Journal of Universal Computer Science, vol. 21, no. 11 (2015), 1379-1384
submitted: 15/12/14, accepted: 21/9/15, appeared: 1/11/15 *© J.UCS*

Enabling Technologies and Business Infrastructures for Next Generation Social Media: Big Data, Cloud Computing, Internet of Things and Virtual Reality

J.UCS Special Issue

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Abstract: The last years we faced a tremendous development of social media powered by innovative technologies related to web services, web 2.0 and social networks. Nowadays we are entering in to the next digitally enriched generation of social media and enabled by thrilling, currently under extensive development technologies, like Big Data, Cloud Computing, Virtual/Augmented Reality and Internet of Things. To our understanding the new generation of social media and the integrated business models that will support them are within a converging area where social features and ubiquitous technologies are met. Social elements, related to behavior, self-esteem, attachment and other psychological dimensions of personality will be transparently integrated to a number of technologies. Thus for the next years we have to wait for a number of new applications and systems, all targeted in a meta-existence level where the characteristics of human identity will be mixed with various digital identity elements. This basic trend and direction in the Social Media research in the next decade will boost the transparency of technologies and will stimulate an extremely different Web than the one we are exploiting together. The key dimension of the Social Media sphere will be the dependent social identification of humans by a number of technologies.

Keywords: Social Media, Internet of Things, Big Data, Virtual Reality, Immersive Technology, Mixed Reality
Categories: L.2.3, L.5.0, L.6.1

1 New technology enabled social interactions

The use of social media in higher education, business and industry has entered into a critical momentum for the innovations to come in the near future [Lytras, Mathkour, Abdalla, Al-Halabi, Yanez-Marquez & Siqueira, 15]. Like every new technology and business practice, social media face the challenges of maturity and value adding performance [Lytras, Mathkour, Abdalla, Al-Halabi, Yanez-Marquez & Ordonez, 14], [Barriocanal, Sicilia, Alonso & Lytras, 11]. To this end a number of critical developments have been realized: Extensive research on the domain, significant commercialization and amazing adoption from billions of users worldwide. A critical focus on the emerging technologies currently provide the next context for the integration of social media in every aspect of human activity [Lytras & Kurilovas, 14], [Zhuhadar, Yang, & Lytras, 13].

We are moving fast toward to the Big Data era. A number of transparent applications and ubiquitous will generate data that have never been realized before in the modern civilization. Advanced data mining and analytical processing processes will serve as the main vehicle for the provision of numerous intelligent services. In a complicated way in the near future the social interactions allowed by social media will have critical digital components that in some contexts would touch delicate issues associated to human identity, privacy and ethos.

In parallel Internet of Things technology sets one more multidimensional context for the integration of smart information technology components in next generation social media. In simple worlds a new giant techno-human space is created with the extensive use of sensors signals, receivers, and transmitters. Any device or thing that can be connected to the IoT will be connected generating unbelievable before years scenarios for business exploitation. According to Forbes "*the reality is that the IoT allows for virtually endless opportunities and connections to take place, many of which we can't even think of or fully understand the impact of today*". We live in an era of critical digital transformation and the impact is not still fully analyzed.

If we add in the previous two technological revolutions the case of Augmented/Mixed/Virtual Reality, then we have almost the full picture. A number of digitally defined contexts and virtual worlds will cause a critical reconsideration on everything that in the near past we thought it was physical or virtual. This convergence will increase the impact of Social Media in human lives and in all the aspects of human activity. From a behavioral point of view the first implication of this convergence will be a deep crisis in the perceived traditional features of human personality. From a computing point of view the first implication will be an extremely unpredicted adoption of Immersive and Wearable technologies that currently have a limited range of application especially in the Entertainment and the Health Domains.

Last but not least Cloud Computing is also a key enabler for the next generation of Social Media application and services for the near future. It is really hard to imagine a social media platform without a cloud computing components. Whether or not the concern about the security in Cloud technologies will exist, the use of cloud services will set new business opportunities for large scale implementations. In the next section we present the main directions of a visioning framework for the innovation enabled social media.

2 A conceptual framework for next generation Social Media

According to the current literature on innovative computing there is a strong belief that the next critical shift in the contribution of the computer discipline to the humanity will have a critical social component [Lytras, 10]. To this direction various technological and political enablers will set the new context for exploitation in any dimension of the human activity. Furthermore beyond this digital enrichment in the human to human social interaction we will realize also a human to machine and machine to machine enriched reality.

2.1 The Big Data and Internet of Things dimension

The strategic objective of improving the quality of services in modern human activities including business, living, learning, etc and their transformation to evolving living organizations with digital reference layers enabling unique service experiences is a key challenge of our times. In fact, Big Data Research, provide a context for a multidisciplinary discussion related to the value adding proposition of several leading edge technologies, including immersive technologies, virtual and augmented reality, wearable technologies, cloud computing, Data science, Social Networks, Web Applications and Internet Technologies.

The Big Data is a brand new paradigm, for the integration of Internet Technology in the human and machine context. For the first time in the history of the human mankind we are able to transform raw data that are massively produced by humans and machines in to knowledge and wisdom capable of supporting smart decision making, innovative services.

For the social media research, this is a new methodological and technological spectrum of advanced functionalities never experienced in the past.

A number of key issues should be investigated and a lot of bold contributions are required in theory and practice:

- Web Services Integration and web applications for Smart Cities
- Censoring, Cloud, GIS applications at micro and wide levels. The social media of the next generation should be able to operate and to analyze data at the micro level supporting communication and data flows from individuals, devices, small groups of people. And for sure a number of unexploited segments will emerge as the new hot domain for support. E.g. the convergence of Geriatrics, Bioinformatics are critical new areas of excellent potential for next generation social media applications exploiting the Big Data technologies and methods
- Data Science for Smart personalized social media services
- Big Data Research for Sustainable Innovations
- Social Media Big Data Research in Education, Poverty, Disability, Water Management, Energy, Transportation, Research, Business, Tourism, Leisure, Living, Security, Economy, and Governance

In parallel a wide spread initiative for the promotion of the Internet of Things research provides the “machine” components to the vision of a next generation web.

The capacity of any item/device in the near feature to be considered as a peer of fully operational data, and as a potential receiver and transmitter of critical information is critical for the realization of more advanced business scenarios. The Internet of Things, will cause an unforeseen explosion in the provision of targeted personalized services to humans and thus the new generation of social media will exploit this feature to its full potential. In a way the matching of services to human needs will incorporate the identification, distribution and management of many machine-generated data. Additionally a boost in smart applications and intelligent agents will be the required meta-level for the justification of these services with the extensive exploitation of semantics research.

The following is a short indicative list of challenges for social media research related to the evolution of Internet of Things research:

- Internet of Things for social Media: technologies, standards, protocol
- Social Networks integration in Internet of Things strategies
- Urban /Social applications enabled by Internet of Things technologies
- Open Media, Open Data, Linked Data
- Social Innovation, Social Well-being, Social Sharing of Services
- Security and Privacy Issues
- Business Models for Smart Media powered by IoT technology

2.2 Immersive Virtual Reality for Social Media and Cloud Computing Services

Immersive Virtual Reality is recognized in our days as one of the most promising technologies with an estimated critical impact on the way that humans will interact with systems. Huge investments on the domain of the Immersive Virtual Reality from well-established vendors and startup companies provide a large scale of constitutional tools and applications for an enriched user experience.

The social media domain is one of the first that will be challenged by the evolution of Immersive Virtual Reality. The provision of content, the design of interaction contexts, the justification of effective interaction scenarios and strategies are key requirements for the next generation Immersive Social Media powered by Virtual Reality. Furthermore more delicate insights like the facilitation of perception, presence, distance, virtual embodiment, and cognition in Immersive Virtual Reality systems for social interactions set several research questions and demand a multidisciplinary approach.

A number of organizations and businesses foresee in the use of Immersive Virtual Reality for the enhancement of their innovation capabilities aiming to release the creativity and the brain capacity of their personnel.

The move toward Immersive Smart Media Applications/Platforms will require sophisticated approaches for enhanced interaction contexts with enriched digital media elements. New media strategies will also be required for the adoption of technologies in the daily social process beyond limitations and barriers of the traditional communication paradigm. Issues related to presence, distance, inclusion, exclusion, will be analyzed and supported with novel approaches. All of them will be a combination of new, advanced, social interaction designs, business models and

adoptive strategies that can expand the sustainability frontiers in advanced applied social media research towards Smart Media and knowledge society vision.

- Immersive Virtual Reality / Augmented Reality / Mixed Reality (VR/AR/MR) Applications for Social Media
- Case Studies of Exploratory and Personalized Social Interactions using Immersive Virtual Reality Applications
- Context Awareness in Immersive Virtual Reality learning systems
- Novel Media Strategies for Immersive Virtual Reality Systems
- Multi-user and distributed Immersive Virtual Reality Media Systems
- 3D interaction for VR/AR/MR Media Systems
- Locomotion and navigation in Immersive Virtual Reality Media environments
- User studies and evaluation of Immersive Virtual Reality Social Media
- Perception, presence, distance, virtual embodiment, and cognition in Immersive Virtual Reality social media systems
- Grabbing and manipulation of remote objects in Immersive Virtual Reality social media systems
- Multimodal Interaction Techniques in Immersive Virtual Reality for social media systems
- Rehabilitative Applications with Immersive Virtual Reality social media systems
- Immersive Virtual reality in behavioral neuroscience and beyond
- Advanced Social Media Labs powered by Immersive Virtual Reality
- Content Creation and Annotation for Immersive Virtual Reality social media systems

3 Conclusions

The contribution of this special issue is unique. It sets new direction for future research and provides a full discussion of critical thinking and comparative studies on the phenomena under analysis. We are at the disposal of the readers for further analysis and collaborations in the domain. Currently we are preparing two proposals for next generation s for learning under the HORIZON 2020 program.

Acknowledgements

We would like to thank all the contributors of the special issue for their excellent collaboration and valuable scientific contributions. The quality of their research and their passion for making science valuable to the Society is reflected in every article of this work. We are also grateful to Christian Gütl, the managing editor of the Journal of Universal Computer Science and the editorial team without whose support this achievement could not have been possible.

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