

SECOND USAGE AREA WORKSHOP

Position Paper on Content Usage Area

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This contribution aims at providing some input towards addressing the five open questions to be discussed during the workshop adopting a content perspective.

Q1) *What use case and scenario in your area would you consider the most appropriate and representative one for large-scale experimentation with the Future Internet platform to be built starting from 2013*

A1) One key requirement Future Internet is called upon to meet is magnified by content services and applications. Content due to its nature requires large volumes of resources, computational and communication, as well as it imposes strict QoS criteria. On the other hand, content is quite attractive which equally attracts large volumes of users that not only do they consume multiples of these resources but they also increasingly contribute their own content (prosumers) moving away from traditional centralized content distribution models to more distributed. Accordingly, a use case or scenario to be considered as part of the content usage area must explicitly and foremost address **multiple manifestations of scalability**. We view two application areas rich in features as appropriate to inspire suitable scenarios: Social Networks and Network Gaming or a combination thereof (e.g. facebook games). Social networks provide that appropriate context to exchange, disseminate and distribute content with real users while network games may stretch the network to its limits. We firmly believe that scenarios that do not capture the intrinsic and dynamics of these areas are going to underestimate the capabilities and functionality of Future Internet.

Q2) *What innovative Internet functionality and technologies would you consider important for your suggested use case and scenario (e.g. context awareness, sensor networks, advanced real time processing capabilities handling huge volume of data, ad hoc service composition and mash-up, managed broadband connectivity and services, embedded media support for interfaces easing the interpretation of processed contextual data, etc.)?*

A2) There has been real progress of innovative internet functionality that is promising to support the aforementioned types of scenarios. As scalability is closely related with distributed operations, we deem that recent advances in overlay technologies, like P2P, will and should play an important role in content distribution by applying an autonomic resource management and optimization that involves users and all kinds of providers. Furthermore, cloud computing and its extension to cloud networking (IaaS, PaaS etc) will ensure availability and access to ubiquitous resources thus providing uninterrupted and timely content services and user interactions.

Q3) *Which of the identified functionalities would you expect the Future Internet core technology platform to deliver to support your and other usage area scenarios?*

A3) Dynamic overlay provisioning customized for specific types of applications and services should be one of the core technologies available in the Future Internet technology platform. These overlays must be able to satisfy specific resource and QoS requirements that not only do they vary from application to application but

they could be conflicting in nature among each other. This is only possible through a new breed of APIs that facilitate the deployment of highly distributed overlays across heterogeneous networks to cater for changing user needs (mobility, device diversification etc). In order to increase efficiency and performance, there is also a need for open network APIs that allow a) optimal use of the underlying network resources, b) regulate contention among the different overlays and c) allow exchanging of monitoring data between the networks and the overlays.

Finally, extending the concept of dynamic overlay provisioning, there is a need for new mechanisms offered through APIs and services that allow the provisioning and deployment on demand of the underlying network technologies that are going to host the overlays and their corresponding functionality (protocols, algorithms etc). This latter capability is known as IaaS and is currently under extensive research investigation e.g. FIRE, GENI etc.

Q4) *What kind of experimentation environment would you consider necessary for broad large scale testing of the platform to be developed in your use area? What would be needed to experiment new services and applications cutting across use areas (services and application mash-up) and building a new services and application ecosystem around the prototype implementations of the platform?*

A4) An experimentation environment that does not capture and offer features and conditions encountered in a real environment is not sufficient to foster innovation. Two are the necessary and sufficient conditions for creating such a realistic environment: a) providing wide and open access to the necessary technologies, systems and networks relevant to the usage area, b) enhancing these environments with rich monitoring mechanisms and scalable algorithms thereof, which allow detailed observations and data collections at runtime. In the context of content usage area, there is a need for deploying and experimenting with a configurable and extensible content network that comprises the whole value chain of systems and technologies of a media production network. In order to achieve configurability and extensibility, the provisioning APIs mentioned in answer 3 will play a key role in the core platform mechanisms.

Q5) *How do you see the potential role of your organisation in the FI-PPP, in the context of Usage areas taking a prominent role in the Initiative, to ensure an appropriate application driven approach?*

A5) University of Patras, in particular the Electrical and Computer Engineering Department, has a long established record in research and development that address the issues highlighted in this position paper. More specifically, we have devised and implemented innovative locality aware overlay algorithms that allow the dynamic and optimal deployment of self-organised overlays. We have also started experimentation with actual peer-to-peer client for live streaming and video on demand developed exclusively by our team that involves real users of the university campus. This know-how and its “products” along with the user’s environment can be readily available in any content-based scenario and provide one of the ingredients of the Future Content Internet.

Regarding infrastructure provisioning mechanisms we have also co-designed and co-developed a framework with the appropriate tools that allows the dynamic provisioning of technologies and services according to user/experimenter’s requirements. This has been possible through the use of Domain Specific Languages, Model-to-Model translation mechanisms and a resource specification language that hides heterogeneity of the underlying infrastructure components. The latter enables programmability across different platforms and technologies. More details can be provided upon request.