

*Use of creative tools, technologies, processes and practices in the sectors of Art, Media, and Architecture: State-of-the-Art and desired future scenarios*

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### ***Abstract***

The aim of the paper is to analyse and present the preliminary findings of the EU FP7 funded CRe-AM project for the Art, Media, and Architecture sectors. This project bridges communities of technology providers and innovators with the creative industries, with the aim to build sector-specific dynamic roadmaps for the future of the European creative industries by examining the current state-of-the-art tools, technologies, processes and practices supporting the creative process against the future scenarios envisioned by stakeholders in these sectors.

***Keywords-Creative tools, technologies, visions, desired future scenarios***

## I. INTRODUCTION

The ICT revolution evidenced in recent years has opened up a new landscape of creative opportunities for the creative industries, driven by the emergence of tools, technologies, applications, processes, systems and interfaces with entirely new capabilities for creators and users. The emergence of powerful tools, applications and technologies (e.g., virtual 3D immersion/visualisation, 3D printing, animation, augmented reality, drones, 3D robotics, 3D projections of artworks, digital video art, virtual tours of artists' works, new tools for sharing and creating art, e-video, visual effect, 3D or 4D architecture etc.) have given rise to new forms of socially connected, interactive and collaborative creative processes as well as new ways of experiencing their outcomes [1] [2] [3] [4] [5]. The interaction of the creative sector with such technologies has led to the gradual transformation of the production and reception of the created object, but this transformation presents considerable challenges for individual creators and

for the creative industries to maintain their competitive edge.

In order to address these challenges, there is a great emphasis today on the need for new creative tools, technologies and processes to be developed, but also, and perhaps most importantly, for increased awareness of already existent technologies that might not be accessible to the creative sector communities, or for their translation into engineered artefacts that are suitable for commercial markets. However, this is not possible without engagement and face-to-face communication [6].

With the creative industries thriving and generating £57 bn per year in the UK alone, and €626 bn in Europe in 2007 [7] [8], it is of paramount importance—not only for the creative sector, but also for the economy as a whole—that the creative communities are able to influence and shape the future of technology and its applications in the creative sector according to their present needs and desired visions. Therefore, tools, technologies and best practices for forecasting and planning such future(s), most notably future visions, scenarios and roadmaps, are essential to the enhancement of creativity through technology.

In response to this need, the EU FP7-funded project CRe-AM bridges communities of technology providers and innovators with the creative industries, with the aim to build sector-specific dynamic roadmaps for the future of the European creative industries empowering them to maintain and further develop their own roadmaps in the future.

The paper presents and analyses the preliminary results and findings of the project for the Art, Media, and Architecture sectors and the methodological and theoretical approaches employed to engage stakeholders, obtain data and thus

substantiate the roadmapping effort. This is done through a brief examination of the ways in which the project has researched and illuminated the current state-of-the-art tools, technologies, processes, and practices used to support the creative process. The paper then outlines the methodological approach to stakeholder engagement and data collection, and how this directly corresponds to the aims of the CRe-AM project. Visions and desired future scenarios envisioned by stakeholders from each sector (with particular focus on individual creators, innovators and SMEs) are then outlined, from which findings are discussed, and conclusions are drawn.

## II. STATE OF THE ART TOOLS AND TECHNOLOGIES

Technologies have become commonplace and ubiquitous in the creative industries, and often contribute to the enhancement of creativity, and in so doing, contribute to the life and culture of society as a whole as well [9]. The interaction of the creative sector with technologies has led to: (a) new forms of artistic expression and entirely new genres of art (e.g. new media art, video art, internet art); (b) new understandings of creativity (e.g. in-museum and in-gallery apps); (c) new materials and tools for creative practice; (d) new business models, markets, consumer groups and distribution channels, as well as entirely new ways of selling creative products; (e) new forms of user-producer interaction; (f) new virtual communities of creators; (g) new forms of creativity itself, such as human-free and computational creativity. The profound influence that technological advancements and tools have on the creative industries is particularly pronounced in the Art, [10] [11] [12] [13] [14] [15] [16] Architecture [17] [18] [19] [20] and Media [21] [22] [23] sectors. In light of this, the CRe-AM project is targeted at investigating these sectors

further, and initiating discourse between creatives and technologists working within them.

The emerging trends and the strong/weak signals scanned, detected and captured from various resources provide a valuable opportunity to go out into the respective sectors and verify and solidify this information with professionals working in industry, and cross-analyse this with their needs, visions, dreams and desires futures with regards to the development of future technology.

## III. METHODOLOGY FOR THE COMPILATION OF VISIONS AND SCENARIOS AND STAKEHOLDER ENGAGEMENT STRATEGIES

The active involvement of stakeholders very early in the roadmap development process, that is, in scenario building can play a decisive role in the success of initiatives such as CRe-AM. Stakeholder engagement is vital to the roadmapping effort, and must be carefully considered in both the planning and adoption phases. Further, it is key that the stakeholders targeted are carefully selected to represent all the respective sectors, and also to represent the key professionals within each industry. The methodology used for the visions, scenarios and roadmapping centred on several interdisciplinary activities bringing together several experts and stakeholders. The project is therefore aimed towards the engagement of individual creators/workers and professionals, SMEs, creative groups, communities and organizations, who currently use ICT tools in their creative practice, as well as investors, venture capitalists, and policymakers in a collective dialogue with ICT researchers and developers, in a manner that provides sector-wide coverage and geographic spread.

This forms an integral part of the stakeholder engagement strategy, but is also key in data collection and the formulation of strong and weak signals. Stakeholder participation has consisted of five main approaches: (a) Future Cafés (Foresight sessions) during CRe-AM stakeholder consultation events with the participation of creators and ICT experts/technology providers, including DELPHI sessions during CRe-AM events with the participation of creative stakeholders and Creative Industry experts; (b) interviews with stakeholders; (c) Analysis of the desk literature, text mining and aforementioned technology trend reports regarding emerging trends and weak signals in new emerging technologies affecting the Creative Industries; (d) pooling of information from online resources, social media, such as Facebook and twitter; (e) CRe-AM online road mapping space and online events.

This engagement with stakeholders was then translated into the collection of data in the form of the strong and weak signals identified and outlined for each sector. To obtain valuable, informative data which enriched the findings from desk research, two methodological approaches were employed. Firstly, the future café/ foresight sessions provided information as to what technology stakeholders predicted would become available in their sectors. Secondly, the DELPHI method was used to ascertain what technologies or outcomes stakeholders hoped and wished would emerge in their sectors. The combination of these two methods allowed for cross-analysis and gap analysis between actual predicted technological advancements (extracted from desk research and future café sessions), and what individuals within the sectors vision, want and desire, contributing rich, dynamic findings to the road mapping effort. This lies at the very core of the aim of the CRe-AM project to unite creators and technologists, such that technologists are aware of what creators want and need, and

that creators are aware of what technology is available, emerging and which technological advancements are feasible. Thus, the methodology approach to stakeholder engagement was developed to provide data that directly addressed the aim of the project. It is also important, when dealing with the creative industries that the timeframe is clearly communicated, and was therefore outlined as relatively small-scale (1-2 years) and in the near distant future (3-5 years). This is particularly pertinent in the current climate, when innovation is based on using these new technologies in order to build applications fast, aiming to achieve several transient advantages (easily abandon and re-invented), rather than long-term developments of standalone products. McGrath in her article [24] argues that “In a world where a competitive advantage often evaporates in less than a year, companies can't afford to spend months at a time crafting a single long-term strategy”. Although it is obviously difficult to precisely plan the future, it is equally obvious that the future does not simply happen: a diversity of future visions and alternative desired future scenarios on the use of technologies, tools and processes can indeed influence the way future will happen. As previously illustrated, the CRe-AM project aims at bringing the communities of creators and technology providers together. As stated, the stakeholders' engagement strategy was developed with this objective in mind. The aim is to collect data, analyse and map desired futures and scenarios which clearly identify the technological innovations and tools that the creative industries desire and need to have available in the future [25].

This paper provides the initial visions and detailed scenarios based on the visions and desired future scenarios as they were discussed and sourced from the CRe-AM organised events, interviews and online feedback received at the portal. The CRe-AM community was consulted to

provide input on visions/future dreams and scenarios in the process of the collective scenarios development for each sector Art, Architecture, Media, e-publishing, design and games. We are presenting the initial visions and scenarios for Art, Architecture and Media in this paper. The participants were asked about new technologies and tools they envisage using in their creative practices in the next 1-2 years and 3-5 years and asked to describe more technologies/tools that would fulfil their expectations for the future. To achieve this, we invited a broad range of stakeholders in the creative industries. Questions were asked regarding visions, desired futures scenarios (picture of the future), reflection on the scenarios, tools, technologies and trends. A further question was asked; “If these technologies/tools were available, what do you dream of creating?” Questions were also asked about the barriers to implementing new technologies/tools, to clearly identify and assess the needs of the stakeholders and what are the Strengths, Weaknesses, Opportunities and Threats (SWOT) for the proposed solutions/possible features and collaboration issues between the technologists and creative professionals. In this paper, we discuss the visions and scenarios only.

#### IV. ART VISIONS AND DESIRED FUTURE SCENARIOS

The following is the data captured for the visions and scenarios from Art Stakeholder consultation and roadmapping workshops held in London on 19th January and 23rd February 2014.

##### A. *Art Visions*

- New Digital Technology closer to the physical world
- ICT creative environments and cloud platform for artists
- More interactive virtual technology that will take full advantage of 3D environments and which the artist will use for immersive experiences for their audiences
- Broader applications of augmented reality, art that will provide the audience the ability to smell and even taste in the form of interactive environments (Multisensory Art)
- Technology/application that allows the artist to control who can print out their work, and get the income directly when the work is downloaded/printed
- New Technologies and tools such as 3D scanning that can enhance the experience of traditional arts.

##### B. *Art Desired Future Scenarios*

- Technology to not dilute the experience but to intensify it including Virtual reality
- “Imagination machine”: Technology would bridge the gap, creating the art work faster and more realistic

- Creating dream-like imagery that can be projected in 3D. Interactive images that you can touch, etc.
- Permanent digital data storage for Artwork and easy exploration
- Interactive work, taking the best of old technologies mixing them with new interactive technologies
- Miniature arts pictures that replace for the first time the abstract QR code
- Augmented technology for sharing and co-creation of art
- Image and music scanning, creating a global database for authorship and IPR tagging
- Scanner for digital content that trawls the web looking for artists/creators'
- Virtual studios to allow collaborative work and Virtual Gallery made more physical, taken off the computer screen Interactive dancing (e.g. with clothes containing sensors with which artists can change colours and lights while performing)
- Interactive film – allowing direct audience participation
- More immersive audio-visual experiences
- “Gestural” computing.

## V. MEDIA VISIONS AND DESIRED FUTURE SCENARIOS

The CRE-AM project has organized several workshops for the media communities in order to capture their visions and future scenarios. The following is the initial media visions and scenarios input from three Stakeholder consultation and roadmapping workshops: (a) Open Playground: The future of gaming, (Liverpool 28th March 2014); (b) Trending Stories, (Liverpool, 23rd May 2014 ;) and (c) Media and e-publishing workshop (Media City Manchester 10th July 2014).

### A. *Media Visions*

- Real-time creative content production
- Live content other than text-based media
- Use media to enhance community cooperation and empathy building
- New multisensory tools that facilitate creation, development and access to media contents
- Users at the center of the editorial process
- New forms of narratives and self-presentation, tools for creating, processing, and communicating narratives and stories.

### B. *Media desired future scenarios*

- Development of perceptive media, especially in community contexts
- Use tech for compassion and empathy building
- Personalised keyboards, new ways to physically interact with hardware
- Interactive exhibition with virtual reality /oculus rift in order to offer users a full and real experience
- Writing & recording short stories that are location based – GPS, MP3, Mapping, physiological monitors
- Mobile projectors, hologram technology, ‘holographic projection using lasers’, i.e. projections for watching films- ‘pocket projector with sound system to take ‘cinema’ where it’s never been before’
- Single sign-on to allow media companies to give users one login and collect data for the production of users’ profiles
- New IPR management technologies
- 4K-8K broadcasting/streaming
- On-demand players that will allow freedom of choice of content and connects various media such as social, purchases, information/wikis and the like – a total interconnected service
- Open-source, searchable, traceable and rich archive
- Technologies for Preditors (consumers who also producers and editors of existing material) and technologies for user manipulation in live streaming
- Interactive web videos that will allow users to select the content continuation according to their needs
- Technologies that will enable co-writing and editing with multiple writers simultaneously without IPR issue.

## VI. ARCHITECTURE VISIONS AND DESIRED FUTURE SCENARIOS

The following is the data captured and analysed from the event “Factory Futures: Future visions, scenarios and needs & the role of ICT”, held in London on 12th September 2014.

### A. *Architecture Visions*

- Tools, which facilitate the generation of market research data. Projections of predictions of the availability or cost of materials
- Software tools as catalysts of social interactivity around design projects

- Integration of existing technology to develop new tools to better control the architecture workflow
- Technologies that facilitate the architect to have a more holistic view of a project. To act as a director. Perhaps the ability to control technologies remotely, or to extend the abilities of human interaction with the built environment by controlling a virtual object you control the real environment
- Technologies that will facilitate creators to know what tools are out there i.e. more transparency of the available technology
- Tracking components or elements of the build, with ID's that corresponding to a 3D space
- Technologies that democratise the information and knowledge involved in the processes of designing and building
- Technologies that facilitate dynamic modelling, so ideas can be realised before they are fully formed and the disseminated to all stakeholders involved in the process.
- Create open software tools where each architect can insert and share their creativity: creative communities (hives)
- Need for customizable software tools that align with the vision of the architect and fit the needs of the specific project
- LASER guided construction. Greater use of LASER technology on site to guide accurate construction
- Hyper accurate GPS or equivalent to facilitate the placement of objects on site
- RFID for tracking components and elements of the build
- A Holographic projection or AR realization of a building in its design phase presented at the site.
- 3D visualisation, rendering and Site based with portable 3D printers.

#### B. *Architecture Desired Future Scenarios*

- Software that can process various file formats in order to move towards universal applications and file formats (interoperability and interactivity)

#### VI. FINDINGS

From the findings of the these sector events, it seems that the Art, Media and Architecture stakeholders are all interested in the visions of the creation of real-time virtual collaborative environments, extended cloud sourcing platform, more affordable and accessible technology that will merge the physical and digital worlds and provide the artists, architects, and media creative professionals with virtual studios, as well as the use of tools to enhance community cooperation, seamless connectivity and empathy building. The cross-sectoral common visions



identified include the use of 3D virtual reality, 3D scanning, 3D printing, Augmented Reality, new forms of narrative and self-presentation, new software and hardware to enhance narration in the future technology, technology for real-time creative production, motion and gesture-controlled interfaces and writing short stories that are location based through GPS applications, and technologies that will enable co-writing and editing with multiple writers.

The identification of weak and strong signals (which were used to develop the visions and scenarios) proved to be a complicated process. In order to demonstrate this complexity we will outline one example from the Architecture sector. This example attempts to justify why BIM is a key strong signal and VR and AR may actually be weak signal. According to Sean Hicks who is Project Leader and BIM Co-ordinator at Levitt Bernstein there are not going to be dramatic changes in architecture in the next 5 years. Architecture is being transformed by Building Information Modelling (BIM) and as a result VR+AR will remain a side show because immersion doesn't help the architects cause. This is because the architect wants the client to see glimpses or sketches of the architectural vision. The architect wants the client to agree to a concept. They could have used much more realistic ways of rendering ideas in the past to provide the vision but they didn't want to go down that route because the more access to info the client has, the more the client can ask to change. It is the architects that are meant to be making the building. The architects have vested interests in the client not constantly analysing the buildings before they exist.

On the other hand, BIM is a game changer as it fundamentally changes the way people work. Architects

have not been truly collaborative up until now but when they work on the same model in the BIM environment they are forced to collaborate. There will no longer be this grey area of debating who's responsibility it was when things go wrong because they are going to be working side by side so it automatically becomes everyone's responsibility. Once they make BIM work properly it is going to become a standard like Computer-aided design (CAD), it is not going to be an option. When you can change any part of the model and produce the cost benefits analysis in real time there will be a lot less latency in decision making which the industry is absolutely ready for.

This technology fulfils a need that has been required for a very long time, communication between all the sectors involved in architecture. This technology has existed for 25 years already but now the societal pressures are far greater, efficiency is more important due to financial pressures. How quickly you can do something and how accurate your plans are dictates whether you get the contract or not. VR+AR does not have this clear business benefit but BIM certainly does.

By creating these technologies, one is inevitably pushing new ideas and shunning old ones, and thereby the danger is you disenfranchise people who have good ideas (even though they are set in their ways) and you devalue them dramatically. For instance, architects may be limited when they apply for a new job because they may not have the right software skills. But ultimately should we not be looking for the best design, rather than the best technology? Therefore, it is important to create gradual adoption of these technologies with real tangible benefits for the community otherwise we will see technology coming in that risks destabilising or losing what works already.

## VII. CONCLUSIONS

This paper presents some initial visions and scenarios produced by the CRe-AM project. After analysing the initial results, the findings of the roadmapping process will be continually revised, so as to lead to the final visions and technology recommendations for a successful implementation of the technology roadmaps for the Creative Industries of Europe. Moreover, we will address the need and importance of developing a practical framework by identifying stakeholders' requirements and by studying new emerging tools and technologies, such as: augmented reality, 3D visualisation tools, cloud sourcing platforms, technologies that can facilitate the generation of creative ideas, 3D virtual environment, 3D robotics, interactive tools, digital cameras, use of drones for reporting, wearable smart watches to present news in a quick way, digitized contact lenses, cardboard headset and phone integrated options providing virtual reality media experiences to a wider audience, apps which allow smartphone users to recreate and dub their favorite movie scenes, television dialogues or music videos with cross-platform sharing, new apps allowing users to send data and texts offline, even without a connection to the Internet, by using Bluetooth and Wi-Fi technology, virtual reality news and entertainment from a media perspective offering a 360-degree experience and innovative practices in order to make positive and significant impact on the creative output etc.

IPR, privacy, other policy and legislation issues also need to be addressed as they are still in their infancy for the creative industries.

Our future work will also include further exploration and visualization of feedback/responses from creative experts and stakeholders, and the further testing and refinement [26] of recommendations on technologies, tools and

processes that the creative community aspires to use in the future creative processes and environments.

Finally, we will develop dynamic and interactive roadmaps that will serve as "process models" based on recommendations for future creative tools, technologies, applications, processes and methods.

## ACKNOWLEDGEMENTS

This work was carried out as part of CRe-AM project, which is supported by European Commission (grant agreement n°612451). The authors would like to thank all the partners of the CRe-AM consortium for their valuable support and collaboration in the project's roadmapping activities.

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