

Sharing Enriched Interactive TV Experiences with the iNEM4U Software Framework

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ABSTRACT

The project iNEM4U (Interactive Networked Experiences in Multimedia for You) is developing an open distributed software framework that allows users and service providers to seamlessly combine interactive multimedia content and services from different types of networks (the Internet, in-home, mobile, and IPTV networks) into one shared experience. In this paper, we provide a brief overview of the project and discuss the TV-centric application we are using to enhance people's social media experiences, in particular to increase the feeling of connectedness for groups of people, such as families and friends.

Categories and Subject Descriptors

C.2.4 [Computer-Communication Networks]: Distributed Systems – *distributed applications*.

General Terms

Design

Keywords

Enriched social multimedia experiences, interactive TV, cross-technology software framework

1. INTRODUCTION

Today's consumers are typically at the center of different types of network infrastructures, such as TV networks, the Internet, and in-home and mobile networks. Each of these networks has its own unique characteristics in terms of supported content types, services, interactivity levels, and evolution speeds. For example, IPTV networks usually provide high quality professional content with remote control-based interactivity, whereas the Internet typically offers services that provide low quality user-generated content with high levels of interactivity. Another example is that IP-based networks such as the Internet and IPTV networks are much more versatile, in particular supporting bi-directional communication, than traditional networks such as terrestrial and satellite networks and also evolve much more quickly.

In iNEM4U we believe that we can facilitate a new generation of social media experiences by enabling users and service providers to combine services, content sources, and devices from *different* networks into one "sharing session", thus

mixing and exploiting the unique characteristics of the individual networks. The problem, however, is that it is currently not possible for users and service providers to accomplish this in an easy way. For example, it is impossible for an average user to set up the facilities to get a live feed with high quality content from a rock concert on his TV set (IPTV network), have his buddies on the Internet get the same content in a synchronized way, enable the whole group to get live picture-in-picture overlays showing photos that other friends who are actually at the concert took with their cell phones (mobile network), and after the concert buy a HD-quality video of the concert on the Web using their mobile account. This also hinders the materialization of new business models and service concepts that span multiple network infrastructures, for instance because providers cannot efficiently make their services available across different types of networks.

The goal of iNEM4U is to overcome these problems by means of a software infrastructure that allows both users and providers to seamlessly combine multimedia content, value-added services, and devices from different networks into one interactive multi-user "session". In iNEM4U, we refer to these networks as "technology domains", as the root cause of the problem outlined above is that each network uses its own set technologies, for instance in terms of application-level protocols, user identities, group descriptions, and metadata formats.

2. SCENARIO

Figure 1 shows the scenario the iNEM4U project is using as its key use case [1]. The scenario revolves around a socially augmented event (a concert to be specific) in which four participants, two who are in the concert audience (Harry and Pauline) and two who are watching the event on TVs remotely

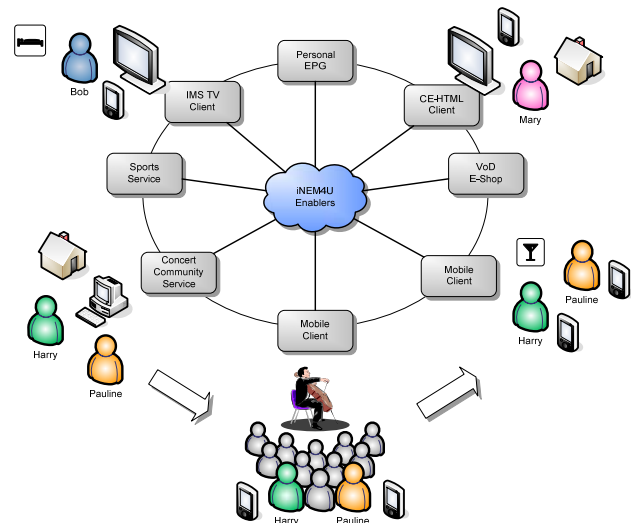


Figure 1. iNEM4U scenario.

(Bob and Mary), enrich the group's experience through social interaction and media sharing. Figure 1 shows the applications involved and the iNEM4U platform in the cloud in the middle.

The scenario begins with the creation of a dynamic community (known as an ad-hoc group). Through the mining of buddy lists and context the iNEM4U platform enables an ad-hoc group, that exists for the duration of the concert, to be created based on friends who are attending the concert, either physically (Harry and Pauline) or remotely, watching a live broadcast (Bob and Mary).

As the four friends join the ad-hoc group through their various devices an iNEM4U sharing session is created through which media and interactions can be shared, synchronized, adapted, recorded and played back. As the concert progresses Harry and Pauline use their mobile phones to take pictures and videos and add these to the iNEM4U session. Harry and Pauline's content is rendered as picture-in-picture overlays for Bob and Mary on their TVs giving them a view of the concert from the audiences point of view.

During the break Bob browses the video archive catalogue for the artist using an interactive TV application and adds some interesting VoD content to the session. Mary, who is at home, has left the room briefly so the content does not begin to play on her TV until she returns.

Following the concert, and with the consent of the four friends, the session information is analysed and a special group offer of access to VoD content from other artists they may like is made to them as part of the iNEM4U session. If all four choose to take it then they will be given a significant discount.

3. APPROACH

Figure 2 shows the approach that iNEM4U takes to realize scenarios such as the one outlined in Section 2. Our technical work focuses on R&D on the iNEM4U software framework, which allows social applications to easily combine the unique content sources and services from different technology domains (home, broadcast, mobile, Web) into one cross-domain iNEM4U session, for instance to enrich social interactive TV applications. The novelty of the iNEM4U framework is that it consists of a set

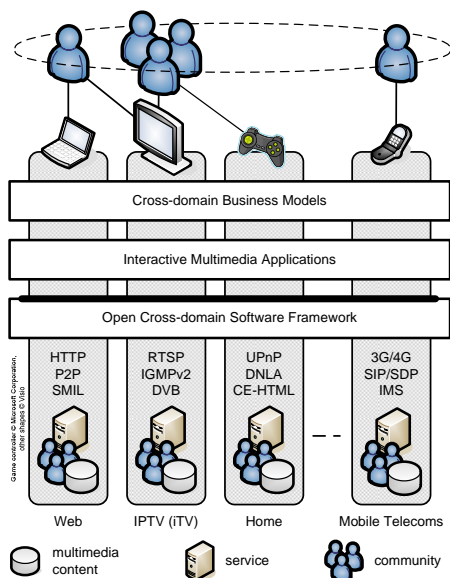


Figure 2. iNEM4U approach.

of service enablers that provide *rich* functionalities and APIs for applications to manage iNEM4U sharing sessions. Examples are enablers for cross-domain identity management, cross-domain synchronization of content at different locations, and cross-domain community representations. The iNEM4U platform is also open, which, combined with its rich enabling services, sets it apart from prior work in this area, such as [2] and [3].

The project also investigates novel business models enabled by the iNEM4U infrastructure, which are discussed in [4].

4. DISCUSSION

The iNEM4U framework delivers a rich set of enablers which through a variety of techniques, including context and metadata derived communities, multimedia shared interactive sessions, synchronized media consumption, and co-browsing allows service providers to create and deliver timely and socially-enriched multimedia experiences involving a mix of devices, user-generated content, professional content, and value-added services. We expect that this will facilitate much richer shared experiences than possible today, for instance for social TV applications, thus enabling geographically dispersed groups of people such as families and friends to maintain a stronger feeling of togetherness.

However, togetherness is not simply fostered through rich multimedia experiences; it also relies considerably on being able to deliver the right thing in the moment. The iNEM4U platform is ideally suited for this purpose as its cross-domain enablers allow shared interactive multimedia experiences, of the type discussed in Section 2, to be delivered to communities no matter where the individuals are and how they are connected. Based on our current prototype, we believe that by bringing people together through a synchronised multimedia sessions across mobile (3G handset) and fixed (TV) devices we can deliver an overall experience which is more rewarding for all participants than watching the content alone and can even improve the subjective perception of the content, with encoding and even content quality issues becoming less distracting when watched with friends.

We will test this hypothesis and evaluate the impact of cross-domain sharing sessions on people's feeling of connectedness using more objective studies carried out in a representative lab environment at the end of the project.

5. ACKNOWLEDGMENTS

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