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Innovation Action

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## **D4.4 Prototype Service Descriptions – Second Update**

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### Abstract

The four multi-screen service innovation prototypes that are being developed by 2-IMMERSE are described in this document. This is the second update of this deliverable. It brings up to date the visions the project has for each of the four innovation prototypes. The last status report was May 2017, this document was compiled in December 2017. The four prototypes were originally called Watching Theatre at Home; Watching Theatre in School, MotoGP at Home and Watching Football in a Pub, as you will see from the text the fourth is now Football at Home. Whilst the use cases are described very specifically, it seems clear that many aspects of service innovation concepts will have much broader applicability. To complement this written document readers are also alerted to look at videos available on the project's website [1] and on our YouTube channel [2].

### Target audience

This is a public deliverable and could be read by anyone with an interest in the way television as a medium may use multiple screens to create richer and more immersive user experiences. It is of specific value to the project consortium as it defines the user requirements that the technology being supplied by the consortium should satisfy.

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### Impressum

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## Executive Summary

Four multi-screen service prototypes that are being developed and evaluated in the 2-IMMERSE project are described. The service prototypes are being developed using a design-led process that places considerable emphasis on both users and markets. Unlike existing services these prototypes are characterised by the fact that the presentation of content is automatically coordinated across multiple screens. This is facilitated by an object-based broadcasting approach for content distribution.

The four multi-screen service prototypes use the valuable but distinctive content-forms of live Theatre and Sport.

The Watching Theatre At Home use case is based on filmed performances by the Royal Shakespeare Company produced by John Wyver, who works for project partner Illuminations. The Watching Theatre at Home service prototype is unchanged from that described in the first update of this deliverable and has not been developed further within the project; the outline description is included here along with links to a video demonstration of the prototype.

The Watching Theatre in School use case is being developed around filmed production of a trilogy of Shakespeare plays, and specifically *Julius Caesar*, by the Donmar Warehouse. This production, due for trial in early Autumn 2018, is at an early stage but elements of the market and social context are described as are early thoughts about the components that will make up the experience.

The MotoGP at Home service prototype creates personalised sports-related experiences using coverage of the MotoGP developed by Dorna Sports and distributed in the UK by project partner BT. The MotoGP use case development is now complete (Dec 2017) and the prototype service is being evaluated. The service description in this document gives a good indication of the experiences that our triallists will be assessing.

The use-case relating to Football has, since the last version of this document, attracted significant interest from one of the commercial arms of the project partners (i.e. BT Sport) and they have encouraged the project to focus on the commercially more important use case of Football at Home. Previously the focus had been on the presentation of football in pubs. The use case description for the football use case has been adapted to reflect this change and the background to the change are discussed.

This document is the second iteration of a deliverable that will have one further update. The four service prototypes will be evaluated in turn during the 3-year project lifetime as shown in Figure 1

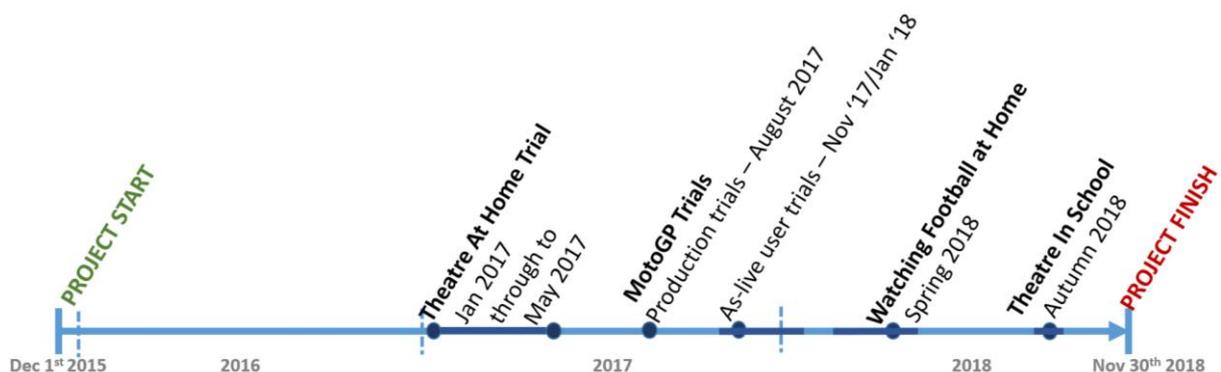


Figure 1 Timeline for the 2-IMMERSE production tests

Given that the service prototypes are at different levels of maturity not all service prototypes are equally well defined, the descriptions of those developed towards the back-end of this project are less well developed than those that will be delivered sooner (or have already been developed).

Each service prototype is described using a guide scenario that explains how a user interacts with the service. This guide scenario is used as the basis for generating the user requirements and hence for defining the capabilities that the technical platform must support. These technical requirements will be described elsewhere.

Whilst the innovations are described with reference to precise markets and content types, the technical solutions to the challenges they create will be useful for a much wider range of content genres and markets than are represented in this project.

Readers are alerted to video resources published by the project that include video based descriptions of each experience that may be found on the project web site [www.2immerse.eu](http://www.2immerse.eu) [1] and on our YouTube channel [2].

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## Glossary of terms

<b>Term/acronym</b>	<b>Definition/explanation</b>
<i>A Level</i>	A Levels, are secondary school leaving qualification in the United Kingdom. They are offered as a main qualification in England, Wales, and Northern Ireland, as an alternative qualification in Scotland, and as an international school qualification worldwide.
<i>BT Sport</i>	BT Sport is a group of sports television channels provided by BT in the United Kingdom. BT Sport is available on the BT TV, Sky and Virgin Media television platforms in the UK and holds various exclusive rights for Sports including rights to 42 Premier League matches per season as well as exclusive rights to the UEFA Champions League, UEFA Europa League, and MotoGP.
<i>Dorna Sports</i>	Dorna Sports is an international sports management, marketing and media company. The organisation has its headquarters in Madrid, with further branch-offices and/or subsidiaries in Barcelona, Rome and Tokyo. The company has been the exclusive commercial and television rights holder for the FIM Road Racing World Championship Grand Prix (MotoGP™) since 1992.
<i>Emirates FA Cup</i>	See FA Cup
<i>EVS</i>	EVS Broadcast Equipment SA is a Belgian company that manufactures live outside broadcast digital video production systems. Its recorders have become the dominant standard for broadcasters worldwide. Their XT3 production video servers enable the creation, editing, exchange and playout of audio and video feeds. The company states that over 5,000 operators of all nationalities now use their applications on a daily basis.
<i>FA Cup</i>	The FA Cup is an annual knockout football competition in men's domestic English football. First played during the 1871–72 season, it is the oldest association football competition in the world. It is organised by and named after The Football Association (The FA). For sponsorship reasons, from 2015 through to 2018 it is also known as The Emirates FA Cup.
<i>Front Row</i>	<i>Front Row</i> is a radio programme broadcast on BBC Radio 4 that has been broadcast since 1998. The BBC describes the programme as a "live magazine programme on the world of arts, literature, film, media and music." It is broadcast each week day between 7.15 pm and 7.45 pm and has a podcast available for download. Shows usually include a mix of interviews, reviews, previews, discussions, reports and columns.
<i>IPTV - Internet Protocol television</i>	Internet Protocol television (IPTV) is the delivery of television content using signals based on the logical Internet protocol (IP), rather than through traditional terrestrial, satellite signal, and cable television formats. IPTV is important to this project as it is IPTV delivery that enables the OBB (object based broadcasting) approach to content delivery.
<i>MotoGP also Moto 2 an Moto 3</i>	The MotoGP World Championship is the premier class of motorcycle road racing. It is currently divided into three classes: MotoGP, Moto2 and Moto3. The primary distinction between these classes is the engine capacity of the motorcycle; 250cc bikes for Moto3, 600cc bikes for Moto2 and 1,000cc bikes for the 'premier' MotoGP races.
<i>OCTO British MotoGP Race</i>	The British Moto GP race is held at a UK race circuit (currently Silverstone) and is sponsored by Octo telematics (the company that make telematics system to monitor driving styles for insurance companies) so is known for sponsorship reasons as the Octo British MotoGP Race.
<i>OPTA</i>	OPTA describe themselves as "The world's leading sports data provider" with a mission to create a global standard for live sports data. They create and sell sports data ranging from live in-match data (score, passes completed, distance run etc.) to league tables, player statistics etc. to broadcasters, publishers and to sports clubs themselves as a training aid.

<b>Term/acronym</b>	<b>Definition/explanation</b>
<i>PiP – Picture-in-picture</i>	Picture-in-picture (PiP) is a feature of some television receivers and similar devices in which one program (channel) is displayed on the full TV screen at the same time as one or more other programs are displayed in inset windows. Sound is usually from the main program only. PiP usually demands the device has the capability to decode two signals simultaneously so is an important use case in our work.
<i>RSC Royal Shakespeare Company</i>	The Royal Shakespeare company perform Shakespeare’s plays, as well as works by Shakespeare’s contemporaries and plays by today’s writers. The RSC want as many people as possible to be able to access theatre at its best, so we bring our work to the widest possible audience through: Touring and residencies – UK and worldwide; Broadcasts to cinemas Live From Stratford-upon-Avon – UK and worldwide; Online activity; Education work reaching out to 530,000 children and young people, including free Schools’ Broadcasts.
<i>Silverstone</i>	‘Silverstone’ is a motor racing circuit in England. Silverstone is the current home of both the British Grand Prix and the British round of the MotoGP series.
<i>Spyder cam</i>	Spyder Cam is a camera used in televised sports coverage in to provide a birds-eye view of the game in sports stadia. Spyder Cam is suspended above the pitch via four wires attached to each corner of the ground and controlled by an operator to follow the action from a height of 10 to 40m above the pitch.
<i>Tracab</i>	TRACAB is a camera-based player and ball tracking system. TRACAB is installed in over 300 stadia, capturing live tracking data on over 4,500 games every year

## 1 Introduction

The 2-IMMERSE project is developing four innovative service prototypes of multi-screen entertainment experiences. Unlike existing services the content layout and compositions will be orchestrated across the available screens and an object based broadcasting approach will be used for content distribution.

This document provides the second update to the description of the multi-screen prototype services that 2-IMMERSE is building and evaluating. It is based on D4.1 “Prototype Service Description – Initial Version”.

This document should enable the reader to:

- picture the type of services the projects is building and has built
- understand why each extends the current state of the art
- understand our motivation for developing them
- understand the method we are using to conceive each service innovation prototype

Four service innovation prototypes are described. The first one, Watching Theatre at Home, is unchanged from the description offered in the first update of this deliverable. For completeness the description written in the first update of this document is included and we include a link to a new short video that shows this experience.

The Watching Theatre in Schools use case is now being developed with the leading London theatre company, the Donmar Warehouse. The Donmar Warehouse have an ambitious outreach and education programme and we look forward to building an experience that will enable Donmar’s educational outreach goals to be achieved by incorporating networked based streamed media experiences. It is our intention that this will enable Donmar to achieve greater levels of educational outreach.

The MotoGP at home service prototype creates personalised sports-related experiences using coverage of the MotoGP developed by Dorna Sports and distributed in the UK by BT Sport. The MotoGP use case development is now complete and the prototype service is being evaluated. The service description in this document gives a good indication of the experiences that our triallists will be assessing.

The use case relating to Football has, since the last version of this document, attracted significant interest from one of the commercial arms of the project partners (i.e. BT Sport) and they have encouraged the project to focus on a use case now called Football at Home, which is much more important commercially than the original use case which was focused on the presentation of football in pubs.

The document includes some significant development in the plans outlined in D4.3. For example:

- The football use case has, following the commercial interest from BT Sport, switched focus from being an in-pub scenario to one that is in-home. The in-home experience is much more important commercially than presentation in pubs and we are pleased to have this change of focus. We recognise it has affected some of the conceptual challenges that we now need to address. In many ways these challenges are similar to those posed by the MotoGP use case. Some of the production challenges, however, are unchanged, for example low cost capture of additional content and the inclusion of data driven graphics. We are not now addressing some of the issues raised by presentation to multiple large screens in a public venue,

including those around control of the content being distributed between producer, landlord and user.

- The nature of the football trial has also changed. This is driven by a better understanding of the challenges posed by capture and production and by an acquired understanding of the importance of the role played by production tools. In consequence, the Football trial is likely to take on an extended form in which new features will be trialled incrementally, over several weeks, rather than being focused on a single event. This approach has been developed in response to advice by BT Sport production staff who are wary of trying to adopt too many changes in production practice in one go. We expect the Football At Home use case to be explored over several weeks through the spring of 2018.
- The project is now working with Donmar Warehouse in order to pursue the Watching Theatre at School use case. Donmar have a different emphasis to the Royal Shakespeare Company and their very enthusiastic open and engaged education department provide us with many opportunities to understand the objectives they have for their educational outreach. They are focussed more on interpreting and learning from drama rather than on encouraging immersion within it. We believe that this approach lends itself to use cases involving multiple short form video presented on a range of screens as opposed to using multiple screens to enhance a long form experience.
- The MotoGP trial has been developed and finessed. The Guide Scenario remains broadly accurate but significant attention has been paid to many design and implementation issues. Also, the experience has incorporated a more complete on-boarding procedure. On-boarding, the process by which people join the experience, had not been considered in detail before within 2-IMMERSE but is clearly an essential process that can shape the success or otherwise of these multi-screen experiences. Further, the on-boarding process is one that can be easily transferred to other experiences.

There are elaborations of these changes in the “What’s changed” sections under each of the prototype service descriptions.

## 2 Approach

The service innovation prototypes are conceived using a user-centred, and market-aware process. This means each service innovation prototype must have a sensible fit with both user behaviour and market economics. It also means that each service innovation must be described in ways that ultimately lead to clear user requirements.

This deliverable describes the four guide scenarios that we use to envisage the service innovation prototypes. We start the descriptions using high level user-stories that outline how named users (persona) interact with our service innovation prototype. These high-level user stories encapsulate a number of innovative key features, described in a solution agnostic way. The way these features are realised is developed through workshops that focus on each more specific user story to create clear technical requirements that must be supported by the 2-IMMERSE platform. The software components created to meet these requirements are then available for all use cases.

These use cases are also derived with a clear understanding of the market. Markets are not homogenous and it is deliberate that the service innovation prototypes are developed with reference to particular well-defined commercial contexts. The solutions developed will probably be applicable in many adjacent markets but the focus is on developing compelling service innovation prototypes for well understood markets in which the service providers associated with this project have clear interests. The service providers directly associated with the project include BBC and BT.

The BBC do not seek profit; they seek value according to their public purposes. The six stated public purposes include: 'Promote education and learning'; 'Stimulate creativity and cultural excellence' and 'Represent the UK, its nations, regions and communities'. These public purposes could be supported through the development of experiences that bring the best British theatre into homes and schools, and that enhance the experience of key national sporting occasions such as the FA Cup.

BT is a public limited company whose purpose is to use the power of communications for a better world. BT is a challenger in the UK Pay TV market and can benefit from well-differentiated appealing services that utilise the unique characteristics of its IPTV-based content distribution network. BT is more classically profit driven than the BBC; BT invests billions in network infrastructure and in content rights and seeks to see return from this investment – a return it can only expect to realise through the creation of relevant, compelling, reliable and valued experiences.

Whilst the innovations are described with reference to precise markets and content types, the technical solutions to the challenges they create will be useful for a much wider range of content genres and markets than are represented in this project.

The four service prototypes are being developed consecutively, with each trial planned at a different stage of development. The use cases will be showcased in due course through videos that will be linked from the 2-IMMERSE web site, [www.2immerse.eu](http://www.2immerse.eu) [1] and available on a YouTube channel <https://www.youtube.com/channel/UCpGa5NU1Bbj8Nkz0vZi7lwA> [2]. At the time of writing (January 2018) only the Watching Theatre at Home use case is fully documented in video, but depending when this Deliverable is read, other videos may be available at these links.

The current status of the prototypes is as follows:

- Watching Theatre at Home – Conceived, built, tested. Evaluation complete.
  - See video: <https://www.youtube.com/watch?v=SDnS9mow4V4> [2]
- Watching Theatre in School – concept being developed, targeting trial in September-October 2018.

- MotoGP at Home – in trial, evaluations should complete in January 2018.
  - Video expected to be published to our YouTube channel in January 2018 [2]
- Football at Home – development about to start for technical tests in Spring 2018.



Figure 4

### Watching Theatre At Home



This service innovation prototype is called **Theatre at Home** because it offers an enhanced social experience for users in a domestic context to watch a live or “as live” broadcast of a theatre performance. The user will have a second screen device that can access synchronized information streams directly from the provider of the broadcast and from the web through social media applications including Twitter but which can also, at times, feature audio and video chat with others who are watching. The service innovation prototype will enable a user to watch a theatre production, shot with multiple cameras, as either a live or an ‘as live’ experience. Viewers will be able to contribute to and monitor different forms of feedback throughout the performance, and to discuss it with others who are watching at the same time, either in a different room or in a different home.

**Owner:** John Wyver (Illuminations)

**Rights Originator:** Royal Shakespeare Company

### Watching Theatre in School



This service innovation is called **Theatre in School**. This service enables pupils in schools across the country to watch a filmed performance of a play in a production by the Donmar Warehouse. Pupils are able to augment the main filmed presentation of a play with access to related supporting content and experiences to help them deepen their understanding of the play. This related content may include a synchronised transcript of the play, character summaries, short films featuring the talent in the play and even live communication session with the actors and other creative talent associated with the production.

**Owner:** John Wyver (Illuminations)

**Rights Originator:** Donmar Warehouse



Figure 9

### Watching MotoGP at Home



This service innovation will provide a viewer with a personalised experience that can be controlled to suit their interests and level of experience in the sport. It will allow live broadcast video and telemetry data to be displayed on a large screen TV and on smaller personal companion screen devices. The User Trials will take place in a series of ‘as live’ broadcasts in multiple households and lab environments. Research insights will be captured from device/service instrumentation and qualitative questionnaires and interviews with triallists. A Production Trial will be undertaken on site at Silverstone during the live race where the production tools will be tested. We will showcase the work in demos after the trials at selected industry and academic conferences and events.

The trial will focus on the Octo Great Britain MotoGP race held at Silverstone in late August 2017.

**Owner:** Andy Gower (BT)

**Rights Originator:** Dorna Motor Sports



plan we thought we would work with the Royal Shakespeare Company, but we are certain that it is in the Project's best interest to work now with the Donmar Warehouse.)

- The MotoGP trial is split into two trials: a live Production Trial that took place in August 2017 and a series of as-live User Trials that are taking place in December 2017 – January 2018. These trials will be reported in Deliverable D4.5 due in March 2018.
- The Watching Football at Home trial is at a delicate stage; and specific plans are quite fluid but the strong support we are experiencing from BT Sport gives us confidence that we will gain access to the stadia and production facilities during the spring to conduct iterative production tests that should culminate in a live trial at a significant match in late spring of 2018, possibly a final at Wembley, and ideally the FA Cup Final.

The four use cases offer varied characteristics in order to test the extent to which it will be possible to specify a generic technical platform to support a range of different experiences.

The following chart (

Figure 3) shows the diverse attributes addressed by the selected service innovation prototypes. It also includes an indication of the extent to which other variants, not addressed by a specific use case, may be addressable by the same system. For example, whilst the theatre at home use case focuses on theatre it would work well for opera, ballet and orchestral performances as well. Likewise, the MotoGP at Home use case may also offer capabilities that could be used in other athletic track based events (as well as of course, other track-based motor sports).

The switch to a focus on Watching Football At Home (from Football in a Pub) means that we will develop no further the insights we have gained about serving content to public locations showing leisure and entertainment content (such as TV screens in pubs and sports clubs). Instead we will focus on the commercially more valuable use case of presenting football to people's homes.

Figure 3 is an attempt to show how insights gained from these use cases may transfer to other use cases, where those use cases are characterised in terms of the subject of the content, the viewers, the location in which the content is watched, the types of additional content that are available to augment the experience and the requirement for synchronicity. Whilst

Figure 3 won't be perfectly correct we hope it exposes some plausible assumptions. For example, that insights gained from the analysis of football are likely to fully translate to other invasion games (rugby, hockey etc.) but also, although to a lesser degree, to track-based games (athletics) and to striking and fielding games (e.g. cricket - given the UK focus). Since we started the project we have become increasingly aware of the commercial interest in e-Sports. For this reason we now also estimate the degree to which the features, capabilities and approaches being developed for our service prototypes may also apply in e-Sports. E-Sports, the live streaming of competitive computer gaming, is a burgeoning viewing experience that whilst widespread is not yet embedded in TV schedules; it may never be. Such experiences, however, could utilise team and player statistics, to aid the storytelling, much as traditional sports do today. Interestingly, performance metrics in e-Sports can be mined from data extracted directly from the game engines - rather than, as is the case for traditional sorts, extracted via ancillary recording processes that generate the statistics on wins, loses, passes completed, goals scored, miles travelled, sector times, current position etc.

The synchronicity column provides an estimate of how closely synchronised the video arriving on different screens must be to give a comfortable user experience.

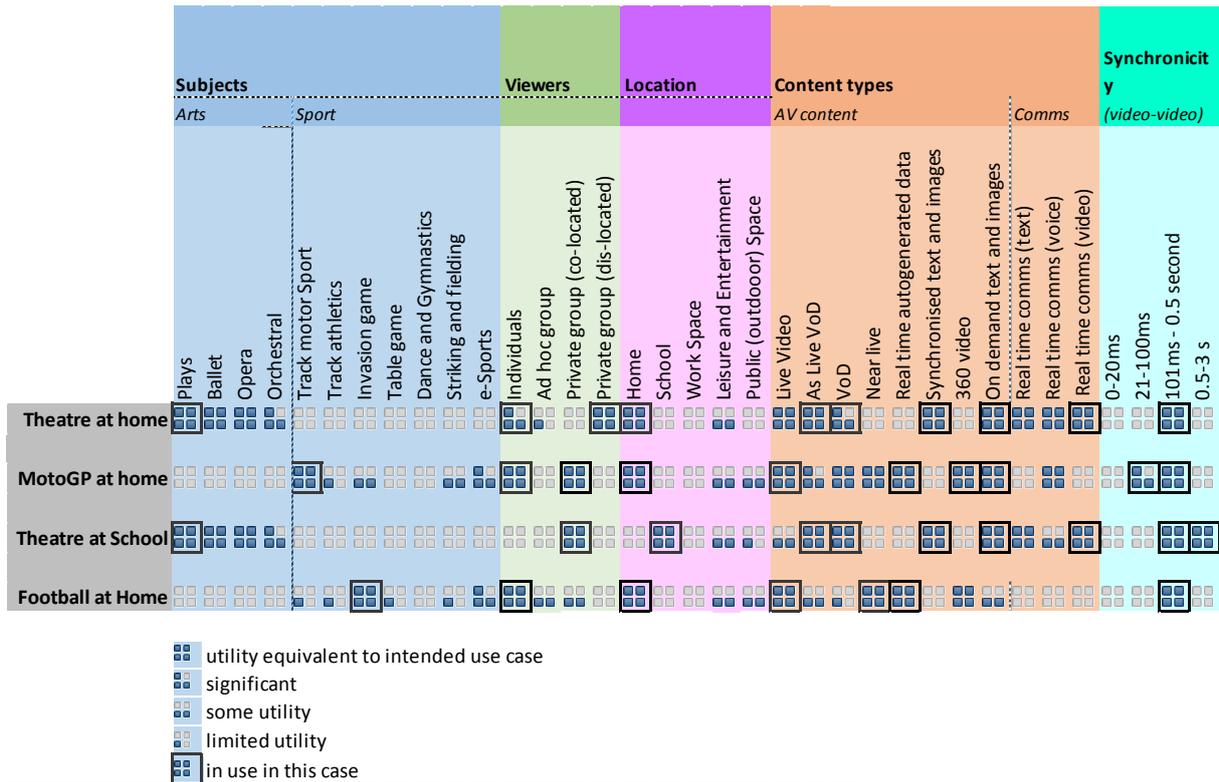


Figure 3 Attributes of the 2-IMMERSE service prototypes with an estimation of the extent to which the innovation developed here may work for other content genres.

### 3 Prototype Service 1 – Watching Theatre at Home



Figure 4

#### Watching Theatre At Home

This service innovation prototype is called **Watching Theatre at Home** because it offers an enhanced social experience for users in a domestic context to watch a live or “as live” broadcast of a theatre performance. The user will have a second screen device that can access synchronized information streams directly from the provider of the broadcast and from the web through social media applications including Twitter but which can also, at times, feature audio and video chat with others who are watching.

The service innovation prototype will enable a user to watch a theatre production, shot with multiple cameras, as either a live or an ‘as live’ experience. Viewers will be able to contribute to and monitor different forms of feedback throughout the performance, and to discuss it with others who are watching at the same time, either in a different room or in a different home.

**Owner:** John Wyver (Illuminations)                      **Rights Originator:** Royal Shakespeare Company



The video provides a good understanding of the experience in use: <https://2immerse.eu/videos/>

This guide scenario, which is written to help the reader picture this service innovation prototype features **Bob**, a 35 year old IT worker, who is friends with the married couple **Dave** and **Sue**. Sue is the organiser of the group. Sue is a teacher who enjoys performing in local am-dram productions and going to the theatre. **Dave**, a pest controller, is also keen on performing and watching drama. **Helen** is a friend of Dave and Sue, she is also a teacher. **Mike** and **Jane** are school friends of Sue, and they live across town with their young family.

N.B. These user stories and notes make reference to a ‘box’; this is the metaphor for users sharing an experience (i.e. in the same session) but in different physical locations (contexts), based on the concept of the theatre box.

### 3.1 Watching Theatre at Home – Guide scenario



**Figure 4 Concept illustration of the Theatre at Home experience**

Bob tries to see local plays if they look interesting or if they get a good review in the media or from friends. He has been along to the cinema to see some of National Theatre Live productions. Tonight he's watching theatre at Number 7, the home of his old school friends Dave and Susan and with one or two other graduates of Bridge St School who will share the experience remotely from their homes in different parts of the UK

Bob received the synopsis of the play a few days before tonight's performance, and he vaguely recalls a discussion of it on *Front Row*<sup>1</sup> in the week. That interview was posted as a link in the synopsis, but he decided not to listen to it again.

The performance starts at 8pm so Bob arrives at Dave and Sue's house at 7:30pm. Sue and Dave have a large TV in the corner of their living room and a second screen on the wall to the right. They both have an Android tablet and Bob has taken along his iPad. Sue switches on the Augmented Media Player (AMP) under the TV and selects the theatre setting from the menu that appears on her tablet.

The TV shows a wide shot of the Apollo Theatre's empty stage. On the second screen Bob, Sue and Dave can view (and perhaps navigate around) a 360-degree video feed from the foyer of people arriving and entering the theatre.

Sue shares that she is about to watch the performance on Facebook and pretty soon Diane's name pops up in response. Dave and Sue have set up a 'Theatre Box' so that more of their old school friends can share their thoughts and enjoyment on the play as it unfolds. Through this tele-presence media app groups of people can message to the whole group or 'whisper' privately to individuals

<sup>1</sup> Front Row is a radio programme broadcast on BBC Radio 4 that has been broadcast since 1998. The BBC describes the programme as a "live magazine programme on the world of arts, literature, film, media and music." It is broadcast each week day between 7.15 pm and 7.45 pm and has a podcast available for download. Shows usually include a mix of interviews, reviews, previews, discussions, reports and columns.

annotating (e.g. 'like') bits of the broadcast in their messages. Sue selects the video-conference mode on the 'Box' settings and an image of Diane appears on her tablet. Bob signs into Sue's Box on his iPad and says hi to Diane.

Sue had talked to Helen about watching tonight's performance when they last met. She couldn't make it to their house but she invited her to her virtual Box. Helen appears on the Box app and joins Sue, Dave, Diane and Bob. They idly chat and catch up as the theatre continues to fill. Sue is interested to access more information about the play and the production, and she reads this on her tablet while the others are chatting.

Soon the noise in the theatre falls away as the Apollo's house lights go down. Dave dims the house lights at number 7. The performance is about to begin. The tablet chatter of the virtual Box slows too. Just as the stage lights go up, two more school friends - Mike and Jane - sign into the box from their home, apologizing for their last minute appearance.

As the performance proceeds Dave decides he can't understand the strange accents being affected by some of the actors and calls up the scrolling script onto his iPad to help him follow the dialogue until he can get used to the way they are speaking.

Sue is really interested in the staging of tonight's performance, and on her tablet she keeps open a fixed wide-shot of the stage, so that from time to time she can compare this with the screen director's live mix of the production which includes frequent close-ups and tracking shots.

There are moments in the performance when Bob's attention is not captivated by what's on stage, but he is curious about the virtual audience and so he accesses on his tablet a graphic that shows him how many others are watching. Also on his tablet is a slider that allows him from moment to moment to rate the production from 1 (dreadful) to 10 (marvellous). His slider is set somewhere around the 4 mark, but he sees that the aggregated score from the rest of the audience is above 7, so he decides that perhaps he is missing something and he focuses again on the actors. By the end of the first half the aggregated score has crept above 8, and this cues appropriately enthusiastic and noisy applause from the speaker on his tablet. Which is something of a contrast with a play last month when the rating at this point was below 3 and he heard an occasional "boo" in the tepid clapping.

At the interval, Sue switches the virtual Box from message only to message and video and throws the mosaic of video images to the TV so the friends can see each other. By the end of the first half Dave had become attuned to the accents and dispensed with the scrolling script and was now using his tablet to browse the programme. The others also look through programme and chat to each other (counting the total number of episodes of Casualty in which the cast has appeared) and guessing what will happen in the second half. As they do so Helen sends a link to Bob. The link is for tickets to a production of the play they are watching that will be performed at their local theatre next spring. On the second monitor in the room the 360-degree live video shows people queueing for the white wine, which prompts Dave to open another bottle of Sauvignon Blanc.

Once again the theatre chatter from the second screen on the wall falls away and the house lights go down. The stage view replaces the video chat on the TV and the distributed group settles down in their virtual box for the second half. Towards the end of the third act there is an amazing moment in the performance when two actors deliver stirring a scene at the peak of their craft. The theatre audience rise from their seats in a standing ovation. The friends remain seated but the aggregated rating has topped 9, prompting a spontaneous burst of applause from the system. They share the moment with the theatre audience, and with the audio channel, by clapping from their sofas in recognition that they have witnessed and shared something extraordinary. They share a second standing ovation at the end of the performance and return to video chat before the group disperses until the next time. Playing out on the main monitor is the 360-degree video feed as the audience at the Apollo collect their coats and head off into the night.

## 3.2 Watching Theatre at Home – What’s changed?

The Watching Theatre At Home service innovation prototype has now been designed, developed and evaluated. The top level description remains valid and the guide scenario in section 3.1 is broadly representative too. During the development process choices had to be made about which features and functionality could be implemented given the time and resources available.

It is acknowledged that the prototype as developed fell short in a number of ways when compared to the description as originally conceived. That description was ambitious and complex, and the implementation as the overall 2-IMMERSE platform was being built has proved to be more demanding than envisaged. Key elements have, however, been achieved, and the lessons learned throughout this process are already proving to be invaluable for the remaining prototypes within the project.

In D2.1 we outlined the four different kinds of experience that we intended the main and second screens to offer to the user. These were Context, Channels, Crowd and Chatter. The following sections describe the extent to which these elements have been addressed.

The video provides a good understanding of the experience in use: <https://2immerse.eu/videos/>

### 3.2.1 Experience class: Context

We wanted to offer the user the ability of contextualising the performance by providing them with access to information about the production in the form of text, images, audio and video. These resources include the kind of material that might be found in a theatre programme, including the list of cast and creatives together with details about what they have appeared in or contributed to previously, as well as short audio and video elements plus text essays about aspects of the production and the play, the historical background or influences on the team that created it.

In the initial configuration the contextual elements are offered as options within the second screen and are not overlaid on the production broadcast, but this may be an option that it is implemented at a later point.

The provision of contextual information about the production has been successfully implemented within the prototype, and this remains accessible to the user before, during and after the performance itself. This information comprises the textual elements of a cast list and the play synopsis, cast and creative biographies and essays about aspects of the production and the play. In addition, during the performance, text synopses of each scene can be accessed to enhance the user’s experience. Production and rehearsal images are also available to be accessed, together with short video elements, and in addition contextual video is offered as part of the main stream of the production itself before the performance and during the interval.

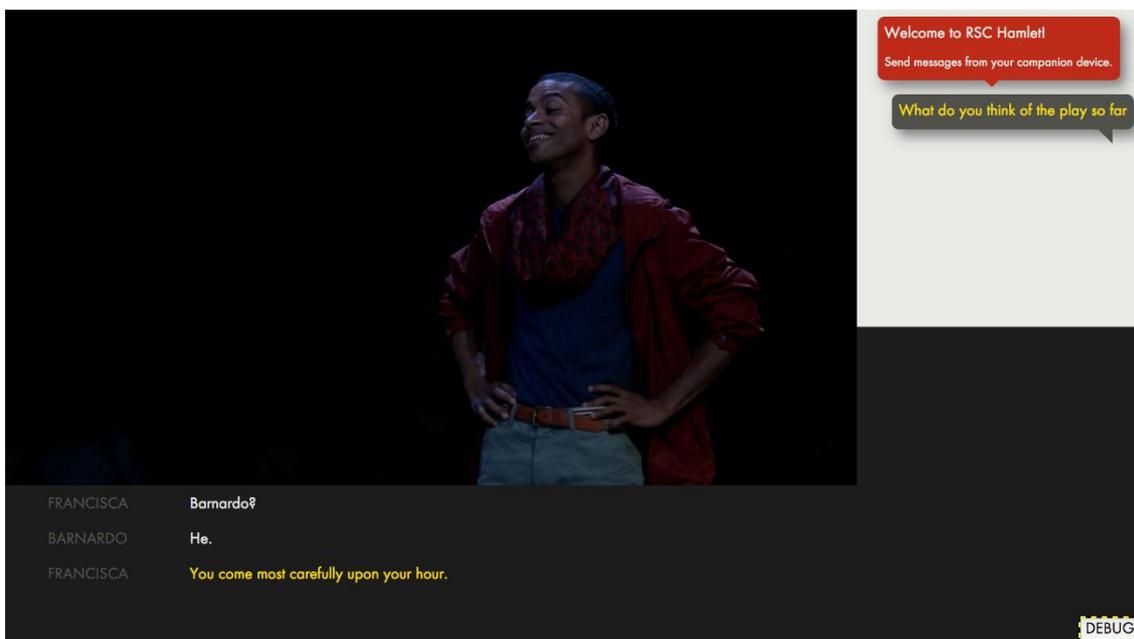


**Figure 5** Three screen shots of the tablet showing some of the contextual information available from the slider that can be pulled up from the bottom of the tablet screen whilst a video interview with one of the creatives plays in the top left of the screen.

### 3.2.2 Experience Class: Channels

Our intention was that we would provide the user with different visual perspectives on the performance of live theatre. We envisaged that before and after the show, and also during the interval, a live (and potentially interactive) 360-degree video feed might be streamed from the foyer of the theatre. Then during the broadcast of the theatre show itself it was envisaged that the user would be able to access, as supplements to the full mix of the performance, and either on the main screen or on the second screen device, three additional synchronised streams; one of these would be the video of a fixed-camera wide shot (which can appear either on the main screen or the second screen device) and the full audio mix, and the other two offer optional subtitles on the main screen and audio description overlaid on the audio mix.

At present, however, the Watching Theatre at Home prototype offers only a single channel of video from the theatre, which is the full mix of the performance, but this is complemented on the second screen with a synchronised scrolling script which provides the accessibility option envisaged by the optional subtitles.



**Figure 6** Screen shot of the main TV screen showing the synchronised scrolling script under them main presentation and the text chat window to the right of the screen.

It is proposed that implementation of the alternative video of a fixed-camera wide shot of the stage will be achieved at a later stage of the prototype's development, as this is seen as an important element enhancing the user's experience.

The integration of 360-degree video from the foyer of the theatre is now regarded as perhaps less essential as a component. During discussions of its possibilities it has also been pointed out that it raises certain privacy and permission issues for those attending the theatre that are not problematic if the performance alone is being broadcast from the auditorium.

### 3.2.3 Experience class: Crowd

We wanted to enable the viewer to gain something of the sense of being amongst a crowd as they experienced the performance. We aimed to do this by allowing the user to access, on the second screen, a graphical representation showing how many other people are watching the theatre show at the same moment and also, if permission by others has been granted, whether any of these are in the user's contacts and/or Twitter feed. We envisaged that the user could also offer feedback in the form of a 1 to 10 rating at appropriate moments during the show as a scene is drawing to a close or the end of a part. This feedback would be aggregated and expressed automatically in numerical and graphical form and also as supplementary audio of applause.

The graphical, and potentially aural, presentation of the crowd in the forms envisaged have not to date been implemented. In part this is because their achievement is a technical task of considerable complexity, and it was decided within the project during this first phase to focus on the basic elements of the channels, context and, as below, chatter. As the planning of the evaluation trials developed it also became clear that these would be undertaken initially between just pairs of households and that within this scheme the testing of the proposed crowd elements would not be feasible. Enhancing the home experience by offering virtual forms of the social experience, in addition to the video chat, remains a priority for the project, but we now have a more realistic sense of just how hard this is to implement.

### 3.2.4 Experience Class: Chatter

Central to the vision of the Watching Theatre at Home prototype was offering the user the ability to chat about the performance by facilitating, through the combination of the main and second screens, real-time interaction with others, primarily before the show begins, during the interval and afterwards. This main interaction has been successfully implemented via video chat. In future implementations the user will be able to organise in advance who will be part of the group for video chat – who, in a sense, will be in their virtual “box”, but she can also invite others who are known to be watching and seek to make contact with other audience members for such chats.

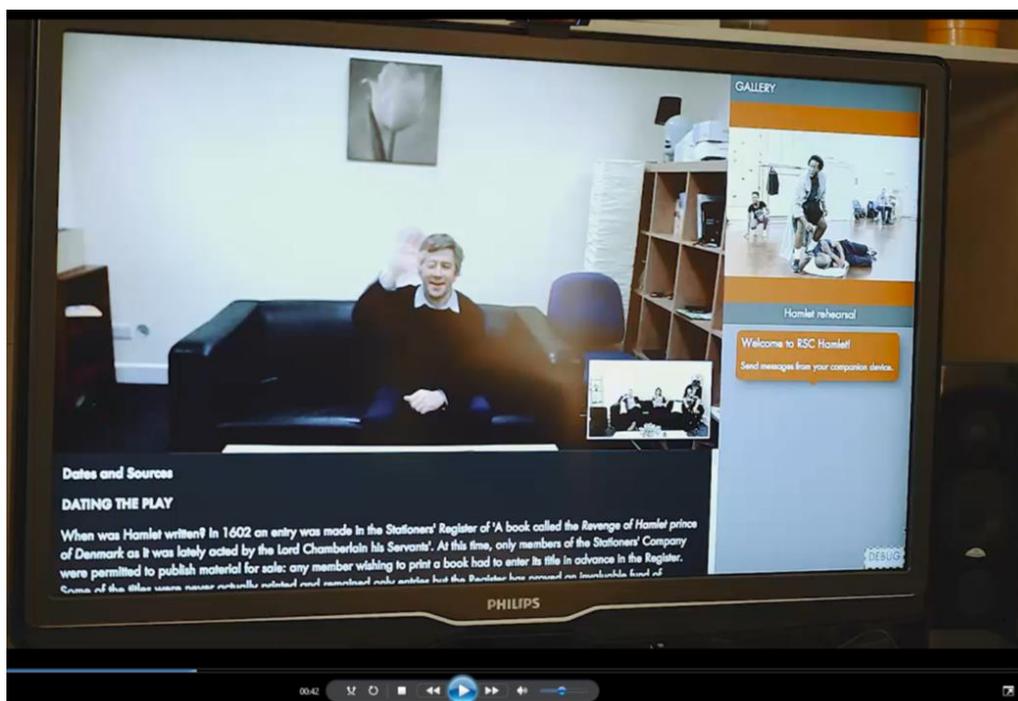


Figure 7 Screen grab from the main screen with video chat showing on the main screen alongside the text chat window.

As already noted, real-time interaction via both video chat and text chat has been successfully implemented within the Watching Theatre at Home prototype. The user is able to use video chat before the performance, during the interval and after the performance is over, but not – in accordance with the social ritual of sitting in a theatre – during the performance itself. The video chat box is active on the second screen. Text chat amongst those in the virtual “box” remains active throughout the experience, including during the performance, and is visible on both the main and second screens. It is hoped that by creating a social context for the user both video and text chat significantly extend the experience of watching a performance on domestic screens.

### 3.3 Watching Theatre at Home – Reflections from the evaluation

The prototype Watching Theatre at Home service, was built using a micro service based software platform. It became available in early January 2017 and was evaluated over the following months. The evaluation served to:

1. Evaluate the technology platform used to support the experience
2. Evaluate this specific experience
3. Provide more generic insights that should be valuable for subsequent prototypes being developed in 2-IMMERSE.

The technical performance of the platform was assessed, through a reflective process involving key stakeholders within the project such as: platform developers; application developers; and cloud deployment specialists. We asked the stakeholders to reflect upon key aspects of the platform such as: extensibility, robustness, scalability, ease of deployment, ease of use and the feature set available.

The Watching Theatre At Home experience itself was carried out through twelve trials, involving two households per trial with one to three people present at each household. Evaluations were based on questionnaires, qualitative semi-structured interviews with triallists, and on analytics of application use based on instrumentation of the app we built.

In terms of the technical performance of the platform, we conclude that the micro-service approach that we adopted was very well suited to the deployment of distributed media applications across multiple screens and multiple locations. In terms of extensibility we believe that the micro service based architecture that we have chosen makes the platform naturally extensible. However, more work is required to give developers the confidence to extend the platform. To improve extensibility further we will consider creating client-side application architecture diagrams and further tutorials, documentation, and overviews to help developers understand and engage with the development of Distributed Media Applications (DMApps).

A large number of actions that can be taken to further improve scalability and robustness of the platform were identified. Many of these are related to the particular challenges associated with building distributed applications.

The results from the user evaluation of Watching Theatre At Home may well be generalizable beyond the particular experience. The findings included the following:

1. Users appreciated the fact that the Watching Theatre At Home experience echoed some of the ritualistic aspects of going to the theatre.
2. Users endorsed the producer’s view that the play should be shown on the shared TV screen and not cluttered by additional content.

3. Users were positive about the ability to share the experience through text and video chat.
4. Users indicated that choice is important indicating they would like more control over the selection and placement of different features.
5. User responses confirmed a number of insights for multi-screen layout preferences
  - a. the companion was the place for referencing and controlling;
  - b. the shared TV was for shared features of primary interest – mainly the play (video-window), notifications, and socializing during the intervals;
  - c. the presence of other features such as the script and social media was negotiated.

The findings will aid the orchestration of future multi-screen experiences.

The ability to manipulate features of the experience means the experience creators have to make decisions about the framework holding the experience together and how individual objects that form the building blocks of the experience behave (i.e., the rules and the models). For example, decisions have to be made about who should decide what goes where. These decisions are layered:

1. Decisions about the design of the overall experience concept – defining the format, phasing and essential elements of the experience.
2. Decisions about which features of the experience are predefined and automated (so users have no control over when and where they appear); and features which are adaptable and can be manipulated by users.
3. Decisions on the degree of adaptability of features, and guidelines/rules on how users can manipulate them. For example, the ability to switch features on/off, ability to change the position of features (device/screen, layout), adaptable to change the appearance of features (palette, font, responsive sizing, etc.), responsive personalization of features (novice/expert).

For details of the evaluation method and the detailed findings please refer to D4.2 [1].

## 4 Prototype Service 2 – Watching Theatre in School

### Watching Theatre in School



This service innovation is called **Watching Theatre in School**. This service enables pupils in schools across the country to watch a filmed performance of a play in a production by the Donmar Warehouse. Pupils are able to augment the main filmed presentation of a play with access to related supporting content and experiences to help them deepen their understanding of the play. This related content may include a synchronised transcript of the play, character summaries, short films featuring the talent in the play and even live communication session with the actors and other creative talent associated with the production.



**Owner:** John Wyver (Illuminations)

**Rights Originator:** Donmar Warehouse

### 4.1 Watching Theatre in School – Guide scenario

In the following guide scenario which is written to help the reader picture the service innovation prototype we introduce **Samra**. Samra is 17 and lives in Dalkeith just south of Edinburgh. Samra is studying English, Drama and History at A level and attends her local High School. Samra hopes to study Drama at college and dreams of performing in the West End.



**Figure 8 Concept illustration for the Theatre in School service prototype**

Samra is looking forward to school this morning. Her A' level<sup>2</sup> class is going to see Harriet Walter in the Donmar Warehouse's acclaimed production of *Julius Caesar*, except they don't have to go from Edinburgh to London, because the live cinema broadcast that was shown in cinemas two nights ago is available online at school. The stream can be accessed for free via the NT Live website by schools around the country.

Before the class views the production, Samra's teacher prepares with her tablet exercises that the class will explore after seeing the play. On the main screen Samra and her classmates can see a mix of graphics with information about the play and shots of the audience settling down in the theatre. But via her tablet, Samra is accessing related contextual material. Ten minutes beforehand she chooses a video stream on her tablet so that she can listen to an introduction from the production's director, Phyllida Lloyd, although she is also tempted by a parallel stream that her friend Cathy is watching with Harriet Walter talking about the role of Brutus – and about the ideas behind this all-female production. She saves a link that will let her watch this later.

As the play begins on the main screen, her tablet offers both a text commentary on the play that unfolds in sync, as well as a text chat box for just her class. From time to time Samra uses this to ask a question of her teacher. Samra hopes to study Drama at Bristol and she's very interested in how a stage manager runs a production. For part of the second half she accesses through her tablet, as an overlaid audio stream, the cues to the lighting and sound departments and to the cast that the London stage manager gave as the show unfolded. She keeps an eye on the text commentary and the chat as well, although she finds she is drawn into Brutus' plight and simply wants to concentrate on the amazing performances. At the close of the production Samra can access via her tablet additional materials to help her understand the production, but her class' work with *Julius Caesar* is only just beginning

Samra's teacher wants to explore themes of female empowerment in relation to the politics of Shakespeare's text and to the dynamics of the production that the class has just seen – and which is set in a women's prison. She selects the scene in which Brutus and his wife Portia discuss who can speak in society and how men and women listen to, or ignore, each other. Samra watches this scene again in her tablet, with a new text commentary that addresses ideas related to the theme chosen by the teacher. During this a chatbot prompts Samra to respond to questions about the scene, and this responds to Samra's answers. At its close, the teacher's tablet offers resources and suggests ways in which the class can use the scene to develop discussions and undertake exercises about who has the right to speak in a range of social settings, and how men and women do so differently. In a next door classroom, another teacher is using the same scene but quite different related resources, all available on her tablet, in a history lesson about the roles of women in ancient Rome and in Elizabethan England. Samra will be able to access these resources and contribute to this discussion as part of her homework later.

## 4.2 Watching Theatre in School – What's changed?

Although it was envisaged that the Watching Theatre in School prototype would precede Watching Theatre at Home, the complexities of implementing the latter and the learnings that have come from this process vindicate the decision to reverse the two. Watching Theatre in School is now intended to be developed with the Donmar Warehouse, and having a working prototype of the domestic version

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<sup>2</sup> A Levels, are secondary school leaving qualification in the United Kingdom. They are offered as a main qualification in England, Wales, and Northern Ireland, as an alternative qualification in Scotland, and as an international school qualification worldwide.

is invaluable for introducing key ideas of second stream media production and use to potential collaborators at Donmar Warehouse and beyond.

The central vision for the Watching Theatre in School prototype is retained, but we are currently refining and developing this as workshop activities with the Donmar Warehouse and associated schools feed into the thinking and planning of the project.

### **4.3 Watching Theatre in School – Prototype service description**

The prototype will develop many of the capabilities of the Watching Theatre at Home service and apply these to a classroom setting, both for watching, engaging with, and developing exercises from both a full performance presented in real time and for using the capabilities to analyse limited sections of the performance in the context of more focused sessions. The prototype will be developed in close collaboration with, and take advantage of, the extensive education programme being created by the Donmar Warehouse to accompany the availability of *Julius Caesar* for use in schools from autumn 2018.

Central to the prototype development will be the development of exercises exploiting the potential of multiple screens for five key scenes in the play. The prototype is intended to demonstrate multi-screen interaction across different clients, event orchestration through the use of the Timeline production tool, to adaptive content responding to screen dimensions and context, to synchronise content across client devices, and to provide a level of personalisation for different skill levels and roles creating an experience that is adaptable to different school requirements, that extend the reach to additional schools of the physical workshops that they are organising with a small number of locations, and that prompt different ways engaging with the production with different versions of activities and exercises. For teachers, the prototype needs to make available the content for different subject areas – within the curriculum, accommodate different time limitations and experience as well as different technology set-ups, and support and mentor teachers.

### **4.4 Watching Theatre in School – Evaluation plan**

Our intention is to work with the Donmar Warehouse and its education programme to develop an initial trial with at least two secondary schools in early autumn 2018. The schools will be chosen in conjunction with the Donmar Warehouse and will be ones where the Donmar has worked previously on education projects.

Evaluation methods for the trial will include, in addition to the technical monitoring of the service and its uses by both pupils and teachers, observation of the prototype being used by teachers and pupils, interviews conducted immediately after the trial and also questionnaires intended to identify which aspects of the service were regarded as valuable and productive, what usability issues became apparent, and what failings the prototype might have. An evaluation report drawings on these sources is intended to be ready for publication in early November 2018.

## 5 Prototype Service 3 – MotoGP at home



Figure 9



**Watching MotoGP at Home**

This service innovation will provide a viewer with a personalised experience that can be controlled to suit their interests and level of experience in the sport. Its video and telemetry data to be displayed on a large screen TV and on smaller personal companion screen devices. The ‘User Trials’ will take place in a series of ‘as live’ broadcasts in multiple households and lab environments. Research insights will be captured from device/service instrumentation and qualitative questionnaires and interviews with triallists. A ‘Production Trial’ will be undertaken on site at Silverstone during the live race where the production tools will be tested. We will showcase the work in demos after the trials at selected industry and academic conferences and events.

The trial will focus on the Octo Great Britain MotoGP race held as Silverstone in late August 2017.

**Owner:** Andy Gower (BT) **Rights Originator:** Dorna Motor Sports

The Spanish company Dorna Sports are the rights owners and event organisers for MotoGP. Dorna sell rights to view the spectacle across the globe to TV service providers, they receive ticket receipts at race circuits and they sell a *VideoPass* subscription access to their content allowing people to view races directly via an App and website.

Dorna Sports provide services with significant global reach [3], [4]. And in 2010 MotoGP became the second largest motorsport in the world [5] reaching 233 million households worldwide in 207 countries. The 2015 MotoGP season reached a record broadcast coverage across the globe with 87 networks in 207 territories showing the full 18-races.

### 5.1 Watching MotoGP at Home – Guide scenario

The following scenario has been written to articulate the key facilities provided within the MotoGP at Home prototype. The service users are father and son Andy and Matthew, who are of different ages, use different compaion screen devices and have a different level of knowledge and interest in MotoGP.

**Andy** (aged 36) has been a MotoGP fan for the past decade or so. He is very knowledgeable of the riders, teams and the different tracks. Andy is a diehard Valentino Rossi fan. He has previously used the MotoGP VideoPass app which gave him access to news, stats and live multi-screen race feeds.

**Matthew** (aged 12) is a relative newcomer to the sport. He gets excited when watching the race, but wishes he could better follow the race action. Sometimes he finds it difficult to understand which riders are on which bikes. Matthew however is quite keen on the young Marc Marquez.



**Figure 9 Concept illustration for the MotoGP at Home service prototype**

Andy is watching MotoGP at home with his son Matthew. Andy is fortunate enough to own a large screen 65" UHD TV and a tablet which he regularly uses while watching TV. Matthew also likes MotoGP and is a keen multitasker who regularly uses his smartphone when the TV is on. Andy has been a MotoGP fan for the past decade or so, while Matthew is a relative newcomer to the sport. Andy is a diehard Valentino Rossi fan and whereas Matthew is keen on the young Marc Marquez.

The platform that controls the presentation of content on available displays is aware of the shared TV and that Mathew and Andy have their smartphone and tablet with them.

Andy switches the TV channel to watch MotoGP. The race is about to start, with riders just starting the final warm-up lap. The leader board occupies the top left of the screen, but has rescaled itself to suit the size and resolution of the large-screen TV so making more screen space available for other content which can be overlaid on top of the main programme. An overlay on the TV prompts Andy to extend the experience to local personal screens. Andy accepts the invitation.

User Profile information previously created is used to customise what appears on their respective screens. Device capabilities are understood and are taken into account to deliver a responsive and synchronised viewer experience. The content presented on their small screens is personalised. Andy's tablet shows a live video feed from Valentino Rossi's on-board bike camera that is synchronised to the display on the big TV. His tablet also shows an overlay which shows Rossi's bike telemetry; this matches Andy's interest in Rossi and the level of detail he's interested in as a committed fan.

Matthew's smartphone provides more general information about the riders and the teams for which they ride. As the commentators follow the action and discuss the race, individual riders are highlighted on his phone, helping him to learn who they are talking about as he watches the race.

Andy wants to see more detailed split timing data and so ‘virtually pushes’ Rossi’s BikeCam to the TV, to make space on his tablet screen. Video from the BikeCam disappears from his tablet and reappears on the TV as a picture-in-picture positioned in the bottom corner of the screen.

As the race unfolds, Marc Marquez is involved in a crash. Previously, Andy has configured the system to show action replays on available extended screens. After only a few seconds a replay is made available, which appears as a notification on Andy’s tablet and an instant ‘pop-up and play’ on Matthew’s smartphone. It takes a further 30 seconds or so for a convenient break in action on the main programme feed shown on the TV, before they are able to cut to the replay of Marquez’s crash.

Half-way through the race Andy receives a notification on his tablet to place a spot bet on who will win the race. A synchronised alert also displayed on the TV, so that he doesn’t miss the notification on his tablet.

## 5.2 Watching MotoGP at Home – What’s changed?

Since the publication of D4.3 in May 2017 we have built the multi-screen user experience for MotoGP; its design is now fixed. At the time of writing in December 2017, we are conducting user trials. We are aiming for 100 responses from people experiencing the as-live experience within their homes and expect these trials to complete in January 2018.

We had hoped to conduct a live production trial, at the UK Silverstone MotoGP race, using software tools developed by the project, to trigger the deployment of the animations and software graphics to be laid out over a clean broadcast feed provided by Dorna Sports. The details of this ambition were described in more detail in D4.2 <https://2immerse.eu/deliverables>. This did not happen. The timescale was too aggressive; the production software was not in a fully functioning state and neither did we manage to complete developing the large range of DMAP components required to deploy all the data-driven graphics components that were a feature of the MotoGP presentation (as seen in section 5.3).

Nevertheless, the development team attended the 2017 Silverstone MotoGP race in August and this proved helpful in understanding the current workflow for the production of the MotoGP content and that insight has worked its way into the development of the production tools. Work on the production tools has been described in D3.3, which is available on the project web site <https://2immerse.eu/deliverables/>. As previously planned, the production tools developed in the project were used in an ‘as-live’ mode through November and December and for the generation of the timeline for the MotoGP experience. Insights from that process are being fed-back into the design process for the production tools. The evaluation results, for both the production tools and the Experience will be published in Deliverable D4.5 which is slated for publication in March 2018 and will be published on the 2-IMMERSE web site <https://2immerse.eu/deliverables/>

In broad terms the experience has emerged as envisaged. It is an ‘at home’ experience offered over at least three screens, with users able to personalise the screen layouts on the big TV based on their preferences for certain riders and/or their knowledge of the sport and/or based on the size they wish graphics to be displayed.

In parallel an ‘on-boarding’ process has been developed, providing a robust and generic method for tablets and phones to initiate a multi-screen experience using established methods and protocols and methods such as the captive portal approach (that enables headless devices to access network services using the keyboard capability of a companion device) and the synchronisation methods provided by the DVB groups ‘companion screen and streams’ - DVBCSS. The on-boarding process is

described in D3.3; that document is available on the project web site <https://2immerse.eu/deliverables/>

This document provides a paper-based description of the experience but readers may benefit from viewing the videos <https://2immerse.eu/videos/> which shows how the experience works.

### 5.3 Watching MotoGP at Home – Prototype service description

This section outlines the key facilities provided within the MotoGP prototype service. The experience has been built to accompany BT Sport's presentation of a MotoGP race. That coverage has a timeline that covers three phases, the pre-race build up, the race itself and the post-race analysis. The features available to the user in our multi-screen experience vary in each of these phases. Within the experience these three phases are known as 'Inside MotoGP', 'Watch Live' and 'Race Review'.

In the following sections the features available to the user in each section are described; readers are again alerted to the video of the experience that may also help in their understanding <https://2immerse.eu/videos/>

#### 5.3.1 Inside MotoGP

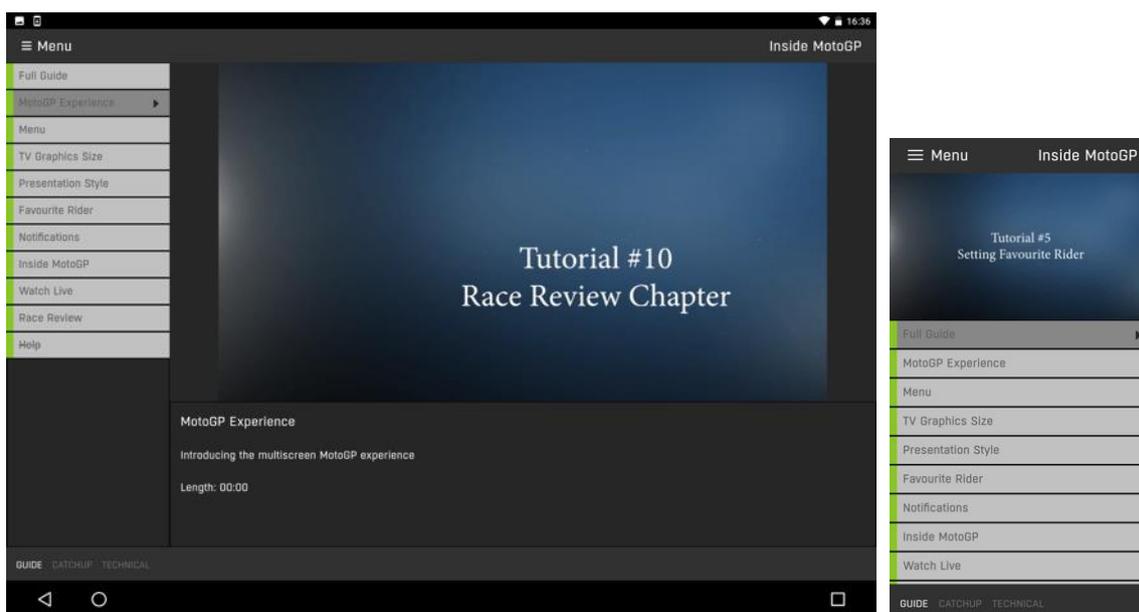
In the time before the race, the commentary teams set up the race; they talk about the performance of teams and the riders and discuss the results of qualifying that have determined the grid position for the race start. The team try to bring out newsworthy or contentious issues that they feel may affect the outcome of the race. In this programme, for example, the use of specific fairing to generate downforce on the front wheel; the selection of tyre compounds and straight line speed of the Ducati were all mentioned.

Alongside this commentary-led exposition we have provided access to a variety of short-form video on demand (VoD) materials to support the user's experience. These include GUIDE videos (that show users how to use the experience), CATCH-UP videos that bring the viewers up to speed with recent MotoGP events and TECHNICAL videos that help viewers understand some of the more technical aspects of the sport; all this material is optional. The menu options in the INSIDE MOTOGP sections are shown below against these three headings.

- GUIDE (A series of short videos showing how to use the multi-screen experience)
  - Full guide
  - MotoGP Experience
  - Menu
  - TV Graphics
  - Presentation styles
  - Favourite rider
  - Notifications
  - Inside MotoGP
  - Watch Live
- CATCH-UP (A series of short videos providing context for today's race)
  - He who dares wins
  - Special Silverstone
  - British riders excited
  - Silverstone circuit
  - Pundits lap at Silverstone
  - Marques grabs pole
  - Marquez lap record
  - Rossi second on grid

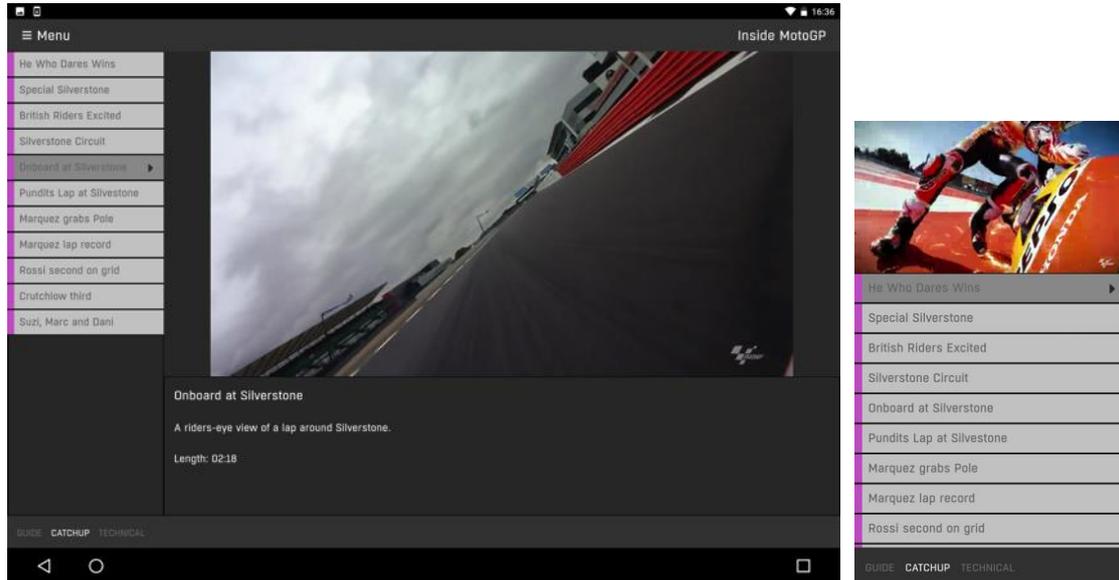
- TECHNICAL (A series of short VoD assets and animations that help explain the more technical aspects of MotoGP)
  - Anti-wheelie electronics
  - Engine sounds and styles
  - Aerodynamics in action
  - Front forks
  - Tyre basics
  - Stability vs agility
  - Aerodynamics rules
  - Inline vs V4 engines
  - Carbon brakes
  - Rear suspension
  - Hard v soft springs

Figure 10 shows content from the Guide section which provides information on how to use the multi-screen experience.



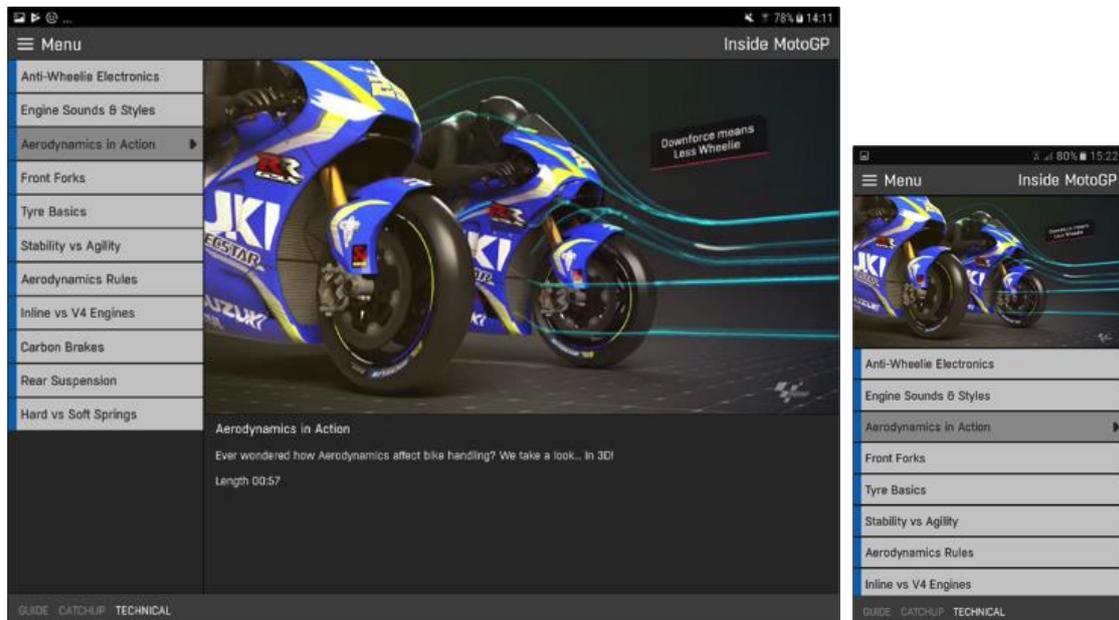
**Figure 10 Showing how, during the Inside MotoGP section that precedes the race, viewers can access additional 'how to' information in the form of short videos explaining how user can interact with the multi-screen MotoGP experience.**

Figure 11 shows content from the CATCH-UP section.



**Figure 11** Showing how, during the Inside MotoGP section that precedes the race, viewers can access additional content to help them get up to date with the MotoGP season so far. In this case the tablet is showing a race lap of Silverstone from an on board camera and the phone is displaying short video introducing the British MotoGP riders.

Figure 12 shows content from the Technical section, in this case providing some insight to the aerodynamics of bikes.



**Figure 12** Showing how, during the Inside MotoGP section that precedes the race, additional content is shown on the phone or the tablet. In this case the viewer can access information about the aerodynamics of the bikes. In this race such information can complement the on-screen discussion about how fairing design affects down-force.

### 5.3.2 WATCH LIVE

During the race itself some of interactions on the companion devices can affect what is shown on both the main TV and on the companion device. The four interactions that do this are asterisked on the menu below. It is this phase that the most complete impact of an object based broadcasting approach can be experienced.

Before going into details about options available in this WATCH LIVE section it is perhaps worth looking at the way the image on the main screen is developed. 2-IMMERSE uses the 'clean' video taken from Dorna Sports and overlays graphics and in some cases videos as layers on top of the main clean video feed. The layout of the graphics is shown in Figure 13.

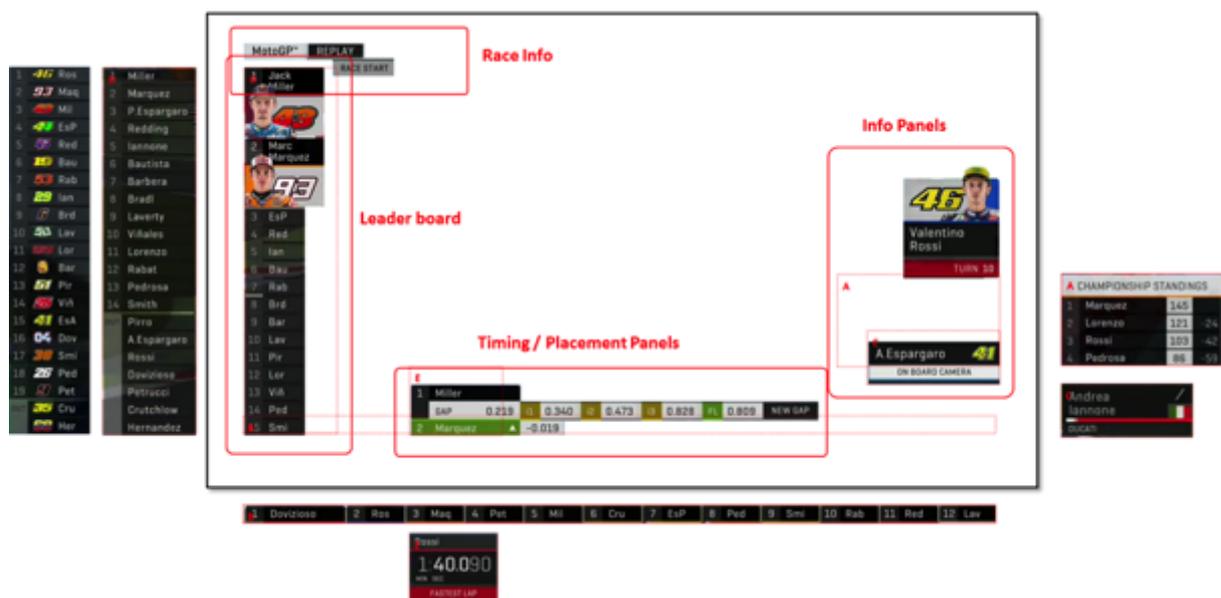


Figure 13 Schematic of the graphics that can be placed over the clean video

The menu of options available within the WATCH LIVE section is shown below. For some of the menu items there are figure references that show the screen images used to allow interaction. Many of the interactions are dynamic involving video and animations and once again the reader is encouraged to view the video <https://2immerse.eu/videos/> to better understand the experience.

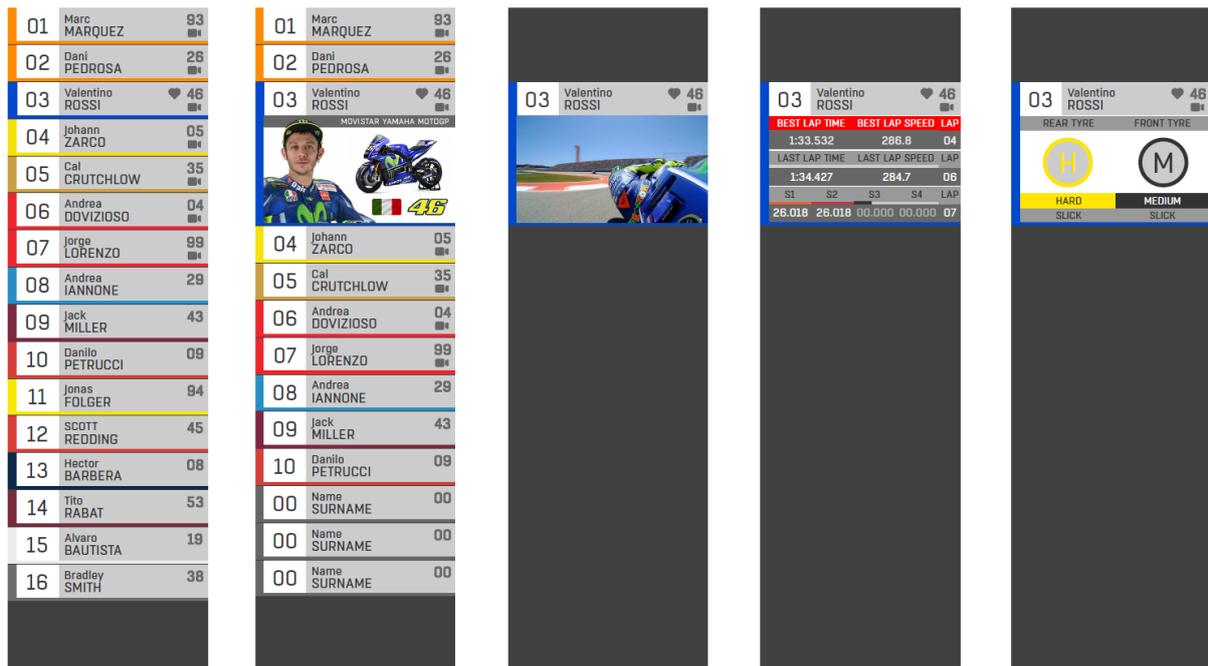
- Leader board (An interactive leader board enabling you to swipe to access different details about each rider)
  - Rider 1 to rider (n) (see Figure 15)
    - Rider profile picture
    - On board camera
    - Split times
    - Tyre choice
- \*Events (A growing list of events that can be viewed as replays on the TV and tablet)
  - Event (1) – optional VoD replays (see Figure 17)
  - ...
  - Event (n)

- Views (A means of affecting the way the experience is presented across the screens)
  - \*TV graphics Size
    - Large
    - Medium
    - Small
  - \*TV presentation
    - Novice
    - Standard
    - Expert
  - \*TV audio balance
    - Ambient volume level
    - Commentary volume level
  - Your favourite rider (selecting a favourite rider enables their BikeCam to be cast to the main screen or viewed on the companion device.)
    - List of riders...

In addition to this menu based approach there is a casting option that allows users to cast the video they select on the tablet/phone onto the main screen. This uses the familiar casting icons as shown in Figure 14



**Figure 14** Showing how videos on the tablet can be cast to the main TV screen as a picture-in-picture (PiP) top row and showing how the tablet can be used to remove picture-in-picture selections from the main screen (bottom row).

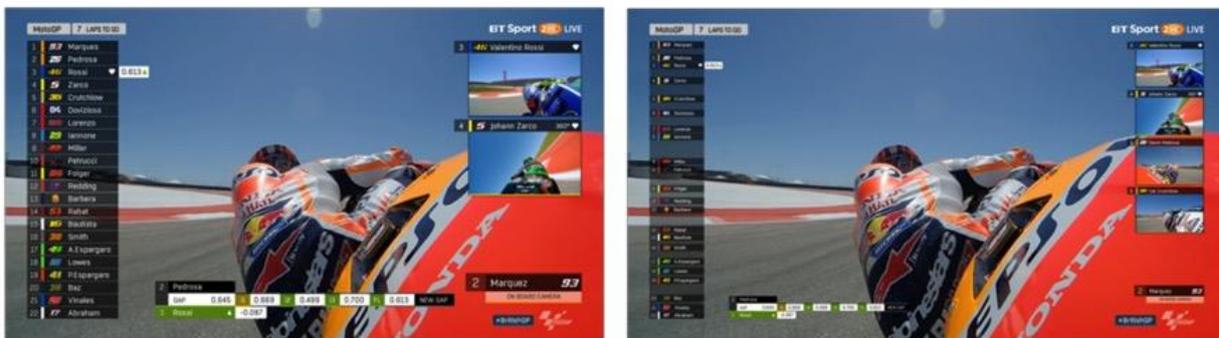


**Figure 15** The interactive leader board on the tablet, showing how selecting expands the leader board entry and swiping reveals the bike cam (if available), split times and tyre set-up

Because graphics are added as objects at the viewers’ locations, we can choose to send different graphics to better suit the context of the viewer, where context may include the size of the TV or whether the viewer has declared themselves an expert or a novice as shown in Figure 16. Viewers can control these presentations through the ‘Views’ menu as shown in Figure 16.

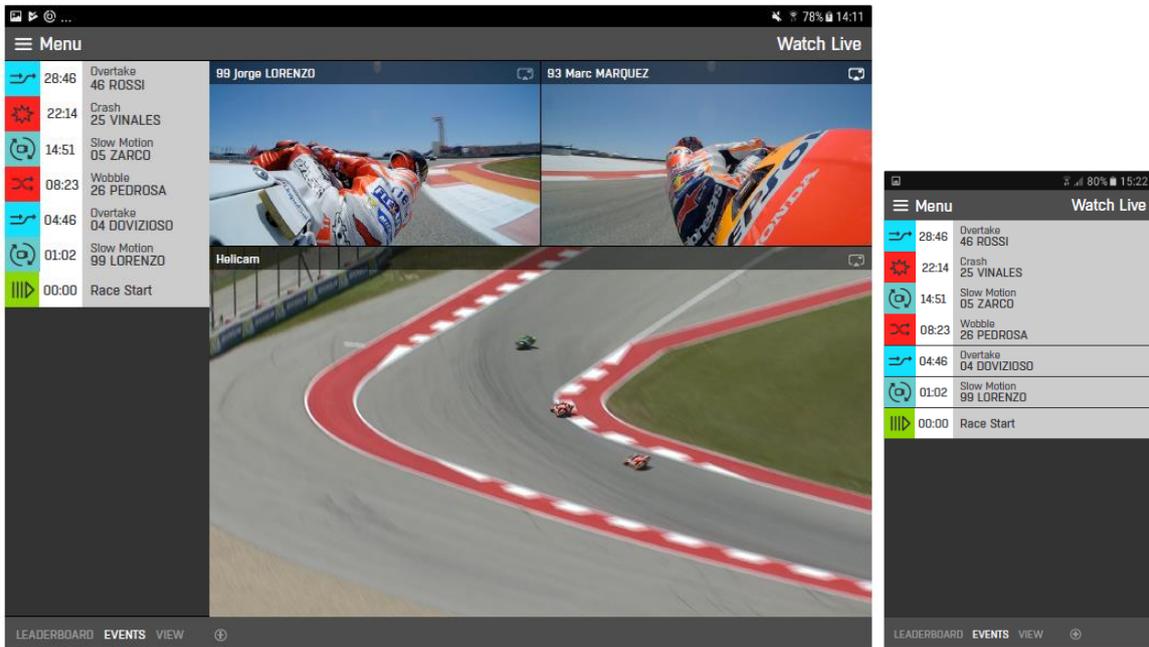


Responsive TV Expert Mode layout optimised for 32”, 50” and 65” TVs



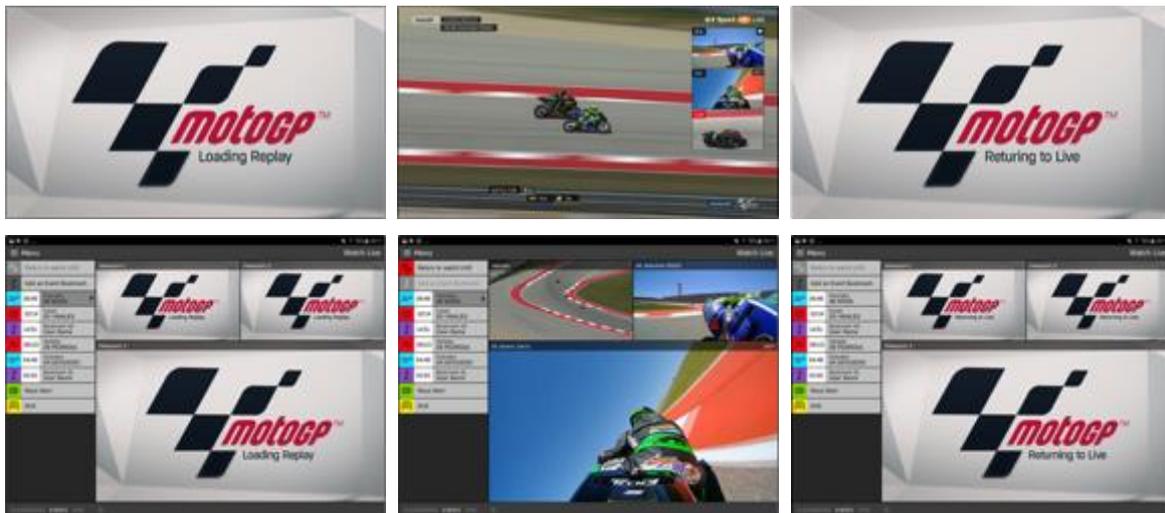
Responsive TV Novice Mode layout optimised for 32”and 65” TVs

**Figure 16** This figure shows how, using the object based broadcasting approach, the graphics can be adapted to affect the size of the graphics to better suit different TV sizes (top row) or to provide more or less information on the leader-board to suit experts or novice viewers of the sport (bottom row)



**Figure 17** Showing the events menu (on both the tablet and phone). Selecting an event during the Watch live stage initiates a replay of the event on both the TV (see Figure 18) and the companion device.

Selecting an event on the phone or tablet initiates a replay on the main TV screen (the Replay is also shown on the tablet). The replay sequence on the TV is shown in Figure 18.



**Figure 18** The screen sequence for event replays on the Main TV (top row) and on the tablet (bottom row). The replay is preceded, and followed by a short screen wipe animation of the MotoGP log to mirror the replays as used in the broadcast programme.

## 5.4 Watching MotoGP at Home – Evaluation plan

The development of the MotoGP at Home experience allows us to evaluate three distinct things:

1. The multi-screen MotoGP at Home experience (i.e. what is being described in this document)
2. The micro service-based approach to building the deployment platform (i.e. what is being described in the D2.5/D5.2 deliverable)
3. The production tools, that are being developed to allow the project to trigger the deployment of graphics animations that will be laid out over a clean broadcast feed. (these are described in D3.3)

Details about the evaluation method and the results will be reported in D4.5 which is due for publication in March 2018. Deliverables are made available on the project web site as they become available. <https://2immerse.eu/deliverables/>

In this section a brief outline of the evaluation approaches is described. The main focus here is on the evaluation of the MotoGP experience.

The MotoGP experience is being evaluated through as-live trials carried out in home and in labs.

### 5.4.1 In home trials

Evaluations will include logs – to show usage patterns and questionnaires that probe the perceptions about the overall experience as well the utility and ease of use ascribed to the different capabilities of the experience. We are seeking 100 responses.

The evaluation trials began on December 8<sup>th</sup> 2017 and after a Christmas break we will recommence trials in January hoping to complete the trials by the end of January 2018. As of December 12<sup>th</sup>, 5 trials have taken place and these should yield 10 interview responses, although not all responses have been collected yet – and they certainly have not been assimilated.

The trials involve participants taking receipt of a trial kit (see Figure 19), including:

- A small computer to act a set top box
- A tablet
- A phone
- Cables
- Instructions (not shown in Figure 16)

The basic instructions explain what the participants need to do to connect the devices and to start the experience. No details are provided of the in-experience functionality as these can be found in the Guide section of the experience (see

Figure 10).



**Figure 19** A trial kit (one of eight kits) showing the small computer, tablet, phone and cables.

Users complete the trial and are interviewed using a questionnaire to define responses to the experience. Triallists are screened on the following issues:

*Required*

- They already watch MotoGP on TV or on a tablet
- Must have flat screen HDTV less than 10 years old. (in the December trials we had to stipulate that triallists could NOT have a 4k TV as the small computer drivers were not compatible with 4k presentation)
- TV must have an HDMI socket on it.
- Must have home Broadband and WiFi of at least 20Mb/s

*Preferred:* they have an Ethernet cable connected device close to their TV

In addition we are aiming for some minimum quota levels:

- aged 18-30; 12 (at least 4 of whom female)
- aged 31-40; 12 (at least 4 of whom female)
- aged 41-50; 16 (at least 4 of whom female)
- aged 51-60; 16 (at least 4 of whom female)
- aged >61; 12 (at least 4 of whom female)
- < 18 - no quota. *\*Please note only the secondary respondent may be under 18. If the child is under 16 written consent must be obtained from a parent or guardian.*

A significant proportion of the home trials (80%) are being coordinated by Acumen Fieldwork, a UK market research agency based in Manchester with recruiters across the UK using test kits provided by the project and with a questionnaire developed jointly between the project and Acumen. Acumen

have selected recruiters in major conurbations such as Sheffield, Birmingham and Manchester. The remaining 20% of respondents should come from the 19 respondents to a BT-led recruitment for people who 'watch MotoGP and would like to take part in a trial'.

#### 5.4.2 Lab trials

Lab trials have taken place in the immediate run-up to the experience being evaluated in homes. Lab trials will also take place toward the end of the trial run when the prototype service is in a more mature state. These later trials should provide a more forensic and ethnographically rich investigation of the way people use the experience.

The early lab trials helped identify immediate barriers to the trial proceeding. These trials involve people with varying level of interest in the technology attempting to start and interact with the experience. The trials took place in labs, in the presence of members of the development team and were conducted by colleagues who had less involvement with the design and implementation of the experience. Trials took place at the BBC and at BT labs; about 4-6 such trials took place, they were very informal but very useful. They were a little like QA tests but from the perspective of someone less familiar with the way the experience had been designed to work. They have resulted in some key design changes including:

- A complete change in the way videos are selected to be shown on the Main TV – the casting metaphor - has now been adopted. This required a change in menu structures but we believe makes the feature easier to use.
- Revisions of the user instructions for on-boarding, to offer greater clarity. Early versions of the instructions tried to describe both WiFi and cable connected use cases in a single document. This proved unwieldy. The revised instructions separate out these two sets of instructions.
- A change in the menu layouts to give greater simplicity. Some features which were buried deep in menu structures were raised up in the menu hierarchy; for example, 'favourite rider' was elevated to make it easier for users to select this feature.
- A change in some menu labels to reduce ambiguity (on the presentation tab in the Watch Live section the words to describe the graphics size were iterated to give users greater clarity about what this feature does – using "Graphics Size" as the label seemed sensible as this is what the feature affects. Previously we listed TV sizes – and what this meant was less obvious.

In the lab-trials planned toward the end of the trial we aim to augment usage logs and questionnaire responses with observations and to use direct observations to prompt questions probing thought processes. The purpose of these later lab trials is to gain different levels of insight into the experience looking at the small details of the way people interact with the devices and the bigger picture about how people arrange devices and how they negotiate to effect user initiated choices in a shared experience. We do not have an exact quota for these trial; one would be too few, 10 probably too many.

## 6 Prototype Service 4 – Watching Football at Home

### Watching Football at Home



Figure 20

This service innovation relates to an experience designed to suit the presentation of football in people’s homes. It will offer an experience that will be context sensitive - including layouts that adopt responsive design approaches, scaling graphics to be appropriate for the TV screen on which they are being displayed, and that also offer access to additional content streams that may be viewed on additional screens (tablets, mobile phones etc.) or rendered as picture-in-picture windows on the main TV screen. We anticipate a system capable of supporting a diverse range of experiences centered, ultimately, on a single sports event.



The prototype will have as a key objective trialing a live end-to-end system. As such it will have in focus the production tools and processes required to allow such experiences to be created as much as the design and experience that these tools create. To achieve this, the trials are expected to take place over a number of matches in the Spring of 2018 hopefully culminating in a showcase final at Webley Stadium.

**Owner:** Martin Trimby (BT)

**Rights Originator:** The Football Association

### 6.1 Watching Football at Home – Guide scenario

The following Guide Scenario helps readers picture the proposed Service innovation prototype. It features the Jenkins family. Parents Sue and Dave, their 12 year old son Toby and 9 year old daughter Sophie. All of whom watch football at home, but all would prefer to do so in slightly different ways.



Figure 20 Concept illustration for the Football at Home service prototype

*When Chelsea play Arsenal in the FA Cup Semi-final, the Jenkins family settle down to watch the big match on Sunday afternoon all hoping Chelsea will reach the Final – Dave and Toby because they are Chelsea supporters, Sue and Sophie because she can't bear to see Arsenal win as they are the bitter local rivals of the Tottenham Hotspur, the team they support.*

*Although the family are all watching the game together at home, they are already thinking about how they want to watch it slightly differently:*

*Sue is interested in watching the antics of the Chelsea Manager, Antonio Conte, on the touchline. She finds him almost as entertaining as the match itself.*

*Toby thinks the usual commentary team for the match is boring, but is looking forward to listening to the alternative commentary coverage provided by his favourite you tube fan channel while watching the whole match from the Spyder cam above the pitch.*

*Sophie just wants to see the interesting bits of the match so she can have her own opinion, as the match will obviously be the topic of household conversation for the rest of the day. Otherwise she is busy IM'ing her friends on her mobile.*

*Meanwhile, Chelsea super fan Dave is trying to analyse every aspect of his team performance using the virtual graphics available on his tablet to decide how well his team is performing. He is also keen to interact with the key moments such as substitutions so he can decide whether he would have made the same decision as the manager."*

*As the match is being broadcast with multi-screen features - they can do all of this together as part of the same match experience on their multi-screen TV setup.*

## 6.2 Watching Football at Home (not in a Pub) – What's changed?

The change of focus from public venues (pubs) to the home for this prototype has changed many aspects of the experience in terms of both screen real estate and interactivity opportunities.

The size and multiplicity of screens available in the home is always going to be less than that available in a public venue. However, with many of these public screens being shared by a large viewing group, the options of interactivity were considerably reduced. Whereas the return to the home environment gives many more interactive opportunities for a smaller group of viewers to dynamically interact with the experience individually on personal devices or to share a joint TV experience where a common consensus can be reached.

The nature of the available content, with which the new experiences can be generated, has also become clearer following commitments from both broadcast associates (BT Sport) and internal partners (Chyron Hego). Specifically:

**BT Sport** are offering access to the GFX production workflow for National League games through a nominated BT Sport match director and technical contact at Moov TV. There is now an opportunity for conducting a series of live technical tests in early 2018 with a heavy focus on production tools being used in live production conditions. Plans have also been put in place to continue the FA content capture of additional ISO camera views and add an alternative commentary team audio for the FA Cup 4<sup>th</sup> round in January 2018.

**Chyron Hego** have confirmed they can support the generation of player tracking data through their TRACAB system which is now active in stadia venues, as well as providing robotic camera capture through their commercial relationship with Nikon. Together these will allow both additional content

capture for the project, as well as enhanced virtual graphics to be taken beyond their current studio use and exposed as interactive options for home viewers.

### **6.3 Watching Football at Home (not in a Pub) – Prototype service description**

The following sections describe in a little more detail the capabilities and features of the system that are implicitly required by the guide scenario.

#### **6.3.1 Watching Football Interaction principles**

Commercial and creative input from BT Sport has provided a greater insight into the balance any multi-screen service must strike between viewer-led choice, director-led narrative and production values. Therefore this home prototype will build on the existing match director's production feed as the centre of the experience on the main TV, while providing a suite of enhanced features across all screens with which viewers can (as a group, or individually) assemble different ways of watching the same match.

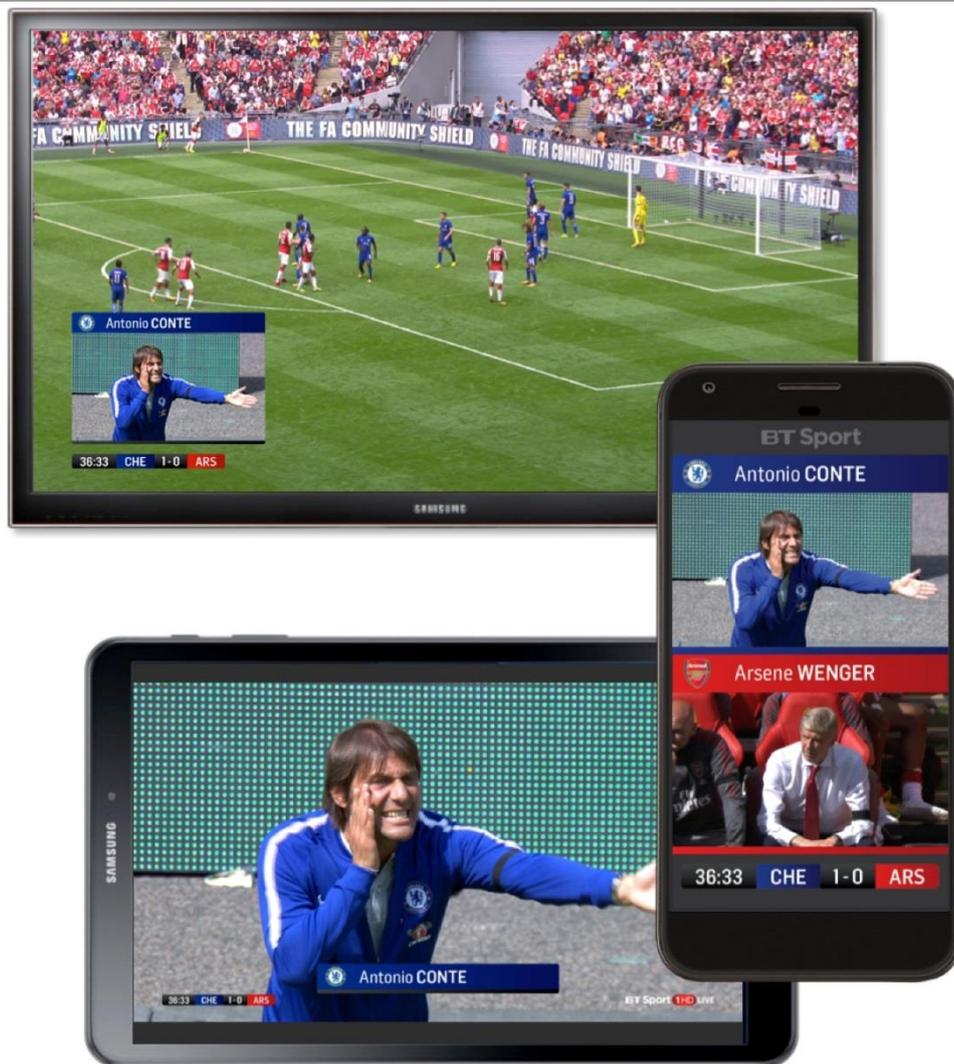
In terms of the user experience we aim for this prototype to feel like a 'TV experience' rather than a digital app on the TV.

#### **6.3.2 Feature 1: Live Additional Views**

*GUIDE SCENARIO "Sue is interested in watching the Chelsea Manager Antonio Conte's antics on the touchline."*

A variety of ISO video feeds are available to the viewer to supplement the main match feed on the TV. These video feeds can be displayed, picture-in-picture, on the main TV or tablet, or as a full screen or part of a split screen on any of the companion screens. However full screen TV layout is reserved for the highly-produced match directors' feed. For the guide scenario, Sue can choose to watch Antonio Conte, picture-in-picture, on the main TV. If others find this too distracting she can switch to watching him on her tablet instead, either full screen or still as a PiP as the whole TV layout is duplicated onto her tablet device.

Live additional views that can be displayed in this way may be team-specific, for example the manager cam, or player cam or watching the match from the perspective of particular supporters would all be team specific. Alternatively, a number of neutral video streams are available such as the Spyder cam match-view or the gantry cam of the currently selected commentary team.



**Figure 21** A multi-screen compilation of the Manager Cam layout options across 3 screens. The viewer has the option of selecting manager cam feeds for one or both teams to supplement the live match action. Note the flexible rendering of the GFX (manager name) as an overlay or as a BT Box title depending on video render size.

### 6.3.3 Feature 2: Alternative Commentary

*GUIDE SCENARIO: "Toby thinks the usual commentary team for the match is boring, but is looking forward to listening to the alternative commentary coverage provided by his favourite you tube fan channel."*

One or more alternative audio commentary feeds can be selected by the viewer, and switched at any time during the match. Each of these commentary audio options is still combined with the broadcast video feed provided by the match director. Alternative commentary teams allow for different presentation styles and match narratives to be created for different types of viewer, whether that is dictated by age, interest or affiliation to a specific team.

Where multiple audio presentations are selected in the same environment (e.g. a companion app selecting a different commentary to the main TV) it is expected that individual users would be required to restrict their commentary via headphones.

In addition to the audio commentary option, ISO videos of the different commentary teams are available for the viewer to engage more closely with the commentators through physical reactions and visual cues. As with other live ISO content they can be displayed, picture-in-picture, alongside the director coverage on the TV or picture-in-picture (or full screen) on tablet devices. (See Figure 14)



**Figure 22** A multi-screen compilation of Commentary Cam layout options across 2 screens. The viewer has the option of selecting a different commentary team to the main BT Sport pundits and can also supplement this with live video of those commentators' reactions.

### 6.3.4 Feature 3: Object based Match GFX (with interactivity)

*GUIDE SCENARIO: "Dave is keen to interact with the key moments such as substitutions so he can decide whether he would have made the same decision as the manager."*

Current match graphics are dictated by the match director and triggered by the GFX operator. These are then delivered to the viewers 'burnt in' to the underlying video content. But an object based GFX system moves the rendering onto viewers' clients and allows the underlying video to be delivered

clean, giving flexibility over which graphics may be shown and on which screen, or screens, they may be shown.

The match director and the graphics team are still responsible for triggering graphics, but the decision to render them (or not) and the decision about to which screens they should be rendered is influenced by the viewer's current multi-screen setup. Figure 23 shows a substitution graphic duplicated on both the screens of the TV and the tablet as the substitution is made.

For those viewers wishing to engage further with the information, the graphic is also interactive, allowing it to be expanded to provide greater depth of information on the current playing XI and the other substitutes available to the manager.

Some graphics are constant on the screen during a broadcast, such as the match clock or BUG (Broadcaster Unique Graphic) and can be used as launch buttons for accessing replays or changing commentary feeds. However, some graphics are specific to match events (substitutions or bookings) or the current narrative of the commentary team. These elements are triggered to appear and disappear from the screen over a short time period while they are relevant. Making them interactive gives the viewer the option to sustain them on the screen either temporarily or permanently while their personal interest may extend beyond the commentary narrative.

Providing interactivity through current match graphics rather than a separate overlaid menu structure is a key element in bringing broadcast and digital experiences closer together. The experience can be director-led or prompted, or only becomes interactive if the viewer engages.



Figure 23 A multi-screen example of an expanded interactive GFX element for a match substitution. The initial lower graphic is director pushed in reaction to a match event. But the viewer can interact with it to expand the graphic to show the current playing XI or available substitutions.

### 6.3.5 Feature 4: Virtual Graphics

*GUIDE SCENARIO "Chelsea super fan Dave is trying to analyse every aspect of his team performance using the virtual graphics available on his tablet to decide how well his team is performing."*

A combination of player tracking data and object based virtual graphics rendered on the companion app allows viewers to personalise a live view of the game with virtual graphics that highlight and track the specific elements of the game that interest the viewer. Viewers can select an individual player and this instructs the system to augment the video feed with different virtual graphics that help the viewer track their position and performance (see **Error! Reference source not found.**).

These virtual graphics are generated automatically in real-time and are toggled by the viewer to allow them to build their own match view.

Much like the interactive touchscreens used by pundits in previewing or reviewing team performance, this allows viewers to build their own tactical or strategic view of the match. Who is out of position in defence? Who is covering the most ground in midfield? Where is the current offside line?

These virtual graphics can also be extended to virtual advertising on the pitch or billboard replacement based on viewer preferences or settings.



**Figure 24** A companion app view of the game with virtual graphics highlighting mid-field players' current position on the pitch. Different players can be selected, tracked and highlighted in real-time within the game.

### 6.3.6 Feature 5: In Game Replays

*GUIDE SCENARIO* "Sophie just wants to see the interesting bits of the match so she can have her own opinion as it will obviously be the topic of household conversation for the rest of the day. Otherwise she is busy IM'ing her friends on her mobile."

Combining the features of interactive match graphics, flexible screen layout and a server-based replay service allows viewers to access on-demand replays across a multi-screen system.

The match clock or score graphic is a constant during the broadcast and can be expanded to show the key events such as goals, bookings and other key moments at anytime during the broadcast. This expanded graphic is also interactive allowing the events to be selected for replay in a variety of viewing options, either side by side with the live broadcast (see Figure 25) or on a single companion device so as not to disturb the collective viewing experience on the primary shared TV.

This feature can also be expanded to provide access to content before and after the match, including pre-recorded interviews before kick-off and pundit reviews after the match.



Figure 25 An example of a replay selected on the Companion App being launched on the main TV alongside the live broadcast.

## 6.4 Watching Football at Home – Evaluation plan

Evaluation plans have evolved to match the switch from the public environment of a pub to the private environment of the home. However, the plans to use a 2018 Wembley football final for the prototype remain in place.

We have on-going support from senior stakeholders in BT Sport (Jamie Hindhaugh, Chief Operating Officer, BT Sport and BT TV) and Andy Beale (Chief Engineer, BT Sport) to associate this prototype service with a major BT Sport broadcast event. Given BT Sports current broadcast rights roster for the 2017/18 season **The Emirates FA Cup Final** (May 2018) is the event we would like to use to showcase the prototype service.

However, capacity and production access for conducting iterative tests means that 2-IMMERSE will also make use of other BT Sport football content rights across Premier League, Champions League and National League (Non-League) matches as tests to prepare us for this final prototype trial.

### 6.4.1 Live Production Tests

It is the primary aim of the prototype to deliver a small scale ‘live’ trial of a showcase football event. To achieve this we will be linking closely to existing BT Sport production and match director roles at both outside broadcast venues and the production Hub at Stratford. Live tests of the individual prototype features are planned from January through to April 2018 in attempt to test and refine both the project production tools and the multi-screen experience required to deliver a single end-to-end trial at Wembley stadium in May 2018.

The emphasis for the production tools will be on live publishing a range of match graphics (as DMap components) to the event timeline. How (and whether) these graphical elements will be rendered on each multi screen device will be defined by the viewer’s selection of match commentary, underlying video and the current interaction state for each screen.

Additional live tests are also required for an end-to-end prototype to establish acquisition and delivery of existing and new, sometimes interactive, media objects, with control over their layout on client devices. This will include the live encoding and delivery of a variety of outside broadcast based content (camera and audio feeds), server delivered data services (Tracab & Opta data and EVS replays) and the client side interactivity. All these elements will require testing before becoming constituent parts of a final live prototype.

#### **6.4.1.1 Triggering match graphics**

Input from both the Match Director role and the Moov TV graphics workflow will allow 2-IMMERSE to run a series of tests from live outside broadcast trucks alongside the existing match director and graphics operator. These tests will seek to replicate the graphics elements provided within a live match.

Initial tests with the 2-IMMERSE live triggering tool will focus on proving we can, in real time, encode clean match feed and publish both the event time-line and layouts. Custom event graphics will need to be obtained in advance, as per the existing workflow, for which we will have access to the BT Sport asset directories such as Sugar Sync (which is a bit like a Drop Box service). Optimum outside broadcast access and capacity has dictated that National League games during January to March will be utilised for these tests.

#### **6.4.1.2 Interactive graphics**

A series of live lab-tests using the 2-IMMERSE live triggering tool and data service (ingesting Opta performance data) will refine the user interaction of graphics elements during live matches. Outside broadcast access is not required and this should allow multiple opportunities to test a variety of matches during Feb-April period, which can provide the appropriate match data.

#### **6.4.1.3 Virtual Graphics**

This will provide virtual graphics developed by Chyron Hego from an outside broadcast production facility to client devices and will support provision of virtual graphics on multiple client devices in different configurations. Utilising matches with existing Chyron Hego support will be essential, but there is no dependency on BT Sport production. Exact details have to be established with Chyron Hego for the scope of these trials and the schedule for their delivery.

#### **6.4.1.4 EVS Replays**

This will establish access to BT Sport EVS replay servers for supported BT Sport games across FA Cup, Premier League and Champions League. No outside broadcast requirement exists with BT Sport once cloud-based access has been granted. There are multiple opportunities to test content acquisition, encoding and delivery and layout on demand of replays for multiple matches during the March to May period.

#### **6.4.1.5 Alternative Commentary Cam & Audio**

This will establish the content and user case for switchable audio commentaries and the use of gantry mounted cameras to capture video of the commentary team for delivery to viewers. Offline content capture of existing BT Sport commentary team is planned for January 2018 in FA Cup 4<sup>th</sup> Round. An alternative commentary team (provided by YouTube channel Spencer FC) is proposed by BT Sport for the final showcase prototype at the FA Cup Final. This alternative commentary will take place from the stadium with BT Sport booking commentary gantry space for Spencer FC.

#### 6.4.1.6 ISO Cameras

This will establish the capture and encoding of ISO cameras feeds from the outside broadcast venue and their uplink to the 2-IMMERSE platform. Existing selected BT Sport cameras for either end of the ground and Spyder Cam are already in place, but additional connectivity will need to be established to uplink these from the venue. However any new content capture options included in the final prototype (Commentary Cams, Manager Cams and Player Cams will have to be established as additional OB requirements with BT Sport, for both venue connectivity (cabling) and uplink. The use of manual project cameras or robotic NIKON cameras will require advance agreement with BT Sport for access and permission to install and capture content. Beyond content capture tests, these cameras will need to have agreed uplink capacity with BT Sport for live delivery. Exact venues and match schedule are yet to be agreed with BT Sport.

#### 6.4.2 Live Production Showcase Trials

The culmination of the iterative technical tests from January through April will de-risk our final live prototype delivery in May. We have a number of options open to us, but the capacity opportunities afforded by Wembley stadium in terms of connectivity, as well as physical gantry and production space, make it a preferred option for the final prototype. BT Sport broadcasts both the National League Play-Off Final and the FA Cup Final in consecutive weeks from the venue in mid-May.

##### 6.4.2.1 Wembley Showcase #1 National League Play Off Final

The National League Play-Off will benefit from the capacity and connectivity benefits of Wembley while attracting a modest number of additional broadcast requirements for this Tier 2 competition – at least compared to the FA Cup Final. This balance provides the best opportunity for a full end-to-end live trial. It will also serve as a full prototype delivery of outside broadcast dependant features ahead of the FA Cup Final a week later.

##### 6.4.2.2 Wembley Showcase #2 FA CUP Final

While the project ambition remains to run the a full live prototype for the FA Cup Final, this event will attract a global audience, and a large number of broadcasters at the Wembley venue, all with their individual requirements for gantry space and connectivity. This may provide capacity challenges for

2-IMMERSE to run a trial as extensive as for the National League play-off at the same venue a week earlier. Increased risk because of the high profile event means that we may still have to achieve late BT Sport stakeholder sign off to run the live trial at this event. However, the minimum aim is to achieve the capture of a full set of content assets that will allow us to assemble an as-live 2-IMMERSE FA Cup Final experience as was achieved for Moto GP. This as-live demo could then be utilised for the remainder of the project, and in showcase events such as IBC 2018.

#### 6.4.3 Trial dates

The dates for final prototype trial are governed by the timetable of the Emirates FA Cup.

The FA Cup is an annual knockout cup competition in English football. It is the oldest association football competition in the world and is organised by, and named after, the Football Association. For sponsorship reasons, from 2015 through to 2018 it is also known as **The Emirates FA Cup**.

In 2014 BT Sport and the BBC acquired *shared* broadcast rights to the Emirates FA Cup from 2014-2018. Up to 25 exclusively live FA Cup matches are being shown on BT Sport from 2014 including the Final, which is shared with the BBC, who have the right to show 16 matches. The deal also includes the FA Community Shield and FA Trophy. Under broadcast rights the BBC has the first and third picks for each round of the competition up to the Quarter Finals. BT Sport has the second, fourth and fifth

picks (where applicable). Where replays are required to settle ties, additional live matches can be selected for TV under the same basis.

The BBC and BT Sport broadcast one Semi-final each, with the Final itself being broadcast concurrently on both BBC One and BT Sport 1.

Matches in the FA Cup (from Round1 to Quarter Finals) are played at the home ground of one first team drawn for the tie. In the event of a draw, the replay is played at the ground of the team who originally played away from home, with extra time and penalties deciding the tie if required.

The Semi-finals and Final are played at Wembley Stadium. The date for the 2018 Final is May 19<sup>th</sup> with BT Sport taking its turn as the host broadcaster.

## 7 Summary and Conclusion

Four service prototypes, based on innovations developed in this project have been described. The project is using these exemplars to help develop a platform that will enable cost effective development of multi-screen experiences in the future. As such a key objective is to use the experience of these productions to refine and improve both the design of the experiences and the design and implementation of the platform used to deliver them.

The first two, Watching Theatre at Home and Watching Theatre in Schools describe experiences using filmed theatre for audiences at home and in schools. The Watching Theatre at Home Trial has been completed.

The MotoGP at Home service prototype creates a personalised sports related experiences using coverage of the MotoGP developed by Dorna and distributed in the UK by BT. The final use case takes coverage of the Emirates FA Cup (the oldest and best known football knockout cup in the world) for which both BT and the BBC have distribution rights and develops enhanced multi-screen use cases to enrich the enjoyment of football fans watching in their homes and in pubs across the UK.

Guide scenarios are used to help users imagine the experience. The implications, for broadcasters, producers and venues, of different aspects of the experience are described in more detail to provide implementers with more insight into the capabilities and changes in practice that will be required to realise this vision.

The service prototypes have been developed based on a deep understanding of the market context in which they will operate.

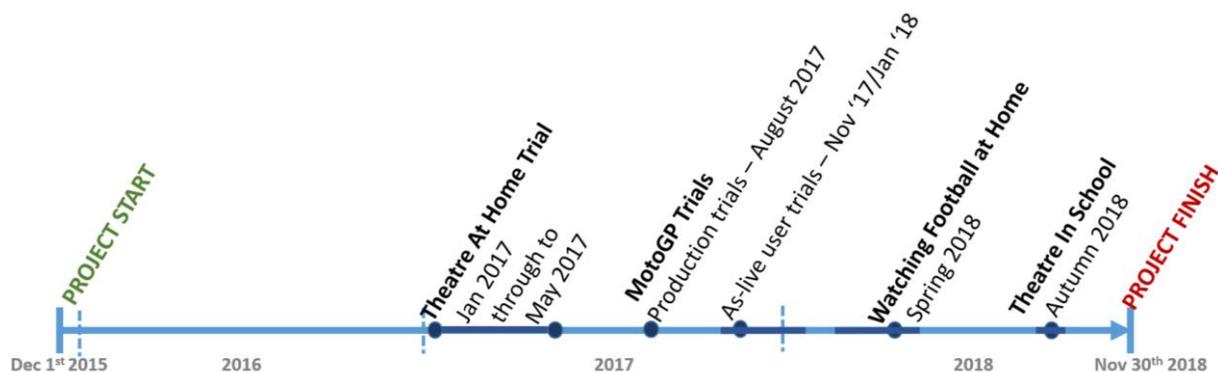


Figure26 Time line for 2-IMMERSE production tests.

The date by which the prototypes should be ready for evaluation is indicated in Figure26.

Whilst the use cases are very specific, it seems clear that many aspects of the service innovation concepts could be used in traditional growth strategies (i.e. same product in adjacent market or similar product in the same market or similar product in an adjacent markets).

Readers are alerted to video resources published by the project that include video based descriptions of each experience that may be found on the project web site [www.2immerse.eu](http://www.2immerse.eu) [1] and on our YouTube channel [2].

## 8 References

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