3.1 Publishable summary

COMPEIT creates a web-based system for highly interactive, personalised, shared media experiences. Research and development will link content-delivery networks with tools for enhancing mediated presence. COMPEIT takes the view that Internet-based distribution will transform traditional broadcasting towards higher levels of interactivity and integration with virtual, mixed and augmented reality, enabled by advanced web technologies and the proliferation of audio/video/tangible devices. The project addresses:

Quality of Experience in flexible, interactive media production and consumption systems designed for professional collaboration and shared leisure activities. It introduces the next step in interactive broadcasting systems by focusing technologies that enrich social connections, improve the feeling of being together in one shared space and enhance collaboration. Modular software will be developed based on low-cost, easily accessible web technologies (e.g HTML5, WebRTC, WebGL), leveraging on cloud based software access and distribution. COMPEIT thus applies WebRTC/HTML5 standards to create innovative connected media components, without extending WebRTC/HTML5 itself. Two key domains are identified for improving quality of experience:

1) Spatial Connectedness
2) Social Connectedness

These areas validates three key web services: a) Shared Experience with Tangible Interaction (SETI) enables audiences to experience enhanced live media together, complemented by tangible and interactive games b) A Broadcast Presence Studio (BPS) to mix live media with various types of web-based content c) Mixed-Reality Interaction (MRI), an advanced WebRTC-based service where content generated by BPS service can be mixed into the viewer's physical environment using ambient devices.

The seamless integration of virtual and real spaces and social interactions is facilitated by COMPEIT, as well as the integration of various smart objects - that one can make use of in both real and virtual spaces. ‘Fluency’ is now our concept to describe how easily one can move into and between these spaces and interact with others with different levels of social connectedness, and how easily features and smart objects are controlled - meaning these are quite important functionalities that we want to see integrated to our upcoming second system prototype.

Main Results

As a result of an expert review in preparation for piloting and evaluations (WP6-7) in February 2015 showed there was not yet a stable fully integrated COMPEIT system that could be evaluated with users. It was decided during the consortium meeting in Tel Aviv that individual components would be evaluated as a result.

COMPEIT’s second year, the user-driven Iterative Phase, has thus been dedicated to piloting different functionalities of the envisaged system, following a narrowed scope and stronger focus.
Among the new results, SharedSpaces showed strongest potential and generated interest from users in as varied contexts as work environments, distributed family socializing, child play, consumer-generated media broadcast and active ageing. SharedSpaces is a web-based tool that brings people together: although you are in different locations, you appear side by side in front of a chosen backdrop, and you can draw together in a virtual space (which can be a 2D image, a 3D environment, or a live video/data stream of choice).

Figure 1. The SharedSpaces design prototype. Top left: An interior with green screen and participant. The other screenshots show how several participants in different locations appear side by side in SharedSpaces, see for example YouTube clip: https://www.youtube.com/watch?v=PXBMeomA224&feature=em-upload_owner

SharedSpaces is an example of innovative WebRTC services increasingly available, inviting users to seamlessly move between real and virtual spaces using a range of previously separated media channels. It adds a spatial quality of experience by representing the users side by side in a shared virtual space. It offers a fun, novel and aesthetically appealing approach by engaging users in multiple locations to manipulate their real-time video-streams, thereby co-creating a shared space, using spatial features to fit their contextual needs. It supports social dynamics by allowing users to draw and paint together and to move and resize video streams. Further, it enhances grounding and social cues by merging video-streams and space, representing users as if they were in the same space. Standard and easily available equipment is used. Our recent user studies show that a seamless integration of space, social dynamics and shared activity benefits the experience of presence, naturalness, immersion/engagement and social connectedness. Our ongoing design research specifically addresses the fusion of spatial connectedness (a term describing how well users perceive that real space is integrated with virtual space) and social connectedness (how well users perceive social dynamics/cues and their relationship with others in mediated space during interaction). We use the term ‘fluency’ to describe how easily one can move into and between virtual and real spaces with suitable levels of social connectedness and dynamics, and how easily
features and smart objects can be controlled - meaning these are quite important functionalities that we want to see integrated to our upcoming system prototype.

Figure 2. Snapshots from piloting of SharedSpaces in Year 2: Future Talent Experience, Groningen and work environment at Ericsson, Stockholm.

COMPEIT’s proposed New Work Plan with Narrow Scope for 2016

Based on the above, we have concluded that SharedSpaces will now be the main framework for COMPEIT, a platform to which all other functionalities and service components are integrated. FIGURE 3 shows how COMPEIT has developed, from exploring a broad range of functionalities in Year 1 – some of which were tested through piloting and evaluated by user research in Year 2 – to a more narrow scope in Year 3 where one use case, that of distributed families, is foreseen as our second pilot. We strongly believe that SharedSpaces is the most suitable interface through which we are able to study their needs in terms of social and spatial connectedness and fluency.

Figure 3 also shows that two of the three foreseen services in COMPEIT’s WP5, namely MRI and SETI, will be directly integrated as functionalities in the main framework, whereas BPS (currently named BeFirst), is integrated through provision of external (mobile) live or recorded media streams into SharedSpaces. Hereby, a more narrow scope has been formulated for the COMPEIT system,
which also represents a more realistic work plan for Period 3, to which we now refer to as COMPEIT’s New Work Plan with Narrow Scope for 2016.

**Figure 3.** In parallel to the above focus on one use case (Distributed Families), other target audiences will be pursued through commercial development paths (as presented in D8.2 Market Analysis).

SharedSpaces was first presented in D4.4 Immersive Spaces that we finalized in February 2015 and is closely linked to other technical development that has progressed in WP4 and WP5 during 2015 and that is summarized in the chapters of this report.

The view of the Project Management Team of COMPEIT is that, for the remaining period, a small team of designers and developers will work tightly across the nodes, to deliver a functioning system prototype that will be validated through the use case of Distributed Families interacting with the system. For this, we propose to form two dedicated work groups, hereby slightly revising the previous project organisation of COMPEIT for its final output: Team 1 will be constituted by named researchers from WP3, 4, and 5 whose task it is to further refine components to an integrated system prototype (Second Prototype), with a well-designed interface that demands close collaboration with Team 2, consisting of named researchers from WP2, 6, and 7, whose task it will be to validate the system and carry out concluding evaluations by the end of Period 3. It is our firm belief that from this work plan, and guided by clear goals, deadlines and adequate project coordination, COMPEIT will deliver final results of good quality and to which all remaining partners are strongly committed.
Work Team 1 (from WP3,4,5): Joakim Norrgård (suggested Team Leader), Pekka Siltanen, Seppo Valli (VTT), Omar Niamut and Joke Kort (TNO), Jimmy Nyström (LTU), Alex Jonsson, Leif Handberg, Charlie Gullström (KTH), Noam Amram (LiveU), Stefan Håkansson (ERI).

Work Team 2 (from WP2,6,7): Joke Kort (suggested Team Leader) and Sylvia van der Pal, Omar Niamut (TNO), Charlie Gullström and Leif Handberg (KTH), Noam Amram, (LiveU).

Dissemination (WP8) will remain a shared commitment for the consortium as a whole. All partners will be represented in continued work, guided by two business developers (Donnie Lygonis KTH, Oscar Rietkerk TNO).

Project Management (WP1) will be constituted by PC Michael Nilsson seconded by Anders Lundkvist (LTU).

In line with the recommendation given at the first review, The New Work Plan provides a strong focus and adds three months to the original time plan and is aligned with the pending amendment. Team 1 and Team 2 will work closely together in Q1 2016, and Team 1 will deliver the D3.7 Second Prototype according to time plan, 31 March. This is followed directly by piloting for the specific use case of Distributed Families, resulting in a Final Evaluation Report delivered on target by Team 2 by 31 October 2016.

COMPEIT’s BPS BeFirst service for Citizen Journalism in Contemporary News Gathering

Mentioned above, the PBS service BeFirst was launched for customer trials in Period 2 (Figure 4). With the worldwide proliferation of smartphones and robust cellular infrastructure over recent years, User Generated Content (UGC) has undoubtedly become one of the major vectors for discovery and acquisition of breaking news. This explains why today’s broadcasters and media outlets are on the lookout for the best method to incorporate this potentially valuable source of content into their existing networks and workflow.

![Figure 4. BeFirst - Leveraging technology for Citizen Journalism](image-url)
Taking mobile journalism to a whole new level, BPS BeFirst allows an interactive service between broadcasters and consumers:

- Broadcasters would create a new meet up place /shared room where users can join, communicate directly with the TV reporters and aid in the news gathering work.
- Users will be able to send videos from anywhere they are chat and see other user’s videos and images.
- The service is a result of excellent and direct collaboration between COMPEIT and NUBOMEDIA FP7 projects leveraging both projects and partners technologies.

Building on BeFirst’s technology, NewZulu have given their users the ability to proactively upload or stream live video at any time, as seen in Figure 5.

![Figure 5. NewZulu](image)

*Figure 5. NewZulu – One of the more interesting examples of BeFirst integration is in the new service offered by LiveU’s partner NewZulu. From their website: “Newzulu.com lets you share and break news around the world as it happens. Newzulu.com is the way for you to get paid for breaking the news. Upload your news through the Web, through our Apps, by email to news@newzulu.com, or when you hashtag #newzulu through your social networks – you can get published and get paid.”*

Outside of COMPEIT, TNO is working on similar technological developments as addressed above for example NU.nl (the largest online newsbroadcaster in the Netherlands). Technical efforts provided by TNO (Omar Niamut) in the Future Work Plan focus in part on the further integration and additional development of BeFirst in SharedSpaces in close cooperation with LiveU.

**Expected Impact**

Our ambition is to enable users to create a seamless mediated space for social interaction and shared activity by integrating live and/or stored media streams combined with software applications (e.g. physical sensors and actuators) that can provide live feedback and empower users to actively control features in local (as well as remote) and virtual spaces.
We have identified three main developments in technology creating the challenges we face in COMPEIT:

Firstly the introduction and market penetration of low cost microcontrollers, sensors and actuators (e.g. Arduino, radio beacons, now embedded in different products, on ourselves, in our clothing (wearables) in and outside our houses, in our cars, etc.

Secondly, standardization work in network technologies and emerging industry standards (often open standards) and information exchange protocols supporting the communication of different kinds of data ranging from sensor data to real time video streams between devices, applications and services embedded in environments.

WebRTC/HTML and other new networking protocols further support easy media stream exchange and combinations of data with software applications enabling users to control features in local (as well as remote) and virtual spaces. In short, web-based service development becomes more contextual and adaptive.

Thirdly, the emergence of networked systems, applications and services support data exchange, manipulation and visualisation in real time through new visualization and interaction means. Progressions in the areas above express the boundaries between the physical and virtual world are dissolving.

The goal with COMPEIT is, through open development methods, to empower users to actively control and interact with and in the environment in a contextually relevant manner, allowing them to share a combination of on-site and remote uses and experiences of virtual and physical artefacts, spaces and others. This calls for designers and developers to work closely in order to design physical equivalents of virtual artefacts (and virtual of the physical), merging the physical and the virtual even further. The new ways to interact with information, objects, people and our surroundings thus provides new challenges for interdisciplinary research, new conceptual tools and methodologies to adequately design and represent content in ways that are meaningful and contribute quality of experience to users in various contexts. Where new business initiatives are seen we will continuously seek support from EIT Digital to mature and to commercialise since many of us are also EIT Digital partners.

The above summarises COMPEIT’s ambition for our third and final year.

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