they have or will have in the near future.

In conclusion, the investigation to Philips' strategic future project gives some implications for the future visioning system model. First, the future can be anticipated through the analysis of the emerging trends. For the trends analysis, information should be gathered in the specified categories:

- (1) Transient information: user trends such as aesthetic trends, fads and fashions

- (2) Implicit information: socio-dynamic trends such as socio-cultural values, expectations
- (3) Fundamental information: changing paradigms, belief systems and world view

Second, scanning technological information should be executed in two points:

- (1) Reviewing technologies that are relevant to the company's field of operation
- (2) Predict the potential of the promising technologies by considering commercial viability, social need, governmental policies, and international standards

Third, outsourcing in the information scanning stage such as involving trend forecasting institutes and research centres, is an effective way to gain high quality information and to enhance the analysis of socio-cultural trends.

Fourth, concept validation and test should be conducted in two stages in order to get more plausible concepts:

- (1) Refine and filter the concepts against the criteria given by the company.
- (2) Assess the concepts by the experts such as leading futurologists, opinion leaders, and trend analysts.

Fifth, to secure that there would be actual customers and markets for the products the company is developing, communication with public is necessary. This can be achieved by exhibiting the life-like models and simulations that are transformed from concepts and ideas.

Lastly, the company should regularly conduct this kind of project and continuously demonstrate to the public in order to make the customers perceive what the company strives to achieve.

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## II.2 Conclusion

From the investigations into the companies, it is concluded that the companies assessed for this research are well aware of the dynamic situation of the market and have been strategically dealing with it. They all identify that the revolution of digital technology has been accelerating the fundamental changes in business as it transforms the way customers live and work. To cope with these rapid changes most of the companies restructured their organisation to a more flexible structure and refined their strategies and tactics of management. In case of Samsung, for instance, they declared a new vision for their organisation and have concentrated all their strength in the direction in which the technological and management environment changes are taking place.

As the result of their perception about the challenging situation due to the rapid technological development and its effects on management strategies, the companies identified that there is a need for a proactive new product development strategy.

In addition, the facts that the speed of the changes caused by the digital evolution is at unprecedented rate, and the reduction in product life cycle due to the changes in the customer's expectation is accelerated, also asks the companies to convert their new product strategy into the one more radical and innovative upon which they can develop one step ahead products.

These environments led the companies to focus on the concept development stage in the new product development process. For developing new concepts that are ahead of customers' expectations, most of the companies take similar mechanisms that project visions of the future in 5 or 10 years and generate new product concepts by analysing them. However, the procedures of each company's concept development system are different from each other since they were developed according to the characteristics of development project and the company's work style. For instance, LG Digital Design Centre allows their designers to organise the teams and each team to define their own procedure and criteria for conducting the concept development projects. While, Philips Design organises a multidisciplinary team to carry out the project as a whole according to the procedure and criteria of the project set and provided by the company.



In anticipating the future, Samsung Electronics approaches the future by exploring and analysing the records of the past since they understand that the direction of the future is determined according to the pattern or mechanisms of historical evolution. Therefore, their information scanning focuses greatly on gathering historical information describing interactions among human history, technological development and natural environment. But LG digital design centre and Philips Design focuses on the analysis of the present situation rather than the past to envision the future because they understand that the formulation of the future is much more influenced by the current situation than what was done in the past. Thus, their information scanning is conducted focusing on current and emerging socio-cultural and technological trends. In case of Sony, they directly formulate the future by anticipating technological development and its directional trends since their new product development strategy takes a high proactive stand. Sony understands that the technological development is the most influential element in the formulation of the future. Thus, their information scanning is much focused on tracing technological development.

In the information gathering method, LG digital design centre strategically uses both the internal information system and the outsourcing at the same time for getting all the design related information including expert's views and analysis about the trend information. Philips Design also uses information outsourcing as an effective method to gather and analyse emerging socio-cultural trends at experts level. Usually, independent trend forecasting institutes get involved at the information scanning stage and work with the company's multidisciplinary team. While, Samsung and Sony depend on their own internal information management systems.

For testing concepts and ideas, Philips organises a panel of experts in futurology and trend analysis and involves them at the concept evaluation stage. All the concepts developed through the projects are checked against the opinions and views of the panel members. Customers are also involved in this concept testing stage as they submit their views and opinions about the concepts presented to them through public exhibitions,

multimedia programs and Web sites. While, the other companies' concept testing process are executed by checking the concepts against their own criteria. Comparing these two procedures, the multiple step testing can secure the objectivity in testing since it reflects the external views and opinions. While the one step testing is effective to save the lead-time in the testing procedure.

### **II.3 Application of the findings**

From the investigations and discussions, some of findings that can be implicated to the future visioning system model figured out in chapter 4, are summarised as below.

To discuss the environment for operating the model, Firstly, the future visioning system model can be adopted when the company pursues a proactive market driving approach for the new product development strategy because of the dynamically evolving market situation caused by the rapid technological development, increase in customer expectations and intensive competition. In terms of increasing the effectiveness of the proactive new product strategy and the future visioning system model in practice, multiple projects and back-up project should be continually conducted to introduce succession products without any time gap. This helps the company to keep the market domination against their competitors that come with similar products after the first product is launched into the market, and to make its potential and actual customers become more receptive to the concepts and products the company provides.

Secondly, the company management should well embed the design strategy into the company's management strategy and its implementation so that the infrastructure for the future visioning system can be built and managed as a whole by the company. Because the future visioning system is, for example, an information integrated process which requires information from various information sources including internal departments and international markets, it needs strategic support from the company management to get cooperative working from the internal departments and to organise information networking. Organising a multidisciplinary team or executing information outsourcing also cannot be achieved without the company managements' strategic supports.

Thirdly, the future visioning system should be conducted with in-depth understanding of the corporate management strategy and objectives to produce the outcomes that are accordant with what the company pursues. To do this the project teams should be constantly reminded of the strategic goals and directions as the project proceeds. When the outcomes meet the company's strategic goals and standards more, the possibility for the outcome to be practically adopted for real production becomes increased. The findings from the investigation that affect the process and structure of the future visioning system model are discussed below.

The findings from the case studies contributed to this research by providing some suggestions for enhancing the operational environment of the future visioning system model in practice and reinforcing the structural contents of the model as summarised as below.

In terms of the environment for operating the model, firstly, the investigation of Sony's AIBO development strategy indicated that the company that adopts the future visioning system model for pursuing a proactive market driving approach in a dynamically evolving market situation, must consider conducting multiple projects and back-up project that introduce succession products without any time gap and help the company increase the effectiveness of the proactive new product strategy and the future visioning system model. Executing multiple project and back-up project enables the company to keep the market domination against their competitors that come with similar products after the first product is launched into the market. It also makes its potential and actual customers become more receptive to the concepts and products the company provides.

Secondly, the case study of LG's design infrastructure development provides the explanations that the infrastructure for the future visioning system model can be built and managed as whole by the company when its management can well embed the design strategy into the company's management strategy and its implementation. Because the future visioning system is, for example, an information integrated process which requires information from various information sources including internal departments and

international markets, it needs strategic support from the company management to get cooperative working from the internal departments and to organize information networking. Also, organising a multidisciplinary team or executing information outsourcing which are the required activities in the procedure of the future visioning system model cannot be achieved without the company managements' strategic supports. Therefore, the company's design strategy should be well integrated into its management strategy and its implementation.

Lastly, the manner of Samsung's implementing design strategy (Figure 8-4) and "Digital Collection" project (Figure 8-8) emphasised why in-depth understanding of the corporate management strategy and objectives is important in the execution of the future visioning system model in practice for producing the outcomes that are accordant with what the company pursues. To achieve this the project teams should be constantly reminded of the strategic goals and directions as the project proceeds. When the outcome meet the company's strategic goals and standards more closely, the possibility for it to be practically adopted for real production becomes increased.

In terms of the structural contents of the future visioning system model, each case study of the selected companies provides some suggestions from the contents of its own new product development project process that focused on the concept lead products.

Firstly, Philips' "Vision of the Future" project based on the intensive information scanning on socio-cultural trends and technological developments defined the specified information categories that the environmental information scanning should achieve to envision the future state. This categorisation of the information was adapted to the future visioning system model for increasing the efficiency of the information scanning process. According to this categorisation, the future visioning system model extended the contents of environmental information scanning to the three main categories: (i) transient information about user trends-aesthetic trends, fads and fashions; (ii) implicit information about socio-dynamic trends-changes in socio-cultural values and expectations; (iii) fundamental information-changing paradigms, belief systems and world views. Philips'

environmental information scanning procedure also suggest that scanning technological information should be carried out in order to review existing technologies and to anticipate the potential of the technologies with relevance to the company's field of operations. This information needs to be checked against the company's technological capabilities for predicting the future of the technologies that the company will be able to reach. Thus, the company's R&D information to identify the current level of the company's technological resources becomes the contents of the environmental scanning in the future visioning system model.

Secondly, Samsungs' two-stage approach to project future vision in the "Digital Collection" project was adopted to the future visioning system model for reinforcing the logicity in achieving future vision. This two-stage approach involved a future visioning system model that projects the future vision according to the procedure as follows: (1) describing the future in a broad sense (2) sharing this future vision between the project teams or team members (3) projecting the future vision according to the specified domains.

Thirdly, the outcomes of the investigation into Samsung's "Digital Collection" project and Philips' "Vision of the Future" project emphasised that concept test should be achieved through the multiple stages to get more reliable concepts. This finding is embedded into the future visioning system model by adding the concept visualization and exhibition stage through which the feedbacks from the public can be gathered to test the concepts. This concept visualisation process is executed in the companies' new product development project process such as LG's NCD and DCR, Samsung's "Digital Collection" and Philips' "Vision of the Future". Therefore, in the future visioning system model, concepts are tested by the internal criteria set by the company and checked against the future scenarios developed by the external experts such as futurologist and trend analysts who can give objective views and opinions. Once the concepts are tested against the internal criteria and the scenarios, they are transformed into 3D real-life models for public demonstration to the company's potential and actual customers to collect their feedback about the exhibits which are used for the second round concept testing or for the

concept revision.

Table II-1 summaries how the case study outcomes contributed to the future vision system model in terms of modifying its structure and reinforcing the environment contents of operating the model.

Table II-1 Application of the Case Study

Company of Case Study	Suggestions and Influential Facts	
	operational environment	structure of the prototype
<b>Sony</b>	<ul style="list-style-type: none"> <li>• proactive new product strategy</li> <li>• execution of multiple &amp; back up project</li> </ul>	
<b>Samsung</b>	<ul style="list-style-type: none"> <li>• involvement of corporate management strategy &amp; objectives in future visioning</li> </ul>	<ul style="list-style-type: none"> <li>• two-stage approach for future visioning</li> <li>• multiple stages for concept testing</li> </ul>
<b>LG</b>	<ul style="list-style-type: none"> <li>• embedding design strategy in company's management strategy for developing infrastructure for future visioning system</li> </ul>	<ul style="list-style-type: none"> <li>• concept visualization for concept testing</li> <li>• applying scenarios to NPD process</li> </ul>
<b>Philips</b>	<ul style="list-style-type: none"> <li>• involving external experts into project process</li> </ul>	<ul style="list-style-type: none"> <li>• categorization of information</li> <li>• multiple stages for concept testing</li> </ul>

If the findings above are applied into the future visioning system model, the structure and process of the model is revised as Figure II-1.

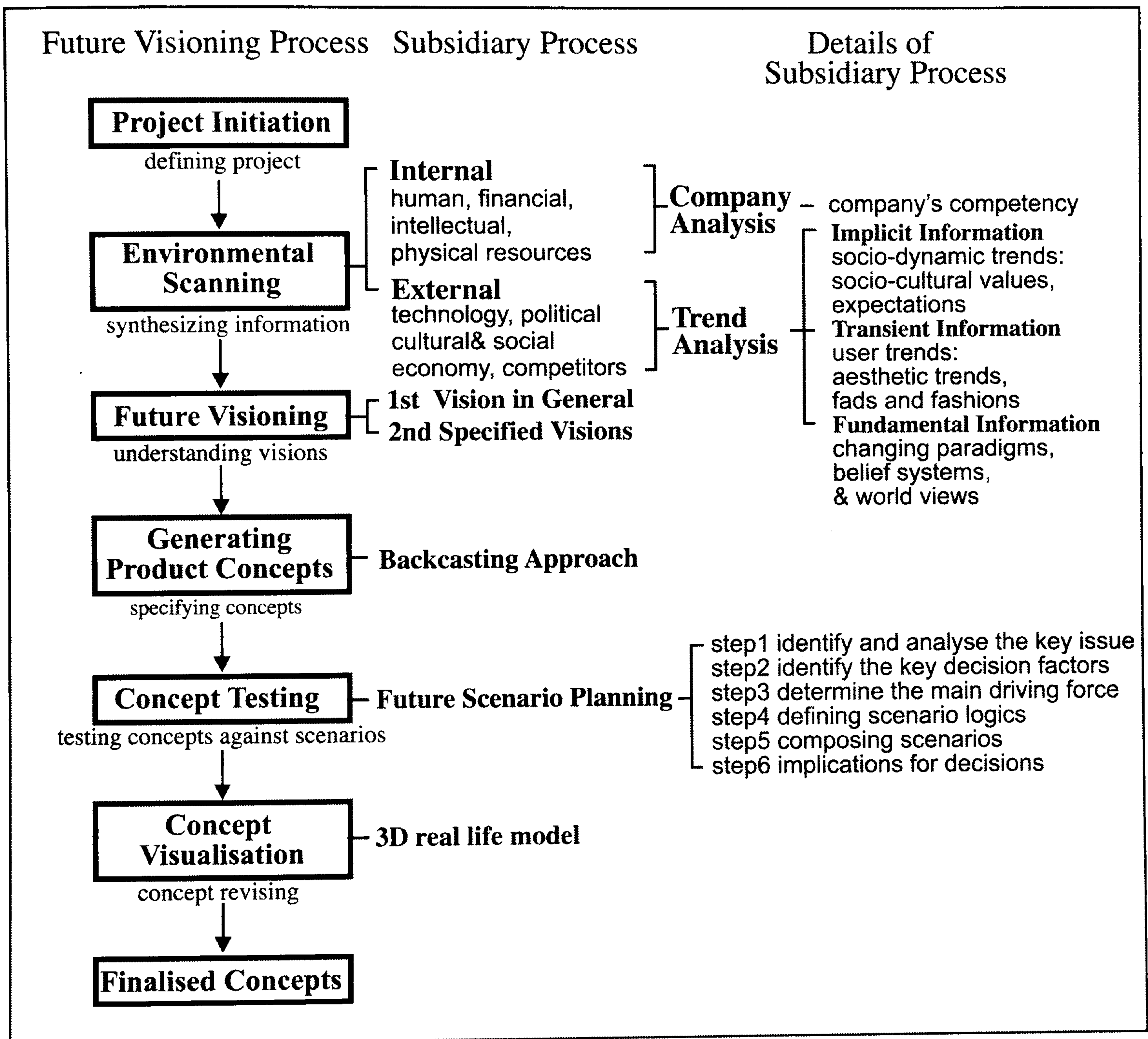
Compared with the preceding model, this modified model more clearly describes the stages of the system and provides specified instructions for each stage. In terms of the structural changes, the future vision development stage has been broken down to three steps so that the future vision that describes the future as a whole is generated first, and the specified future vision of the each domain of life is projected later. After the future visions are defined, the project team then starts generating new product concepts by analysing the future state of people's life that the future vision provides.

In the preceding future visioning system model, future scenarios are developed after the future vision is defined so that it tests the feasibility and the robustness of the future vision against the potential future environment. However, this procedure raises the needs of other test tools for the concepts that are generated from the future vision.

While, in the modified future visioning system model, the scenarios are developed after the concepts are generated and used as the concept validation tool. Because the concepts are derived from the future vision, if the scenarios validate the concepts, then the future vision is consequently verified. Therefore, this modified procedure combines all the test

procedures and increases the efficiency of the future visioning system model as a whole. The scenarios development in this model is conducted with the involvement of the experts in futurology and trend analysis so that the project team can get quality scenarios and increase the objectivity of the test. The concept realisation stage is added in this modified model. The concepts passed through the validation stage are realised into the 3D real-life model and demonstrated to the public so that the concepts are finally revised by the public reactions and feedback.

Figure II-1 4<sup>th</sup> Future Visioning System Model



## **Part III Discussion and Conclusion**

### **III.1 Introduction**

In this part the research outcomes are discussed as a whole to demonstrate how the companies should adopt the future visioning system model suggested in the preceding part of this thesis. Firstly, the researcher discuss how the outcomes of the discussions of chapter 2,3,4 in Part I are assembled together and construct a hypothetical suggestion of developing future visioning system model. This provides the reasons why the concept development process should be reconsidered and the future visioning method is appropriate for this purpose.

From this discussion the researcher induces the suggestions of designer's new roles and tasks that they should take as a futurist, information integrator and process moderator when the future visioning system model is adopted as a concept development process in the new product development process. The structural change of new product development process is also demonstrated by the comparison with the traditional process.

Then the research discusses the findings from the final validation interviews. As the interviewees pointed out it is explained the differences between future visioning and future scenarios for better understanding of future visioning system model is explained and the procedure of deriving concepts from the future vision given at the concept development phase. Repositioning the scenario planning phase in the future visioning process is made after the efficiency of the process is discussed.

With the findings from the discussion, the future visioning system model that was concluded in part II is revised and finalised. And the contents of each stage of the future visioning system model are described. The researcher then provides the conclusions of the research work with the list of main findings and the some of recommendations which explain how the companies could adopt the future visioning model under the practical circumstances and what environment they should create for better operation of the model. Lastly, the researcher completes the part with providing suggestions for future research.



## **Chapter 10 Discussion, Conclusion and Suggestion**

### **10.1 The Future Visioning System as a New Product Development Strategy**

As discussed in chapter 2 the market that consumer electronics companies today are competing in is the dynamic product market where the high rates of technological change accelerates evolutions of product concepts, manufacturing process capabilities, and technologies for coordinating product creation processes. In addition, customers in this market become more sophisticated in their abilities to identify and select products that meet their particular needs, and their preferences become more varied and demanding. Thus, market preferences and the means available to serve them are subject to significant change, and precise prediction of market preferences at the completion of a product development project is likely to be impossible.

This implies that the consumer electronics companies must obtain greater strategic flexibility to respond advantageously and broadly to continuous change in competitive conditions in the future by performing a fundamental shift to the strategy concept centering on creating new kinds of product strategies and process for creating new products accompanying with managerial and organisational competences rather than taking the strategy concept focusing on predicting and planning for market change (Sanchez, et al, 1996)

With this perspective, executing the future visioning system can be a strategic method to implement the basic shift. In terms of product strategy, the future visioning system enables an offensive strategy that is often characterised as market driving approach to generate new product concept guided by the future vision forward sensing how future customers' needs evolve rather than traditional market research focusing on customer need at present. Because the product concepts provided by the future visioning system are future based, the product choices generated from the concepts outstrip the customers' expectations over the products in the present market. Thus, this strategic market approach will create a new product market and allow the company to dominate it. Due to the absence of competition, this approach also enables the company have higher profits associated with the product they introduce in the market, particularly if market growth is rapid.

Considering that product strategy should emphasise 'speed to market' when the market is in dynamic situation (Sanchez, 1996: Smith, 1999), the future visioning system model deals with this matter by enhancing a new product development (NPD) process. In a contemporary new product development, its process usually consists of three distinct phases such as the inception phase examining a new product opportunity and its technological capabilities and generating product ideas, the creation phase conceiving a range of product concepts, selecting the most appropriate and developing them through to the prototype stage and realisation phase introducing the product to the manufacturing facility and then to the market place (Jones, 1996) (Figure 10-1). Among these three phases, the inception phase is the most problematic phase because of the idea development and idea selection stages that involves transforming a raw idea into a robust concept through careful definition of the underlying technologies, identification of expected customer benefits, and assessment of the market opportunity (Crawford, 1994). Montoya-Weiss and O'Driscoll, (2000) also argued that this pre-development activities often are lacking and many front-end idea selection decision are made without the use of objective evaluation criteria so that most of time delays in NPD process are caused.

The future visioning system model tackles these time delays in NPD process by both reinforcing environmental information scanning process and involving the scenario planning. The information scanning process covers both internal environment and external environments, and then examines the company's capabilities in resources over the anticipated future trends. This ensures that the future vision from which new market and product opportunities are generated is built on a practical base so that the company can avoid an ad hoc decision on creating new market and product opportunities caused by neglecting the company's capabilities, especially when product development project develops future based products (Harmel and Prahalad, 1994). As Wilson (1992) argued, inadequate decisions in the early stage of NPD process cause time delays or consuming financial and human resources without producing revenues and profits due to redefining or cancelling the entire project. The environmental information scanning process in the

future visioning model contributes time efficiency in NPD process by preventing inadequate decisions.

Involving the scenario planning as a product concept evaluation tool is also one of the methods by which the future visioning model deals with the time delays in the NPD process. In the future visioning model future vision is projected in two different levels: Primary vision with general prediction describing the future as whole and subsidiary vision with detailed prediction explaining future states of consumer life. New product concepts are mostly derived from the subsidiary future vision by specifying customer needs in the future state of consumer life. Scenarios are developed to validate this subsidiary future vision in the light of examining new product concepts. Technical feasibilities and applicability of the projection of the future vision are usually examined by contrasting the vision over scenarios. In developing scenarios, external experts in futurology and forecasting get involved to lead the process so that scenarios developed through this process can become objective criteria for the concept evaluation procedure. Securing objective evaluation criteria consequently reinforce the product definition phase that follows the concept evaluation phase in NPD process by getting well-defined concepts. This implies that a company can avoid any time delays or late changes that may cause lower revenues and profits because of frequent revisions of the insufficient product concepts in the middle of NPD process (Rassam, 1995).

Furthermore, the future visioning model contributes to enhance the NPD process by its designer lead approach and integrated procedure. In the existing NPD process functional involvements of the departments involved are specified and their roles are designated in each stage. For example, market research and research and development lead the major roles in the inception phase, design in the central creation phase and production engineering, manufacturing and marketing in the realization phase (Figure 10-2). As Jones and Cooper (1995) argued, the success or failure of the NPD project can be influenced significantly by the interfaces between these involving functions done by the different departments. To increase the interfacing it is often recommended that all the department involved should fully understand the entire process (Rothwell and Whiteston,

1990) and that there should be regular communication between the departments for ensuring that all the information related to the project should be shared by the people involved (Walsh et al., 1992).

The future visioning system model tackles this matter as it integrates the inception and creation phase where the functional involvements and roles of marketing, R&D and design are differentiated, and lets designers lead the entire procedure. Because unlike other NPD process models that focus market and customer research, the future visioning system model produces future oriented new product concepts by projecting future state, it is not necessarily to differentiate functional involvements of marketing, R&D and design, and assign them to each stage of the NPD process. The process of the future visioning system model also supports this design lead approach. As seen in Figure 10-3, its integrated concept development procedure is completed by visualisation of the concepts that converts non-visual state concepts into visual and intangible form. This visualisation is the primary functional role of the designer that is executed through manipulation of both imagination and memory (Dahl and Chatopadhyay, 2001).

Figure 10-1 NPD Process

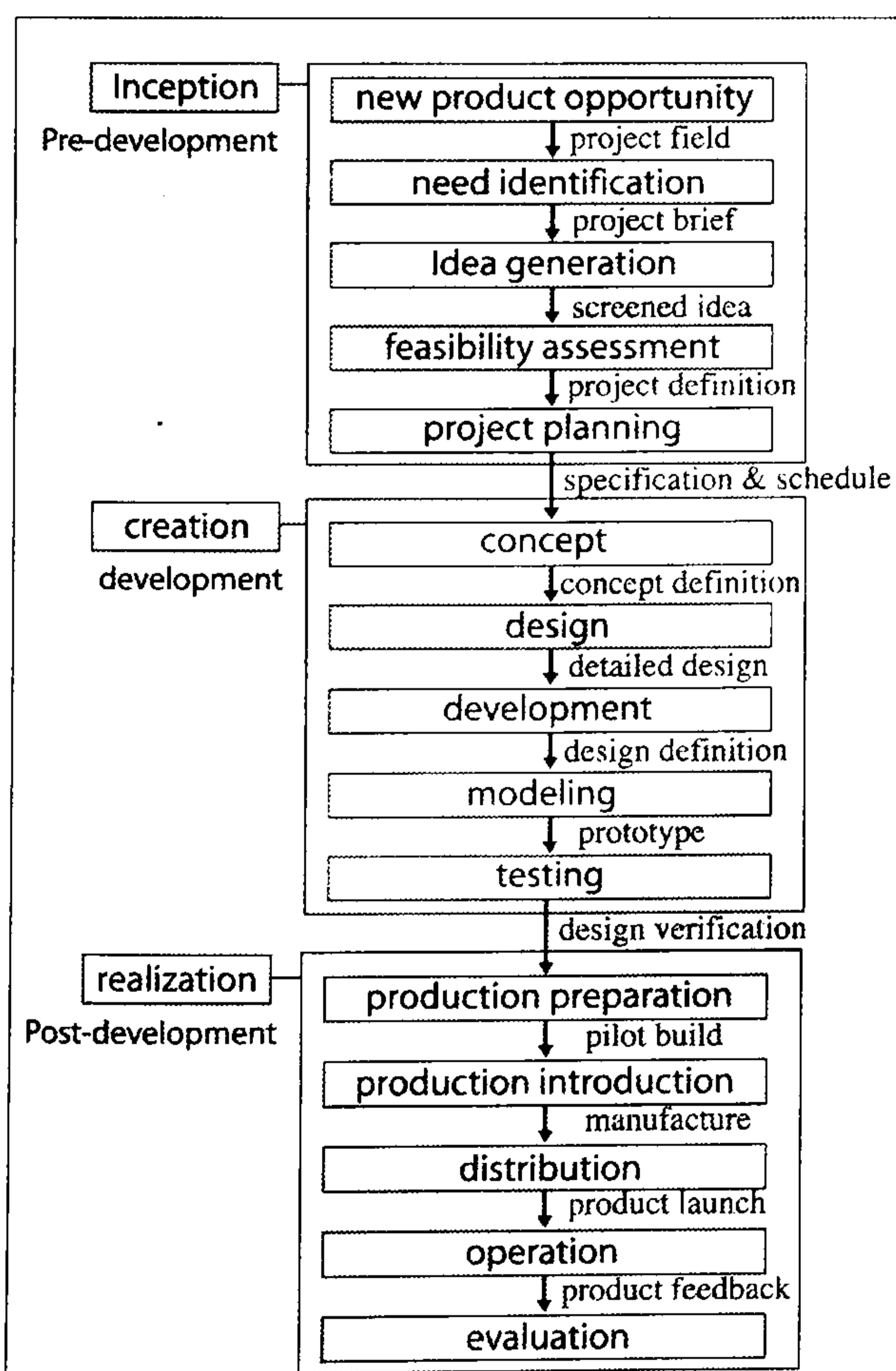
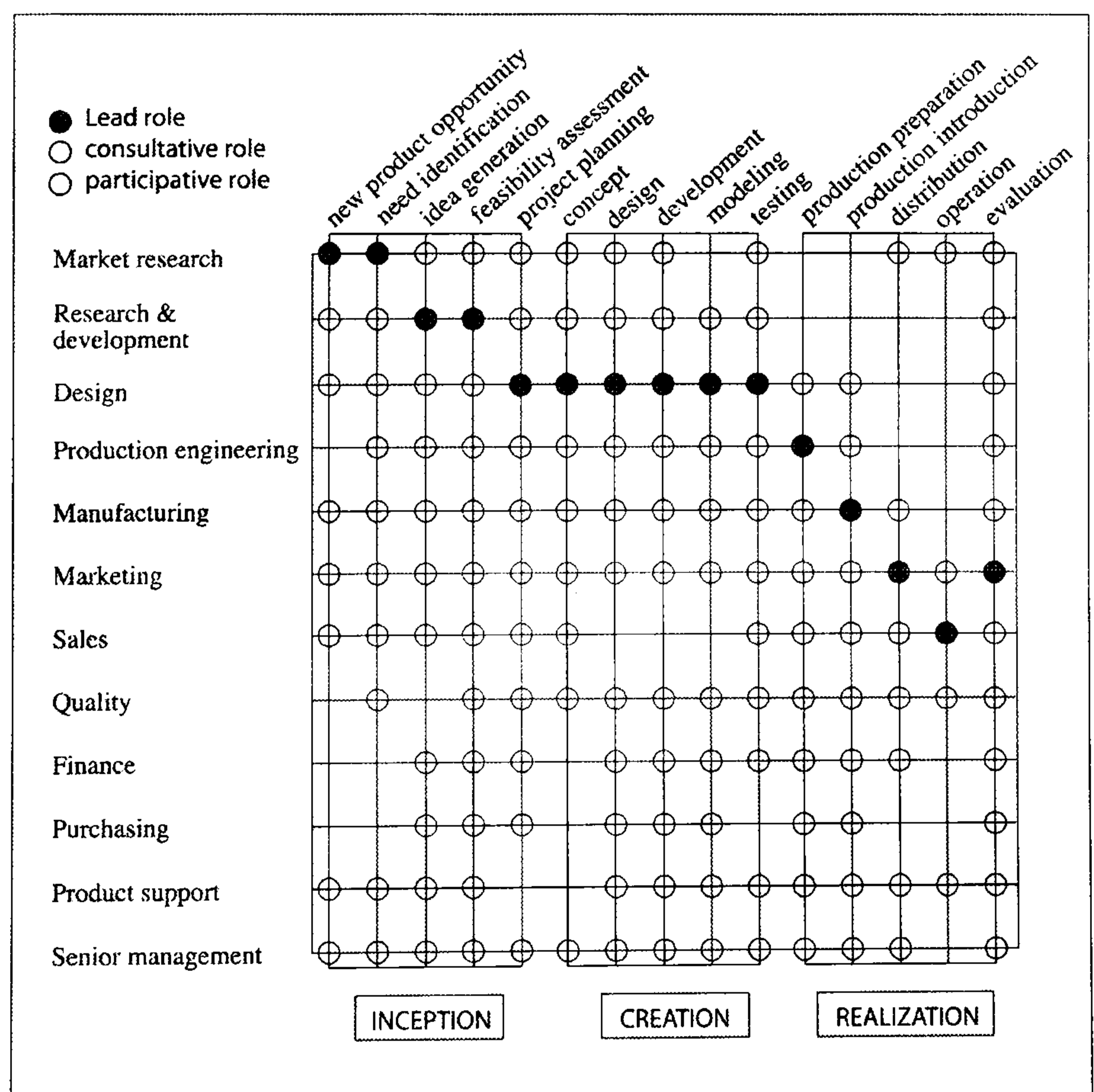
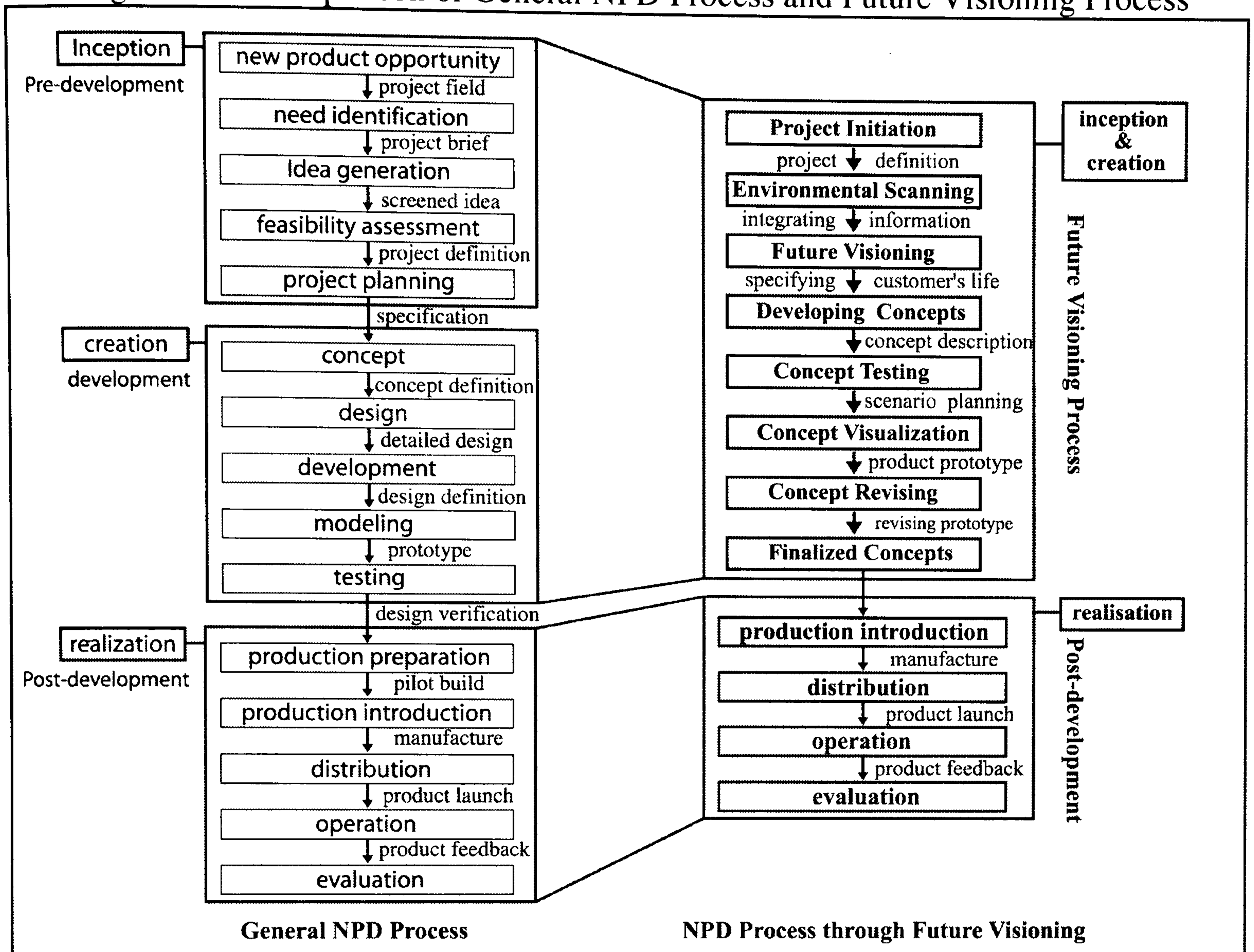


Figure 10-2 Functional Involvement



Adapted from Jones (1996)

Figure 10-3 Comparison of General NPD Process and Future Visioning Process



### 10-2 Designer's Role in the NPD Process

From the discussion above, it is identified that role of design and designers in NPD process changes when the future visioning system is adopted as a strategic tool for concept development. In the general NPD process, design is usually required for their participating role in helping project planning at the pre-development phase where the marketing and R&D take the major role such as examining new product opportunity, defining project field and generating ideas, and it leads the central creation phase from defining the design concept to product prototype model testing. This implies that design is not much involved in early the stage of NPD process as it still remains mostly in the creation phase in which designers are often particularly characterised as customer interpreter by their concern with all the factors that can make or break a product in the eyes of the customer such as styling, ergonomics and user-friendliness (Rassam, 1995). However, as the future visioning system model is involved in the NPD process and

designers lead this procedure, design's role in the revised NPD process can be extended more broadly.

### **10.2.1 Designers as Information Integrator**

Because environmental scanning is one of the core activities in the future visioning system model it is required for designers to have proficiency in information management. In undertaking environmental scanning designers first must be aware of the many variables within a company's internal and external environment, and carefully monitor and evaluate those factors. In internal scanning, designers look within the company itself to identify internal strategic factors. For example, those critical strengths and weaknesses that are likely to determine if the company will be able to take advantage of opportunities which evolve in the future. In external scanning, while, designers identify how the macro environment including the economic environment, the technological environment, the cultural and social environment, and the competitive environment influences the formulation of the future. After the environmental scanning is completed, they then analyse information gathered here and integrate them for building a foundation of future vision. For executing these required activities effectively, however, designers should be disciplined for making decisions on information during the scanning process and interpreting information selected through the decision because absence of self-censorship screening misinformation or disinformation and errors in interpretation are a source of many future visioning failures (Godet, 2000).

### **10.2.2 Designers as Futurist**

Once the environmental scanning is completed, designers project the future vision based on the interpretation of the information gathered. They firstly define a major driving force that stimulates other environmental factors to interact and build a future vision by anticipating feasible outcomes of interaction as whole. When a vision objectively describing a future state is formulated, designers contrast the vision against company's internal capabilities identified through the environmental scanning process. In doing this they revise the vision to one that is more desirable, intended and compelling in the company's perspective.

Since designers work directly in the service of a company that will use their work, they are expected to be particularly strong in methods and techniques, and more effective in collecting, organising, and interpreting data about trends, potential developments and discontinuities. In this sense, Coats argues that there are some personal characteristics which designers, as futurists who project future vision in business level should possess (Coats, 2001):

- A grasp of the trends in society, from the point of view of their continuation and possible disruption from discoveries, invention, crises, or other events;
- A sense of more than one viable, plausible and complex alternative future;
- A sense of values of self and others which serves two purposes: 1) sorting out the important from the unimportant in making forecasts, and 2) as a means of identifying social and institutional goals;
- Imagination;
- A sense of responsibility for influencing the future on a large or small scale.

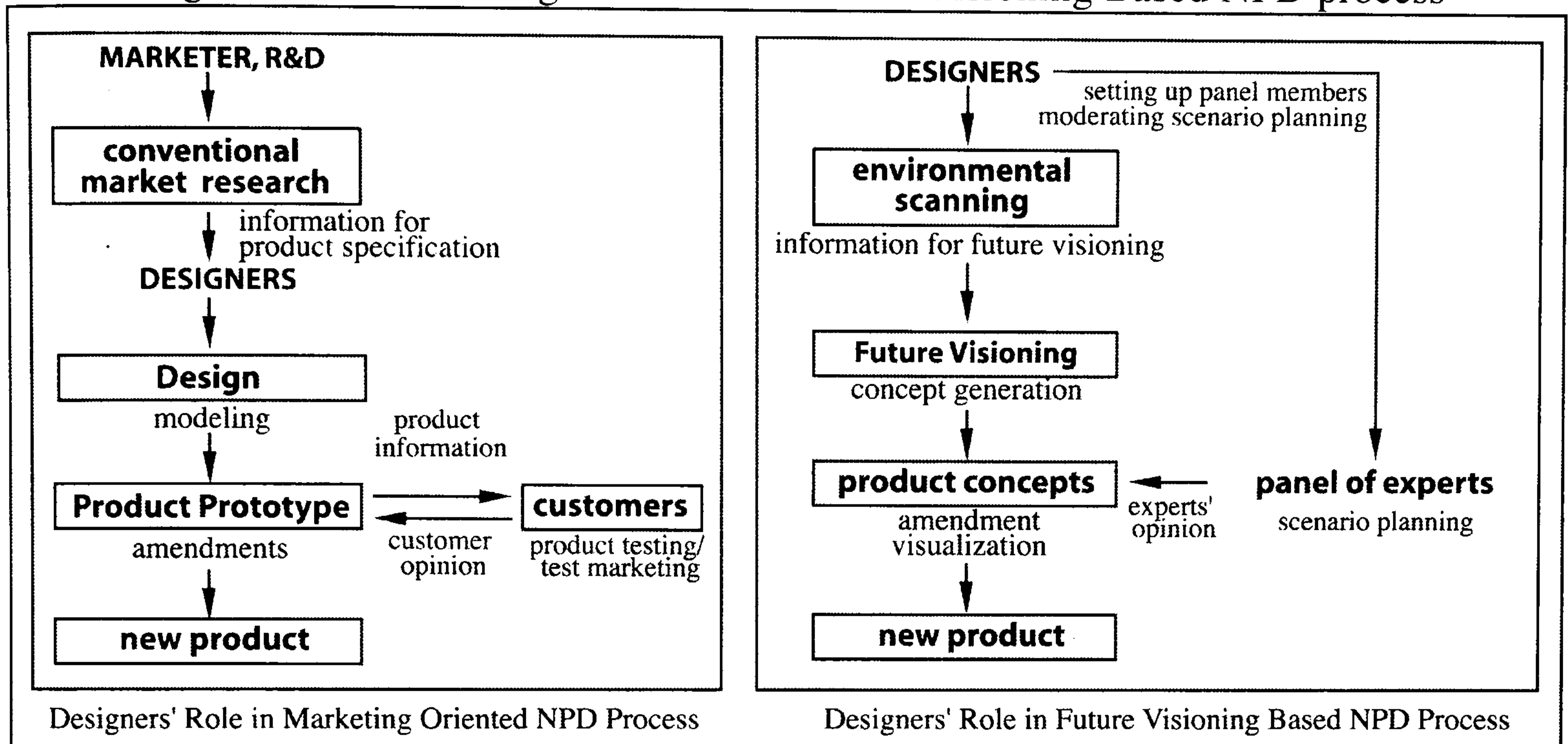
### **10.2.3 Designer as Process Moderator**

In the future visioning process model scenario planning gets involved at concept evaluation stage. Experts such as sociologists, cultural anthropologists and futurologists are selected and invited to develop future scenarios. This expert based scenario planning is based on the assumption that collective expert judgement is a valuable method of objective forecasting in the circumstances where a problem does not lend itself to precise analytical techniques. Thus, this technique aims to derive the benefit of bringing together a group of experts without the disadvantages of a 'committee situation' (May, 1996) such as deference to recognised leading opinion, persuasion by dominant members, dismissal of minority views and groupthink. In this sense, a designer who operates the future visioning system in NPD process must moderate the process of scenario planning by inducing the participants to present ideas simply, critique the ideas of others, and respond to critiques of their own ideas.

Setting up the expert panel is also a crucial task for the designer who runs the process of the scenario planning. Because the effectiveness or accuracy of the procedure is much influenced by 'expertise' or 'knowledgeability' of experts' (Row and Wright, 1999), it is

required for the designer to have a careful-selection of adequate experts. For this purpose, it is also necessary to constantly identify leading experts in the related area and keep track of their research and achievements. Figure 10-4 illustrates how designer's role can be diversified in the future visioning based NPD process compared with designers' role in marketing oriented NPD process.

Figure 10-4 New Designers Roles in Future Visioning Based NPD process



### 10.3 Assessment of the Future Visioning System Model

Discussed in this section are factors pointed out by the interviewees at the validation interviews that need to be explained more in order to increase acceptability of the model. There are three most argued points by the interviewees (Ahn, 2002; Lee, 2002): (1) the necessity of distinguishing differences between Future Vision and Future Scenario; (2) the way to deriving concepts from future vision given; (3) time efficiency procedure

#### 10.3.1 Difference between Future Vision and Future Scenario

In terms of dealing with future state, future vision and scenarios are similar to each other. In both development of future vision and scenario, the plot of a future state is formulated on the analysis of information gathered through environmental scanning. In the procedure, all the environmental categories such as technology, society and culture, economics, and politics are reviewed through this environmental scanning and the changes and trends in each category are identified. The information about changes and



trends are then synthesised based on the consideration of influence of a defined driving force, and transformed into a plot of future state. However, in the future visioning process that develops a plot of future vision for concept development, a company's capability construct implying managerial competence and capacity is additionally considered and reflected in defining the future vision. Thus, a plot of the future state in the future vision is more likely to describe the future from the company's perspective. It provides a realistic and feasible description of the future state in which challengeable objectives that a company seeks to achieve are also implied so that what the vision illustrates is a company's pursuing a future so that customers are willing to follow.

While what is supposed to be achieved through scenario planning is the alternative future that could occur depending upon the direction of decisions, actions and events, and the from a recognition of the unpredictability of the future, and scenarios are usually built in multiples by involving experts who provide clear unambiguous advice based on their expertise. This enables the future vision developed for concept generation to be validated against various possible circumstances in the future by contrasting it against the alternative future options. Table 10-1 provides the comparison in the characters of Future vision and Scenario.

Table 10-1 Comparison of Future Vision and Scenario

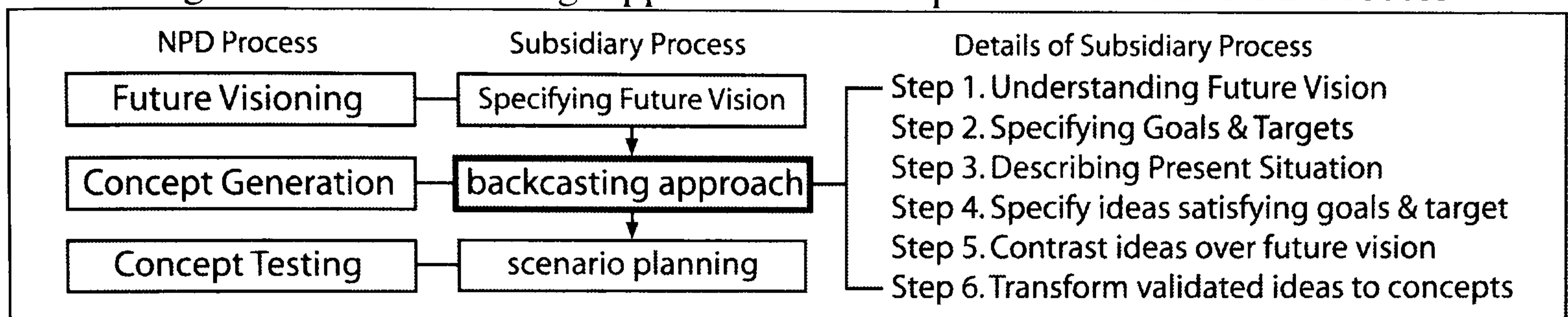
	<b>Developer</b>	<b>Information</b>	<b>Concerns</b>	<b>Purpose of use</b>
<b>Future Vision</b>	Designers	Qualitative Environmental Information	Company's Managerial Competence & Capacity	Concept Generation
<b>Scenario</b>	External Experts	Qualitative Expert Information	Uncertainty of the Future	Validating Future Vision

### **10. 3. 2 Deriving Concepts from the Future Vision**

It is also necessary to be clear about the ways of deriving concepts from given future vision in order to give clear understanding to the user of the future visioning system model. Once the future vision is developed in a specified form, designers are asked to formulate new product concepts from understandings about the future vision. As indicated in the future visioning system model (See Figure II-1) designers can use the

backcasting approach. This backcasting approach starts from comprehensive understating of the given future state on which particular goals, and targets are specified. These goals and targets could be particular needs in customer lifestyle or trends that are anticipated to be happening in the future. The present situation is then described and understood by the designer who conducts the concept development to specify the suggestions with which the future needs could be satisfied. Lastly, the suggestions are transformed to new product concepts as they are validated by comparing to the future vision given. This procedure can be illustrated as Figure 10-5.

Figure 10-5 Backcasting Approach of Concept Generation in NPD Process

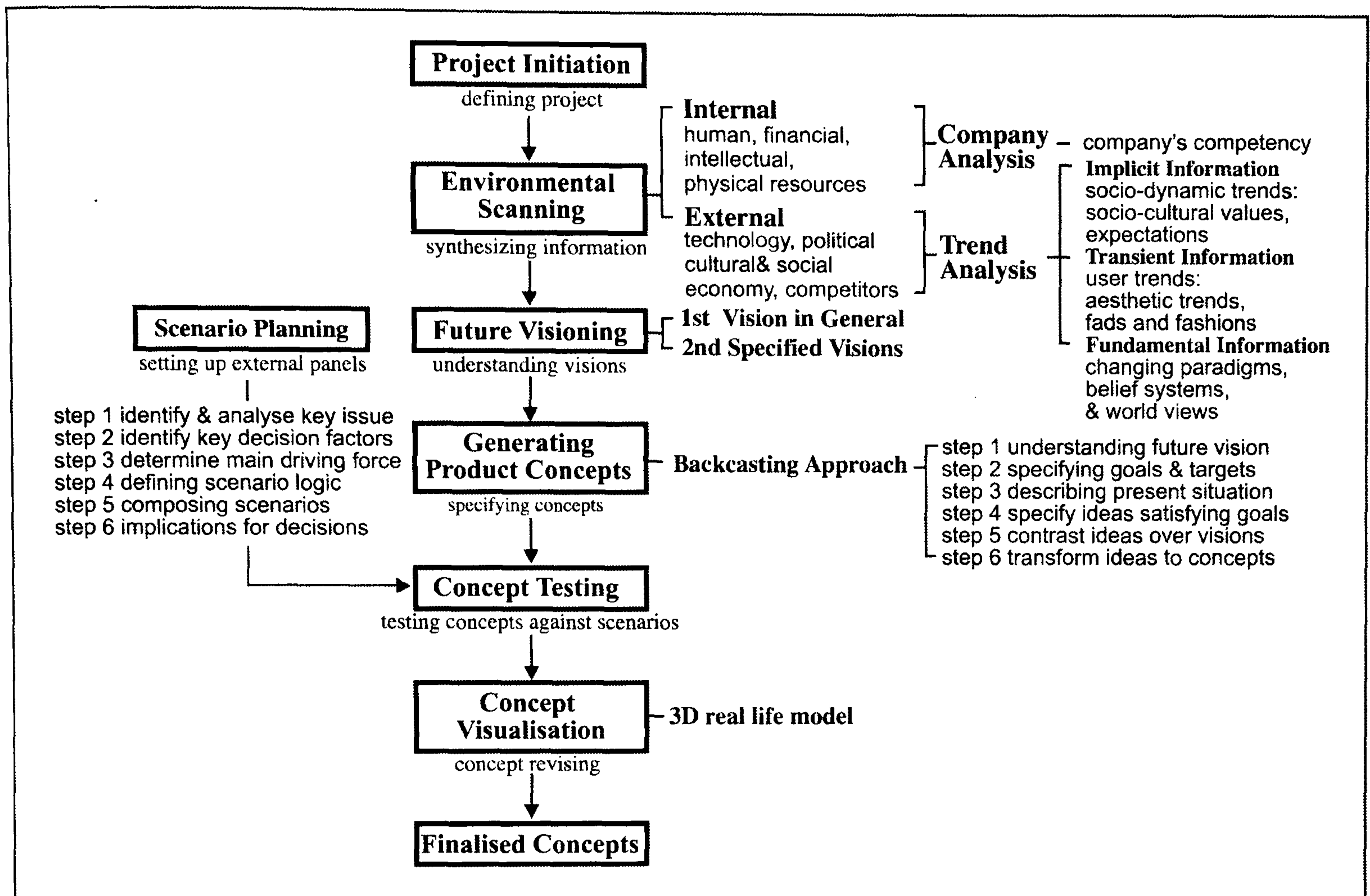


### 10.3.3 Time Efficiency of Procedure Future Visioning System Model

It was suggested by the examining interviewees that the point of conducting scenario planning in the future visioning system model should be reconsidered in terms of time efficiency. According to the 4th future visioning process model in the preceding part II (Figure II-1), scenario planning is executed after concepts are developed. However, if the future visioning proceeds successively according to the order of the process suggested in the future visioning system model, there would be a problem of a discontinuation of the procedure after the product concept generation phase. Because scenario planning itself is a time consuming task that is conducted by the external experts, it is expected for the designers to have a pause after concept development phase as they wait for completion of scenario planning. Considering these facts the system operator should separate the scenario planning phase from the successive procedure of the model and execute it in parallel with the future visioning phase. As a result, this enables the system operator to manage the concept generation phase and scenario planning to be competed at the same time so that the concept testing phase could be continued without any time delays caused by waiting for completion of scenarios. Overall, time efficiency of the NPD process can be increased and fluent proceeding of future visioning system can be achieved by repositioning scenario planning in the process. As this suggestion is added to the 4th

future visioning process model (Figure II-1), the structure of the model is revised as Figure 10-6.

Figure 10-6 Finalised Future Visioning System Model



### 10.3.4 Description of the Finalised Model

#### Project Initiation

Task of this stage is to define characteristics and objectives of the project in depth to provide clear direction of the project that the project team members must share and remind themselves while they carry out the tasks assigned to them. This should be conducted with the idea of achieving coherence in outcomes of team members' works.

#### Environmental Scanning

In this stage, variables of company's internal and external environments must first be defined and clearly comprehended by the project team members. As discussed in preceding chapter 5 scanning the company's internal environment should be focusing on gathering information about human resources, financial resources, intellectual resources and physical resources for identifying company's competency. In external environmental

scanning technology, social-cultural factor, economy, political and competitor are accessed to identify trends that influence formulation of the future. Trends are identified in the forms of socio-dynamic trends, user trends, changing paradigm and worldviews. As environmental scanning proceeds, the robustness and veracity of incoming information must be instantly checked by the team members over the information checklist provided in chapter 4.

### **Future Visioning**

From the synthesis of information gathered in previous stage, future vision is formulated in this phase. Vision is firstly developed in a general form that gives a wide view to enable the team members to share coherent holistic understanding about the future. Specified visions that describe each aspect of human life in detail are then derived out as primary source from which the team members can generate new product concepts.

### **Scenario Planning**

As an independent phase, scenario planning stage starts from setting up a panel of external experts of futurology and trends analysis who lead its process. External experts firstly identify the central concerns of the project and the developments or driving forces that are likely to have the most important influences on these concerns in the future such as scientific or technological development. They then assess the importance and uncertainty of the driving forces for the central concerns to identify critical factors that can be used as the central themes of the scenarios bringing about quite different futures. At the next stage of scenario planning, the experts select the scenario logics that are the main themes or assumptions around which the scenarios are to be constructed. Based on the main themes the scenarios are then developed in the form of narratives that present a plausible future.

### **Developing Product Concept**

Based on comprehension of future vision developed in the preceding phase, the project team specify goals and targets which could be particular forms of customer life anticipated in the future. Then, the project team describes the present situation and

establishes ideas in which the goals and targets could be satisfied. Once the ideas are developed based on the consideration of the present situation, the project team contrasts the ideas over the future vision and transforms them into product concepts.

### **Concept Testing**

In this phase, the project team validates the concepts generated through future visioning by contrasting them against the future scenarios developed by the external experts. The main point in this testing is to check whether the concepts and the projection of the future scenarios are coherent in terms of standard anticipated future.

### **Concept Visualisation**

This phase is largely led by designing activity that is the primary role of designer. The project team transforms the concepts into 3D real-life prototype models by defining individual design concepts and designing the products in detail. In this visualisation phase, the product functions actively involved in the realisation stage where the defined concept go into production, are also considered.

### **Finalised Concepts**

In this phase the manufacturability of the developed product are assessed by the project team with cooperation of production engineering and manufacturing. When the products meet the initially anticipated level of manufacturability, they are approved by the management as finalised concepts that are ready for the next stage of NPD process.

## **10. 4 Conclusion**

Consumer electronics industry today is facing a highly competitive market situation caused by rapidly evolving technological development and the sophisticated and most demanding customers. In this market competition, the importance of new product development is recognised as a strategic tool with which consumer electronics companies deal with the difficulties of competing in the market. More particularly, companies must develop new products which go in advance of customers' expectations by taking advantage of advancing technological development for winning in the market. This 'first

in the field' strategy enables consumer electronics companies to create totally new market and to dominate it when the products are accepted by the customers. To develop one-step-ahead products satisfying the proactive NPD strategy, it is required for the companies to reconsider enhancing the NPD process, especially by utilising a new product concept development phase.

In terms of time efficiency of NPD process that is one of the important requirements of NPD development, the concept development phase is where the most of time delays are caused because they typically involve ill-defined processes and ad hoc decisions that require late changes in NPD process. This late changes result in less revenue and profits or cause cancellation of the entire project. In addition, In the development of one step ahead product concepts, concept development process takes a different approach because concepts it is expected to develop are not the reflection of the current customer needs but the future based suggestions of which customers are going to be convinced.

In this perspective, future visioning which projects the future vision describing a desirable and feasible future state is recognised as a fundamental element that can be adopted for creating a concept development tool which is appropriate for a proactive NPD strategy. As this future visioning method is reinforced with the involvements of environmental scanning and scenario planning, future visioning system model has been developed as a concept development tool (See Figure 10-7).

When this future visioning system model is adopted in the NPD process, the structure of traditional NPD process is transformed into one which is enhanced in terms of time efficiency because the future visioning process integrates both inception and creation phases in the traditional NPD process. As the results of this, involvement of designers in early stage of NPD process is increased and their role in the NPD process does not remain only as customer interpreter who is defined by their visualising skill but extend as futurist, information integrator and process moderator.

The conclusion from the outcomes of this research work can be summarised as follows:

- (1) Executing proactive product strategy can be a strategic tool for consumer electronics companies to gain competitiveness in the market today as it enables the companies to create new market with one-step-ahead products.
- (2) Developing new product concept development process is necessary for the companies to create one-step-ahead product: future visioning system is recommended as an advanced approach that creates new product concept by projecting and exploring future vision.
- (3) Future visioning system model could consist of 8 stages: project initiation, environmental scanning, future visioning, generating product concepts, scenario planning, concept testing, concept visualisation, and finalised concepts.
- (4) Product concepts can be generated from future vision by applying backcasting approach that starts from a comprehensive understanding of future vision.
- (5) Scenario planning should be involved in the future visioning system model as a concept testing tool providing objective validating criteria. Its process therefore should be conducted as an independent phase by external experts.
- (6) Executing future visioning system model creates new roles of designer in new product development process such as information integrator, process moderator, and futurist.

### **10.5 Recommendations**

In concluding this study, there are some recommendations on how consumer electronics companies may adopt the future visioning system model into their NPD process and in what environment they may operate as follows:

Consumer electronics companies should be aware that the future visioning system model is developed as a concept development tool that fits to the proactive NPD strategy pursuant of developing one-step-ahead products. For this reason, the future visioning system model can be more effective and suitable for the companies that want to achieve new market creation and domination with new concept-lead products. In addition, because this system produces the future-based-concepts that are tested through a multiple

testing procedure, companies can effectively develop new products in terms of development time and cost. Therefore, by adopting the future visioning system model in their NPD process they can effectively deal with the difficulties in generating the advanced new product concepts for the consumer electronics product market where customer expectancies are high, and enhance the efficiency of NPD process in time and cost.

As the future visioning system model is adopted into the NPD process it can contribute to enhancing designers roles in NPD process because the revised NPD process involved with the future visioning system model is mostly led by designers, unlike the traditional process in which marketing and R&D take leading roles. This implies that there should be an organisational restructuring for executing the future visioning system in the NPD process. In terms of cooperation structure, for example, designer or design manager who operates the future visioning system model should be put in the position in which they can rally people from other department within company to support them. This modified organizational structure can be appropriate for the competition in the consumer electronics product industry where design is considered a strategic success factor because the designer or design manager can lead the whole NPD process from the design perspectives under such structure.

Because the future visioning system is an information-integrated process where a broad range of information is required and transformed into product concepts, this system should be operated under the environment that enables designers effectively to gather information and feed them into the system. Therefore, it is recommended for the companies adopting the future visioning system model to consider organising an information network which covers a wide spectrum from international to domestic environment and developing an information database system that saves information in a structured way so that the designers can instantly access the information sources at any time and effectively acquire the information for their purposes. Because this information network and database system can enable the designers to save time in the information



scanning procedure by instantly providing information, the entire procedure of the future visioning system model can be accelerated and completed time efficiently.

To maximise the benefits of concept development through future visioning such as early domination of new market, companies should conduct projects multiply. Executing a back-up project which provides succession product should follow quickly to keep leading the market they dominate with the first product when the products are accepted by customers because it enables the companies reduce the gap between first product and its succession. This gap may allow the competitors with similar products to enter the same market and erode the market share. Therefore, as they lead the new product development project that aims to produce the first in the market product, the companies should also start the development process for the second generation product so that the second generation product can be ready for market launching when the first product's market success attracts competitors to launch similar or imitated products in the market.

Because the second generation comes with enhanced features and design, the competitors' products will have even more pressure to compete in the market where the first product has already become the market dominator and customers start anticipating next generation product.

For achieving a fluent operation of the future visioning system in practice and quality outcomes of the operation of the future visioning system model, companies should encourage their designers to discipline themselves to be acquainted with the process of the future visioning system and the required tasks in each stage of the procedure. For instance, designers should be led to achieve proficiency in information management. Because the outcomes of the future visioning system will be differentiated according to the information inputs to the system, the designers who operate the future visioning system should be disciplined to discern relevant information and then acquainted with information interpreting skills. When the designers are well practiced in information management they can also reduce the time of future visioning process by conducting information scanning phase time-efficiently. In addition, designers should also be led to develop personal characteristics of futurist as mentioned in preceding section in this

chapter. These characteristics will be helpful in enhancing designers' ability to develop credible future visions from the interpretation of the information input.

When this environment and requirements are acquired and satisfied the future visioning system model can be operated to a high standard. However, to achieve this environment for the operation of the future visioning system, it is necessary that the holistic supports should be set up and maintained throughout the company management levels. Therefore, designer managers should make efforts to raise the concerns about design among company managements so that company managements integrate design strategy into the company's business strategy for nurturing the environment of the future visioning system.

Finally, it is recommended for companies that the future visioning system must be adopted and operated as a strategic tool for exploring future and opening new markets in order to be a leading company in the consumer electronics product market. The system will provide the companies the advanced and innovative concepts of future products as the source of their competitiveness so that the companies can effectively compete in the consumer electronics industry by giving their customers high perceived value in the future products. It will also provide a good opportunity for the designers to re-characterize themselves and redefine their roles in the fast evolving business environment by letting them explore the future and realise it first. Therefore, the future visioning system can be the most appropriate tool for accelerating both business and design practice.

### **10. 6 Suggestions for Future Research**

Regarding the necessity of further development of the research work findings, there are some suggestions for future research generated at the completion of this research. The areas and suggestions are outlined as follows:

### **10.6.1 Measuring Impact of Adoption of Future Visioning System Model**

For increasing the practicality of the future visioning system model, it is suggested to execute the model in a real situation and observe how the model is implemented under practical environment in companies. Outcomes of this pilot study are expected to provide more factors that influence the structure of the future visioning system model and the way of its implementation in practice. One of the important factors to be found is, for instance, the interface between design and others in NPD process. Because the future visioning system model is largely led by design, this may shift others such as R&D marketing and manufacturing engineers who used to take major roles in the process to the position where their involvement is limited, and consequently cause the passive cooperation between design and others. Therefore, it is important to find an improved way of adequate involvements of others for increasing the adoptability of the future visioning system model in practice.

### **10.6.2 Enhancing Designers' Capability of Interpreting Environmental Information**

Because the quality of the outcomes of future visioning depends on how the information is comprehended and interpreted by designer, it is important to research more about characteristics of environmental factors and the way they interact in terms of affecting the formulation of the future. This is expected to provide certain logics of reading environmental information and interpreting their interactions so that designers can utilise it for projecting future vision.

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# Appendix 1: Conference Paper

## Environmental Scanning in a Fast Changing Environment

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## INTRODUCTION

The strength and success of a company is strongly dependant on its ability to develop more innovative products in reduced development time and costs, in order to provide its existing and prospective customers with a continuous flow of improved services and products. However, the development and introduction of new products satisfying customers is getting more difficult in fast changing business and customer environment. Because of easy and frequent information access due to development of Internet Technology, for instance, the lifestyle of customers is being altered and their expectations of business are increasing greatly and far faster. Today's' customers adjust their behaviours and thinking to the Net where information is updated in minutes or seconds. They know technological capabilities are exploding like never before and they expect new products to solve problems in ways that transform how we live and work. Thus managers and designers must continually carry out environmental information scanning to provide a comprehensive view or understanding of the current and future information of environmental constituents.

## INFLUENCES OF INFORMATION ON DESIGN

To succeed with responding to customer's high expectations, companies must have great ideas for their product innovation. Successful concepts are nurtured in a balancing act that sensitively blends both imagination and a well organised information structure. Systematic information input stimulates the developer's imagination to generate better solutions. Heleen and Paul explained that information expansion affects designers work in searching for innovative solutions because their decisions are based on the amount of knowledge which they gained from experience and the way this information is structured. Designers can generate more creative outcomes of their decisions by extending their boundaries of knowledge with information from various disciplines.

In practice, designers are not always used to looking for information in other disciplines than those closely related to the design problem at hand. They constrain their solution space and thus will limit their output of conceptual design. This functional fixedness or fixation phenomenon can be overcome by acquiring a certain body of knowledge extent in memory and knowledge learned from new additional information. The recent study, 'design assignment IV' by Delft University of Technology also provides evidence that designers with additional information such as the relationships between human needs are more creative than those without such information. Acknowledging that human needs and possible product characteristics which fulfill the needs changes over time due to changing conditions affected by technological, social, political or cultural aspects, and that outcomes of design are influenced by systematic information input, companies must support designers with additional information to win the competition by developing the right structure of information system.

## ENVIRONMENTAL SCANNING

To provide information which gives a penetrating view of possible future changes in every aspect of the business environment in the context of monitoring, interpreting and forecasting issues, trends and events which fo far beyond the

## Appendix 1: Conference Paper

customer and market, the environmental scanning should be carried out frequently. Niv and Issac<sup>4</sup> explained in their study that differences between successful firms and unsuccessful firms are in the pattern and the frequency of conducting environmental scanning. The more successful firms carry out environmental scanning at a higher frequency in the task environment such as the competitor, customer, and technology sectors, and they are flexible to adapt their patterns of scanning to the environment. The more successful firms make more use of formal written information sources-internal and external, and of personal external sources-with personal involvement of the top executives, compared to others that make use of environmental scanning of internal personal sources(informal sources). To be more successful, Jain<sup>5</sup> suggested there are some objectives that environmental scanning should meet.

- Providing a base of objective information which can be defused if recognised well in advance
- Provide intellectual stimulation to decision makers
- Sensitizing the firm to the changing needs and wishes of its customers
- Improving the image of the firm with its public by showing that it is sensitive to its environment and responsive to it
- Providing a continuing, broad-based education for executives, especially strategy developers
- Providing a base of objective qualitative information about the business environment that strategists can utilize

The primary purpose of environmental scanning is to provide a comprehensive view or understanding of the current and future information of environmental constituents by its procedures: gathering, analyzing and interpreting. The procedure is evolved over time according to its commitment. However, in practice, the threat strikes or opportunities pass while information is being collected because the business environment is changing fast and its subsequences are uncertain. Flexibility of perspective and an holistic approach to information analysis are thus critical considerations. Peter Schwartz<sup>8</sup>, President of Global Business Network, describes information detecting procedure in this context.

*“Flexibility of perspective is critical. You simultaneously focus on questions that matter to you, and keep your awareness open for the unexpected. Like a hunter, alerted to the presence of prey by the snap of a broken twig, you learn to pick out a key piece of vital information in the dizzying flood of words, images, sounds, and numbers that most of us swim in. Most of us have built up a set of strict filters to keep from drowning. We pay attention only to what we think we need to know.*

*Being a scenario-planner, therefore, means becoming aware of one’s filter and continually readjusting it to let in more data about the world, but without becoming overwhelmed.”*

Concept creation as a strategic tool for competing future High-value environmental information gathered through the scanning procedure provides a good foundation for generating high-quality concepts. Because the concept already involves preliminary or embryonic forms of product designs, and answers the specification and the identified product requirements, generating good concepts in the initial stages saving time delays and money costs. The concept poorly defined results in less revenues by affecting the obsolescence date of a product while clearly defined concepts reduce risks of being late into market and increase profits<sup>7</sup>. To succeed in product development, the concept development has to be accurate and timely in the initial step of the development process.

To develop high-value concepts, there are three structured techniques of concept development<sup>8</sup> that are widely adopted in practice;

- Task analysis: which explores the interaction between the product and the person who used it by observation and analysis
- Product function analysis: known as FAST(Function Analysis Systematic Technique) starting with brainstorming to present the functions of the products. It ends up with a list of functions which cannot easily or logically be subdivided into subsidiary functions
- Life cycle analysis: a broader analytical technique for exploring opportunities for refining and improving the design of a product

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These methods analyze different aspects of the concept design problem to its core elements and produce a number of concepts. However, these techniques are used for the derivative products that are designed around platform innovation by changing incrementally the attributes and the functions. For platform changes that require radical innovation a different approach to concept development is needed, because in the platform change project, there is a greater need to develop technological and market knowledge and new research in building the direction for the project in the initial stage of development process.

In modern society, as markets and competition are getting more matured and sophisticated customers are increasing their expectations. They want better quality, more functionality, enhanced performance, and great value. They know technological capabilities are able to solve problems in ways that transform how we live and work. To survive in this competitive customer environment companies are asked to be ahead of those customer's expectations.

Charles Handy<sup>9</sup> described a new requirement for companies facing the new competitive era as follows.

*"Recently it has been fashionable for companies to think of themselves as problem-solving organisations. That is actually wrong because, by the time you've discovered the problem and you're already out of date. You have to be ahead of the problem. You have to invent the world. You have to think 'second-curve'."*

Since the 1980's customers have devoted their financial and human resources to customization activities to meet their specific needs and the dynamic revolution of information technology has affected the business activity and its environment<sup>10</sup>. These changing factors affect the situation that is accelerated by fast developing information technology in modern society. Bill Gates<sup>11</sup> explained the business transition that is accelerated by fast developing information technology in modern society.

*"If the 1980's were about quality and the 1990's were about reengineering, then the 2000's will be about velocity. About how quickly the nature of business will change. About how quickly business*

*itself will be transacted. About how information access will alter the lifestyle of customers and their expectations of business. Quality improvements and business process improvements will occur far faster. When the increase in velocity of business is great enough, the very nature of business changes."*

### FUTURE VISIONING AS A TOOL FOR CONCEPT CREATION

To create new concepts that stay ahead of customer expectations and a competitive market challenge, developing a future vision is widely adopted by market leading companies. They invent possible future visions which reflect where their societies are heading and what feasible changes will be happening in the short or long term future. By exploring those visions they find new and possible business opportunities that lead the customer expectations.

Hamel and Prahalad<sup>12</sup> suggested that imaging the future is an important tool for being prescient about the size and shape of tomorrow's opportunities, and conceiving radically new ways of delivering existing customer benefits. Once a company gets to the future first through the vision, there are substantial benefits from it. Getting to the future first may allow a company to establish a vital monopoly in a particular new product category so that the company can set standards and capture the royalties flowing from owning critical intellectual property rights. It also may enable a company to establish the rules by which other companies will have to compete. At worst it may slow up competitors intent on copying their ideas. This will create a time gap to enable the company to create new ideas while their competitors are trying to catch up.

In practice, Philips developed a future-projection named "Vision of the Future"<sup>13</sup> and stimulated a wide-ranging discussion about the sorts of products and services they should be offering to the public in the coming decade. Based in research into human psychology and into social and technological trends, they defined character of the today and evidences of trends becoming visible, such as potential or latent trends in human behavior, psychology and cultural phenomena. Then they explored how the trends might interact



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to give rise to new products and services and produced some three hundred new proposals which were later filtered down to the 60 concepts and transformed into realistic future situations in the forms of hard models and short video clips. The outcomes of the “vision of the future” were then presented to the public in a number of different ways such as permanent exhibition, book publishing, Web site, to obtain direct feedback and generate discussion with people all over the world. Creating accurate visions of the future requires companies to have a deep understanding of the trends and discontinuities-technological, demographic, regulatory, or lifestyle that create and shape new competitive space. This understanding helps top define the driving forces that influence outcomes of events and shapes of future such as society, technology, economics, politics, and environment. All these driving forces are linked together and interact with each other behind events or changes. As Williams<sup>14</sup> says, innovation that makes changes in our society is the outcome of a cycle of mutual adjustments between social, cultural and technological factors. Regardless of where the cycle begins, there is interaction with the other factors as the innovation comes to fruition.

However, technological changes in modern society are widely accepted as a core driving force affecting the shaping of future<sup>15</sup>. It enables a major breakthrough in human capabilities. Changes are dependant on the new capabilities that open up by the technological changes and by the particular consequences that it leads to. The Internet, for example, radically transforms our lifestyles and the world of business by creating a new universal space for information sharing collaboration, and commerce. At Microsoft, the ‘Web workstyle’ due to Internet technology is changing business processes by replacing paper processes with collaborative digital processes. It cut weeks out of their budgeting and other operational processes<sup>16</sup>. The Internet can also offer customers “mass customization”. Whereby, customers are able to pick out the precise style or pattern they want and have it sent via the Internet to the factory, which will then manufacture the product custom-made.

Michio Kaku<sup>17</sup> explained that there are three pillars of scientific achievements in twentieth

century which affected on entire industry and lifestyle: the quantum revolution, the bimolecular revolution and the computer revolution. These revolutions in science unraveled many of the fundamental “rules of nature” so that people could have the ability to understand the matter around them and start bringing changes in their lifestyle. He also asserted the relationship between the three revolutions will be vastly accelerated and enrich the development of science. This acceleration of science and technology will change nature of business by redefining the wealth of nations from natural resources and capital to brainpower and imagination, invention, and the organisation of new technologies<sup>18</sup>.

Technologies may take years or decades to travel from initial idea to commercially viable products. And their successes still depend on the demand for the products which incorporate them and its diffusion in the customer market. Once a product is launched into the market, cultural meaning is generated by customer’s cultural practice<sup>19</sup>. If this cultural meaning is widely accepted by society, its diffusion rate then is accelerated and the demand is increased. And the positive meaning also brings more chance to make profits and more possibilities for a second generation of the products. This effect is much stronger when the product is more innovative and new.

A good example of the technology driven products comes from Sony. When the Sony design center developed “First products to market”, they firstly investigated the best technology to create something that excited people, refined that product and try to create a market for it by educating and communicating with the public instead of market research or asking what kind of products people want. This approach keeps the company always one step ahead of the public’s imagination. In practice, Sony activates the product development strategy called ‘Sunrise/Sunset’ which has an eight-step process for all products to accelerate this approach<sup>20</sup>. The concept of this strategy is an assumption that an entire product line evolves, from first appearance to final design, within a single day divided into seven phases: sunrise, early morning, late morning, noon, early afternoon, late afternoon, and sunset. In this strategy is a core element that triggers the

## Appendix 1: Conference Paper

development project. As a new technology is developed engineer and designer are assigned unique tasks which prepares in advance for what will be happening next in each phase.

This approach has quite high level of risk of failure when its development direction is set by designer's intuition or prejudices about technology, and it is too large and too expensive to attract any but the most curious customers known as "innovators or early adapters". However, it may still be effective new product development strategy for the technology driven society where new customers are emerging from the "overclass" namely high-achieving people with technical knowledge<sup>21</sup>. Thus they demand high-quality products and personalised service. Price of a product is not the constraint on their purchase of a product they want. Even though the percentage of innovators and early adopters in the target market is lower than other target market categories such as early majority, late majority, laggards, the same or more profits can be earned even with minimum productions because of the high price advantage that breakthrough products usually enjoys. Launching Sony AIBO in 1999 proved this by its market success<sup>22</sup>. When the robot dog, AIBO ERS-100, was launched in the market, its high price was not an obstacle for the customers who responded to purchase it through the Internet. This AIBO opened totally new markets of "home entertainment robots" and brought a chance to reveal a whole new arm of its consumer electronics business.

But for the developers it is still important to know how the technology-driven product or its concept affects customers adoption and social diffusion before they initiate the project or launch the product. There are number of characteristics of innovative products<sup>23</sup> by which the product developer can measure the level of failure risks.

- Relative advantage: the degree to which an innovation is perceived as better than the product it supersedes, or competing products
- Compatibility: the degree to which an innovation is perceived to be consistent with the existing values, experience and needs of potential adopters
- Complexity: the degree to which an innovation is perceived as being difficult to

understand or use

- Trialability: the degree to which an innovation can be experimented with a limited basis
- Observability: the degree to which the results of an innovation are visible to others

### CONCLUSIONS

To compete successfully for the modern and future market, companies need to have the capacity to bring a revolution in their products which can fulfill the highly sophisticated customer expectations. Without a point of view about the opportunity for change-for revolution-a company is more likely to forfeit the future than own it and to follow the market than lead it. As a strategic tool for bringing the revolution, building their vision of future is an important task for companies since advanced concepts and ideas are derived from it. However, effective environmental scanning works are highly needed to gather information, because directions of market, customer values or expectations and the cultural reactions are detected and validated based on information to build a feasible future vision. To gain right the information, in this context, designers should carry out environmental scanning frequently and have flexible perspective and holistic approach to information analysis. Designers also should avoid allowing their intuition and prejudice to be too dominant when they select from the range of information gathered. Designers who acquire this environmental information scanning skill will successfully increase their leading roles in creating future vision and enhance their ability of transforming ideas and concepts into realistic form so that they contribute to sustain the business success of their companies into the future.

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In 1998, Ray completed a project for the UK Design Council demonstrating how primary and secondary schools can use design management as strategic planning tool to improve school management.

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# 2000 CMG Conference Report

1. 2000 International Conference
2. Color Marketing Group
3. Process
4. Influences / Key Words
5. 2003 Contract Color Direction
6. 2001 Contract Color Current
7. PROLOGUE

2000.11.20



**LG Electronics Corporate Design Center** UFD TEAM:COLOR



CMG  
FALL2000  
INTERNATIONAL  
CONFERENCE

## 2000 International Conference

Color Marketing Group

THEME: The Big Dig-Constructing Color Resources

TIME: October 28-31,2000

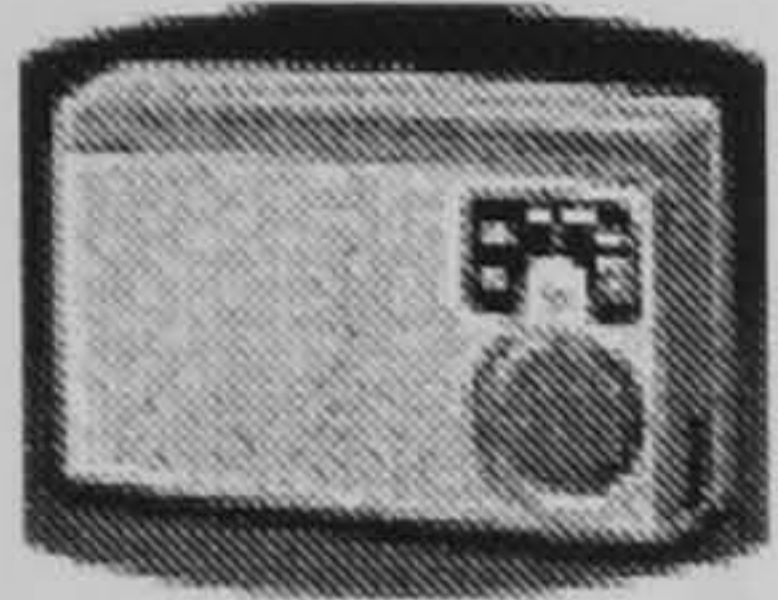
PLACE: **Boston,Massachusetts, USA**

PARTICIPAENT: LG,Hyundae Motors, Samsung,  
-Mercedes-Benz, Ford Motor, General Motors,Volkswagen  
-Panasonic, General Electric Appliances, Motorola  
-Dupont Paint, PPG, Nippon Paint, Merck,Engelhard  
-Rubbermaid, Pantone

purposes: - Monitoring General Color Trend  
- Developing Strategies Direction & Palettes  
- Building corealtion with designers from other country

## Appendix 3: History of Sony's 'First in The Market' Products

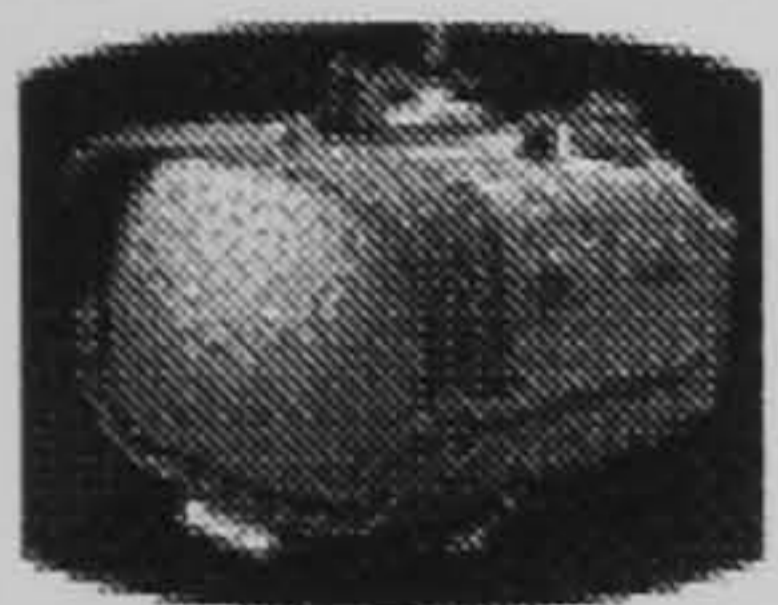
### Sony- A Company of Firsts 1950-1999



1955

1955

- Introduces the first transistor radio in Japan.



1960

1960

- Akio Morita establishes Sony's first major overseas operation on 514 Broadway in New York City with a capital investment of \$500,000.
- Sony introduces the world's first fully transistorized, portable B&W TV in Japan.
- Introduces the first transistor radio in Japan.



1962

1962

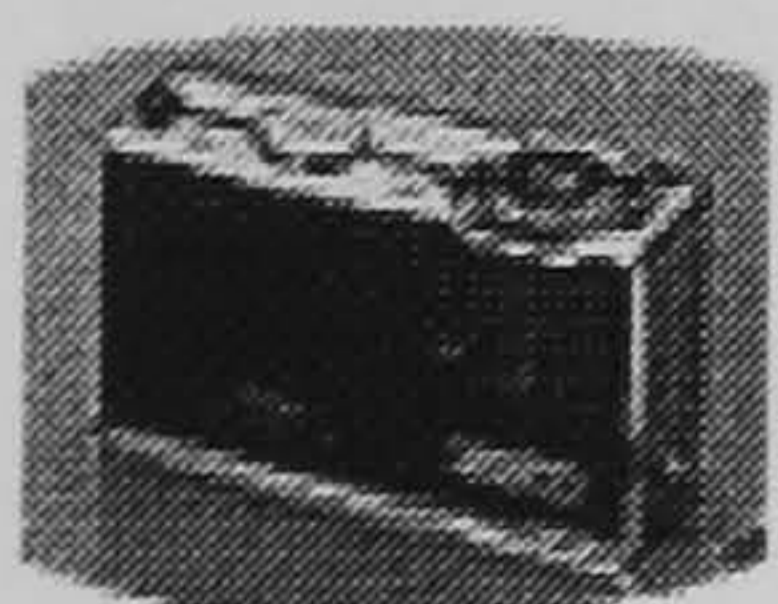
- Debuts world's smallest and lightest television, the 5-inch micro TV-5-303.
- Markets 2-inch open-reel videotape for the world's first transistor videotape recorder, the PV-100.



1965

1965

- Markets world's first home-use videotape recorder, the CV-2000.
- Introduces the world's first transistor condenser microphone, the C-38.



1968

1967

- Introduces the world's first portable VTR is introduced, the DV-2400.

1968

- Markets the world's first integrated circuit radio, model ICR-100. It weighs approximately 3 ounces and is one-half the

## Appendix 3: History of Sony's 'First in The Market' Products

size of a pack of cigarettes.

### 1975

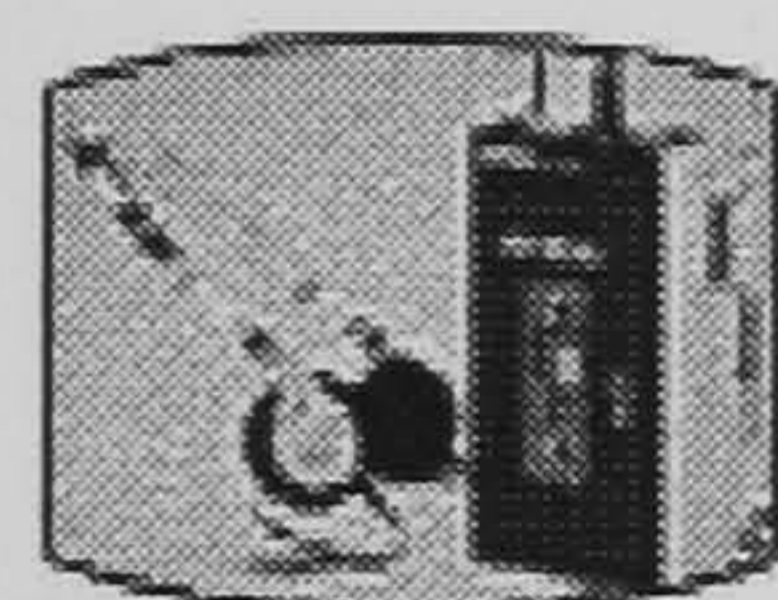
- Introduces Betamax VCR, world's first home-use videocassette recorder using 1/2-inch tape.
- Demonstrates the world's first four-channel cassette tape recorder. The BM-144 allows the user to switch back and forth on single standard cassette from four different recordings.



1978

### 1978

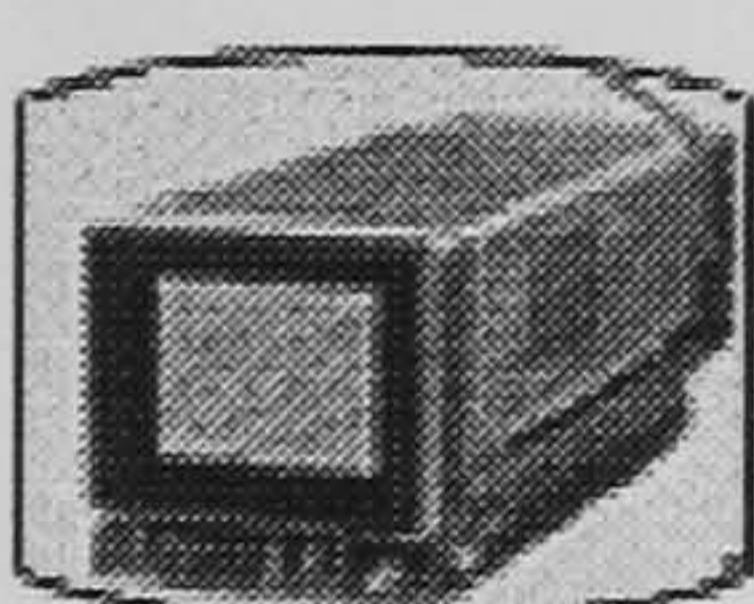
- Introduces the world's smallest tape recorder for standard cassettes, the TCM-600.
- Markets the MC-90, the world's first metal magnetic particle micro cassette enabling a maximum of three hours recording and playback.



1979

### 1979

- Introduces magnetic recording tape.
- Introduces the Walkman TPS-L2 personal stereo, changing the way the American public listens to music.



1980

### 1980

- Markets the KV-4000, the smallest Trinitron color TV in the world with a 3.7 inch diagonal picture.

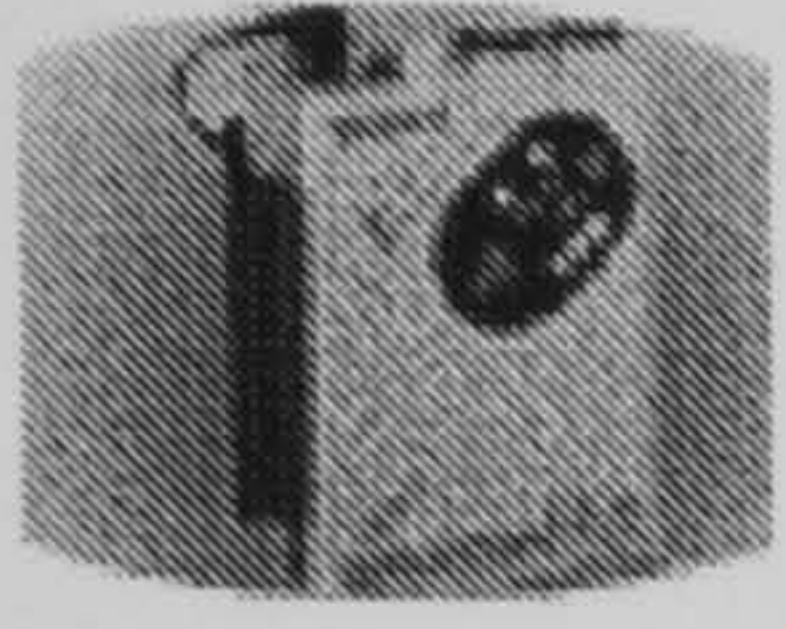


1981

### 1981

- Introduces first compact Walkman personal stereo (model WM-2).
- Sony, Philips and Polygram announce the impending introduction of a compact disc digital audio system to the world market within two years.

## Appendix 3: History of Sony's 'First in The Market' Products

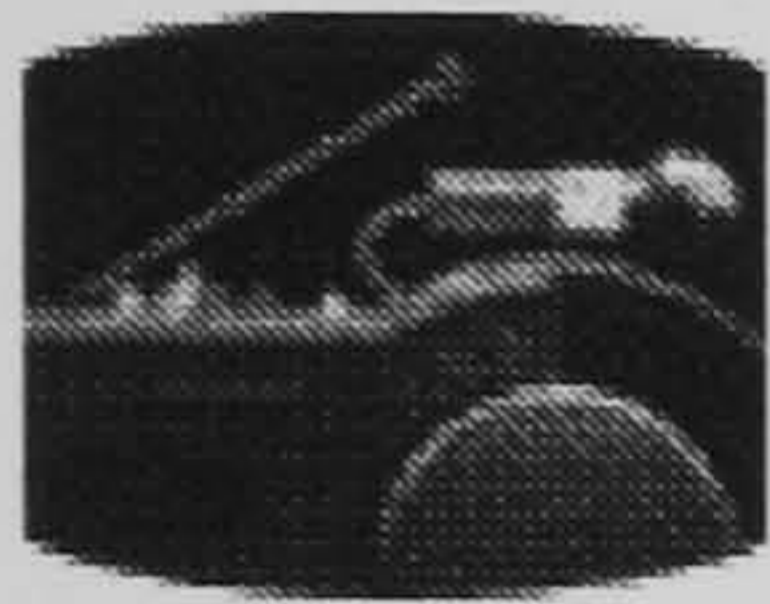


1982

- Introduces first 3.5-inch micro floppy disk drive

1982

- Introduces first recording Walkman personal stereo.
- Introduces first Walkman personal stereo with a built-in tuner.
- Unveils the Watchman personal TV, the personal pocket-sized television. The FD-210 is the world's smallest, lightest and flattest television.
- Introduces first water-resistant Sports Walkman personal stereo.



1987

1987

- Introduces My First Sony product line for children.
- Markets the D-1 Series video cassettes, the first in the world for 4:2:2 format component digital VTRs.



1991

1991

- Sony develops the MiniDisc (MD), a revolutionary, ultra compact optical disk.



1994

1994

- Introduces Magic Link Personal Communicator.
- Introduces the world's first MD changers for cars.
- Announces the world's first MD Data portable drive.
- Sony introduces its first 5.25-inch multifunction (rewritable and write-once) magneto optical jukebox.



1995

1995

- Introduces the world's first MD business recorder.



## Appendix 3: History of Sony's 'First in The Market' Products

- Introduces world's highest performing 5.25-inch magneto optical drive.
- Launches the Sony Playstation videogame system in the U.S.

### 1996

- Sony unveils its first ever Voice File™ IC Chip Recorder the ICD-50.
- Sony introduces the world's smallest digital video camcorder, the DCR-PC7, with a LCD screen.
- Sony introduces the world's lightest Discman<sup>(R)</sup> portable CD player the D-777.

### 1997

- Sony launches "Digital Dream" family of CDMA handsets including the industry's first dual band dual mode PCS/cellular phone.
- Introduces the industry's smallest and lightest phone the CM-Z100 PCS phone.
- Sony introduces floppy disk-based digital still camera the Digital Mavica<sup>(R)</sup>, the MVC-FD5 and the MVC-FD7, which allows users to store their images onto a standard 3.5-inch floppy disk.

### 1998

- Sony unveils the first DVD Discman portable disc player-the world's smallest and lightest.
- Introduces the first DV Video Walkman, which offer playback, dubbing & basic editing capabilities.
- Introduces floppy disk Digital Mavica cameras MVC-FD91 and MVC-FD 81 with XGA resolution and MPEG "movie mode."
- Sony introduces Memory Stick, and IC(integrated circuit) digital storage media.

### 1999

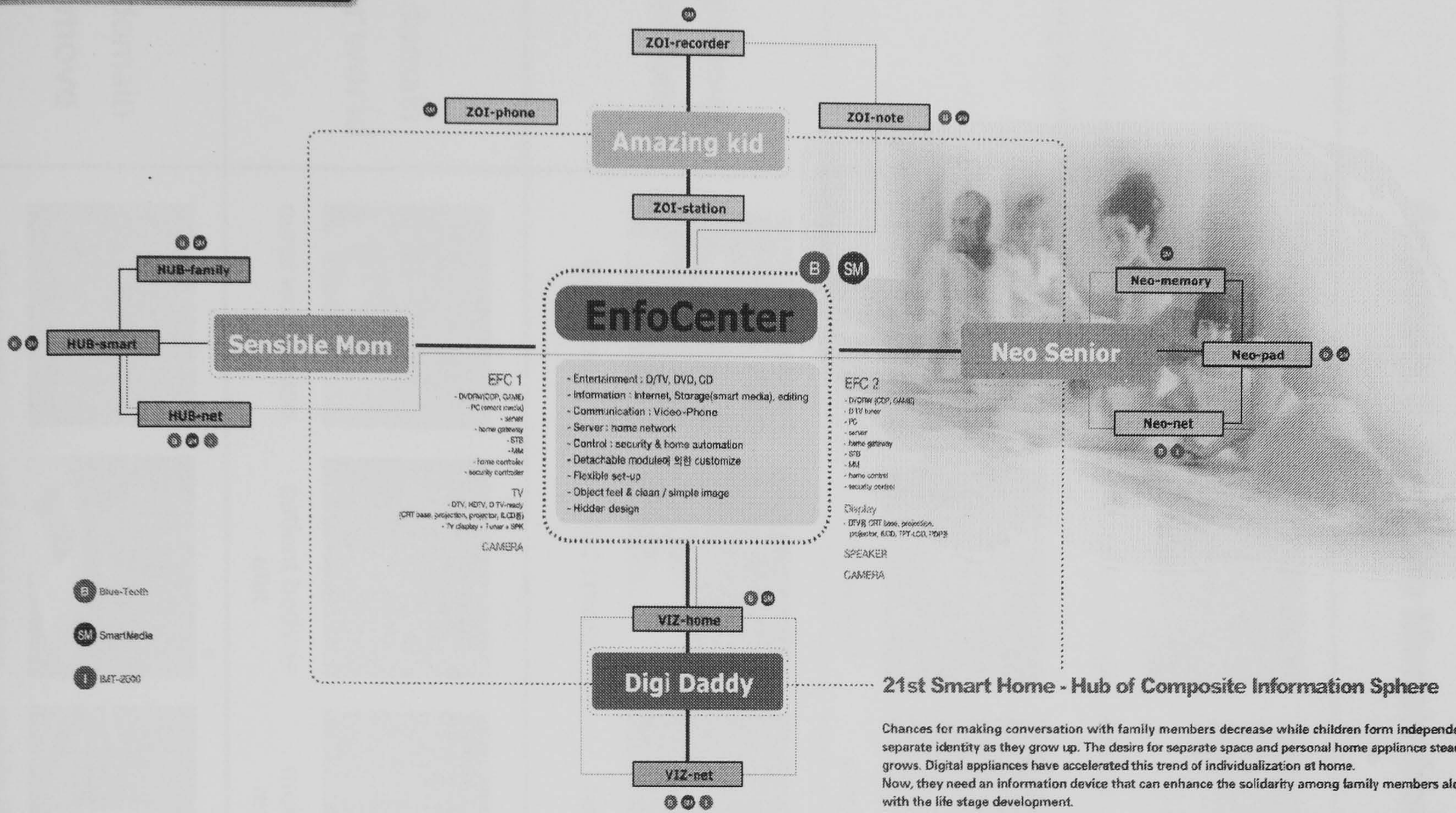
- Sony introduces the MZ-R55CG, the smallest portable MiniDisc recorder player.
- Launches i.LINK(IEEE1394) LSI

## Appendix 3: History of Sony's 'First in The Market' Products

incorporating 5C Digital Content Protection Technology.

- Launches the first entertainment robot AIBO, ERS-110.

### -Product Convergence Map-



All copyright & designed by SAMSUNG

station  
motion  
music

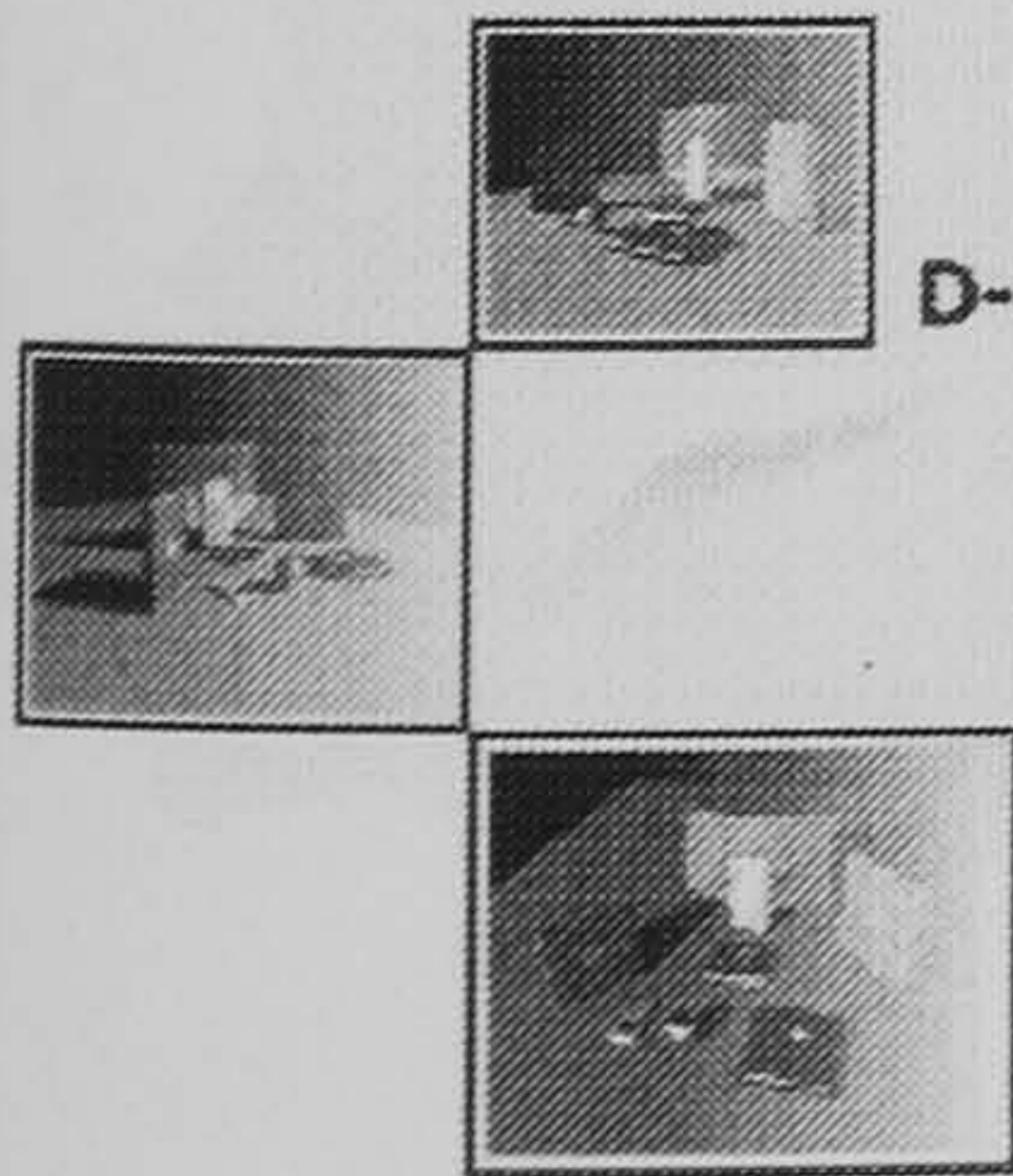
## D-COMPO

# D-COMPO

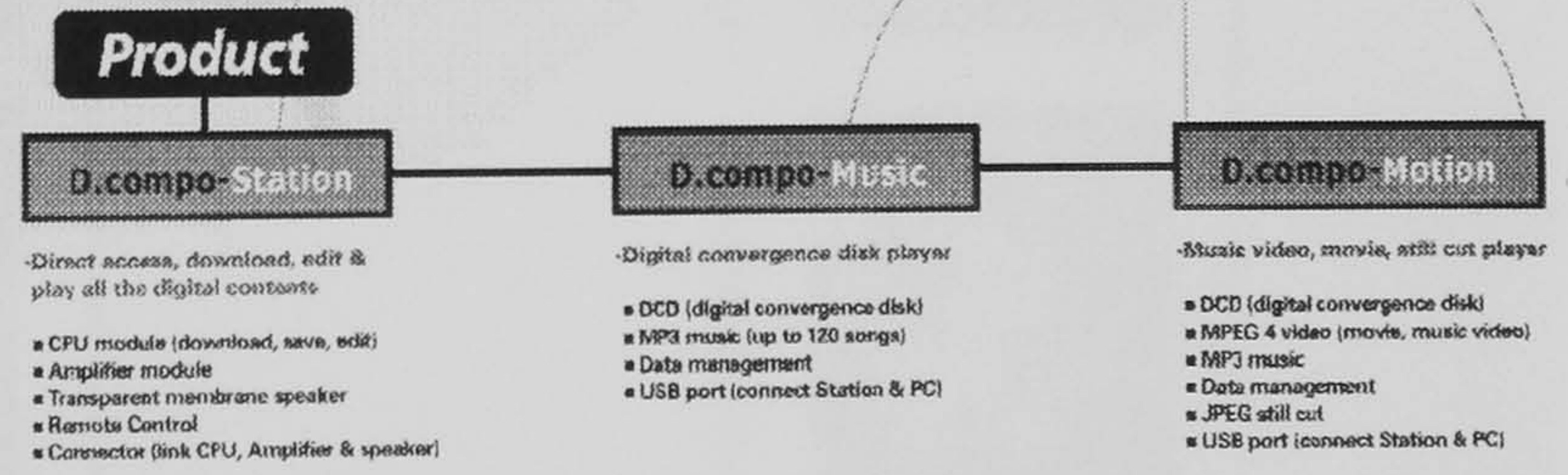
DATA

### "I want my own digital entertainment gear for my exclusive use!"

Large volumes of entertainment contents have flourished on personal computers and the Internet. They now consist of digital data more than ever before. However, the users still undergo rather complicated procedures to enjoy entertainment contents on the present computer platform. Further, it restricts the user environment, as the personal computer needs to be placed at a fixed location. Further, consumers are forced to purchase expensive computers with many ancillary functions that are not necessary for enjoying the digital entertainment only. From now on, they will prefer an inexpensive mobile multimedia gear, stripped of unnecessary functions, yet enabling entertainment contents anywhere. We would like to present a new personal entertainment device through design development of "D-compo" concept.



D-compo.com



All copyright & designed by SAMSUNG

Appendix 5: Real-life Models from Phillips' 'Vision of the Future' Project

<p>Personal domain mind and body</p>	 shiva  immersion goggle  videophone watches  ski jacket  enhanced jewellery  emotion containers  video postcard  music t-shirt  hot badges  magic pens  recharge jacket
<p>Domestic domain home and family</p>	 living room  kid's room  bathroom  home work  recharge mats  intelligent garbage can  flexible lighting
<p>Public domain the wider world</p>	 nurse workstation  patient bedside unit  multimedia rentable  multimedia dispenser  office work  new bar
<p>Mobile domain on the move</p>	 biko games  pull down screen  mobile diagnostics  work wear  cushion screen