



# Royal Opera House: Alternative mobile apps

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## Research and Development Report

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For more information about its projects and digital R&D stories from around the world, visit *Native: Magazine of the Digital R&D Fund for the Arts* at [artsdigitalrnd.org.uk](https://artsdigitalrnd.org.uk) or connect with us on Twitter [@digitalrnd](https://twitter.com/digitalrnd) or by using the hashtag [#artsdigital](https://twitter.com/hashtag/artsdigital).



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Can arts organisations  
develop a more sustainable  
model for app creation to  
deepen engagement with  
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# Executive Summary

## Background

Digital distribution channels have enabled England's arts and cultural organisations to bring more cultural experiences to more places. However, globally dispersed audiences present new challenges for engagement, marketing and fundraising, with smartphone penetration, device and ticketing solutions varying from country to country.

The Royal Opera House's live cinema audience has grown rapidly, overtaking attendance at the ROH's home theatre in Covent Garden.

With a long history of investment in digital innovations, the Royal Opera House now wanted to explore a sustainable mobile solution to foster engagement and cultivate revenue streams in these new markets.

Mobile development is a challenging and resource-intensive area for the arts sector to work in. A competitive audit conducted by Kings College London (KCL) searched arts organisations internationally and found only two notable examples of good practice or of the use of responsive technologies.

Although these findings encouraged the ROH and its partners to develop something that was truly new to the sector, they also highlighted the technological challenges (being limited by legacy content-management systems) and cost implications (investment required to make the various versions of website or app required for each device).

The team scoped out a 'hybrid app' solution, as an alternative to the products currently being offered by the arts and cultural heritage sectors. This would resemble native apps in their interaction design but avoid the marketing challenge presented by native apps. Three particular opportunities stood out:

- Mobile booking – although there was evidence of mobile-optimised booking within the sector, it was clear from the surveyed sites that this is largely dependent on the abilities of the institution's third-party system.
- Digital programmes – the area of electronic, multimedia programs was underdeveloped in most organisations' mobile offerings, with the

nearest equivalents provided, for example, by the Barbican and Kings Place, in the form of static PDF versions of printed materials.

- Mobile donation – mobile giving was perhaps the most underdeveloped strand in all the offerings surveyed within the sector and one that had struggled to obtain much visibility on institutional websites. However, mobile-optimised solutions were in existence, notably Just Giving and the Donate app.

## The project

With partners at Kings College London and digital agency POP, the ROH set out to answer the question:

Can arts organisations use a more sustainable model for app creation to deepen engagement with audiences?

A cross-departmental and cross-organisational Project Board and project Working Group were formed to deliver the project.

The partners established an iterative, agile development approach that was responsive to the research process, underpinned by a more traditional approach taking best practices from Prince2 project methodologies; this included the use of Gantt charts, project initiation documentation, risk management strategies and risk control documentation.

The partners needed to establish a hybrid solution that would work on any physical device, that supported all online activity of the ROH website including sales, and that allowed for storing content offline in the form of a digital publication.

After examining a number of different technical solutions, and the impacts and costs of each, the project team ultimately agreed on a very different solution they had first envisaged: to take the existing ROH website and make it responsive.

Making the website responsive meant that the ROH could leverage all existing content, features and sales functionality without having to reinvent it. The team then built the digital guides within the responsive website by creating a 'My library' section, where the user could access content that was

available offline. Instead of making the entire website available offline, only the 'My library' section could be downloaded to the user device.

Taking this approach allowed the ROH to make the best use of open-source products that were already on the website. The website was already using a semantic approach without an expensive content- management system (CMS). Content is placed in its natural place on the internet – for example, photos are kept in Flickr, videos in YouTube and sound in Sound Cloud. This content is then cross-tagged with data held on each production used to sell tickets and the pages are dynamically generated based on the cross-tagging.

For more static or specialist content, such as the blog, the ROH used WordPress, a free and powerful tool for creating web pages (already used for the blog section of the ROH website) that supports the use of off-campus, tagged content from platforms such as YouTube. WordPress was also used to manage the content for the mobile-giving stories, and for an open-source articles module. Hence this platform provides all the digital guide functionality.

Although this approach had a number of advantages, including avoiding expensive CMS costs, a number of legal challenges arose because of ROH wanting to charge for digital guides via free platforms. ROH therefore had to engage directly with legal teams at Sound Cloud, YouTube and Flickr to find a solution. They ultimately agreed that content could be placed behind a paywall as long as that content was specific to the ROH and was also freely available to users of those platforms. The publications team subsequently created a special written editorial that could be charged for, augmented by free content.

The ROH mobile site went live to the public on 18 December at [www.roh.org.uk](http://www.roh.org.uk), with the first digital guide, for the ballet *Giselle*, available at the same time for £2.99; the ballet opened on 18 January and had a live cinema relay on 27 January. The second guide, for the opera *Don Giovanni*, was released on 27 January and advertised at the *Giselle* screening, with the production opening on 1 February and a screening the same day. Guides were also subsequently created for *The Sleeping Beauty* and Christopher Wheeldon's new ballet, *The Winter's Tale*.

With a user-friendly mobile-giving platform, fully integrated with our CRM system, in place, the ROH wanted to test the propensity of cinema audiences to make donations through extending the reach of its annual Pointe Shoes Appeal.

A short film about the appeal (showing a 'day in the life' of a pointe shoe) was screened at a performance of *The Nutcracker* in December. Cinema goers were invited to text a donation of £5 – the cost of a set of pointe shoe ribbons – via the Just Text Giving solution.

## Results

Overall, the project has delivered a sustainable hybrid app for the ROH, and improved user experience of the organisation's digital offering.

Since its launch in December 2013, over 700,000 people have used the hybrid app, the majority of whom were regular mobile and tablet visitors to the ROH website and were transitioned seamlessly from the previous mobile site.

Improvements to the mobile experience has increased users' dwell time and their propensity to make purchases via mobile devices; the ROH sees this as a means of protecting revenue currently generated via desktop activity.

Digital guides and mobile giving were promoted to 1,000 cinema attendees, but resulted in lower uptake than expected and have generated income of around £1,400. However, activity has been sufficient to warrant further investment by ROH over the medium- to long-term, and the guides will remain in use throughout the lifetime of current website.

## Insights

The ambitious scope of the project exerted considerable pressure and has made everyone involved think about what is achievable. This has filtered through into the ROH's planning for future website development, and the organisation is now working to a programme that delivers less, but better.

User-experience testing was insightful and caused the ROH to rethink some of its desktop and mobile web experiences, revealing that simple interactions and navigation can be confusing for users.

It also highlighted the lack of visibility of calls to action, and unclear or confusing feedback and interaction metaphors (e.g. icons) that did not match participants' mental models. Participants commented on the number of steps they had to go through to purchase a ticket and looked for key calls to action rather than reading on-screen information.

The biggest impact was the introduction of large green call-to-action buttons and the redesign of the ticket selection tool for both desktop and mobile users.

## Future

The ROH has committed to funding the digital publications for an additional 12 months beyond the initial R&D project, and a review is being conducted of the digital guides, with a medium- and longer-term proposal for looking specifically at design and content.

Although the initial take-up for mobile giving was very limited, this was the first time the ROH had communicated with cinema audiences over philanthropy. The organisation will continue to explore how different audiences respond to appeals, offering mobile giving to all donors and comparing how audiences respond to different subject matter and presentation approaches.

The R&D project has developed a productive relationship between KCL and the ROH, and the ROH continues to work with the KCL Cultural Institute on other projects, including the Kings College Cultural Challenge (internship programme) and a post-doctoral project. In addition, ROH chief technology officer Rob Greig has been asked to lecture on the 2015 Cultural Studies MA at KCL, and the project has broadened ROH's approach to working with academic institutions. ROH is now in discussion with other institutions to explore how they might collaborate.

The project has also made a material contribution to research into the use of and engagement with mobile digital resources in the arts, with a strong focus on cost-effectiveness, sustainability, and depth and breadth of engagement. This work is especially valuable for large-scale organisations and ticketing consortia that use Tessitura, helping them to develop their own sustainable, cost-effective applications and to leverage better value for their investment in technology. However, the specific learning around mobile

philanthropy and digital publications will be equally useful for organisations of other sizes who are considering how to grow and deepen audience engagement with the arts and culture.

KCL's findings report, together with the analytical and research instruments developed during the process of this project, are available as a part of a toolkit of best practice. These are freely available online and are being widely publicised among our colleagues in the arts and technology sectors.

ROH are also openly sharing and distributing code specially developed for the project with the arts sector, in the form of snippets for specific challenges that were faced, such as application caching. This can be accessed online via [GitHub](#).

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Improvements to the mobile experience has increased users' dwell time, and their propensity to make purchases via mobile devices.

## Introduction

Digital distribution channels have enabled England's arts and cultural organisations to bring more cultural experiences to greater numbers of people.

However, globally dispersed audiences present new challenges for engagement, marketing and fundraising, with smartphone penetration, device and ticketing solutions varying from country to country.

Against a backdrop of declining public funding, organisations need to find new ways to foster engagement and cultivate revenue streams in these new markets.

## Digital development at the Royal Opera House

The Royal Opera House (ROH) aims to enrich people's lives through opera and ballet. Home to two of the world's great artistic companies – The Royal Opera and The Royal Ballet, accompanied by the Orchestra of the Royal Opera House – it seeks to inspire audiences while breaking new ground in the presentation of lyric theatre. The ROH is unique in the breadth of its artistic output, extent of reach, digital innovation and depth of commitment to learning and engagement, including its approach to pricing and wide-ranging participatory projects with schools, families, communities, adult learners and artists.

ROH is also at the vanguard of digital arts engagement, pioneering big screens (1987), cinemas (2008), digital whiteboards (2011) and mobile games (2011). Productions are relayed live to cinemas in 41 countries; by September 2013 annual attendance had reached 346,000, a figure that doubled in the subsequent year (when this project was delivered), overtaking attendance at the ROH's home theatre in Covent Garden (which itself stood at 97% occupancy). Our first live digital content day in March 2012 – Royal Ballet LIVE – received 194,000 live views and a further 1,000,000 within five months. Further events with The Royal Opera and in conjunction with other companies followed, as well as a small number of pilot live streams of performances. The organisation's social media following remains strong, with more than 150,000 Facebook likes and 115,000 Twitter followers at the time of writing.

The investment in digital platforms by the ROH is playing a crucial role in increasing and deepening engagement with our work, both in the UK and internationally. Our digital strategy recognises the changing demographics of our audiences and how they interact and engage with the arts. The strategy also acknowledges that other revenue streams need to be found against a backdrop of declining funding, with digital activities providing one of several ways for the ROH to diversify its income.



*Over 28,000 people attended the Royal Opera House's final BP Big Screen of 2013, a series of free outdoor live relays. Trafalgar Square in London reached its maximum capacity and thousands more lined the edges of the square to enjoy the performance of Tosca.*

**Source: Elliott Franks courtesy of Royal Opera House**

## Why the ROH undertook this project

This project came about through:

- ROH's desire to extend opportunities for audiences to engage with its growing body of digital content about opera and ballet
- ROH's desire to build stronger relationships with its fast-growing cinema, digital and broadcast audiences through additional engagement opportunities and by capturing customers' details so they can be included in customer-relationship marketing (CRM)
- ROH's need to generate revenue from diverse sources to underpin its artistic ambitions and thus monetise digital content
- ROH's sense of responsibility to develop sustainable digital models for the cultural sector.

ROH wanted to seize the opportunity presented by mobile technology to enable audiences to engage with its work outside of its primary building and away from their desktops. At the time of our initial proposal to the Digital R&D Fund, a recent Google report, *Our Mobile Planet UK* (May 2012), had reported smartphone ownership at 51% of the population, with nearly 60% of owners accessing the internet daily with their mobile device. Although digital publications had not been attempted before in the arts sector, and less than 15% of the world's websites were responsive in 2013,<sup>1</sup> ROH and its partners were aware of interesting examples from outside the sector.

Several organisations (including ROH) had already developed applications for specific purposes, e.g. ticketing and games, but these often had a limited shelf-life and audiences.

ROH now wanted to:

- Develop a more sustainable approach, involving multiple content delivery over a longer period

<sup>1</sup> <http://mashable.com/2012/12/11/responsive-web-design/>

- Explore the potential to integrate applications with databases, avoiding costly content-management systems and manual double entry
- Develop new products to engage the broadcast and digital audiences for the arts.

## Proposal

ROH proposed working with its long-term partner, Seattle-based technology company POP, to develop a 'hybrid app' that would combine the best features of websites and applications, using new digital methodologies born of Web 3.0 along with semantic approaches and contrasting, traditional native app developments. Models for the project included the *Financial Times (FT)*, *USA Today* and the Amazon Cloud Reader.

'As with all research and development initiatives, the hybrid mobile app project for the Royal Opera House had everything conducting an experiment can offer: an initial hypothesis, a strategy, cooperation, managing the variables, constant change and plenty of unknowns and surprises, all leading, hopefully, to results.'

**Nara Zitner, programme director, POP**

With a robust mobile platform in place, ROH proposed to test three aspects of audience engagement that would be new to the sector:

- Digital publications – exploiting recent e-book developments to pilot pre-production, location-sensitive 'e-programmes' around four productions straddling our live and broadcast seasons. Initially offered free or low-cost to test the market, e-programmes would provide self-navigated audio-visual and narrative insights as an alternative to/extension of the traditional print programme. Publications delivered via digital platforms would be as accessible to cinema, broadcast and digital audiences as to theatregoers, enabling us to improve parity of experience.
- Mobile ticketing – leveraging the capabilities of the ROH's cloud-based transaction (online ticketing e-commerce) solution to combat the challenges of high-volume ticket sales that have limited application among large organisations and ticketing consortia, especially users of Tessitura (the CRM database used by the ROH and many other cultural

organisations). Like many large ticketed venues, the ROH experiences very large volume ticketing booking days. It can be very challenging to manage 100,000 customers demanding 1,000,000 pages over a two-hour period and most off-the-shelf mobile ticket solutions are unable to meet these demands.

- Mobile giving – raising the profile and increasing the ease of philanthropic giving across mobile devices as part of a broader engagement offer, and combatting some of the limitations and costs associated with third-party solutions such as Just Text Giving and the Donate app. Third-party solutions are not integrated with arts ticketing solutions and creates a data disconnect, which at best, limits analytics, such as knowing the true value of the customer, and at worst, risks damaging the relationship, e.g. making the same request twice or requiring a second Gift Aid sign-up. And third-party solutions do not always hand over the full donation, requiring administration to maintain their services. The proposed mobile giving solution was to be fully integrated with our CRM system, removing the need for manual data entry, and linked to existing Gift Aid records to ensure tax-efficient giving. It would also operate overseas, enabling us to test the propensity to give of our part-international cinema audiences.

## Mission & Values

To foster a connection between the Royal Opera House and a global community of opera and ballet audiences.

### **Production-focused**

The production is the unit around which content is organized

### **Participatory**

Encourages users to be involved, through social media or financial contributions

### **Plain-spoken**

Speaks to audiences in a straightforward manner

### **Globally aware**

Works on every device, worldwide, and knows where you are

### **Personal**

Knows what the user wants and gives it to them

### **High Quality**

Lives up to the ROH standard for excellence

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*Alignment of the project with the Royal  
Opera House's mission and values*

**Source: POP 'Digital Guide' Project Overview**

In developing the project, analysing its success and sharing learning, ROH proposed to work with Kings College London's (KCL) Department for Digital Humanities, a relationship brokered through Kings College Cultural Institute. The department demonstrated research expertise in user engagement and user research, focusing on user groups of web-based resources (typically within digital humanities and digital cultural heritage), with a particular interest in applying this expertise to a cost-effective concurrent design of mobile applications and websites.

'The Department of Digital Humanities (DDH) at King's College London undertakes innovative academic research and external consultancy in the application of technology to the arts, humanities and cultural heritage sectors. The Digital R&D Fund project fitted particular research interests within the department concerning user-experience research and user engagement with digital technology within the arts and cultural heritage sectors.'

**David Little, user experience designer,  
Kings College London**

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The ROH digital strategy recognises that other revenue streams need to be found against a backdrop of declining funding.

## The project

The overall research proposition for the project was:

Can arts organisations use a more sustainable model for app creation to deepen engagement with audiences?

The Digital R&D Fund allocated £125,000 towards the project, with the ROH covering the remainder of the costs (£71,000) through its core income (a combination of box office income, fundraising income, commercial income and National Portfolio Funding from Arts Council England). The technology partner, POP, also provided £13,000 of in-kind support.

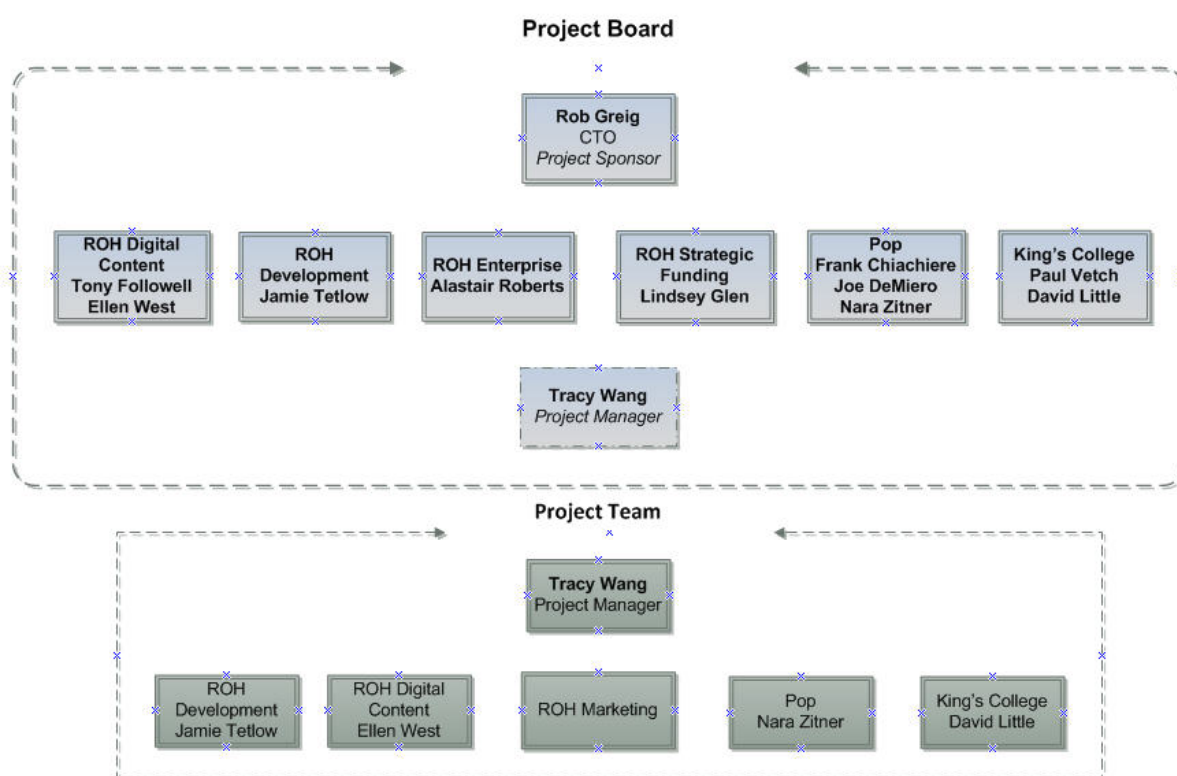
## Management

The partners established an iterative, agile development approach that was responsive to the research process, underpinned by a more traditional approach taking best practices from Prince2 project methodologies; this included the use of Gantt charts, project-initiation documentation, risk-management strategies and risk-control documentation. More detail regarding the project management structure is available in the toolkit: <http://www.roh.org.uk/digital/toolkit>

A Project Board was established comprising ROH chief technology officer Rob Greig, head of media Tony Followell and director of ROH enterprises Alastair Roberts; Paul Vetch, head of research development and delivery and business innovation fellow, Department of Digital Humanities, KCL; and Nara Zitner, POP programme director. The team produced project initiation documentation and met regularly throughout the project (via conference calls because of the remote location of the technology partner) to review statements of work, risk controls and research outcomes.

A project Working Group was also formed, sponsored by Rob Greig and led initially by ROH technology programme manager Tracey Wang. During the project, Tracey began a period of maternity leave and her role was temporarily covered by Nara Zitner visiting from Seattle, and then fulfilled by ROH programme manager Lea Indig. Technical development was led by head of digital development Jamie Tetlow, working with POP. Content was developed by the ROH's experienced in-house media team: head of media Tony Followell and digital content manager Ellen West. The structure of

digital guides was led by publications manager Will Richmond, reporting to publications editor John Snelson. Mobile giving was led by fundraising campaigns and communications manager Rachel Edmunds, replaced by Sacha Glasgow-Smith, reporting to head of strategic funding Lindsey Glen. Box office and marketing was represented by marketing and CRM manager Sophie Lilley and head of marketing Layla Amirshahi.



### *Structure of the Project Board and Project Team*

**Source: Royal Opera House**

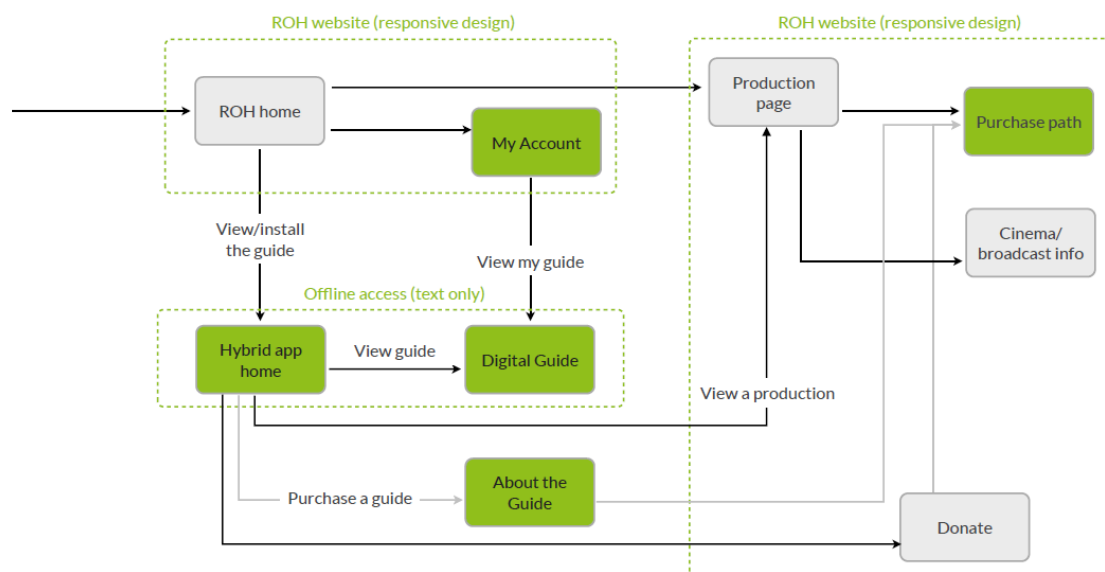
The Working Group initially met fortnightly at the ROH to devise and deliver statements of work and ensure that service levels were maintained. They also ensured that risks and major changes were escalated to the Project Board. A series of project gateways (review points) ensured alignment with research findings and technology choices. Following the project launch, the Working Group was disbanded, although it met in April to review the ROH's experience of the project.

As anticipated, a significant challenge came from working with two different project methodologies: POP's water flow model (a traditional project-design approach that charts the flow through conception, initiation, analysis,

design, construction, testing, production/implementation and maintenance) and the ROH's more agile, iterative approach, compounded by the 8-hour time difference. This presented significant challenges for co-development.

Some of the contingency was used to send the ROH head of digital to POP's offices in Seattle for three days to agree on working practices. During the trip the two organisations discussed respective development methodologies before comparing project plans. They identified key milestones in POP's initial project-overview document and their waterfall project plan and married these up with items on the ROH agile backlog (e.g. POP's geo-location with ROH's cinema mapping redevelopment). ROH head of digital also took advantage of POP's ample whiteboards to sketch out the full architecture, note technical details and user flows, and further devise roles and responsibilities for the upcoming build. Having an extended period of time to discuss the project allowed more detail to be shared and interrogated than a time-boxed conference call often allows.

## User Flow



*Mapping of user journeys through the hybrid app*

**Source: POP 'Digital Guide' Project Overview**

## Competitive audit

In February 2013, Kings College London identified and analysed take-up and user behaviours of mobile applications, identifying behavioural commonalities across user groups, in particular but not limited to those

within the arts sector, and in the context of existing statistical information gathered by the ROH about its own use of its digital offerings. Methods included face-to-face interviews, focus groups, observations of mobile usage, user diaries and conversations with application producers.

KCL synthesised this work into an initial report to inform the design and development of the app, which will be published as part of the toolkit emerging from this project.

The research was carried out in three stages:

1. A landscape review/‘competitive audit’ reviewing the state of arts and cultural institutions’ engagement with mobile technologies, supplemented with an overview survey of mobile tools in use for complementary activities (e.g. food, drink, entertainment and ticketing).
2. User research seeking to investigate the behaviours and motivations of smartphone and tablet users when engaging with arts and cultural information online, including their information-seeking activities, experiences of transacting and willingness to pay for content.
3. Usability testing of hybrid app prototypes with representative users.

KCL formally presented their findings to the partnership and gave the project team the opportunity to comment and feedback, followed by a second presentation incorporating the feedback.

The KCL research showed that only a quarter of arts organisations surveyed had a mobile website and those that had a mobile presence were more likely to use a native mobile app. The two best examples were outside the UK: the Rijksmuseum and Baltimore Museum were the only organisations to provide an effective ‘app-like’ experience; their approach was to build for tablet first, which gave a modern feel and slick user experience and was fully transportable between desktop and tablet devices, at the same time making the best of the tablet touch user interface. It was interesting to note the lack of tangible examples of good mobile practice within the performing arts in general. Organisations with a clear digital strategy such as Tate and the V&A had more effective mobile offerings, but these were either incomplete or

focused on one device type. There were no examples of a ubiquitous offering across all devices, such as tablet, phones, desktops, etc.

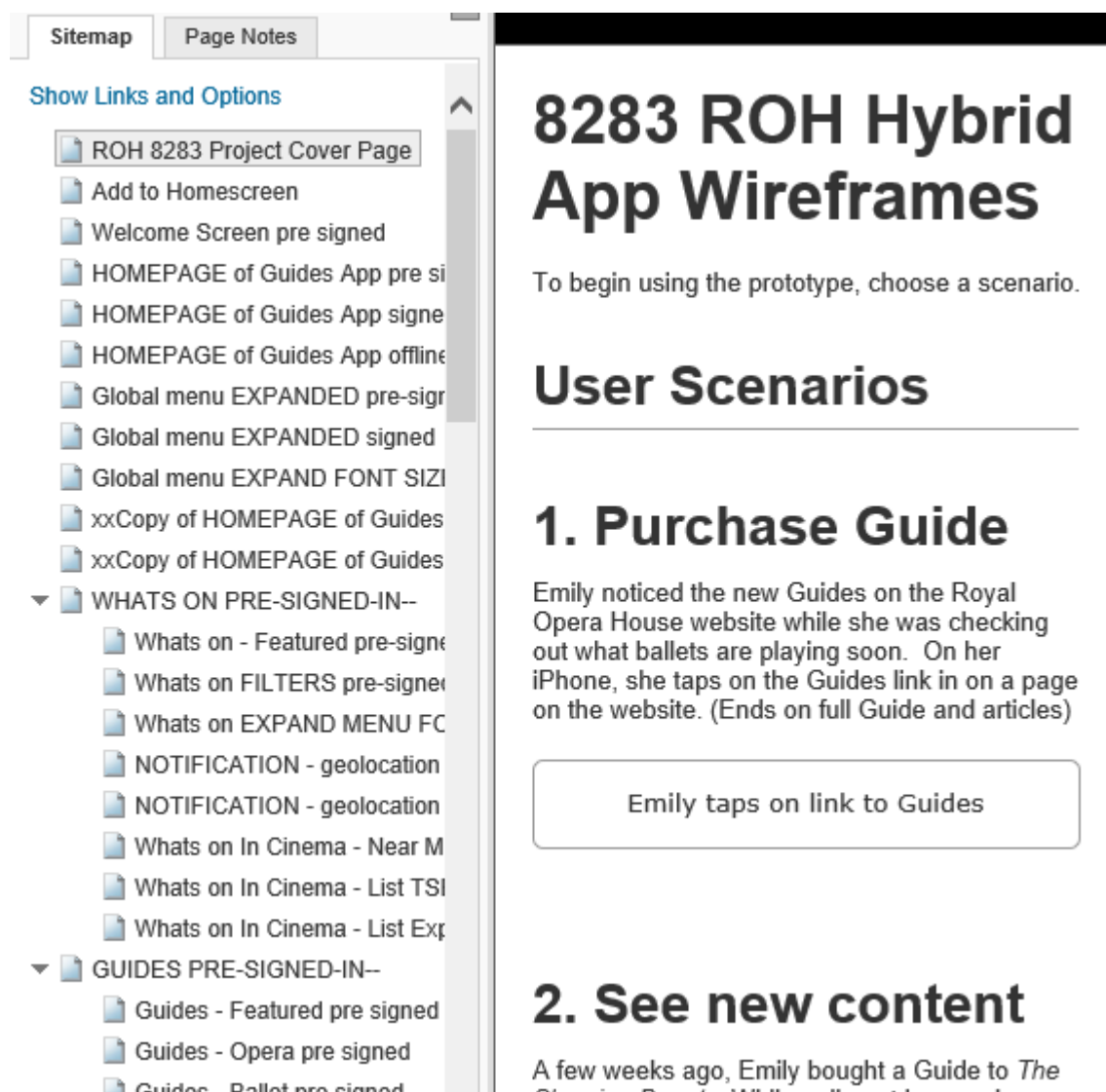
A very small minority of organisations were involved in mobile giving, but in every case the fundraising component was buried deep inside the website. The ROH had researched various mobile solutions, including Just Giving and the National Funding Scheme's new Donate App. These third-party solutions involved some costs and were not all operable abroad (around half of ROH's cinema audience views performances overseas). More fundamentally, they operated in isolation from the organisations' existing customer databases, requiring visitors to re-enter personal details and Gift Aid authorisation, and organisations to capture (sometimes at a cost) and manually enter the data into their system.

While these findings encouraged the ROH and its partners to develop something truly new to the sector, it raised the question as to why so few arts organisations had a consistent offering, and why none of those surveyed was fully capable on any device. The reasons were technological, on account of legacy content-management systems or cost, i.e. the sheer investment required to make the various versions of website or app required for each device. These findings led to the conclusion that adaptive and native technologies were not sustainable for even the largest arts organisations.

At this point the project team wondered whether the partners were being too ambitious, and whether the aim of a ubiquitous hybrid app experience supporting mobile giving, ticket sales, digital publications and geo-location was deliverable within the allocated timescales and budget. Fortunately, early prototyping by POP proved that it was possible to make the existing website responsive.

## Prototype development – usability testing

KCL used lo-fi prototypes on an iPad to test the application with a group of potential users. Methods included user observation, feedback and contextual inquiry.



*Prototype tool used to develop early version of the hybrid application*

**Source: Kings College London**

The prototype was tested with five participants: two male (both in the 25–34 age range) and three female (aged 35–44). It was recommended by KCL that five to six participants is an ideal number; more than six delivers diminishing returns. This also made the test group manageable.

Five participants were used to test interactive prototypes of the mobile app, using standard face-to-face, task-based usability testing in which participants were asked to 'think aloud' while working through the tasks. The tasks were carried out on an iPod Touch, running specialist usability testing software (UX Recorder) which allowed for the recording of sessions.

Learning from this process resulted in:

- Reducing the length of both content and e-commerce pages to reduce scrolling and keep key processes (e.g. ticket processes) focused and quick to complete; we also introduced mobile collapsed-by-default secondary-information sections within the checkout process
- Re-wording navigation links and interface controls, particularly where there is potential for confusion between related but different actions (e.g. purchasing a ticket or guide and 'Shop'); we also removed the mobile-specific navigation and kept parity with the desktop menus as a complete responsive website
- Greater visibility of links; we introduced clear path-of-least-resistance indication with green progress buttons, and increased target size of all links across the responsive website
- Greater visibility of user actions (sign in, my account, logout); we ensured that the account link is always accessible from the global header and added an additional sign-out link within the account section.

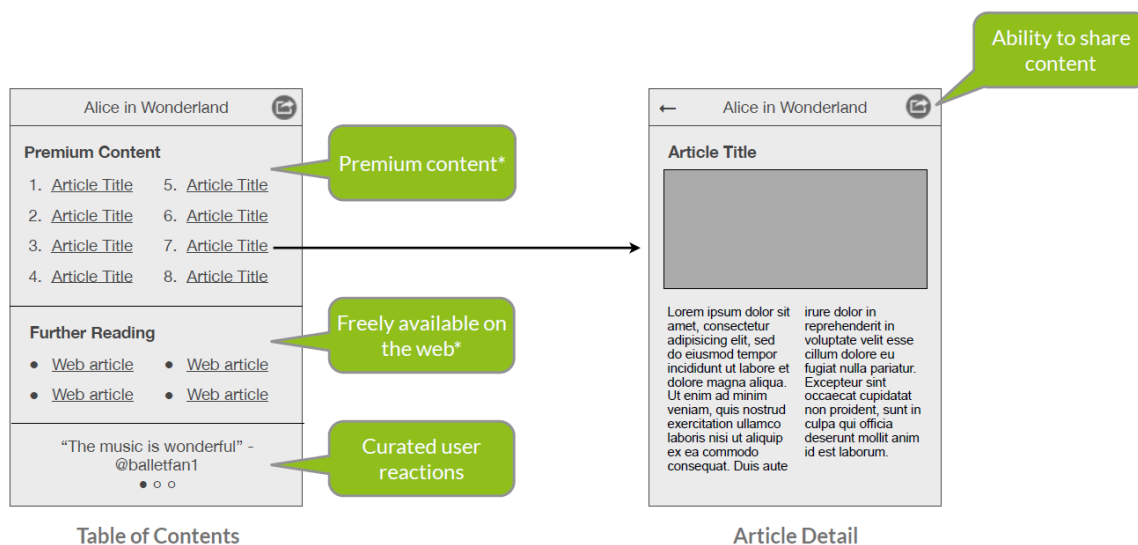
## Further development

The digital guides were closely linked with a performance and needed to be integrated with a customer's existing account. Unlike the Amazon Cloud Reader, it was not viable to make the app a standalone device, partly because of technical complexity but also because of the other services we were aiming to deliver: mobile giving and geo-location. The partners needed to establish a hybrid solution that worked on any physical device and supported all online activity, including sales and storing content offline in the form of a digital publication.

This challenge led the project team to a very different solution than the three we had used as examples, one that would have the greatest impact and be the most cost effective: to take the existing ROH website and make it responsive.

Making the website responsive meant that ROH could leverage all existing content, features and sales functionality without reinventing it. The team then built the digital guides by creating a 'My library' section, where users could access content available offline. Instead of making the entire website

available offline, only the 'My library' section could be downloaded to the device.



*Initial high-level wireframes illustrated how premium and free content could be curated within the Digital Guide*

**Source: POP 'Digital Guide' Project Overview**

Taking this approach allowed the ROH to make the best use of open-source products already present on the website. The website was already using a semantic approach without relying on expensive content-management systems (CMS), whereby content is found in its natural place on the internet – for example, photos are kept in Flickr, videos in YouTube and sound in Sound Cloud. The content is then cross-tagged with the data on each production used to sell tickets and the pages are generated based on the cross-tagging.

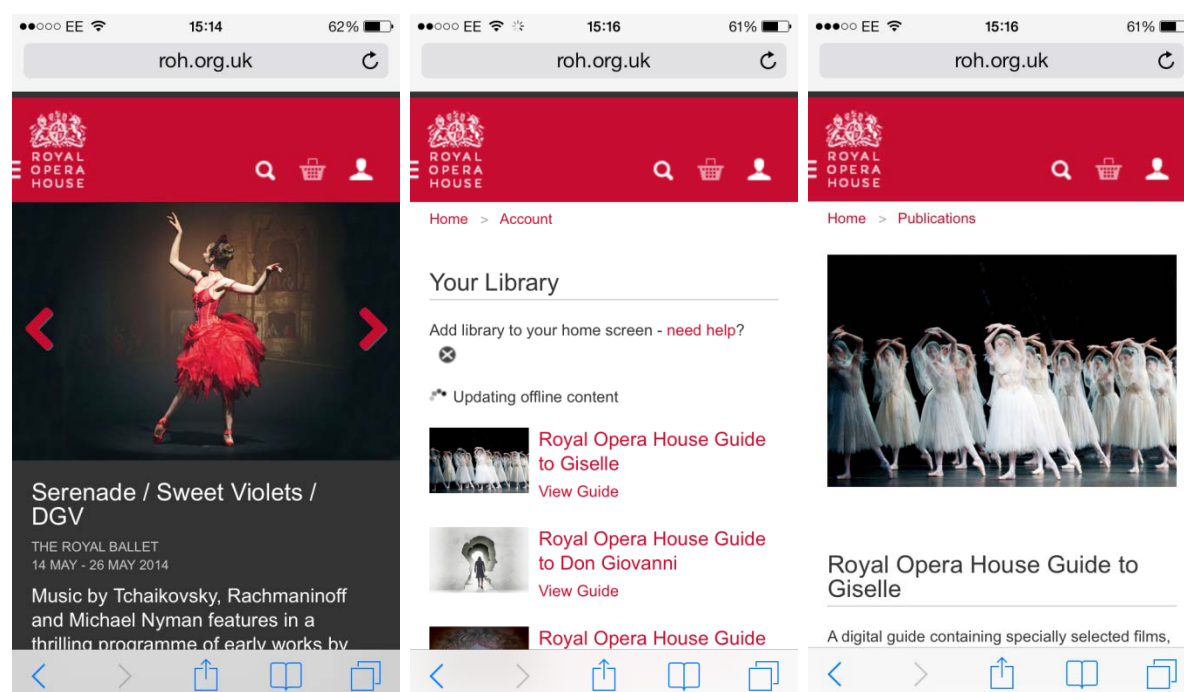
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This solution was not, however, without its challenges and, unsurprisingly, provoked legal issues. Putting content in freely available and widely available

platforms on the internet made sense as there are multiple benefits arising from this approach: content can be stored for free and eliminates the need for costly CMS; process duplication is reduced and search-engine optimisation (SEO) is improved. It also provides access to functionality and features that an organisation like the ROH could never afford to develop.

However, the ROH had intended to charge for the digital guides as a new revenue opportunity, but charging for content stored on free internet platforms was potentially crossing a line and meant having to engage with legal teams at Sound Cloud, YouTube and Flickr, to discover what was possible. Initially, it looked unlikely that any ROH media could be held on these platforms because of the terms and conditions of the providers, a problem that threatened to undermine the entire project as well as the semantic approach of the website.

However, working with the platform providers, the ROH found it could place the content behind a paywall as long that content was specific to the ROH and was still freely available to users of the platforms. The publications team therefore created a special written editorial that could be charged for, augmented by the free content.

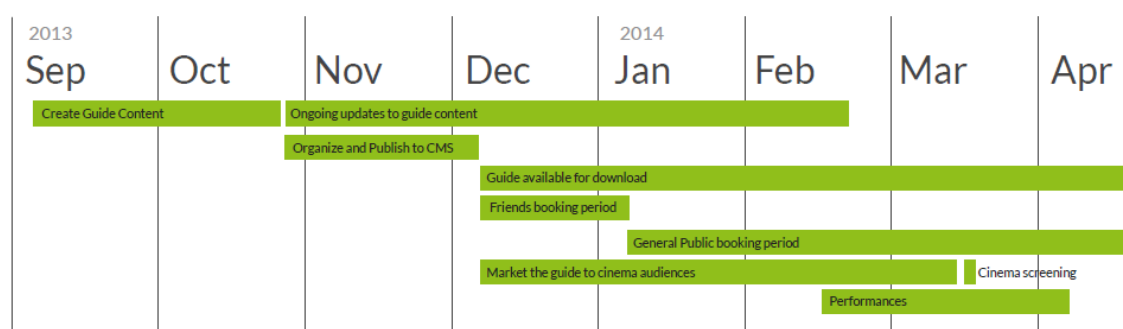


*Screenshots of the first Digital Guide for Giselle, including 'Your Library' section*

**Source: Royal Opera House**

## Launch

The ROH mobile site went live at [www.roh.org.uk](http://www.roh.org.uk) on 18 December, with the first digital guide, for the ballet *Giselle*, released at the same time. The ballet opened on 18 January and ran a live cinema relay on 27 January. The second guide, for the opera *Don Giovanni*, was released on 27 January and advertised at the *Giselle* screening, with the production itself opening on 1 February along with a screening the same day. Subsequent guides were created for *The Sleeping Beauty* and Christopher Wheeldon's new ballet, *The Winter's Tale*.



### *Content planning timeline for The Sleeping Beauty*

**Source: Royal Opera House and POP**

Digital guides were priced at £2.99, which was felt to be in line with comparable digital products in different sectors, e.g. digital versions of match-day programmes at football clubs. Research showed that £2.99 was a standard price for these products and that this was significantly cheaper than the £8 programmes sold for ROH stage performances.

Once the partners had established that the site and guides were working well, ROH began marketing them to its customers. This included:

- Digital guides accessible from the relevant production page
- All customers for Covent Garden performances of relevant productions being invited to purchase a guide at the checkout

- Guides being advertised in emails sent to all Covent Garden ticket bookers to remind them about their ticket purchase and informing them about timings and dining options
- Guides being advertised in emails promoting cinema relays
- Blogs about the site previewing the guides
- Guides being advertised in the free cast sheets distributed at cinema screenings
- A short film promoting digital guides being screened at all cinema relays of productions for which a guide is available
- Promotion in handouts to press members on press nights of relevant productions
- Promotion through tweets and Facebook status updates.



*Frame from Royal Opera House Digital Guide video, which has been viewed almost 10,000 times*

**Source: Royal Opera House & YouTube**

## Mobile giving

With a user-friendly mobile giving platform, fully integrated with our CRM system, in place, the ROH wanted to test the propensity of cinema audiences to make donations. It did so by extending the reach of its annual Pointe Shoes Appeal, which is one of the ROH's longest running and most successful campaigns. Ballet goers are invited to make a donation to support the cost of providing pointe shoes for Royal Ballet dancers; the company uses approximately 12,000 pairs each year at a cost of approximately £32 each.

A short film about the appeal (showing a 'day in the life' of a pointe shoe) was screened at a performance of *The Nutcracker* in December. Cinema goers were invited to text a donation of £5 – the cost of a set of pointe shoe ribbons via the Just Giving solution. The film was repeated at the screening of *Giselle*, with audiences invited to use the mobile site to give.



*Frame from Royal Opera House Digital Guide video*

**Source: Royal Opera House and YouTube post-launch analysis**

KCL used Google Analytics data to establish how people were using the application and its content. KCL's analysis is outlined below.

## Costs

The total budget for the project came to almost £200,000.

Figure 1 - Project budget

Key Activity	Grant £000's	ROH contribution £000s	Total £000's
Research	36.2	5	41.2
Development	88.5	16.3	104.8
Content evaluation/analysis	0	32.5	32.5
Deployment and evaluation	0.3	8.2	8.5
Other	0	9.5	9.5
<b>Total</b>	<b>125</b>	<b>71.5</b>	<b>196.5</b>

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Making the website responsive meant that the ROH could leverage all the existing content, features and sales functionality without having to reinvent it.

# Results

## Overview

Overall, the project has delivered a sustainable hybrid app for the ROH, and improved user experience of the organisation's digital offering.

Since its launch in December 2013, over 700,000 people have used the hybrid app, the majority of whom were regular mobile and tablet visitors to the ROH website, and were transitioned seamlessly from the previous mobile site.

Improvements to the mobile experience has increased users' dwell time and their propensity to make purchases via mobile devices; ROH sees this as a means of protecting revenue currently generated via desktop activity.

Digital guides and mobile giving were promoted to 1,000 cinema attendees, but resulted in lower than expected uptake. These new features generated income of around £1,400, although activity has been sufficient to warrant further investment by ROH over the medium- to long-term. It is envisaged that these features will remain in use throughout the lifetime of the current website.

Detailed results for the launch and post-launch are discussed in further detail below.

## Detailed results

### Mobile site usage

During the three-month testing period there were 707,491 site visits from mobile and tablet devices (of which 363,913 came from mobile phones).

Engagement across both mobile and desktop devices has increased steadily prior to and following the launch, so benchmarking the rate of change is needed to isolate the impact of the changes.

In the 19 months preceding launch, mobile usage increased 458% from 49,619 to 227,428, against a desktop usage increase of 175% from 282,638 to 495,416.

This is consistent with the gradual increase in the proportion of people engaging via mobile devices as opposed to desktops (see below). In the three months since launch, mobile usage peaked in Jan/Feb 2014 at an increase of 110%, while desktop usage increased 108% during the same period.

Over the course of the 19-month benchmark period, the proportion of ROH website traffic from mobile devices doubled, growing from 14.93% to 31.46%. In the three months following launch, mobile web traffic further grew to 33.88%, peaking at 35.71% in Jan/Feb 2014. This is a faster rate of growth than in the benchmark period on a per-month basis.

Mobile use among audiences continues to grow steadily; by mid-2015 we expect 50% of all ROH web traffic to come from mobile devices.

### Dwell time

Investment in the quality of mobile sites appears to increase dwell time. During the testing period, the gap between desktop and mobile dwell time narrowed from 2 minutes, 6 seconds to 52 seconds.

### Ticket sales

Improvements to the mobile ticketing experience increased customers' propensity to make purchases via mobile devices.

During the benchmark period, the proportion of tickets sold on mobile devices increased by 6.34% (from 3.8% to 10.14%). Post-launch, the rate of sale on mobile devices increased rapidly, peaking at 18.14% in Jan/Feb 2014, representing an increase of 8% over 2 months.

### Digital guides sales

A small but significant proportion of audience members is interested in purchasing a digital guide for a production. A total of 363 guides were sold during the testing period, of which 29% were purchased from mobile devices, while 39% of guides purchased on mobile devices occurred on cinema screening days. These figures imply that mobile-accessible guides are a useful means of engaging with cinema audiences who are unable to access production programmes.

The rate of purchase currently seems steady, averaging 121 guides per month.

*Table 1 – Digital guides sales*

	Giselle	Don Giovanni	Sleeping Beauty
Number sold	186	77	107
Number sold on cinema screening day	18	15	16
Number sold on mobile devices	62	23	24
Number of sales on cinema screening day on mobile devices	8	6	5
% sold on cinema screening day	9.68	19.48	14.95
% sold on mobile devices	33.33	29.87	22.43
% of sales on cinema screening day on mobile devices	44.44	40	31.25

*Table 2 – Page visited before digital guide sale*

	Giselle	Don Giovanni	Sleeping Beauty
Account sign in	11.23	17.15	11.23
ROH events page	7.73	6.81	7.73
Order confirmation	4.67	5.86	4.67
Production page	1.5	0.04	3.44
Cinema	0.58	0.53	0.58

This shows which pages were viewed prior to a purchase of a digital guide. As can be seen, the 'Sign in' page accounts for a high percentage of this, which is logical, as customers will have been signing in to buy a digital guide. However, it is interesting to note the relatively low percentage of sales leading from specific production and cinema pages.

*Table 3 – Page visited after digital guide sale*

	Giselle	Don Giovanni	Sleeping Beauty
Account sign in	4.43	7.52	4.43
ROH events page	22.56	20.24	22.56
ROH visitors' page	3.02	2.68	3.02
Production page	1.38	0.01	5.16
Cinema	0.96	0.91	0.96

A high proportion of customers returned to the general ROH events calendar after purchasing a digital guide, implying other items were bought in the same sale. The figures for exit to cinema pages are slightly higher than those for entrances from the cinema pages, which suggests that customers were led to read about ROH cinema relays after purchasing a digital guide. It is also good to see that a noticeable proportion of exits (more than 1%) are to the ROH visitors' page, where customers can make restaurant reservations and visit the ROH online shop.

## Mobile giving

The pilot mobile-giving appeal at the cinema screening of *The Nutcracker* generated just five donations totalling £24, with a further five donations made online or by phone totalling £102. The mobile-giving appeal at the screening of *Giselle*, attended by an audience of over 100,000, generated just 13 donations totalling £376. For comparison, the Pointe Shoes Appeal (also publicised by direct mail, targeted emails, online promotions and front-of-house activity) typically generates £60,000–70,000 per annum. We cannot tell how many direct mail donations or subsequent legacy pledges may have been influenced by the cinema film.

These results would seem to indicate that cinema audiences' propensity for mobile giving is very low. However, it can take time to prepare an audience to give philanthropically and to understand motivations for giving. Further activity involving at least one alternative 'case for support' is necessary in order to test fully this experiment.

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Cinema audiences’ propensity for mobile giving is very low. However, it can take time to prepare an audience to give philanthropically and to understand motivations for giving.

# Insights

## Scope of the project

The scope of the project was ambitious, a factor that exerted additional pressure. Furthermore, the project was not just pure R&D: the partners had assumptions to test and therefore a real product to deliver. Although they did deliver on the agreed date, in hindsight they felt they should have aimed to do less. Focusing on one area, such as mobile giving, would have given the team more time for in-depth research and evaluation, which in turn might have improved results.

The level of stretch introduced by the project has made everyone think about what is achievable. This has filtered through into the ROH's planning for future website development and they are now working to a programme that delivers less, but better.

The investment in HTML5, offline caching and responsive technologies was no less significant than that involved in developing native applications. As these are relatively new technologies, there was a certain amount of trial and error leading to longer development times. The main benefit has been the continued development of a platform that works on any device without the constraints of native applications. There has been no reinvestment in repurposing code for new devices, but time will tell whether this model will remain effective in light of technological developments such as the next generation of wearable technologies.

The ROH experimented with different content and marketing schedules to optimise interest in sales. Predictably, they found that the greatest interest in online content was around live cinema screening, when the guide was marketed in print and on screen. Other peaks coincided with marketing emails. Take-up was lower than targeted (it will take time to make audiences familiar with the concept), but figures suggest that interest in purchasing our online content continues to rise. The biggest challenge remains gauging when and through what routes audiences seek out different types of content.

Sound Cloud provides good social-media engagement, with the ROH's international following 'liking' many clips, which in turn promoted sharing

on the site. This demonstrated the value of keeping online content networked with social media to drive traffic in both directions.

## User experience

The user-experience testing was insightful, revealing that simple interactions and navigation can be confusing for users, which has caused the ROH to rethink some of its desktop and mobile web experiences. In particular, testing highlighted the lack of visibility of calls to action, and unclear or confusing feedback and interaction metaphors (e.g. icons) that did not match participants' mental models. Participants commented on the number of steps they had to go through to purchase a ticket and showed little evidence of reading through all the on-screen information, instead looking for key calls to action.

While the use of language is clearly understood within the institution, it may be less clear to those outside – for example, 'Shop' (in the main navigation) and calls to action such as 'Purchase a ticket', 'Purchase a guide', 'Big screen' and 'In cinema'.

There was also confusion about participants' position in the purchasing path, particularly when the penultimate stage provided feedback on the success of the ticket purchase and the last stage was an 'upsell' of restaurant bookings. The upsell step appeared to divide participants: some were ambivalent, others found it intrusive and irritating.

The most visible impact was the introduction of large green call-to-action buttons and the redesign of the best-available ticketing selection tool on desktop and mobile devices.

Over the course of the project, the ROH learned that to sell content online it is crucial to provide a clear description of the offering. Many users reached the pre-purchase page but did not follow through with a purchase, which is something the ROH will need to investigate further.

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The user-experience testing was insightful, revealing that simple interactions and navigation can be confusing for users, which has caused the ROH to rethink some of its desktop and mobile web experiences.

# Future

## Technical development

The R&D project has created an appetite to further develop digital applications and products at the ROH, and has equipped us with a greater understanding of the processes and challenges of exploring technologies that are not currently mainstream.

Much was learned about the need for clear and concerted collaboration between content producers and digital-development teams, if the result is to be a worthwhile product. As the ROH enters the next phase of development it plans to use content requirements to guide development tasks rather than just currently available functionality, including exploring new content notification and dynamic updating.

The challenges of working with multiple platforms simultaneously had been underestimated. For example, despite the World Wide Web Consortium (W3C) establishing a standard practice for storing content offline on a mobile device, manufacturers tend to follow their own standards and approaches. This meant that despite the ubiquity of responsive websites and digital guides, some code has had to be developed to manage the nuances of specific platforms. In hindsight, the partners felt they should have given themselves more time to research and test the technology; this is something that will inform future digital development.

## Digital publications

The ROH has committed to funding digital publications for a further 12 months beyond the completion of the initial R&D project. A review is being conducted of the digital guides, with a medium- and longer-term proposal to look specifically at design and content of the new product. We believe the project has good long-term potential, both in its current guise and in new formats, such as free guides for BP Big Screens, an ROH Student Scheme, World Ballet Day etc., and for new initiatives yet to be fully scoped, such as a digital membership scheme.

The project also helped the ROH think more holistically about productions and the types and forms of content that could appear in print, online or behind a paywall, for each production.

## Mobile giving

While initial mobile-giving take-up was very limited, this was the first time the ROH had communicated with cinema audiences regarding philanthropy. ROH will continue to explore how different audiences respond to appeals, offering mobile giving as an option for all donors and comparing how audiences respond to different subject matter and presentation approaches.

## Future collaboration

The R&D project has developed a productive relationship between KCL and the ROH. ROH continues to work with the KCL Cultural Institute on other projects, including the Kings College Cultural Challenge (internship programme) and a post-doctoral project. ROH chief technology officer Rob Greig has been asked to lecture on the 2015 Cultural Studies MA. The project has also broadened the ROH approach to working with academic institutions and it is now exploring collaboration with other institutions. The ROH and POP envisage further collaboration.

Following the launch of the project, the ROH wanted to explore further the development of new digital products with commercial and cultural value. In particular, it has collaborated with the Fluxx agency on a two-day programme called Rapid Start, with the intention of taking 100 ideas and evaluating and prototyping two over 48 hours. Many of the staff from the digital R&D project took part in Rapid Start, including an intern from Kings College.

## Value to the cultural sector

The project has made a material contribution to research into using and engaging with mobile digital resources in the arts, focusing particularly on cost-effectiveness, sustainability, and depth and breadth of engagement. This work is especially valuable for large-scale organisations and ticketing consortia that use Tessitura, helping them to develop their own sustainable, cost-effective applications and leverage better value for their investment in technology. However, the specific learning around mobile philanthropy and digital publications will be useful for all organisations considering how to deepen audience engagement with the arts and culture.

KCL's findings report, together with the analytical and research instruments developed during this project, are available as a part of a toolkit of best practice. These are freely available online and are being widely publicised among our colleagues in the arts and technology sectors.

ROH are also openly sharing and distributing code developed for the project with the arts sector, in the form of code snippets for specific challenges, such as application caching. This can be accessed online via [GitHub](#). Rob Greig, chief technology officer, ROH, says:

'The R&D project has created an appetite to further develop digital applications and products at the ROH, equipping us with a greater understanding of the processes and challenges of exploring technique and technologies that are not currently mainstream. It has also enabled us to create a great platform for deepening engagement among all our audiences, and especially among those who cannot ordinarily set foot inside our London theatre.

'The project has opened up new ways of working collaboratively with academic and technology partners and enabled us to share learning widely.'

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The project has opened up new ways of working collaboratively with academic and technology partners and enabled us to share learning widely.

Rob Greig, chief technology officer




# Further resources

[roh.org.uk/digital](http://roh.org.uk/digital)

The toolkit hosted on the ROH website is intended to be a permanent resource for sharing learning from the project, and will continue to be updated with future digital-development activities.




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## Digital



Royal Opera House digital guides

0:00 / 0:51


YouTube

### Digital


With the support of the Digital Research and Development Fund for the Arts the Royal Opera House is making available the outputs of its digital production to help inform future developments in the arts sector.

We have collated here our project documents and processes, a user experience toolkit and our open source and open data initiatives.

### Find out more



Hybrid App Project



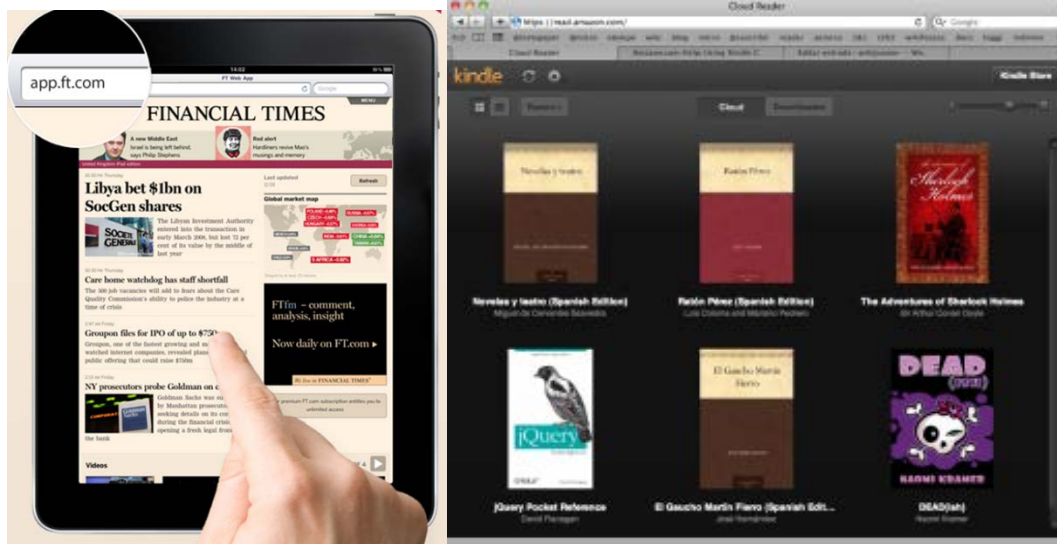
Toolkit

### Digital

[Toolkit](#)

## Appendix A – Other examples

### Amazon Cloud Reader



Amazon Cloud Reader is a HTML5-based application that works on any device. It was built by Amazon as an alternative to the native applications traditionally found within device-specific stores such as Apple iTunes. This enables Amazon to circumvent some of the punitive charges within native app stores.<sup>2</sup>

### *Financial Times* app

The *FT* was another early adopter of HTML5 applications, which it developed for much of the same commercial reasons as the Amazon Cloud Reader.

ROH visited the *FT* at their London Bridge office to discuss some of the challenges the publication had faced in developing its own application. However, the comparisons were limited because of scale. For example, the *FT* initially used an external agency to develop its app, but later bought the entire company, a model that cannot be replicated in the arts.

### *USA Today*

Like the *FT*, *USA Today* is a digitally mature, international news media organisation that offers a series of native apps and a HTML5 app. However,

<sup>2</sup> <http://www.telegraph.co.uk/technology/amazon/8693760/Amazon-hits-back-at-Apple-with-Kindle-Cloud-Reader.html>

both the *FT* and *USA Today* applications, which were available and in use when the ROH partnership started, differed significantly from that of the ROH in that they were used to deliver their core business product. In contrast, the ROH and other arts organisations have products that cannot be managed offline, such as selling tickets or buying membership.

## Appendix B – Budget breakdown

Key Activity	Grant	ROH contribution	Total £000's
Research			
Research	17.4		17.4
Strategy and research phase: initiation/preparations/kick-off	1.9		1.9
Project management/monitoring	9.1		9.1
Project meetings		5.0	5.0
Project status meetings with stakeholders	3.1		3.1
Competitive audit and findings report	1.3		1.3
Requirements gathering	3.4		3.4
Development phase: initiation/preparations/kick-off			
Prototype development and functional brief		11.9	11.9
Usability audit	1.3		1.3
Prototype revisions/approval	2.8		2.8
Mid-project budget review	0.7	0.2	0.9
Visual design (3 rounds of comps)	1.9		1.9
Project specification generation (3 rounds)	3.7		3.7
Planning for development phase: build plan and project plan	3.4		3.4
Budget and contract review/approval for development phase		0.3	0.3
Development phase: initiation/preparations/kick-off	3.1		3.1

Key Activity	Grant	ROH contribution	Total £000's
Project management/monitoring	7.8		7.8
Technical analysis/consulting	3.4		3.4
Project meetings	4.4		4.4
Project status meetings with stakeholders	3.1		3.1
Application development (Sprint 1)	9.7		9.7
Application QA (Sprint 1)	6.0		6.0
Application development (Sprint 2)	9.7		9.7
Application QA (Sprint 2)	6.0		6.0
Application development (Sprint 3)	9.7		9.7
Application QA (Sprint 3)	3.0	3.0	6.0
Comprehensive application QA	6.9		6.9
User acceptance testing	1.9		1.9
Deployment plan		0.9	0.9
Content evaluation/analysis			
E-programmes: freelance support for 4 publications @ £5,000		20.0	20.0
Media trail (app advert)		7.5	7.5
Mobile-giving pilot campaign		5.0	5.0
Deployment and evaluation phase			
Launch		1.9	1.9
Post-launch analysis phase: initiation/preparations/kick-off	0.3		0.3
Project management/monitoring		1.3	1.3
Content evaluation/analysis		2.2	2.2
Key performance indicator (KPI), analysis and findings report		2.8	2.8

Key Activity	Grant	ROH contribution	Total £000's
Other			
Contingency (5%)		8.5	8.5
Travel		1.0	1.0
Total	125.0	71.5	196.5

# Glossary and Abbreviations

Amazon Cloud

CMS Content-management system

CRM Customer relationship management

Flickr An image hosting and video hosting website

Gantt charts A chart in which a series of horizontal lines shows the amount of work done or production completed in certain periods of time in relation to the amount planned for those periods

Gift Aid A scheme enabling registered charities to reclaim tax on a donation made by a UK taxpayer, effectively increasing the amount of the donation

Google Analytics A service offered by Google that generates detailed statistics about a website's traffic and traffic sources and measures conversions and sales

HTML5 A W3C specification that defines the fifth major revision of the Hypertext Markup Language (HTML)

KCL Kings College London

POP POP Technologies

Prince2 PProjects IN Controlled Environments - a de facto process-based method for effective project management

Sound Cloud A Swedish online audio distribution platform that enables its users to upload, record, promote, and share their originally-created sounds

Tessitura An enterprise application used by performing arts and cultural organisations to manage their activities in ticketing, fundraising and customer relationship management.

W3C	World Wide Web Consortium, the main international standards organization for the World Wide Web
Web 3.0	The creation of high-quality content and services produced by gifted individuals using Web 2.0 technology as an enabling platform
WordPress	Free, open source publishing software
Youtube	A video sharing website

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