Third BRIDGET Workshop

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Tables

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1   Executive summary

This document reports the results of the 3rd BRIDGET workshop, the conclusive step of the project. The main results of the workshop contradict the current tendency to describe 2nd screen applications as too costly for the service provider and not sufficiently rewarding for the end user. Indeed the idea of exploiting the web of links that exist among the individual semantic elements of the millions of content items owned by content or service providers is as attractive as ever and the Authoring Tool is what makes the exploitation possible.

The notion of the links – that the project calls "bridgets" – and of the web of links – that the project calls "Multimedia Hyperlinking Environment" (MLE) – the first instance of which is 2nd screen applications, is attracting attention and interest is being collected for an industry forum called Bridget Alliance.

2   Introduction

The 3rd BRIDGET workshop reported in this document is the end point of a process sketched in its main aspects in the BRIDGET project proposal and implemented through the following milestones:

1. Presentation of project work plan to industry representatives at the 1st workshop (M2)
2. Development of use scenarios (M3)
3. Development of Requirements and Functionalities (M5)
4. Revision of developments at the 1st project review (M15)
5. 1st round of user trials (M21)
6. Presentation of BRIDGET solution phase A at the 2nd workshop (M22)
7. Identification of new phase B use cases (M25)
8. Revision of developments at the 2nd project review (M28)
9. 2nd round of user trials (M33)
10. Presentation of BRIDGET solution phase B at the 3rd workshop (M36)

The 3rd BRIDGET workshop was implemented in the context of conditions that had substantially changed from the time the project was conceived, submitted and approved. Over the years, broadcasters have carried out trials of second screen services, but the results have been mixed. Still the notion of exploiting the web of links that exist among the individual semantic elements of the millions of content items owned by content or service providers is as attractive as ever.

The W3C Media Fragment specification, the ISO Media Linking Application Format (MLAF) standard and related technologies already provide the technological basis for various forms of exploitation. MPEG in particular is building additional standard infrastructure with its emerging Media Orchestration (MORE) standard that can be used to signal availability of and alignment to ancillary secondary timed content that enhances the consumption of primary content.

12 people attended the 1st BRIDGET workshop and have provided feedback that has been used to produce the use cases and requirements on which project phase A was developed. The results achieved in the first 18 months of the project (Version A) were presented and discussed at the 2nd workshop. This was implemented in a "distributed" form because, by sampling a number of potential attendees, it was understood that attendance would not be sufficient enough to allow reliable and useful conclusions. Indeed the ~40 people who were individually interviewed by project partners in the distributed workshop were from a much wider variety of countries and industries than would have been possible with a traditional workshop where all people come to the same place at the same time. Again the feedback received was used to identify use cases and refine the requirements.

The situation at the 3rd workshop was even more challenging than at the 2nd workshop. However, bearing in mind the reviewers' recommendation to revert to a traditional workshop, the project held a full-scale workshop co-located with another major activity (the MPEG meeting in Chengdu, China). This was attended by experts in the field which were not just from research but also from planning and product development for a variety of companies and institutions.

The workshop was held with an original format that involved a presentation, a demonstration of the Authoring Tool, an online questionnaire and a general discussion whose themes were triggered by an analysis of the questionnaire results.

Workshop participants expressed an interest in a new industry forum called Bridget Alliance (BriAll). The first target of the forum is to consolidate industry interest in 2nd screen applications by providing a place where the services and the elements required to deploy attractive 2nd screen applications are discussed, experiences contributed and discussed, and best practices are identified and documented. However, BriAll has the ambition to address other MLE instances as well, such as 3D Reconstruction, similarity-based Image and Video Retrieval, Post Production, Augmented Reality, Virtual Reality and Media Orchestration.

As a complement to the workshop one mini-workshop was held in Milan attended by Italian BRIDGET partners and other Italian business representatives . The project results (Version B) were presented, the questionnaire was filled and the responses to the questionnaire discussed.

3   Why bridgets

The media and entertainment industries have seen a dramatic shift in content production, distribution and consumption due to the change of consumers' viewing habits, expectations regarding the richness of the content, and technology factors such as the proliferation of mobile devices, which in turn impact how video is produced and consumed. This trend is likely to continue as content producers innovate and improve the way we communicate with one another both at work and in our daily lives.

The implications are profound and broad. The rapid development of video is leading to a fundamental shift not only in media business and the related economy, but also more broadly in our culture and society. The latest advances in affordable virtual reality (VR) and augmented reality (AR) already transform the way we interact and share experiences with one another [1]. The connected devices are projected to grow to 910 million by 2019, averaging nine devices per household, and many of them can support the bridged and VR'ed content consumption and even their production by the consumers.

Video is not simply an important part of the online experience. Increasingly, video is the internet. Within the next few years the overwhelming majority of internet traffic will be video. According to Cisco forecasts, global consumer internet video traffic will make up 80% of all consumer internet traffic by 2019, up from 64% in 2014. But internet content is not linear – it is interactive, cross-linked and very rich in nature. So how can we give video the attributes that are the essence of internet? The answer is in the bridgets and the direct ecosystem that supports their efficient creation, storage and delivery.

BRIDGET project addressed all these issues by developing and standardising a common, open format for the generic link between the media elements. This, in turn, builds the foundations for an eco-system for creation, distribution, use and re-use of bridgets. We proposed an advanced architecture for authoring and consumption of cross-linked content and demonstrating the viability of the approach through field trials and user evaluations in the context of the second screen. The project also advances Content Search technologies beyond what is currently possible in terms of search speed and robustness.

3.1   2nd Screen

Bridgets support innovative functionalities for enriching multimedia content by connecting it to other related content, augmenting it with virtual information of interest, and allowing navigation of the 3D reconstruction of the scene. The bridget format is generic, device independent and it supports content linking between any media elements, e.g. between two video segments available in a library. One example application of bridgets is to augment television broadcast content, which is inherently linear, with cross-links to other content. The elements of the enriched content are presented to the user on the second screen (e.g., a tablet), improving the quality of experience.

Bridgets are by no means limited to the broadcast scenario and work equally well with the Internet delivery, where bridgets and destination media are both stored in the service provider server and the three

content types are all delivered via the internet . In this case synchronization is provided by the service provider, however the accuracy of synchronization between 1st and 2nd screens may depend on the protocols used to deliver program and destination media.
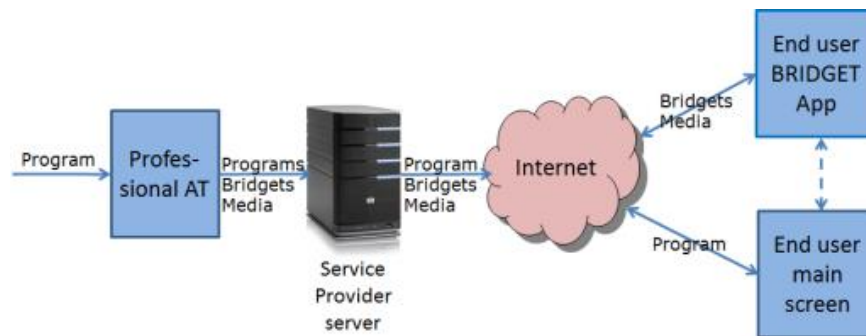

Figure 1 Bridgets in a purely internet scenario

3.2   Video Search

Video is arguably the most data-intensive and complex digital asset to manage. As use of video continues to expand rapidly and archives grow in size, uncovering the relevant content and semantic links becomes of major importance for sustainable production. With Video Search capabilities, all media assets available as end-points are pre-processed off-line and compact visual descriptors are extracted and indexed in a database. The bridget creators can then pose a visual query by selecting an object of interest (e.g. a building or a book cover), entire frame (e.g. a scene) or a video segment (e.g. a shot of an interior of a museum). The search process will return all available content in the database that is linked by visual similarities to the query. Video search reduces the time required to discover relevant content, significantly reducing the time required to author bridgets and thus the production cost.

3.3   3D reconstruction

To enhance the richness and interactivity of content, bridgets may point to synthetic 3D objects or scenes, either manually created by artists, or automatically reconstructed from sets of real-world images. Thanks to 3D reconstruction, the user can choose to be placed inside a virtual model of the main scene and experience it by freely navigating beyond what dictated by the program creator.

BRIDGET's 3D scene reconstruction tools support multi-view 3D A/V media generation and encoding at the service provider's side, as well as decoding and rendering at the end user's side. This enables the content creator to run a semi-automatic extraction of 3D scene information from archived (and, typically, previously broadcast) 2D/3D A/V content captured from several viewpoints. After its efficient transmission, the virtual or augmented 3D scene is decoded and rendered according to the user-selected viewpoint.

4   The BRIDGET solution

4.1   Bridget Technologies and standards

The BRIDGET solution for companion screen consists in developing a set of key components and exposes them to professional users and end-users by building specific-purpose applications. Figure 2 presents the basic model enabled by BRIDGET. A number of actors (Broadcasters, Application or Service Providers but also users) can create BRIDGET applications and complex services coordinating multiple BRIDGET applications. Applications use functionalities provided by a set of defined BRIDGET technology components and exposed through a consistent API by a middleware layer. This layer may provide additional components beyond those developed in BRIDGET (e.g. video decoding capabilities) to create particular applications. The applications can access these APIs locally or remotely in a distributed environment. Applications are locally installed or delivered through a network to the actual user devices

and then executed. Depending on the context, an application may be developed to interact with a Professional User (e.g. in a broadcaster's post production environment) or an end user.
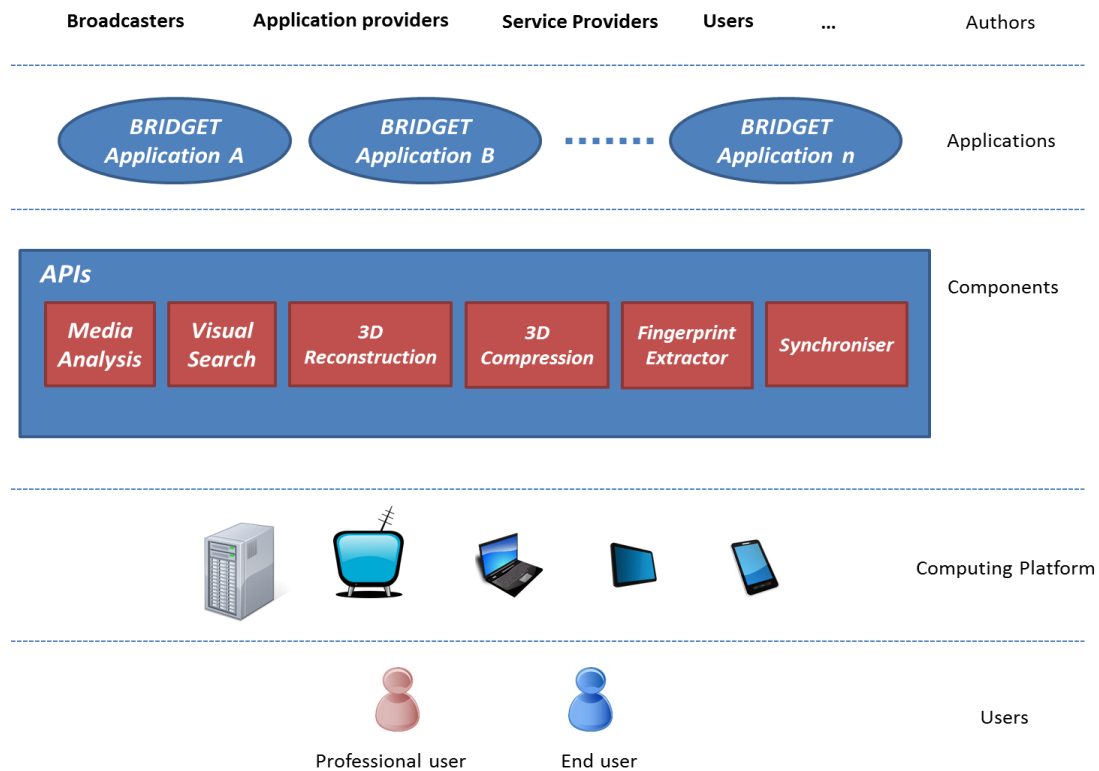

Figure 2 – BRIDGET Architectural model

The set of key technologies developed during BRIDGET and integrated in the architecture is presented in Table 1.

Table 1 – Key BRIDGET technologies

Component	Description
Media Analysis	analyses a media content producing a hierarchical temporal structure representation of the content, as well as low-level descriptors (e.g. visual content-based), high-level annotations (e.g. scene classification), and quality measures (e.g. visual or audio quality based).
Visual Search	supports search for visual objects in large image and video libraries: analyses images and videos in the content libraries, extracts compact descriptors, builds descriptor databases and indexing schemes, ranks results
3D Reconstruction	creates a 3D model from input images and/or videos
Fingerprint Extractor	extracts an Audio Fingerprint (AFP) from an uncompressed chunk of audio data
3D Compression	produces a compressed 3D graphics data structure from a 3D model that can be efficiently transmitted, and later decompressed and rendered to screen

These components are integrated in a consistent manner and this was made possible by developing Media Linking Application Format (in short MLAF), a standard of the MPAG family in the suite ISO/IEC 23000 (MPEG Application Formats – MPEG A). MLAF is structured as a restriction of MPEG-21 DIDL including some key descriptors from MPEG-7 and other parts of MPEG-21. MLAF is basically the standard format for bridgets. The main concept of MLAF consists in modelling bridgets-related information as a hierarchy of DIDL elements. The topmost (root) Container is the wrapper of the whole linking information between a certain Digital Item, the source item, and its bridgets. Each of the former and the latter is modelled as a specific restriction of the generic DIDL Item. Each Bridget is considered as a DIDL Item as well and contains a reference to the spatiotemporal portion of the Source Item where it is active (i.e., it defines the segments of the timeline and the picture region of the Source item associated to the Bridget information which shall be shown on the rendering device). This information is wrapped in MPEG-21 Annotation structure and is implemented making use of MPEG-7 Moving Region and Audio-Visual Segment structures. The Bridget structure may also contain information about the recommended usage of the Bridget information, implemented by making reference to MPEG-21 part 22 (User Description) Recommendation Information.Obviously, the Bridget item contains the reference to one or more destination items, i.e. the Digital Item used as enrichment of the main Source Item in the specified spatiotemporal portion. Since a bridget is a result of an editorial work, each Bridget can be described making use of an EBU Core Descriptor and represented by a multimedia element. The Bridget Presentation par of MLAF is capable of representing 2D and 3D scenes that may contain multimedia content such as 2D and/or 3D graphic elements, images, videos and sounds. The multimedia content can be part of the scene (stored locally) or it can be referenced (through hyper-links) from external repositories where compliant media files are available. Moreover, a scene can be static or animated and can connect to sensory information that can be either local or remote. The Bridget Presentation supports external interaction allowing the user to communicate with the scene elements and therefore affecting the scene behaviour. The actions that can happen in a scene can be programmatically triggered by using time sensors, routes and scripting while other actions can be triggered by the user interaction through touch sensors.

4.2   Bridget Authoring Tool

The BRIDGET Authoring Tool (Figure 3) is composed of three main components : (1) an *Authoring Tool Frontend*: the user interface providing easy and organized access to the BRIDGET software platform, (2) an *Authoring Tool Backend*: the BRIDGET software platform, integrating all the Bridget engines and (3) the *Bridget Server*: web service providing storage for the produced bridgets.
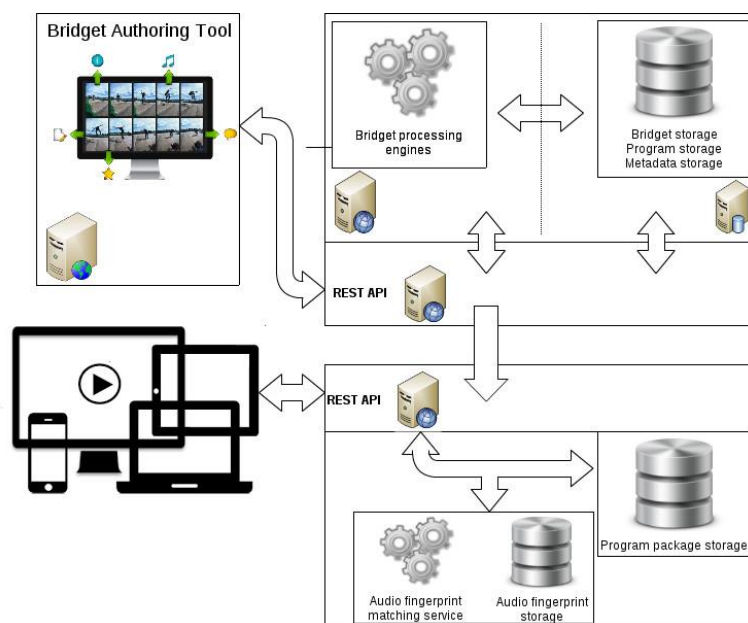

Figure 3 - Bridget Authoring Tool block diagram.

4.2.1   Authoring Tool Frontend

The Authoring Tool Frontend is a true HTML5 application that runs entirely on the browser. The user interface and workflow have been developed by following professional advices received by usability experts. The software was developed as general purpose, potentially being applied in any BRIDGET use-cases and scenarios with the focus on the creation of reusable components, enabling easy customization without major programming impact. The main Application Components are:

1. *Bridget Client*: A set of cross-browser JavaScript interfaces used to interact with the Bridget AT Backend APIs. Interaction is based on HTTP AJAX calls. The client also adds a layer of abstraction by automatically issuing multiple calls and aggregating results.
2. *Application Logic*: A Javascript layer that models the application logic and state management. This is where the user workflow is implemented.
3. *User Interface*: A set of reusable UI Components built using React.js and JSX declarative language.

In the BRIDGET AT Frontend, the destination images, the destination video contents and the source contents are abstracted as a generic BRIDGET AT *Resource*. This translates to a simpler management of listings and metadata visualization.

The most relevant UI Components and theirs functionalities are synthesized in Table 2.

Table 2 – UI Components and theirs functionalities

ResourceListItem	renders a BRIDGET AT *Resource* (destination content image, destination content video or source content video) with a small thumbnail and an overlay menu revealed on mouse hover
ResourceItemMetadata	renders an HTML fragment for displaying BRIDGET AT *Resource* metadata
ResourceMetadataEditor	renders a form for editing resource metadata
List Component	renders HTML fragment for displaying a responsive list of *ResourceListItem*. It also allows multiple items selection and filtering
Player	renders an HTML5 media player based on video.js with some advanced functionalities for interacting with the timeline and selecting shots
Waveform	renders a graphical waveform of the audio signal. The waveform is aligned to the video timeline allowing selection based on audio level
BridgetList	renders a brief list of bridgets
BridgetEditor	renders a form of editable bridget metadata;
ObjectPicker	renders an interactive view of one still image allowing user to select an area of the image. This can be used to select an object inside a single video frame
DDDCreator	renders a complete interface for creating a 3D reconstruction. It supports dataset upload, selection of the reconstruction method (provided by WP6) and visualization of the reconstruction result in multiple formats
DDDDetails	renders a detailed view of the 3D Destination Resource with and integrated 3D viewer
Reconstructions	renders a brief listing of the reconstructions performed on the platform
LivePlayer	renders an interface for managing a Live Program, including controlling the state, the addition or removal of Live Bridgets
LayoutEditor	renders a complex interface for editing a selected Bridget's layout

The Authoring Tool Frontend also includes a browser plugin based on GPAC[1] Multimedia Framework. This plugin is used to present the authoring user with a preview of the final bridget before it is delivered and then visualized on the mobile client. The plugin is based on the same rendering engine and logics as the mobile application, therefore it renders a preview exactly matching the final result.

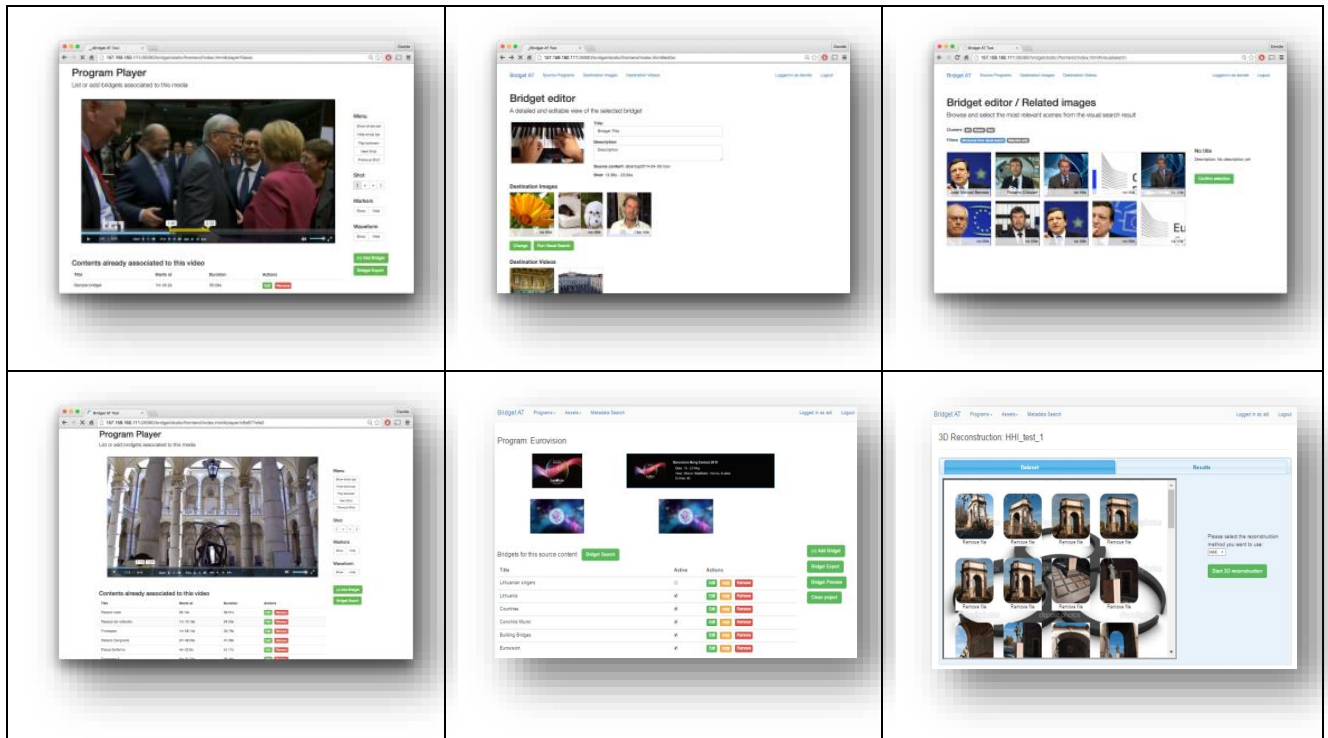The following figure illustrates snapshots of the BRIDGET Authoring Tool Frontend.

Figure 4 - Block architecture of the Authoring Tool Backend

4.2.2   Authoring Tool Backend

The Authoring Tool is built around a set of services called *Bridget engines (BE)* which are exposed to the frontend through a REST API, as illustrated in Figure 5.

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[1]   [1] http://gpac.wp.mines-telecom.fr/
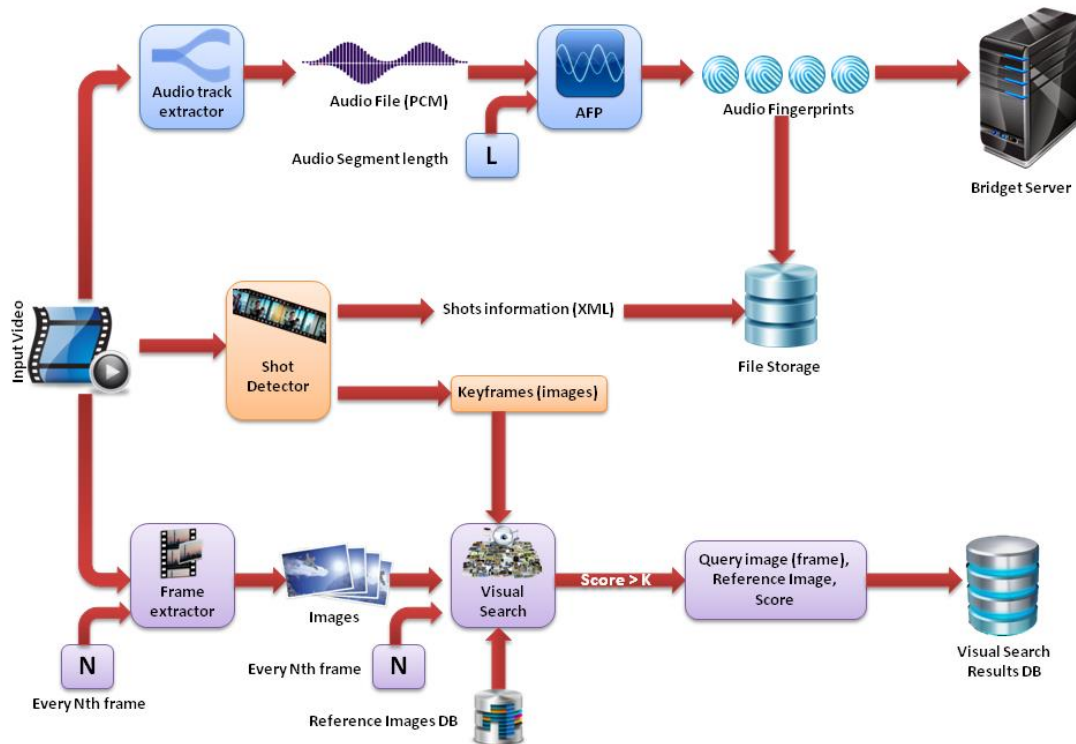
Figure 5 - Block architecture of the Authoring Tool Backend

The BRIDGET Authoring Tool has also the functionality of 3D reconstruction of objects from images and the following software architecture ensures it.
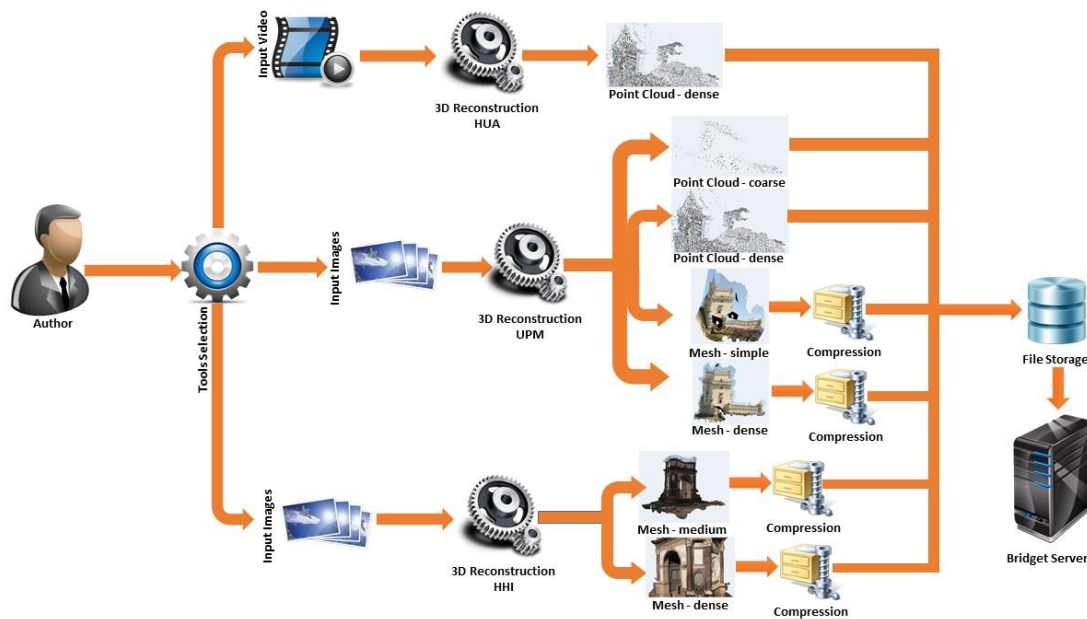

Figure 6 - Block architecture of the 3D Reconstruction Authoring Tool Backend

The most relevant Backend Services and theirs functionalities are synthesized in Table 3.

Table 3 – Backend Services and theirs functionalities

Web Server	provides the REST API for the frontend, manages and launches the BE (*Shot Detector*, *Visual Search*, *Audio Fingerprint*); BE are activated through system calls directed to the engines themselves
Shot Detector	video analysis tool that takes as the input the program video and outputs a hierarchical structured file that contains the start, duration and keyframes (image) for each detected video shot
Video frames extraction	video tool that takes as the input the program video and an integer parameter (N) and outputs the extracted frames (as individual image files). The integer input parameter N is used to subsample input frames (only 1 out N is analyzed);
Visual Search	image analysis tool that performs a visual search operation (compliant to Compact Descriptors of Visual Search – CDVS standard) with an input query image (extracted video frame), outputs the first K more similar images (ordered descending according to computed matching score) and stores in a database a combination of query image, reference image and score. The descriptors of the reference images are pre-computed and stored
Audio track extraction	takes as the input the program video and outputs the extracted audio track in uncompressed PCM format
Audio Fingerprint	audio analysis tool that received in input the uncompressed PCM file corresponding to the program and an integer (L = audio segment length in seconds) and outputs a set of file containing the audio fingerprints (audio descriptors) corresponding to each audio segment. These files are then pushed to the Bridget Server so that the Bridgeted program can be identified based on the audio fingerprints
Scripts	a set of scripts (written in bash, perl or python) with the purpose to launch the engines in a pre-defined order and to link the input and output of each BE
3d reconstruction	tool that takes a video as an input and outputs a dense point cloud
3d reconstruction	tool that takes a set of images as input and outputs a medium quality and a high quality 3d textured mesh
3d reconstruction	tool that takes a set of images as input and outputs 4 results: coarse point cloud, dense point cloud, textured mesh based on the coarse point cloud and textured mesh based on the dense point cloud
Compression	3D mesh compression using state-of-the-art MPEG SC3DMC TFAN profile

The Bridget Server, as presented in Figure 7, is mainly composed of a web service which provides access to a database through a set of REST HTTP calls. Its main goal is to store published bridgets and provide access to them for the Bridget applications.
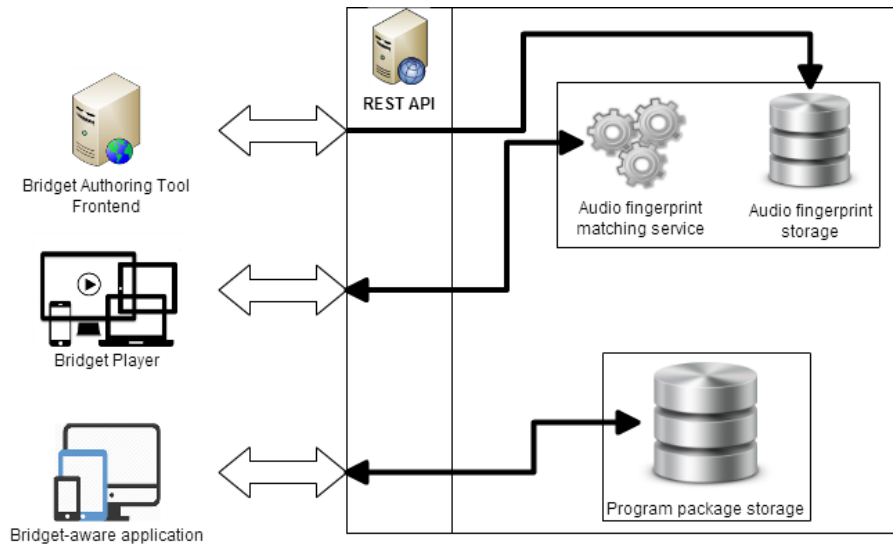
Figure 7 - Block diagram of the Bridget Server

Bridgets are stored per program, meaning that for each program a textual file, the Bridget Main Scene (compliant to BIFS scene description format, as described in next subsection) is produced, together with its binary MP4 version. BIFS files are made available for download, in order to allow external bridget-aware applications to communicate with the BRIDGET software platform.

The identification of the correct program and related synchronization is enabled by the audio fingerprint matching service, which receives a chunk of audio stream from the device, extracts the fingerprint and matches it against the fingerprint database. Once a match is detected, the system queries a program database to retrieve the URLs of the MP4 and BIFS files containing the bridget description, sent back to the device as output response.

4.3   Bridget Players

The BRIDGET player is built on top of OSMO4, the GPAC multimedia player and modified in order to be able to support the Augmented Reality Application Format (ARAF). Additionally, two new modules have been added and integrated into the player architecture, in order to support a new rendering method of synthetic models and the audio fingerprint extraction and matching.

The output of the BRIDGET Authoring Tool Bridget (representing the input of the BRIDGET Player) is called BRIDGET Main Scene and consists of an MPEG-4 file. When loading it, BRIDGET Player performs the following actions:

- Instantiate the AFP external prototype.
- Retrieves the PCM data and sends (XMLHttp) it to the Bridget Server.
- Gets back the result from the Bridget Processing Server: a link to the corresponding MP4 file (bridget content) of the recognized audio and the synchronization data (timestamp).
- Displays the bridget content.

The architecture showing how the Bridget Player, the Server and the Bridget Main Scene are connected is depicted in Figure 8.
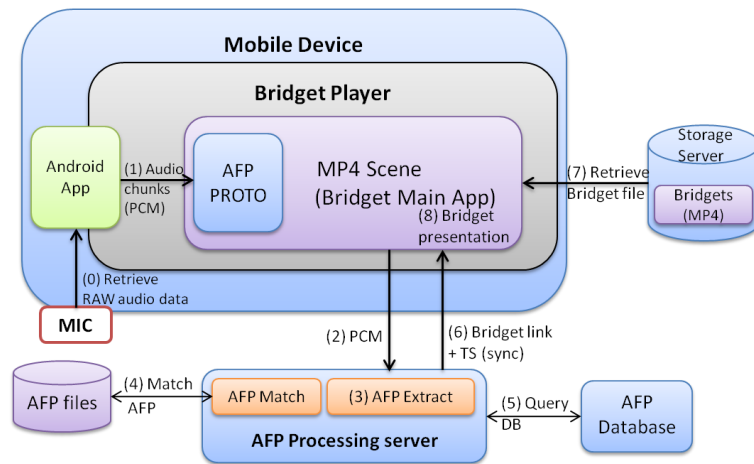
Figure 8 - Bridget Player Architecture

5   BRIDGET user trials

5.1   Use scenarios tested

During the project several proof of concepts have been identified and developed, with the intention to put under test the end-to-end workflow envisioned by BRIDGET. Tested scenarios covered both the Authoring side and the End User side. On the *Authoring* side, the functionalities of the Professional Authoring Environment were tested with people covering a wide range of role in media production, such as directors, executive producers and post-production experts. On the *End-user* side the Bridget Player App was tested through dedicated focus groups in which the interactive functionalities of the app and the overall user experience have been evaluated, and a final extensive user trial session. Overall, the test sessions involved 136 users among professionals and end users.

5.2   Execution

Trials have been executed in two rounds. The first round, held during summer 2015, tested the first release of the BRIDGET system (Version A) including the full editing functionalities of the Authoring Environment and the End User Application. The second round, performed between summer and fall 2016, tested Version B, including some specific authoring functionalities such as Live bridgets and support for 3D reconstruction.

5.3   Results

The results of the user trials of the Professional Authoring Environment showed that the functionality presented have been well received and considered generally well designed to fulfil the requirements of a hypothetical Bridget creation workflow. However, the usage in actual production would require improvements in terms of content organisation, graphic layout and integration with existing enterprise services. From the strategic perspective of utilisation of the tool in the context of a media company business process, although the idea of such a service has been acknowledged as valid, there is a clear indication that an accurate study on the impact in terms of resources and integration of personnel skills is to be carried out in the remaining timeframe of the project.

At focus group sessions the main features of the BRIDGET concept were presented and all the application functionalities have been analysed in detail from the end user's point of view in order to get feedbacks and suggestions on the "ideal" Bridget Application. In general, the feedback was quite positive and the common feeling was that the application concept could be extended to many types of TV programmes and different target groups. In particular, suggested scenarios focused on educational TV programmes, shows containing manual activities and programmes with high levels of user interaction such as quiz and game shows. Bridgets were considered graphically attractive and their presence allows the user to go deeply in the topic

of the TV programme. However, in many cases content has to be redefined both to avoid redundancy and to make the interaction modality clearer. Users showed a high level of interest about social pages and external links that need to be included, based on the target and type of the TV programme.

6   BRIDGET workshop

6.1   Introduction

The 3rd BRIDGET workshop was articulated in two instances:

1.   The main workshop held in Chengdu (China) on 2016/10/19T11:00-13:00
2.   A mini workshop held in Milan c/o Sky Italia on 2016/11/11T11:00-13:00

Participants at the main workshop and at the mini-workshop were provided with the same information and were asked to perform the same actions, namely

1.   Powerpoint presentations describing the background, the process and the main results of the BRIDGET project
2.   Practical usage of the BRIDGET Authoring Tool
3.   Answers to online questionnaire
4.   Discussion based on the questionnaire responses
5.   Proposal for a Bridget Alliance (BriAll)

6.2   Participants

A total of 27 individuals responded to the questionnaire. Of these, 22 responses were from people attending the Chengdu workshop and 5 from the people attending the mini-workshop in Milan.

Participants were asked to provide address information: 6 skipped the question and 21 answered. Out of 21 respondents, 17 provided their company names and 19 their email addresses.

Participants were asked to provide a description of the roles in their companies. Table 4 gives an organised view of the results.

Table 4 – Classification of 3rd Bridget workshop attendees

Academia	Research	Development	Others
Research Assistant / Associate Lecturer Academia Professor (2) Associate Professor Lecturer	Research (2) R&D Engineer Principal Researcher Broadcasting & Media Research Media Research Principal Scientist	Head of TV applications Project manager Engineering (2) App Sw development coordinator Senior Software Design Engineer	Innovation Manager Innovation Coordination Consultant Standards (2)

The Companies represented at the workshops

AIT - Austrian Institute of Technology
ETRI
Higgs
Imagination Technologies
Kyung Hee Univ.
LG Electronics
Mediaset

Myonji University

NTT Data

Queen Mary University of London

Raad Consulting

reallifefilm international GmbH

Sharp

Sky italia

TNO

UPM

No country information was provided by the respondent. However, this can be easily guessed from the affiliation.

6.3   The presentation

The powerpoint presentation included the following elements:

1. The notion of linking between media items considered as a whole evolving toward the notion of linking between temporal and/or spatial elements of different media items. Practical examples are:
   a. A 2nd Screen application where a user is led from a video at a given point to other (2nd screen) media items
   b. An Image or Video Search application where a user provides an image or a video as input and is led to a number of images or videos related to the input based on some criteria
   c. 3D Image Reconstruction application where one or more than one user provides a number of pictures of an object and is led to a 3D model of that object
   d. An Augmented Reality application where a user at a physical place is led to a replica of the same space enriched with other natural or synthetically generated media items
   e. A Virtual Reality application where a user navigating a virtual space is led to another virtual space based on some actions.
   f. A Mash up application where a user assembles different media and related information from different sources
   g. A Media Post production application in which the editor enriches the content of an existing programme with additional excerpts and media taken from the archive or produced on purpose
   h. …
2. Standard technologies exists that can be packaged to support these and other applications
   a. Companion Screens & Streams (DVB CSS)
   b. Second Screen APIs (HbbTV 2.0)
   c. General Media Description (MPEG-7 Part 2, 3, 4 and 5)
   d. Media Fragment specification (W3C)
   e. AudioVisual Description Profile (MPEG-7 AVDP)
   f. Animation Framework eXtension (AFX)
   g. Augmented Reality Application Format (ARAF, MPEG-A Part 13)
   h. Media Linking Application Format (MLAF, MPEG-A Part 18)
   i. Compact Descriptors for Visual Search (MPEG-7 Part 13, a.k.a. CDVS)
3. A number of standards in the pipeline supporting newer applications
   a. Compact Descriptors for Video Analysis (CDVA)
   b. Media Orchestration (MORE)
   c. Point Cloud Compression (PCC)
   d. Coded Representation of Immersive Media (MPEG-I)
4. The message: It is time to uncover the full value of the web of relationships that exist between the *semantic* elements of media assets
   a. We call the relationships *bridgets*
   b. We call the web of relationships *Multimedia Hyperlinking Ecosystem*

5. The key to enable this vision is the main output of the BRIDGET project: "easy *authoring* of multimedia hyper-links (bridgets)"
6. Practical demonstrations of the BRIDGET Authoring Tool
7. Brief summary of 3 phases of user trial
    a. Heuristic evaluation (2015 and 2016)
    b. Focus Groups (2015 and 2016)
    c. Focus Groups (2015 and 2016)

6.4   Questionnaire

The project has spent a significant amount of time to develop the questionnaire given in Table 5. Please note that

1. Some questions have suggested answers.
2. Links are provided to the participants' individual responses.
3. The numbers of those who answered the questionnaire and skipped individual questions are given in the 2nd and 3rd column, respectively.
4. The numbers of the individual answers are also provided. In some cases multiple answers were allowed.

Table 5 - Bridget creation user requirements

Questions	Ans	Skp
Do you think that bridgets address relevant problems for your company/industry?	24	3
− Yes	15	
− No	2	
− Don't know	7	
Do you see added value in a tool that makes it easy to produce bridgeted content?	24	3
− Yes	22	
− No	1	
− Don't know	1	
Where do you see added value in the BRIDGET authoring tool (tick all that apply)?	24	3
− Ability to instantly find relevant video content in large archives	21	
− Ability to generate high quality 3D models	6	
− Ability to package bridget in the MLAF format for interchange with other environments	11	
− I see no value	1	
− Other (please specify)	2	
Is in house 3D reconstruction useful for your industry?	24	3
− Yes	8	
− No	11	
− Don't know	5	
Rate the quality of automatic 3D reconstructions of the demos (choose all that apply)?	20	7
− Very good for (add for which apps)	5	
− Acceptable for (add for which app)	7	

− Needs improvements	8	
− Any additional comments?	5	
Do you see MLAF as a suitable enabler of the anticipated media-hyperlinking ecosystem	21	6
− Yes	15	
− No	2	
− Yes, but more is needed such as …	4	
Is the fact that MLAF is an open standard important?	23	4
− Yes	16	
− No	3	
− Yes, more is needed, e.g. …	2	
About user engagement: do you think bridgets could (you may choose more than one option)	23	4
− Attract more TV viewers?	9	
− Distract viewers	7	
− Improve user experience	17	
− None of the above (please explain)	4	
About content creation: do you think bridgets could (you may choose more than one option)	22	5
− Help content creators provide better content?	18	
− Help content owners better exploit their assets?	14	
− Suggest new formats	8	
− None of the above (please explain)	1	
About social interaction inspired by media content: do you think bridgets	22	5
− Could enhance social interactions?	18	
− Could negatively impact social interactions?	1	
− Would not have any impact?	4	
About content monetisation: do you think bridget	22	5
− Could help to further monetise content?	19	
− Would not have any impact?	3	
Extending/applying bridgets to other media types, including VR, 3D audio	23	4
− High	11	
− Medium	10	
− Low	2	
Use of bridget as objects for social interactions	23	4
− High	8	

− Medium	11	
− Low	4	
Use of bridgets to streaming of live events	23	4
− High	13	
− Medium	8	
− Low	2	
Use of bridgets in social interactions	22	5
− High	6	
− Medium	10	
− Low	6	
Other suggested topics	4	23

Links from the table above

Added value in the BRIDGET authoring tool

- − Reuse of Semantic Web (LOD) content
- − Improve Content engagement

Quality of automatic 3D reconstructions

- − Quality
- − Most of consumers
- − It could probably be applied for the restauration of historical monuments
- − On-line courses, tv documentaries, educational tv programmes
- − Impossible to tell from the quality of the video on the screen

MLAF enabler of media-hyperlinking ecosystem

- − Don't know
- − NA
- − NA
- − Better reuse of semantic web

MLAF important because it is an open standard

- − Don't know
- − NA

About user engagement

- − It should be possible to switch on/off
- − I think this will make search easier, not consumption
- − Online broadcasting has more potential than tv

About content creation

- − An open area is interactive TV/ Internet Broadcasting

Other suggested topics
−   Advertising
−   Allow comms among 3rd parties content?
−   May improve support for referee decision in sport events. May improve news content (text based twitter content analysis is already in place). Investigative journalism
−   Application to product placement endorsements and 'click-to-buy" scenarios would be a practical application.

6.5   Graphic results

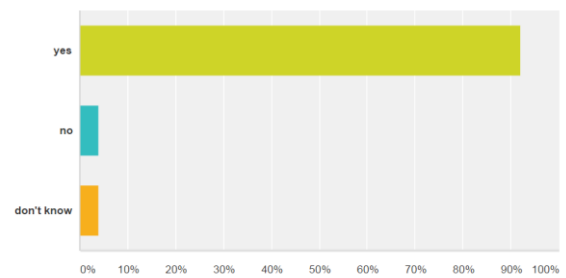The charts below reproduce the results above in graphical form
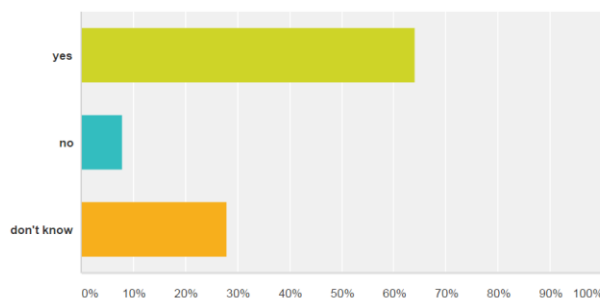
Rate the quality of automatic 3D reconstructions of the demos (choose all that apply)?

Answered: 21   Skipped: 7
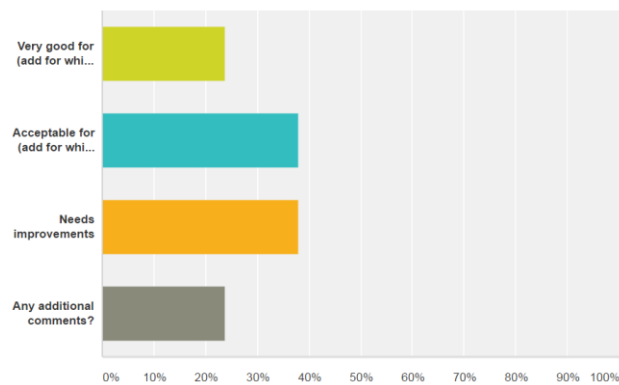
Do you see MLAF as a suitable enabler of the anticipated media-hyperlinking ecosystem

Answered: 22   Skipped: 6

Is the fact that MLAF is an open standard important?

Answered: 24   Skipped: 4
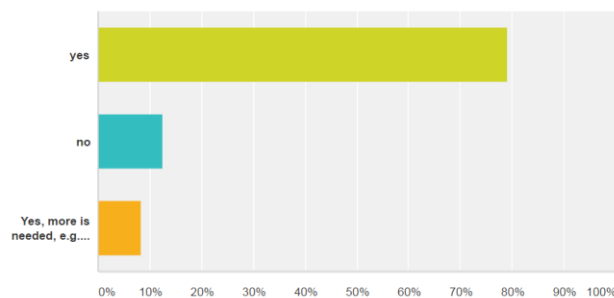
About user engagemet: do you think bridgets could (you may choose more than one option)
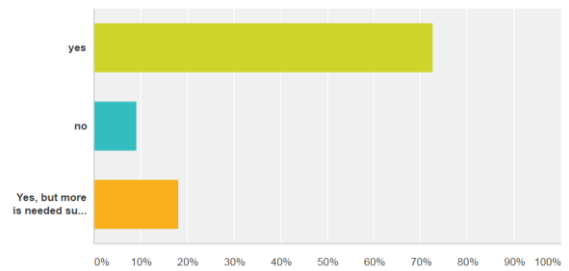
Answered: 24   Skipped: 4

About content creation: do you think bridgets could (you may choose more than one option)

Answered: 23   Skipped: 5

About social interaction inspired by media content: do you think bridgets

Answered: 23   Skipped: 5

About content monetisation: do you think bridget

Answered: 23   Skipped: 5

Extending/applying bridgets to other media types, including VR, 3D audio

Answered: 24   Skipped: 4
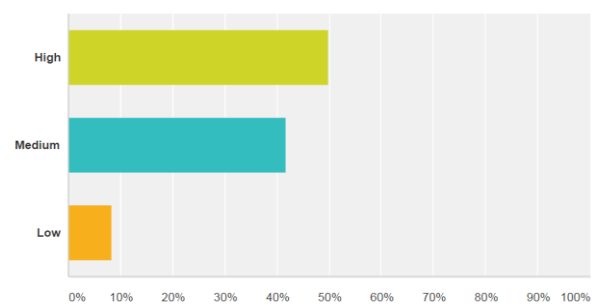
Use of bridget as objects for social interactions
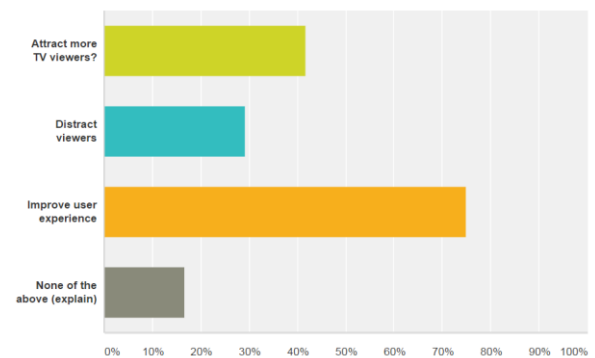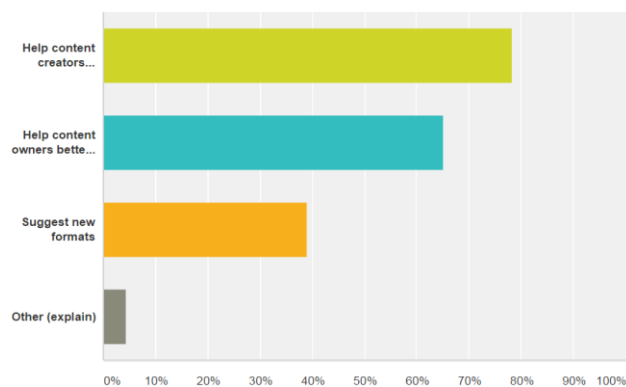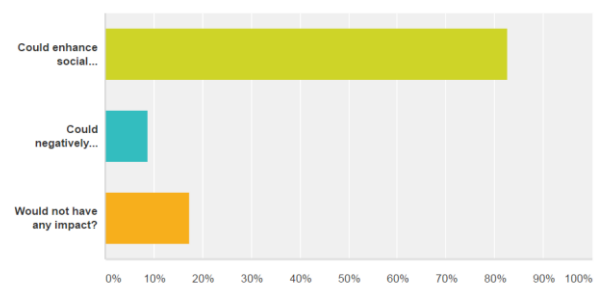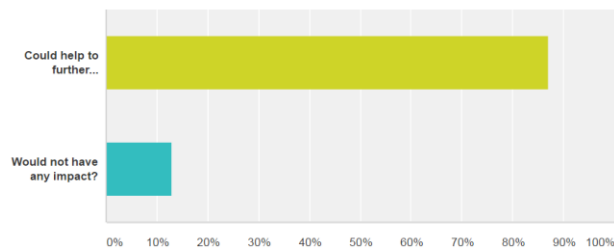
Answered: 24   Skipped: 4
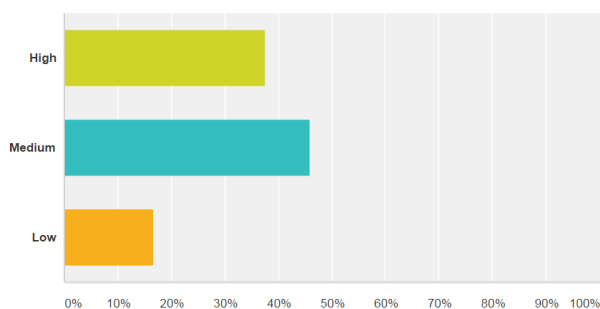
Use of bridgets to streaming of live events

Answered: 24   Skipped: 4
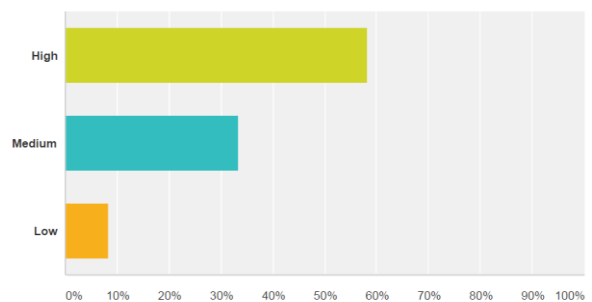
Use of bridgets in social interactions

Answered: 23   Skipped: 5
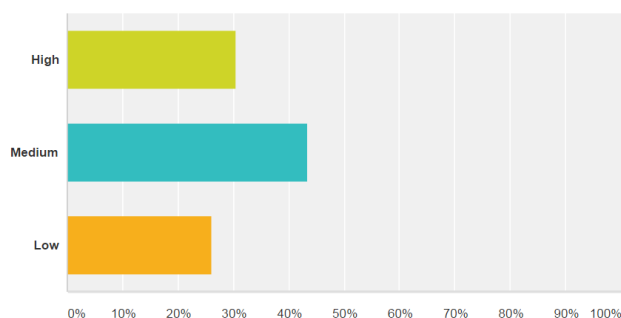
6.6   Discussions

The bulleted list below provides a report of the discussions organised by themes

1. Relevance and use of bridgets
   a. Bridgets are relevant but we must learn how to convert TV viewers from a lean back to a lean forward experience
   b. Bridgets can be useful for ads but also for non-commercial links such as touristic places
   c. Bridgets are good for enhanced product placement
   d. Bridgets should be attractive, not distractive and the second screen should be seen as an extension to, not as a replacement of, the 1st screen
   e. Bridgets are an opportunity to provide more info during the consumption of TV content which consumers want (better in my walled garden than outside)
   f. Bridgets can be a building block of a complete HbbTV system
   g. MHE can be a framework for a new generation of broadcasting systems that some countries are considering
2. The BRIDGET Authoring Tool
   a. The AT frontend should be designed keeping in mind that the users will be non-technical

    b. A productised Bridget AT frontend should exploit more of the potential of thecurrent AT backend

    c. Bridgets come at the right time because the nature of content production is already changing and more changes will be brought by internet video distribution

    d. In the future the (primary content) production paradigm may be influenced by the fact that it is known that the content will be distributed in a bridgeted form

    e. The AT should evolve from "content creation" and enable the creation of new AV services where user interactivity will be increasingly important

3. 3D reconstruction

    a. 3D reconstruction is a technology with potentially interesting usages such as more complete understanding of objects, newer interfaces etc. Further work is needed to understand how the potential can be exploited

    b. The quality of today's reconstructed 3d is generally not yet adequate to satisfy users watching broadcast content. However, the demonstrated technology could be used to create some objects that it would be too expensive to generate with other means, e.g. for 2nd screen purposes

    c. The UX of reconstructed 3d objects is relevant because end users playing with 3d models (people faces etc.) are a reality today

4. Bridgets as a social objects

    a. Bridgets are interesting new tools to concentrate end users' attention and stimulate discussions on specific program sections

    b. The use of bridgets as social objects can be dangerous if not "moderated"

5. Bridgets for live programs

    a. Bridgets for live programs are important because that is where the largest audience is concentrated

    b. Live bridgets are useful, but they need a different workflow

        i. Bridget must be prepared in advance

        ii. Schedule is uncertain

        iii. Potentially running order needs to change

    c. The AT frontend for live bridgets requires a thorough rethinking, particularly for large events (e.g. there are people creating "live" bridgets almost in real time and a director overseeing what bridgets are transmitted and when)

6. Open bridget format

    a. An open format is useful because it decreases the cost of application development and because users can create and exchange bridgets

    b. An open bridget format allows users to contribute bridgets to the broadcaster but also to their social networks

7. Bridget Alliance

    a. General interest in joining the Bridget Alliance, wish to be kept informed of how the initiative evolves

    b. The Bridget Alliance could become an attraction point of the scattered interests in 2nd screen applications

6.7 The Bridget Alliance

The BRIDGET partners propose the establishment of the Bridget Alliance as an environment where industry players can develop new business opportunities based on the notion of, technologies for and standards on Multimedia Hyperlinking Environment. The first target of the forum is to consolidate industry interest in 2nd screen applications by providing a place where the services and the elements required to deploy attractive 2nd screen applications are discussed, experiences contributed and discussed, and best practices are identified and documented. However, BriAll has the ambition to address other MLE instances as well, such as 3D Reconstruction, similarity-based Image and Video Retrieval, Post Production, Augmented Reality, Virtual Reality and Media Orchestration.

The 3rd workshop and other contacts with industry players outside it have shown that there is an interest in Multimedia Hyperlinking Environment technologies, standards and applications that the Alliance is intended to support.

7   Conclusions

The 3rd BRIDGET workshop confirmed that media domain professionals find significant added value in the bridget notion and technologies, and particularly in the professional authoring tool that allows to create 2nd screen content inexpensively. One technology whose integration in the authoring tools stands out is the visual search tool that allows bridget editors to find relevant content in large archives, thus providing the means to leverage under-utilised content of service providers. We note that this value is not limited to 2nd screen production, it is also generally useful in post production.

Furthermore content creators stress the value of 3D reconstruction obtained from images and videos captured with ordinary cameras without particular set up. The quality achieved does not fully meet the expectation of service providers yet, but it can already be used practically in some instances because today end-users love to play with 3D models. There are potentially other interesting applications that need further study.

Media professionals appreciate the value of bridgets expressed in the MLAF standard to capture the essentials of the relationships between media content. They also stressed that having a non-proprietary open standard is important.

Furthermore media professionals value the viewers' interactivity and engagement enabled by bridgets, and the support to social aspects. However, they also stressed that the way to instantiate these new aspects requires further thoughts and investigations and the Authoring Tools should flexible enough to support them.

Media professionals think that BRIDGET has made important strides toward enabling sustainable 2nd screen applications. However, more research should be done, e.g. how bridgets can be extended/applied to other media types, including VR, 3D audio, how bridget can be used as objects for social interactions, how bridgets can be applied to live contexts etc.

Finally, media professionals appreciate the fact that, for the first time, Broadcasters, Service Providers and any participant in the media value chain has a web based Authoring Tools designed for easy insertion in the content production/post-production workflow, a distinctive element of the project that makes BRIDGET stand out of all other projects in this area.

While second screen is no longer a novelty for media professionals, the ability of bridgets to enable low-risk sustainable solutions adds new lifeblood to 2nd screen. For these reasons they are positively considering the benefits of joining the Bridget Alliance that can provide a forum where particularly 2nd screen applications can be discussed in the early phases of the Alliance thus helping the kickstart of the new industry.

8   Acknowledgements

9   Annex A – The Bridget Alliance

This is a draft of the Bridget Alliance statutes that is being circulated among companies deemed to be interested in becoming menbers of the Alliance.

(Draft) Statutes of the Bridget Alliance

ARTICLE 1 - Name

The "Bridget Alliance" (hereinafter referred as "BriAll") is constituted as an association under the terms of Articles 60 et seqq. of the Swiss Code and these Statutes.

ARTICLE 2 - Seat

The seat of BriAll is in Geneva, Switzerland.

ARTICLE 3 - Purpose

BriAll is a not-for-profit organisation with the mission to promote continuing successful development, deployment and use of Multimedia Hyperlinking Environment (MHE) technologies, standards and applications.

Multimedia Hyperlinking refers to the linking of temporal and/or spatial elements of different media items, such as between

1. a given point of a video to media items in a 2nd Screen application,
2. an input image or video and similar images or videos from a data base
3. a set of photographs of an object and a computer generated 3D model of that object
4. a physical place and the digital replica of the same space enriched with other natural or synthetically generated media items
5. a virtual place and another virtual place experience by a user in a virtual reality application
6. a set of different media items and related information from different sources and the mash up media item created by a user

BriAll operates on the basis of open international collaboration of all interested parties: corporations and individual firms, partnerships, industry fora, end users and their organisations supporting the BriAll mission and the means to achieve its goals. The terms are reasonable and applied uniformly and openly.

The goals of BriAll are realised through the development of Recommended Practices and if necessary Technical Specifications – clollectively called "BriAll Approved Documents" – so that businesses can develop new or improved applications. BriAll may contribute the results of its activities to appropriate standards organisations and other appropriate entities whenever this is instrumental to achieve the general BriAll goals.

The business of BriAll shall not be conducted for the financial profits of its Members but for their mutual benefits. Discussions about sales levels, methods, channels of distribution, markets, customers, prices or profitability or any other topic which would restrict use of Digital Media are prohibited.

ARTICLE 4 - Membership

4.1. Application conditions

Any corporation and individual firm, partnership, governmental body or international organisation supporting the purpose of BriAll may apply for Membership. BriAll may define certain categories of individuals who support BriAll's goals and allow these to apply for Associate Membership.

BriAll does not restrict Membership on the basis of race, color, sex, religion or national origin.

The Members agree to respect all legal provisions and these Statutes concerning BriAll. When developing BriAll Approved Documents each applicant has to declare himself individually and collectively committed

to open competition in the development of BriAll Approved Documents. The Members are not restricted in any way from designing, developing, marketing and/or procuring the technologies developed.

Members are not bound to implement or use specific technology standards, or recommendations by virtue of participation in BriAll.

Membership in BriAll in no way obligates or requires a member to license its patents or technologies to others. If a member chooses to license its patents or technologies, membership in BriAll in no way imposes, obligates or requires such member to offer such licenses on any particular terms.

4.2. Voting rights

The Members who have the right to vote are called Principal Members.

The Administrative Council (hereinafter referred to as "Board of Directors") may from time to time propose to the General Assembly the establishment of one or more classes of non-voting Members.

The Members who do not have a voting right are called Associate Members.

4.2.1 Rights of the Principal Members

A Principal Member:

1. is entitled to one (1) vote at the Annual and General Meetings and any Committee Meeting in which they participate
2. is entitled to access to all working documents, minutes of meetings (Board of Directors and Committees) and written contributions by BriAll by electronic means
3. may be requested by the Board of Directors to provide qualified representatives to further the work of various Working Committees

4.2.2 Rights of Associate Members

An Associate Member in good standing:

1. has no voting right at the annual or General meetings or any Committee meetings
2. is entitled to access to all working documents, minutes of meetings (Board of Directors and Committees) and written contributions by BriAll by electronic means
3. has all obligations of Principal Members
4. has the right to become a Principal Member solely by payment of the difference between the Membership fee for an Associate and a Principal Member

4.2.3 Rights of Individual Members

Individual Members are a particular type of Associate Member. To qualify as Individual Member a person shall

1. Declare any economic ties to any organization that may have a business interest in the area of BriAll work
2. Refrain from using the information obtained in meetings for the purpose of their personal remuneration such as through a consultancy without obtaining previous consent of BriAll and declaring who their clients are.

BriAll reserves the right to review representations of Individual Members.

3. Admission procedure

A written application must be submitted to the Membership and Nominating Committee in the form prescribed by the Board of Directors. Such application must contain a signed agreement to be bound by the Statutes.

The Membership and Nomination Committee recommends the approval or rejection of the application in accordance with the criteria defined by the Board of Directors. The criteria shall be objective and non-discriminatory, shall be published and shall allow any party with good faith to become a Member.

The final decision as to admission rests with the Board of Directors. The admission procedure is completed when the new Member has paid the subscription fees.

4. Terms and conditions

Membership shall be considered complete and in good standing when the signed BriAll Statutes document is accepted by BriAll and dues are full paid. The membership is valid for one fiscal year, and is renewable on payment of the annual membership fee without any new approval.

Initial Member dues for the first year of membership shall be payable upon submission of a signed Statutes document. Payment of annual dues in each subsequent year shall be due and payable on the first day of BriAll's new fiscal year.

5. Suspension, exclusion and expulsion

The Board of Directors can decide to suspend or expel a Member and shall state the cause. In particular, the Board of Directors may so act in the following cases:

1. delay in or default of payment of fees
2. violation of the Statutes, procedures or resolutions adopted by the Board of Directors

The Board of Directors shall not act in a discriminatory manner in suspending, excluding or expelling a Member.

Membership shall automatically cease in case of bankruptcy, withdrawal or cessation of business or of such a change in the nature of business that criteria for Membership would no longer be complied with.

In case of delinquency of any Member relating to its payment of fees obligation, the Board of Directors may suspend such Member by written notice. The suspension shall be effective thirty (30) days after the date of the notification unless the default of payment has been cured during such period.

Any Member shall automatically be excluded and expelled if his fees are not paid within ninety (90) days following the effective date of the suspension notice.

In case of expulsion, the Member forfeits any fees paid during Membership.

The delay for new Membership application is at least one (1) year from the date of expulsion.

The admission of an expelled Member is subject to his payment of all arrears in fees and any other monetary obligations to BriAll.

6. Resignation

Resignations require notice in writing to the Board of Directors.

The resignation becomes effective as soon as the resigning Member has fully paid any outstanding amounts still due to the BriAll. In case of resignation, the Member forfeits any fees paid during Membership.

7. Property rights

7.1 Intellectual property rights of the Members

All patents, copyrights or other intellectual property owned or created by any Member shall remain the property of that Member. Such ownership shall not be affected in any way by the Member's participation in BriAll, unless the Member specifically agrees otherwise.

All material presented to BriAll or its Committees shall be deemed to be of a non confidential nature and hence suitable for public distribution.

7.2 Intellectual property rights of BriAll

Through its activities, BriAll may generate protectable intellectual property rights.

7.3 BriAll's publications

BriAll may publish documents to promote its objectives and purposes.

Members' employees may be cited as co-authors when appropriate.

The use of any Member's name, trademarks or trade names by BriAll including a Member description of BriAll's work is prohibited without prior written consent of the concerned Member, even after Member's resignation, exclusion or expulsion.

7.4 Other property rights

In the event of the dissolution of BriAll and liquidation of the association, the assets remaining from the liquidation shall not be distributed among the partners in proportion to their contribution but shall be allocated to a not-for-profit purpose, the partners expressly waiving any payment on the net assets of liquidation.

ARTICLE 5 - BriAll's bodies

The bodies of BriAll are:

1. the General Assembly
2. the Administrative Council (herein referred to as "Board of Directors")
3. Advisory Committees and Working Committees

ARTICLE 6 - General Assembly

6.1. Organisation

The General Assembly is formed by the Principal Members. It is the supreme body of BriAll.

Other Members may attend the General Assembly as observers.

6.2. Meetings

6.2.1 Annual Meeting

The Annual Meeting at the direction of the Board of Directors shall be on such date and time and at such place as shall be designated from time to time by the Board of Directors and stated in the notice of the meeting.

6.2.2 General Meeting

Due to special reasons a General Meeting may be held at any place designated by the President or the Board of Directors.

The Board of Directors shall call a General Meeting within thirty (30) days of the receipt of a written request setting forth the proposed agenda signed by at least twenty percent (20 %) of the Principal Members.

6.3. Notice

Written notice of the time and place and purpose of holding any Annual or General Meeting shall be given to each Member of BriAll who on the record date of notice is permitted to attend such meeting at least thirty (30) days, but no more than ninety (90) days prior to the scheduled date for the meeting. The written notice of a meeting will include the proposed agenda. All notices shall be given at the address on file with BriAll either personally, or by tele-copier, electronic mail or by first class, registered or certified mail.

6.4. Quorum

Thirty percent (30%) or more of the Principal Members, excluding proxies, shall be necessary for the initial establishment of the quorum for the transaction of business. For subsequent establishments of the quorum proxies shall be counted. Participation by teleconference is considered to be equal to participation in person.

If such quorum is not met at any meeting, a majority of the Principal Members present in person or by proxy shall have power to adjourn the meeting from time to time without notice other than announcement at the meeting of the time and place to which the meeting is adjourned.

6.5. Decisions

A fifty percent plus one (50% plus one) or more vote of the Principal Members in good standing present or represented by proxies is required to pass a resolution of the Members in the following cases:

1. approval of the audited accounts
2. election of the Directors to the Board of Directors
3. appointment of the Auditors
4. approval of the minutes of the previous meeting

A two-third (2/3) or more vote of the Principal Members in good standing present or represented by proxies is required to pass a resolution of the Members in the following cases:

1. revision of these Statutes
2. winding up of BriAll
3. approval of the budget and the annual fees
4. removal of a Director from the Board of Directors
5. indemnification pursuant to Article 13 of these Statute
6. definition of categories of individuals who support BriAll's goals and will be allowed to apply for Associate Membership

6.6. Proxies

At all meetings of BriAll any Principal Member shall be entitled to vote either in person or by a duly accredited proxy. A proxy shall not be valid for more than the meeting for which it is intended to be used or any adjournment thereof. No Principal Member shall validly hold more than two (2) proxies.

ARTICLE 7 - Board of Directors

7.1. Organisation

The Association shall be managed by a Board of Directors which shall have a minimum of three (3) Members for the foundation act of BriAll only and an uneven number of no less than five (5) and no more than eleven (11) Members elected by the first General Assembly.

The President and the Vice-President are chosen among the Board of Directors.

The Board should have insofar as possible a balanced representation of the main interests in the Multimedia Hyperlinking Environment.

Directors shall receive no salary for their services.

6.2. Candidates

Director Candidates are proposed to the General Assembly by the Membership and Nominating Committee.

The Directors, with the exception of Secretary and Treasurer, are selected from among the Principal Members' employees

No Member should have more than one of its employees appointed as a Director.

6.3. Term

The Directors shall serve terms of two (2) years, staggered so that one (1) half of the Board of Directors is elected each year.

For the first term five (5) members of the Board of Directors extend their term to three (3) years.

A Director may not serve more than two (2) consecutive full terms of office and neither that Director nor another employee of the same Member shall be eligible for re-election as a Director before the expiry of one (1) full term. Further no Member may have employees serving as a Director for a period of more than two consecutive full terms. No employee of such Member shall become eligible for election until a further full term shall have passed.

6.4. Removal

Directors may be removed in the following cases:

1. by the Board of Directors, if the Director has been declared of unsound mind or convicted of a felony
2. by the Board of Directors, if the Director has failed to attend 3 consecutive Board meetings and did not provide proper justification
3. by decision of the General Assembly with a two-third (2/3) majority vote

6.5. Vacancies

Any vacancy in the Board of Directors should be filled until the next meeting by decision of the Board of Directors on a simple majority of the present Directors at any meeting of the Board of Directors.

The Member whose employee is chosen for filling the vacancy shall not already be represented in the Board of Directors and has to be confirmed as Director by the next General Assembly.

6.6. Meetings

Meetings of the Board of Directors shall be held anywhere in the world.

The President shall determine the regular meetings' time, place and the intervals between these meetings.

Special meetings shall be called by the President on at least fourteen (14) days notice prior to the meeting; the notice shall contain date, time and place of the meeting and shall be sent personally, by mail or electronic transmission, with acknowledgement of receipt.

Special meetings shall be called the same way on written request of one-third (1/3) of the Directors.

Urgent matters may be discussed by teleconference.

The requirement of notice for any meeting of the Board of Directors may be waived by the unanimous consent of the members of the Board of Directors. A Director may evidence such consent by a writing delivered to both the President and Secretary at or prior to such a meeting by mail or electronic transmission, with acknowledgement of receipt, or by the vote of such Director at the time of such meeting.

6.7. Quorum and majority

Any transaction of business is possible as soon as a simple majority of all the Members of the Board is present.

Other decisions than sanctions against Members are taken on a simple majority vote of the present Directors.

Sanctions against Members, including removal, are taken on a two-third (2/3) majority vote of the present Directors.

The President shall cast the deciding vote in case of a tie.

Any action which may be taken at any meeting of the Board of Directors, may be taken without a meeting by unanimous written consent of the Directors which consent shall be delivered by each Director to both the President and Secretary by mail or electronic transmission with acknowledgement of receipt.

6.8. Powers

The Board of Directors:

1. interprets and administers these Statutes, other documents and agreements related to BriAll
2. supervises the good execution of these Statutes
3. manages the properties and business of BriAll
4. proposes the budget to the Members
5. sets the annual scale of fees - or sets a pro-rata fee for new Members to accommodate the financial year - all so that the fees for each class of Membership are sufficiently non-discriminatory and affordable.
6. determines the rights and obligations of non voting Members
7. sanctions Members
8. drafts the annual report of BriAll for the General Assembly
9. represents BriAll
10. calls the meetings of the General Assembly
11. elects employees of Members to fill any vacancy in the Board of Directors until confirmation or replacement
12. elects Officers, prescribes their duties except as otherwise provided by these Statutes and may remove them
13. sets up, controls and determines powers, duties and responsibilities, if they are not already set up by these Statutes, of Standing Committees other than those foreseen in these Statutes, Special Committees as may be found necessary or desirable to carry out the objects and purposes of BriAll, Working Committees
14. orders the publication of documents proposed by the Working Committees
15. acts within and according to the provisions of these Statutes.

ARTICLE 8 - Officers

8.1. Organisation

The Board of Directors shall elect the Officers after the Annual Meeting of the General Assembly.

The Officers shall be:

1. the President
2. the Vice-President
3. the Secretary
4. the Treasurer

The President and the Vice-President are automatically Officers.

The Secretary and the Treasurer may be the same person or their offices may be filled by the Vice-President.

The Officers shall receive no salary for their services.

8.2. Term

Officers shall hold their offices for one (1) year or until their successors are chosen. If they are Directors, the rules of Article 7.3 shall be applied accordingly.

8.3. Removal

Officers may be removed by resolution of the Board of Directors. No indication of cause is necessary for the removal.

8.4. Vacancies

In case of death, resignation, removal or disqualification of any Officer, the vacancy shall be filled by the Board of Directors. If the Officer is a Director, the rules of Article 7.5 shall be applied accordingly.

8.5. President

The President shall:

1. preside over the General Assembly and the Board of Directors
2. call the meetings of the Board and determine the intervals between the regular meetings
3. propose the agenda
4. oversee the execution of the General Assembly's and Board of Directors' resolutions
5. automatically be a member of standing and special Committees

8.6. Vice-President

In case of the President's impediment, the Vice-President shall:

1. perform all the duties of the President
2. exercise all the power of the President

The Vice-President shall also perform all other duties prescribed by resolution of the General Assembly, the Board of Directors or these Statutes.

8.7. Secretary

The Secretary shall:

1. keep the complete list of references (names, addresses, etc.) of BriAll's Members and of their employees interested in BriAll
2. attend all the General Assembly's and Board of Directors' meetings
3. keep a correct record of all the transactions in these meetings in a minute book belonging to BriAll
4. be the custodian of the corporate records, except those pertaining to the office of the Treasurer
5. send out notice of meetings to every Member
6. conduct all correspondence, except correspondence pertaining to the office of the President, the Vice-President or the Treasurer
7. perform all other duties and orders prescribed by the Board of Directors, the General Assembly or these Statutes
8. keep or cause to be kept a copy of the Statutes, as amended to date, at the seat of BriAll.

8.8. Treasurer

The Treasurer shall:

1. disburse, collect and receive any money due and belonging to BriAll
2. manage the deposits of BriAll under the supervision of the Board of Directors and as designated by it
3. notify the Secretary of any Member's delinquency relating to its payment obligations
4. draft the annual financial report of BriAll for the Board of Directors prior to the Annual General Assembly
5. maintain the financial records of BriAll according to the Generally Accepted Accounting Principles (GAAP) and Swiss law.

8.9. Signature

Except as provided elsewhere in these Statutes, all documents which purport to bind BriAll must be signed by the President and another Officer.

ARTICLE 9 - Advisory Committees

9.1. Organisation

BriAll has specifically Standing and Advisory Committees as described hereinafter.

Each Committee shall have one (1) Member at least, who is a Director and chairs the Committee.

8.2. Quorum and votes

The quorum for the transaction of business in a Committee is the simple majority of its present members which are Principal Members.

Advisory Committees take their decisions on a simple majority vote of their present Members.

Directors in Advisory Committees have no voting rights as pertains to the business of that Advisory Committee.

8.3. The Membership and Nominating Committee

This Committee shall:

1. review the qualifications of each applicant for Membership
2. recommend the approval or rejection of each application by the non-discriminatory application of published objective non-discriminating criteria
3. propose nominees for election to the Board of Directors taking into account the requirements for balanced industry and geographical representation
4. propose nominees for all Officer positions to be filled by the Board of Directors

8.4. The Finance and Audit Committee

This Committee shall within the financial year (1st of January to 31st of December):

1. review the accounts and finances of BriAll and prepare the audit report for the Board of Directors
2. propose to the Board of Directors the revised schedule of fees to be paid by the Members of BriAll
3. recommend an annual budget
4. recommend auditors for appointment by the Board

ARTICLE 10 - Development Committees

10.1. Organisation

The Board of Directors establishes Development Committees to accomplish the work of BriAll.

Each Development Committee and subgroup of it shall consist of Members of BriAll.

8.2. Procedures and voting

The work of the Development Committees is regulated by the Work Procedures. These will specify that special care must be exercised to achieve concurrence of BriAll Members in approving documents affecting their industries.

ARTICLE 11 - Logo

BriAll shall have a Logo.

ARTICLE 12 - Liability

For its obligations BriAll is liable with its assets only.

The Members Officers and Directors are not liable for the debts, actions/inactions of or on behalf of BriAll, provided such actions/inactions are in accordance with the Statutes and/or directions of the General Assembly or the Board of Directors.

ARTICLE 13 - Indemnification

To the fullest extent permitted by law and these Statutes, BriAll shall indemnify its Directors, Officers and other persons, including persons formerly occupying any such position, against all reasonable and related expenses, and all judgements, fines, settlements and other amounts actually and reasonably incurred by them in connection with their correct execution of their duties prescribed herein.

On written request to the Board of Directors by any person seeking indemnification, the Board of Directors shall promptly determine whether the applicable standard of conduct has been met and, if so, the Board of Directors shall recommend indemnification to the General Assembly. If the Board of Directors cannot recommend indemnification because the number of Directors who are parties to the proceedings with respect to which indemnification is sought prevents the formation of a quorum of Directors who are not parties to that proceeding, the Board of Directors shall promptly call the General Assembly. At that meeting, the Members shall determine whether the applicable standard of conduct has been met and, if so, shall authorise indemnification in accordance with this article.

ARTICLE 14 - General provisions

14.1. Annual fees

Annual membership fees will be determined by the Board of Directors as defined in Article 7, Section 8 and presented for approval of the membership during a duly convened General Assembly.

14.2. Term of BriAll

BriAll shall have a term of five (5) years and shall be wound up upon expiry of such term unless agreed otherwise by a two third (2/3) majority vote of the Principal Members.

14.3. Dissolution

Should BriAll be wound up, the balance of its assets shall, after deduction of debts, not be returned to the Members in proportion of their contribution, but be donated to a not-for-profit goal, the members explicitly renouncing any payment from the net assets remaining after liquidation of BriAll's property.

14.4. Antitrust Policy

Each Member acknowledges that the Members are committed to fostering competition in the development of new products and services. The Members further acknowledge that they may compete with one another in various lines of business and that it is therefore imperative that they and their representatives act in a manner that does not violate any applicable antitrust or competition law or regulation in any jurisdiction. Accordingly, each Member hereby assumes responsibility to provide appropriate legal counsel to its representatives acting under this Agreement regarding the importance of limiting their discussions to subjects that relate to the purposes of BriAll and avoiding discussions of matters relating to product costs, product pricing, methods or channels of product distribution, any division of markets, or allocation of customers or other competitively sensitive issues, whether or not such discussions take place during formal meetings, informal gatherings, or otherwise.

14.5. Amendments to the Statutes

The effective date for amendments to these Statutes shall be the date such amendments are duly enacted by the General Assembly in accordance with Article 6, Section 5, unless stated otherwise in the amendment or the General Assembly resolution enacting such amendment. All members shall be bound by any duly enacted amendments to these Statutes and be given sufficient time to resign if they do not agree to the changes.

Duly signed at Geneva, on this xx/xx/2017

10 Annex B – Partners List

Table 6 – Partners list

Nr.	Organisation name	Country
1	University of Surrey	UK
2	CEDEO SAS di Chiariglione Leonardo e C.	IT
3	Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung E.V.	DE
4	Huawei Technologies Düsseldorf GmbH	DE
5	Institut Mines-Télécom	FR
6	RAI – Radiotelevisione Italiana	IT
7	Telecom Italia S.p.A.	IT
8	Universidad Politécnica de Madrid	ES
9	Visual Atoms	UK