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Final report

Digital and Live-Generated Media in Public Spaces

for Creative Scotland Digital Media IP Seed Fund

research and development of a film and digital content delivery system for public screens and projection

Note: This document makes extensive use of hyperlinks to related resources and references online. If you are viewing a print-out of this document you won't be able to see these links, so contact info@netribution.co.uk to receive a digital version.

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Project overview

The creation of this project was motivated by the struggle producers and distributors have to make a return on their work. With online revenues for films still uncertain, exhibition income is more important than ever, as it remains one market where people are happy to pay for content - and the market is healthy and growing. The music industry has weathered many of the challenges of the digital transition thru a resurgence in festivals, touring and concerts, which overtook sales of singles and albums in 2009, as the biggest earner.

However, despite developments such as the Digital Screen Network - which requires cinemas to programme a non-mainstream content on some screens in return for capital grants - exhibition is still very hard for independent filmmakers to access. Over the past three years Netribution has been exploring how changes to the way people are gathering to watch films can offer new opportunities for filmmakers to access the market; while the rise of social media and marketing could change the way people discover content in the first place.

Networked discovery: A new hope

Online there are three stand-out examples of the power of networks being used to mobilise people around film screenings outside of conventional cinemas with the help of websites:

- *Iraq for Sale* used the website BraveNewTheaters.com to organise 3000 screenings across the US on the opening weekend (having previously been the first feature film to crowd-source its budget). The site continues to be used to mobilise and promote screenings of independent documentaries for non-traditional public screenings.
- *Four Eyed Monsters* invited fans of their free online video-podcasts to request a screening in their local town. These were plotted on a Google map and when enough people in a region had requested a screening they would phone cinemas in that area to arrange a screening. Their screen averages far outstripped industry averages for that period, and the project led to the websites OpenIndie.com and CrowdControls.cc by the main team and which both support audience-powered screenings. Forthcoming Finnish indie film *Iron Sky* has used CrowdControls to net over 30,000 screening requests during production.
- *Age of Stupid* used another website - IndieScreeings.net - to sell custom licenses to screenings for schools, town halls, community groups and so forth, raising over £140,000 at the same time as a traditional cinema and DVD release thru Dogwoof. That website has now evolved into GoodScreenings.net, run by BritDoc.

Each of these online services have shown remarkable success in using the web and network effects to get interest in projects that might once have struggled to get a cinema release, let alone large-scale exposure, yet depend upon posting out DVDs to the person screening the film.

Cinema-on-demand

Most digital cinema works around the distribution of films thru either encrypted hard drives or satellite connections. However as fibre and superfast broadband becomes more widespread, it seems inevitable this will become the preferred method for delivering digital files. Indeed, as this project was coming to a close news emerged that a group of independent cinemas in the north of England had received BFI funding to build, test and trial delivery of films across a fibre network. The advantages are numerous:

- **Cheaper**. The storage and bandwidth costs are normally less than hard-drive/DVD/Blu-Ray burning and postage.
- **Quicker**. Film programmes can be finalised just before a screening starts allowing more flexibility with programming.
- **Monitoring**. While it's impossible to know how many times a disc, tape or film reel has been played, digital delivery can allow for tracking of films played - where, when, how often and for how long.
- **Global campaigns.** Although dependent on the rollout of broadband, it will be far easier for an independent producer or distributor to manage an international exhibition campaign if they don't need to ship prints, tapes, discs or hard drives to remote locations.
- **Efficiencies of scale.** By removing the staff time of processing licenses and sending out copies of the film, more content can be made available without an increase in costs - i.e. it would be much easier to offer an archive of several thousand titles for distribution digitally than storing physical copies and manually processing each license.
- **Innovation**. Just as 3D has reinvigorated the exhibition sector, digitally delivered exhibition opens up strong potential for interactive cinema experiences and locally-specific content.

Challenges with digital rights

However there are two major stumbling blocks for such a system: concerns over piracy surrounding digital distribution and the challenge of securing digital rights from film rights owners who are currently inundated with requests. During our research we learnt about these concerns from a range of service owners (names removed):

- One of the founders of an **online indie screening service** told us that only 6% of their micro-indie feature films were available with a 'download to screen' license, because of the perception that more copyright infringement comes from downloaded video than DVDs. And the 94% of producers refusing to let their work be downloaded represented the more radical and experimental area of the market (admittedly the service was not offering any form of rights management or encryption, but depending on trust).
- Even with security as part of the package, the head of **digital distribution at a major studio** explained to us that with a limited budget their department was only able to work with a fraction of the companies asking them each day for digital rights and partnerships. They focused instead on those with the largest possible market (such as BT's 5 million existing broadband subscribers).
- The head of a distributor of one of the UK's largest **archives of film rights** supported this, explaining they were receiving requests every day and only working with a very small minority of them.
- Head of international business affairs at a **music major** took this one step further, explaining how in a market where countless online services are bidding for rights they would work with the services offering the highest pre-sales. Given that many services would not survive more than a year or two, unless it was felt there was genuine innovation - such as Spotify - they would simply try to get as much money from these services as possible and work only with those able to pay.

This led us to conclude that there are two fundamental structural problems in the digital industry which is holding back the digital film distribution space:

- rights owners have not yet established the internal infrastructure to scale digital distribution to multiple platforms easily, just as they could scale DVD retail to any shop wanting to sell the discs.
- with online revenues uncertain, cherry picking particular services offers a way for large rights owners to make money thru pre-sales from those well financed by VCs regardless of their success or market potential, as well as to favour companies which they might have an advantage from their success (such as Spotify, where each of the labels have a small shareholding).

For new online services this creates a viscous circle that without content they struggle to get audiences, and without audiences they struggle to get content. It's a market which favors the best financed video services.

Creative solutions

Faced with these market hurdles we decided that, other than money, rights owners could be attracted to services that:

- Can offer them a larger or different audience than they currently have a relationship with;
- Offers the ability for new ways to make money, or new approaches to add value to their content.

In other words, without large VC finance, the focus should be on innovation.

Broadening out the initial scope of the project it was important to recognize, amidst our focus on the big screen the rise in the smallest screen - the smart phone and tablet. These devices are used as viewing systems in themselves, but we begun to wonder how they could exist alongside big screens.

A demo of HTML5 features by Mozilla's Paul Rouget showcased a web page in a browser on a smart phone controlling a web page on a computer screen using a technology called WebSockets. Rouget was using the two devices together like a remote control for a slide presentation - but it seemed like the technology could be used for a number of different applications: feeding information from the video to the phone, and letting the phone select or vote on different videos to play. There was an 'a ha' moment when looking at the work of another Mozilla project - Popcorn, which adds live information to a video during playback (see below) - it seemed like it would be great to try and put the extended metadata onto a secondary device.

So as a first step we decided to work with content already available online, such as the plethora of short films, animations, documentaries, music videos and feature films legitimately available on video sharing sites such as Daily Motion and YouTube.

We would then look at the innovations a screening framework could offer to a variety of market applications, with a specific focus on secondary devices such as phones, tablets and laptops, and how they could interact with screens. Our potential market could include:

- School, colleges and universities, both for classroom teaching and after-school cinema clubs (ie FilmClub). In learning environments linking between screens or digital whiteboard and laptops/tablets could offer great potential.
- Bars, clubs and music venues which might - as well as sport - show music videos, live concerts and events, films and music visualizers to accompany the music playing in the venue. A phone could become an interface for a jukebox or even extended sound output.
- Community centres, care homes, young offender institutions, homeless shelters, etc which have communal viewing facilities (ie Open Cinema).
- Digital signage systems, conference centres, training spaces, business hubs, receptions and shop windows - where interaction with the end-user thru their phone could directly lead to sales.

Timeline to the project

2008 - 2010 : before the bid

Netribution began exploring the future of exhibition with a feasibility study in 2008/2009 funded by the Technology Strategy Board called *A Living Cinema: Methods and Models for Improving the Social Experience of Film*. It looked at the evolving shape of film exhibition in non-cinema spaces, and a new form of live generated cinema that used a video games engine to live render animated scenes in response to triggers such as music or the movement and reaction of the audience. After development in Glasgow, test events in Newcastle and South London brought together films with live music, food, interactive installations, discussion and dancing. A report on this project is available.

From this, Netribution began to envisage a tool that could offer films on demand to venues, while providing extra interaction. This lead on to the Video Access Licensing Identity Database (VALID.ac) project which looked at streaming video at resolutions up to 4k with an access control licensing system and a focus on the academic community, where high-speed broadband is widespread. A consortia was founded including Kendra, the Leeds Film Festival and Glasgow's Yuva and was granted further funding from the Technology Strategy Board, but the project stopped after problems with match-funding. During the three months at the start of the project before these problems materialised we developed a technical model, and hosted an unconference on the future of exhibition at Leeds Film Festival with Open Indie's Kieran Masterton and Peter Gerrard (who went on to found Distrify).

May 2010 : Digital IP Seed Fund successful

In May 2010 a new bid was made to the Creative Scotland Digital IP Seed Fund to create a playlist management system with: "an API for third-party 'visual apps'. RSS feed aggregation and playlist management.

The ideas was to build a system that could hand any video type, but focus initially on content that was already available - such as short films on Vimeo, music videos on YouTube or archive content on Daily Motion. We would then integrate this with live generated visuals - similar to the music visualizer in iTunes - giving a service for venues, bars, pubs and cafes to show on their screens music-based content more relevant to their space than music channels such as MTV.

June - September 2010 : Research, design and technical partners.

As the paperwork was put together for the project we began researching the technical questions around the project, drawing up interface designs and looking for technical partners.

Nic initially approached Kieran Masterton who had built OpenIndie.net - he proposed building the system in Ruby on Rails - but was not based in Scotland. At the same time, during the Edinburgh Film Festival, Nic watched Skeletons in the videotheque and was impressed to find a system that worked very well and discovered that the developers were based in Edinburgh and had a track record of video development projects, including the Vtheque system powering EIFF and Encounters and who specialized in video management systems.

Over a series of meetings we began to brainstorm technical approaches and discovered a lot of mutual interest. It is hard to find people who understand both technical development and the film industry, and to find one based in Edinburgh was a big step forward for us.

October 2010 : Open Video Conference / Subtitles Design Summit

In October I went to the second Open Video Conference in New York to chair a panel on the future of cinema and exhibition, at an event that brought together technologists, lawyers, directors and activists with over 1500 attendees. Ahead of the conference I joined a small group of people attending the Open Subtitles Design Summit organised by the Participatory Culture Foundation. While the trip was funded outside of this project, the subjects and connections made were very relevant and there was a lot of related discussion.

Future of Exhibition: Opening the Box Office

If cinema going and exhibition is to filmmakers what gigs and concerts are to musicians – a live, unique experience that people are still happy to pay for – why is it a space so dominated by major media companies? And given the rapid technological shifts in film and videomaking, why has the film-going experience barely changed in 60 years? In this session we'll look at how people are taking exhibition into their own hands – from

microcinemas and indie film clubs, to VJing and visual art, fan-driven screenings and audience interactivity, exploring how the future of exhibition goes way beyond the multiplex.

Co-panelists:

Arin Crumley, co-director of the breakout self-financed New York-set feature Four Eyed Monsters talks about how he created a groundbreaking release for his first film, and introduces his new platform, OpenIndie, funded by Kickstarter and offering a way for filmmakers to organise screenings outside of traditional cinemas.

Holly Daggers, a VJ and visual artist with a CV spanning from James Brown to The Roots, and creator of the EyeWash visual lab and Forward Motion Theater will discus the rise of live visual art, the crossover with music and how the audience can interact with the work.

Jon Reiss, director of the self-distributed and produced graffiti documentary, Bomb It, and author of Think Outside the Box Office, looks at how producers are bypassing traditional gatekeepers to reach out to their audience while exploring the tools that are shaping this process.

It was the first time I'd met Arin and Jon in person, and discussions with them and many other people met during the five days continue today - a blog describing some of the outcomes of the conference is here.

November 2010 - January 2011 : Development gets underway, outreach

On return from New York an agreement was made with VastBlue to be our development partner. This agreement made Vast Blue technical lead, while Netribution would focus on functionality, design, testing and management. Vast Blue could both license their existing VTheque system as well as building a new system that sat alongside it to meet our functional needs - this gave us a far more powerful system than if we were to create the entire software from scratch. New wireframes and designs for the system were created and a functional specification was locked down with a range of designs created (see below).

In late November I headed to London and met with a number of people across film, media and technology to discus BOP, including:

- Nik Powell, head of the NFTS, about possible use in education and for industry marsterclasses
- Mike Butcher, head of TechCrunch Europe and key figure of the 'silicon roundabout / tech city'
- Alex Nunes, technical lead for YouView, the IPTV platform from 4 and the BBC
- Christopher Warrack, CEO of OpenCinema, which hosts community screenings
- Peter Buckingham, head of distribution & exhibition at UK Film Council, now BFI
- David Nicholas Wilkinson and Terry Gilliam, who are working on a 3D conversion of Time Bandits and looking at exhibition 2.0

February - April 2011 : Alpha release code sprint

With the designs finalized and the framework for managing the videos pulled together, focus shifted to the javascript required to make a drag-and-dropable timeline and to sync multiple devices. Working with Vast Blue we pushed to get the project to demo stage and went thru a series of rounds of development, testing and re-development.

Discussions were had with Ian MacKenzie at Channel 4, Ken Hay, Scott Donaldson at Creative Scotland and Sonja Henrici at Scottish Documentary Institute which led to Netribution supporting SDI as a partner in their bid to CS for funding for the Virtuous Circle project.

April 2011 - present

In his book *A Guide to the Successful Management of Computer Projects*, Hamish Donaldson presented the '90% rule', which is that the first 90% of a project takes 90% of the time, and the last 10% also takes 90% of the time. This couldn't have been more true in this case. From having a working system thru to having a final beta was a long process. It became clear how tech projects could run and run, and why the agile coding philosophy is to release early and often.

So most activity at this stage was focussed on this - we missed Cannes, but the Virtuous Circle project was successful.

Research highlights

A summation of our research areas and findings.

Desktop vs Web

An early decision needed to be made between creating a desktop application or web ap. A summary of the analysis is below:

Desktop App

✓ System not dependent on the technology bundled with browsers.
✓ System not dependent on being connected to the web.
✓ Traditionally more stable, with better memory handling as it's impossible to know what other browser windows a user may have open at the same time.
✓ Can manage secure downloads (as opposed to secure streaming).
✳ The software needs to be developed for each platform (Windows, Mac, Linux, iPhone, Android, etc)
✳ The end user needs to upgrade their system to the latest version.
✳ No access control - once the ap is downloaded there is no control over what can be done with it.
✳ Development costs are typically higher and longer because of the need for multiple platform support.

Web App / HTML5

✓ Single development can work across all platforms (Windows, Mac, Linux, iPhone, Android, etc).
✓ Easier deployment for the end user - visiting a web page rather than downloading an ap.
✓ It's easier to connect with integrate with online video, web technologies and live data streams.
✓ Desktop app can still be built from it thru systems like FluidApp, Bubble and Mozilla Prism.
✳ Limitation over technology used - eg Silverlight for video encryption requires a plugin downloaded.
✳ Only the latest browsers are designed to handle large locally stored files (ie feature films) or to use the machine's graphics card.
✳ The end user may have old browsers, or lots of tabs open at once, or plugins installed that create conflicts.

There is a trend within the tech industry towards web based aps - with google's new operating system focussed on a lightweight machine with software, services and files stored 'in the cloud' and running thru the browser. Plus a web-app could be turned into a desktop app easily, but the reverse is not true. So we decided to focus on web apps.

Coding language and framework

The choice over software frameworks was narrowed down to three open source options:

- **Ruby on Rails** - used by many web 2.0 applications, including Twitter, Distrify, Nation Builder and OpenIndie
- **Python** - used by Miro / Miro Community, Spotify and parts of Google, and good for building both web and desktop aps
- **PHP** - widely used (including by YouTube, Vimeo, Facebook, Joomla/Wordpress/Drupal)

While Python and Ruby both have advantages for a complex application, they have smaller developer communities meaning its harder (and more difficult) to find coders. Furthermore VastBlue's VTheque, which integrates with BOP, was built in PHP, using the CakePHP Framework.

HTML5 audio + analysis

We wanted a venue owner to be able to line up a playlist of not only music videos but live generated visuals in response to their own music where there was no music video available. Our initial plan was to develop the audio analysis and music visualizers thru **Unity**, a powerful 3D graphics framework and tool used for iPhone and console development as well as offering - thru a plugin - advanced 3D graphics within a web browser. As the project research commenced, a number of developments occurred in the web graphics community which shifted our thinking.

One problem is that Unity - which costs over £1500 for a developer license - requires the end user to download a plugin, and the audio analysis functions are very basic. To create live visuals the computer needs to performs what's called a **Fast Fourier Transform (FFT)** - a kind of spectrum analysis which transforms audio wavelengths into binary points so that graphics can be created in response - and this ability was not available within Unity. There is limited external audio support in Unity3D with this plugin but plugins are not available for the web streaming version.

Around the time we were looking at this, Mozilla announced the **Firefox Audio API** which would allow for full audio analysis, filtering, creation, and manipulation. There is a brief overview of the background to this development at Ajaxlan, and some demos here and here. Chris Rogers at Google (formerly at Apple Audio) also unveiled an API. This has enabled the creation of music visualizers in the browser without extra plugins by connecting with Javascript or WebGL animated patches (see below).

Apple and Microsoft have still not announced their plans with audio but there is now a W3C Audio Incubator Group with Google, Mozilla and the BBC amongst the founding members.

None of these audio solutions include getting audio from the user's internal audio stream or mic input (as you can with Flash) - as discussed here. Mozilla is planning to implement better device integration at a later date (which would allow, for instance, teleconferencing thru the browser) but this is not yet released. Flash, Silverlight and Java are the only fully supported approaches for external audio input.

There are examples of programmes using Flash for audio analysis, and passing the data to Javascript to process (such as this) and until there is native browser support for audio input, this would be the best approach.

Javascript and WebGL graphics

Another development during the project was the emergence of a browser-native 3D graphics language in the nightly beta builds of the main browsers - and indeed in the main releases of Chrome and Firefox at the end of the project. **WebGL** is a web version of the OpenGL graphics engine (which powers Mac OS X, amongst others), and by including it within browsers, users can experience live generated full screen 3D without the need for plugins, and without resource intensive Flash.

The Mozilla team, who added WebGL as standard to Firefox 4, created a demo called 'Flight of the Navigator' which showcased live generated 3D visuals, audio responsive animations, incorporating streams of live web data, such as Twitter posts and Flickr photos at the conference MozCon (online version - for Firefox and Chrome).

Also in 2010, Processing, a graphics language used widely by the video art and visuals community moved online with a port to a Javascript version. This created a further boom in innovation around 2D visual art with sites such as HasCanvas

We approached one well-known and pioneering coder in this space - Jacob Siedelin - who had created an impressive 2D music visualiser using javascript. But asides from him not being based in Scotland he eventually bowed out to other commitments. At the launch of the WebGL version of Chrome in 2011, it was revealed that Google had employed him to create a 3D WebGL music visualizer.

It became clear that 2D javascript languages and native 3D thru WebGL offered a strong alternative to Unity: the approach was cheaper and would provide a wider audience - using freely available web technologies. But there currently a skills shortage in the area. There were at this stage perhaps no more than a handful developers using Javascript and WebGL for visuals making - and those that were approachable seemed to have quickly awakened the interest of giants like Google. We approached some of the developers behind Mozilla's Flight of the Navigator demo - who had also worked on Processing.js and Popcorn.js (see below) and again found them so booked up with work that nothing could be done in the timescales.

What was positive was how quickly the space was evolving with new examples appearing almost every day of work that could run thru our system.

Metadata

At the Open Subtitles Summit in New York a breakaway group discussed the uses and types of metadata with one of the W3C video specialists, Silvia Pfeifer. She wrote up our conclusions here, quoted below:

"There are three fundamentally different types of metadata:

- **Technical metadata** about video: information about the format of the resource – things that can be determined automatically and are non-controversial, such as the width, height, framerate, audio sample rate etc. This information can be used to, e.g. decide if a video is appropriate for a certain device.
- **Semantic metadata** about video: semantic information about the video resource – e.g. license, author, publication date, version, attribution, title, description. This information is good for search and identification. Semantic metadata can be separated into two more types:
  - Universal metadata is semantic metadata that can basically be applied to any content. There is very little of that and the W3C Media Annotations WG has done a pretty good job in identifying it.
  - Domain-specific metadata is such metadata that only applies to some content, e.g. all the videos about sports have metadata such as game scores, players, or type of sport.
- **Timed semantic metadata**: semantic information that is associated with time intervals of the video, not with the full video – e.g. active speaker, location, date-time, objects. This can also be subdivided into:
  - Textual - ie. metadata that is only relevant as part of a subtitle or caption file, because the metadata relates to a certain word or a word sequence,

- Complex - ie independent timed metadata [eg. map references, other media] that can be stored in JSON or some similar format.

The summit was organised by Universal Subtitles, and we considered how this kind of time synchronised metadata could be useful in public screenings. In particular we looked at two complex timed semantic metadata formats:

Popcorn.js

Popcorn.js is an event framework for HTML5 Video that provides a simple API for synchronizing interactive and immersive content. Popcorn.js utilizes the native HTMLVideoElement properties, methods and events, normalizes them into an easy to learn API, and provides a plugin system for community contributed interactions. The project's lead - Brett Gaylor - describes HTML as bones, CSS as skin, Javascript as muscle, and Popcorn the instructions to make 'the body' dance along to a video. This allows related metadata to appear at ket points during playback - the IMDB credits for the actors on screen, footnotes, links for more information, a Google map reference, related tweets or online profiles.

More information available at popcornjs.org and examples of some recent experiments here:

- Notre Poison Quotidien (ARTe)
- State of The Union Address (PBS)
- "Donald Duck Meets Glenn Beck" (Rebellious Pixels)
- The original popcorn demo (Mozilla / Brett Gaylor)

Universal Subtitles

Universal Subtitles is a tool to let anyone add subtitles, captions, or translate nearly any video on the web. It works in a collaborative Wikipedia-like fashion creating a file that can be attached to most kinds of web video (which can be on video sharing sites such as YouTube or privately hosted). This way users can embed a YouTube video on their website and invite site visitors to add and improve translations in their own language.

Some examples:

- PBS newshour translation party
- Alive In Egypt
- New York Times on Egypt
- OK GO, translation party

It is an initiative of the Participatory Culture Foundation. More info at universalsubtitles.org/

Licensing

In the UK, available films for non-theatrical distribution are handled by three services:

- MPLC covers Disney, 20th Century Fox, MGM and Metrodome.
- FilmBank is co-owned by Warner and Sony and represents many other distributors including Lionsgate, Pathé, Paramount, Universal, oversee the non-theatrical distribution of many major studio and independent films including Warner Bros, New Line, Sony, Lionsgate, Optimum and Pathe.
- British Federation of Film Societies represents many smaller and art house distributors including Dogwof, Guerilla Films and Warp Films.

Each organisation has their own licensing system. Filmbank (the largest) is split into a PVSL and SVSL

The PVSL

The PVSL is an annual license (From 1 May to 30 April) entitling holders to screen unlimited films throughout the year using their own DVDs/Home Videos purchased from any legitimate outlet. Users include; educational establishments (schools, colleges etc), nurseries, after-school clubs and youth centres, pubs and bars, holiday resorts, care homes and hospitals as well as community and transport groups. With the PVSL you will be covered for the use of films from most of the major Hollywood and independent studios. The playback has to come from legally purchased DVDs or VHSs. Where a film is shown with full sound, a PRS licence is also required for the use of the films soundtrack. The same licence applies for the use of music so most organisations are already covered. The license cost ranges from £81pa for up to 249 members or weekly viewers thru to £2430 for 8000-14,999 people.

The SVSL

The Single Title Screening Licence (STSL) is issued on a title-by-title basis. This allows the license holder to screen films in either commercial (paid audience) or non-commercial (free of charge) environments as well as promote the screening outside of the venue itself. Aside from being able to promote screenings and charge audiences, films are often available 10-12 weeks after cinema release and prior to being available to rent or buy on DVD.

Outdoor public screenings - ie at festivals or drive-ins - require a different application and have a separate Rate Card - costs are around 20-40% higher.

SVSL Costs - non commercial screenings

If no money is made from the screening. For Non Commercial UK Screenings with external advertising rates are based on the Non Commercial UK Screenings Flat Fee rate below plus a minimum of £50.00 per screening. The costs rise in proportion to number of screenings and size of audience - from £79 for one screening to up to 200 people, thru to £3682 for 10,000 to 20,000. Over 15 screenings to up to 200 people would cost £580.

SVSL Costs - commercial screenings

If there is a charge for the screening the screener must give 35% of the box office, or a minimum guarantee, whichever is greater. The minimum guarantee ranges from £79 for one screening to £526 for 12 to 14.

Other licenses

DVD Concierge Service. For hotels/B&Bs that offer their guests a DVD library they can take to their room. The license costs £30 + VAT per room per annum and the seasonal licence (suitable for properties open 8 months or less) only £20 + VAT.

SeaVIsion for screenings at sea. www.seachoice.co.uk handles cinemas on cruise ships and Walport handles screenings for crew on board ships (and possibly oil rigs?).

Coach and Bus License if there's just one screen, coaches and buses can use a PVSL license (see above). Otherwise they need a special Coach and Bus License at £150 a year, running from Feb 1 to Jan 31 on a non pro-rata basis.

In flight Entertainment is an industry in itself whole other industry, with the World Airline Entertainment Association acting as a an industry body - www.waea.org. Generally companies handle programming and licensing (as well as running the in flight systems) - these companies make deals directly with the film companies.

Music videos in public places

These licenses are handled by the PPL and they have a range of different licenses for different organisation types. More info here, here are here.

Market data

Digital Jukeboxes

The latest generation of digital jukebox come from Virtual Jukebox which enables customers to text a request from 7m songs - 99% of published music. The US market leader for digital jukeboxes is TouchTunes.

Satellite TV in pubs

Sky Sports licensing for British pub and bars have an average monthly charge of £6k with growing frustration about price hikes. A recent study found 42% of pubs use Sky - 97% for Sky Sports and 17% for MTV.

Digital Signage

The market for outside TV screens is growing with the outdoor digital signage market now worth £3.5bn and the UK market hitting nearly £1.5bn in 2009 and set to grow strongly.

Community Cinemas

An interesting map of the average distance of houses to the nearest commercial cinema in England - here. and for independent cinemas here. The 2008/09 survey Cinema For All found:

- BFFS estimates that there are a total of 38,000 community cinema members across the UK
- 56% of responding organisations were established in 2000 or later
- Average full membership fee was £26.30.
- Average audience size was 76 and the total admissions from responding organisations was 105,000. From this BFFS estimates that the total number of admissions in 2008/09 to have been roughly 347,000.
- 91% 'usually' or 'sometimes' used DVD as the format to show films. One quarter usually used 35mm a their projection format
- Community cinemas are most prominent in areas under served by commercial cinemas. 44% of responding organisations serve rural areas.

Branding

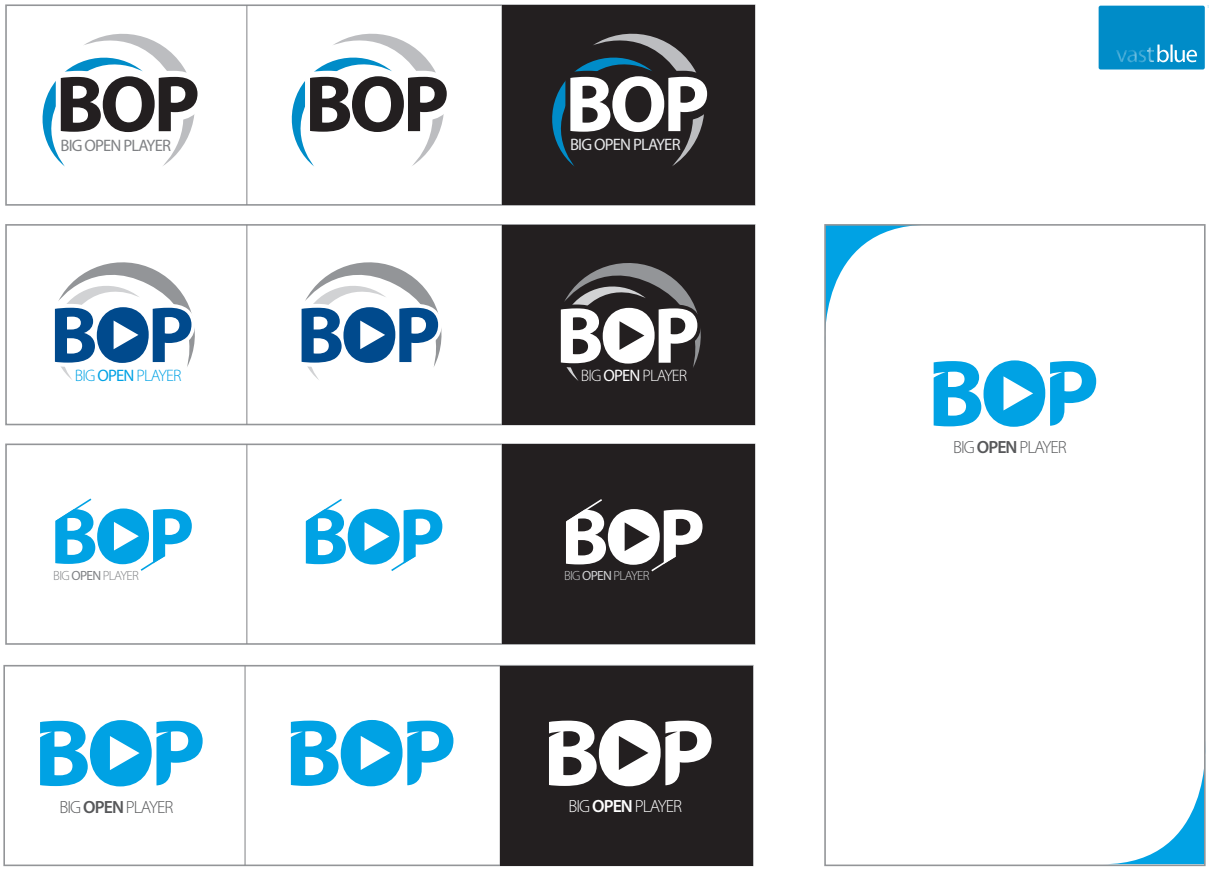
There was discussion throughout the project about the best name and brand for the system, with a fair amount of time searching domain name databases to find something still available. An acronym offered more creative options, and an early concept was the **Big Open Player** or BOP. Big for the Big Screen; Open, for Open Source and Player or Playlister for the output. With it's connection to jazz and dance, bop seemed light and easy to remember and say. We would have immediately settled with this name, except that BOP.com is the name of a website that sells sex-enhancers, so a debate began as to how much this could damage the brand. Another option - the Distributed Open Playlister - was explored, but does not sound so good when spoken and could confuse with Director of Photography.

Over the course of the project a number of other possibilities emerged:

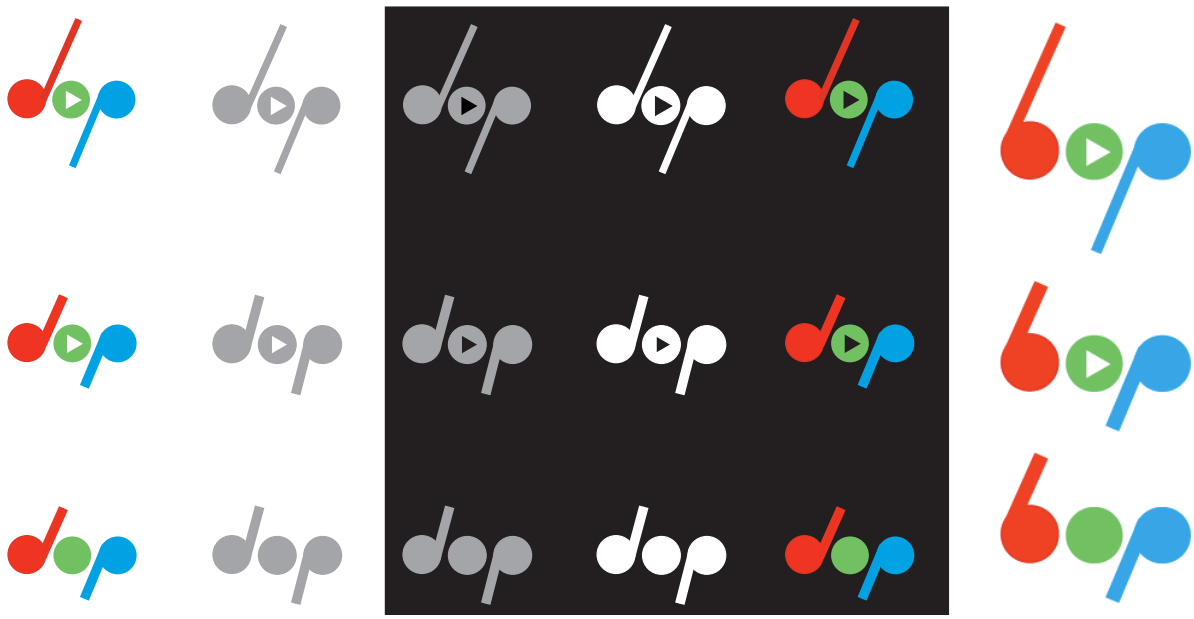
- The **Visualist** to emphasize building playlists (http://visuali.st and http://visualist.co were available)
- **Vubrick** for the construction of playlists using a brick metaphor and designed to sound like Kubrick (vubrick.com, viewbrick.com and vubric.com were all available).
- http://**the.screen.is**/ for a memorable name that could be used to construct unique channels for venues (ie. my.screen.is and this.screen.is/filmhouse)

We finally agreed that we needed a name for the framework and then specific brands for the services that would be built upon it (in the way that you have Joomla as the name for the CMS which is unconnected to the names of the sites build using Joomla). So we settled on using BOP (http://bop.li) for the framework and http://the.screen.is would be for the first test system.

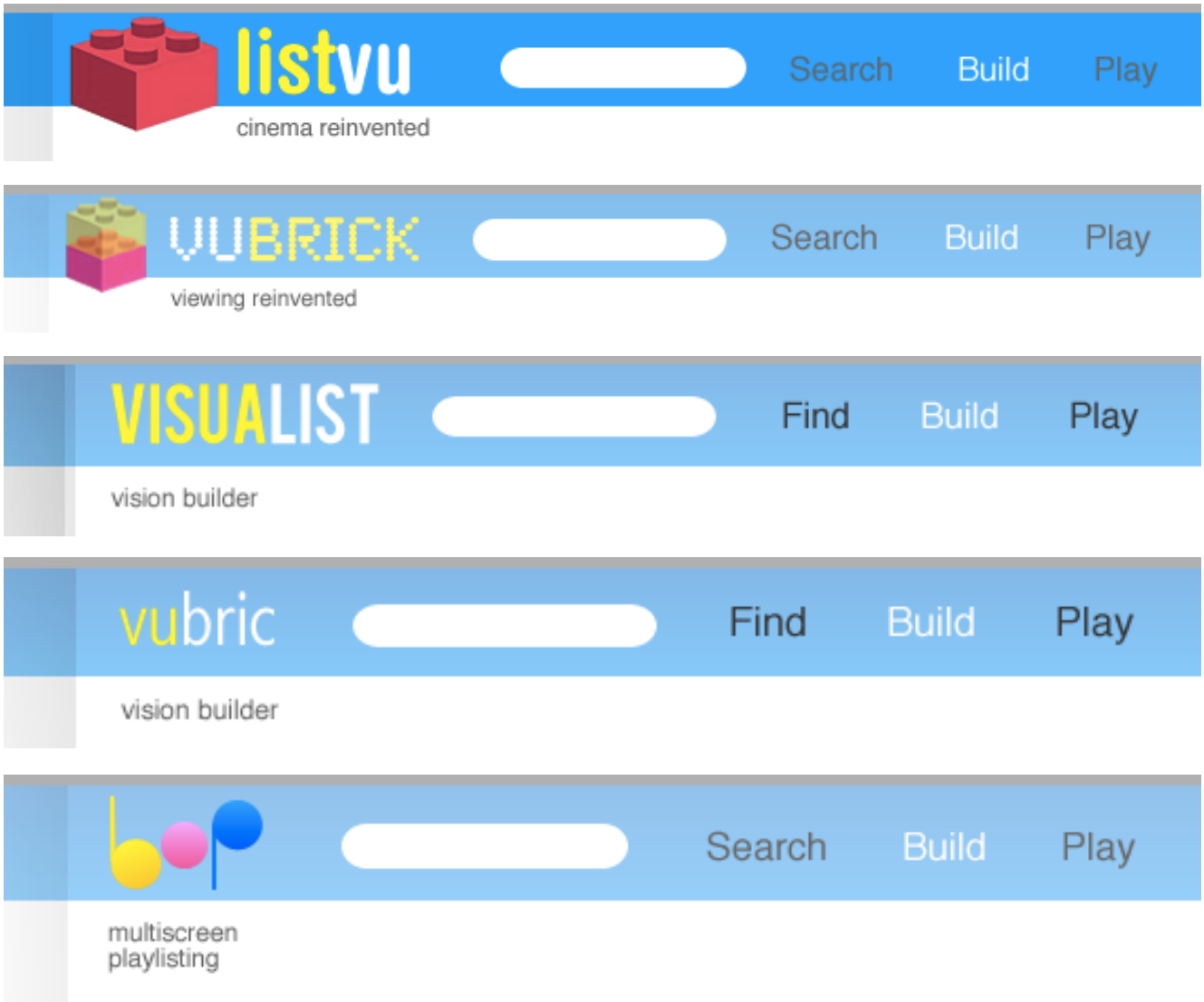
Vast Blue produced a range of design options, which included using the playback button as the middle of the 'O'. Early Vast Blue designs:



At Netribution we played around, simplifying the logo to three circles, for each colour of the video signal - red, green and blue. It also reflected the Netribution logos which is based on the intersection of these three colored circles (below). The simplicity of this logo - three circles, two lines and a triangle, meant that, in spite of the lack of the .com domain, the name BOP stayed in common use. We also played with a Web 2.0 version, ditching the play button and using the three primary print colours of cyan, yellow and magenta (right)

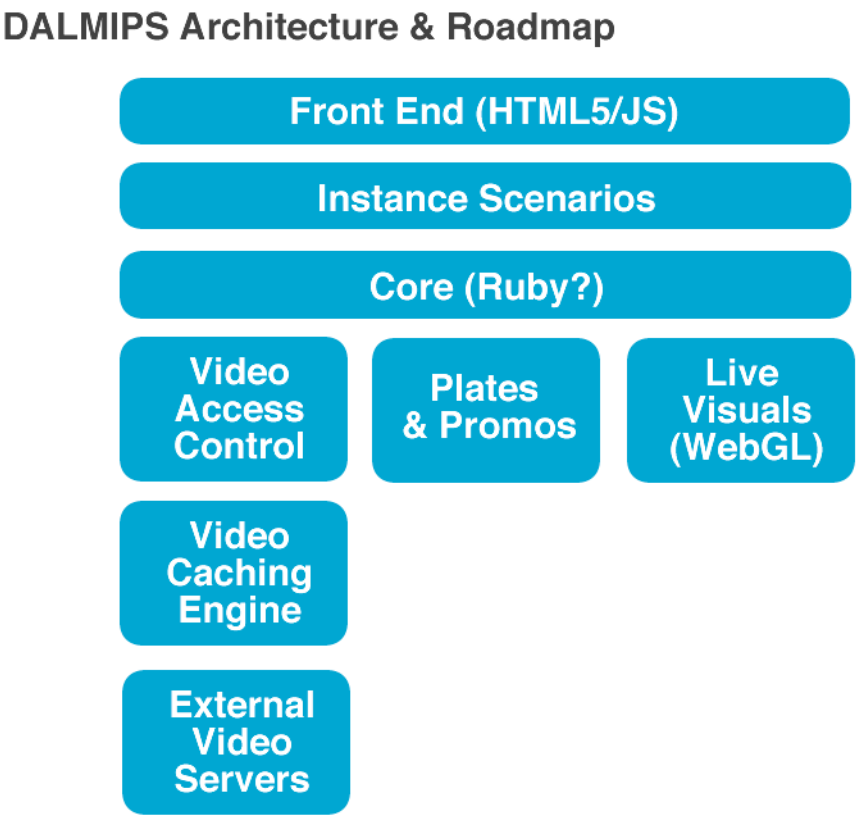


Some of the other designs we explored are below:



Architecture

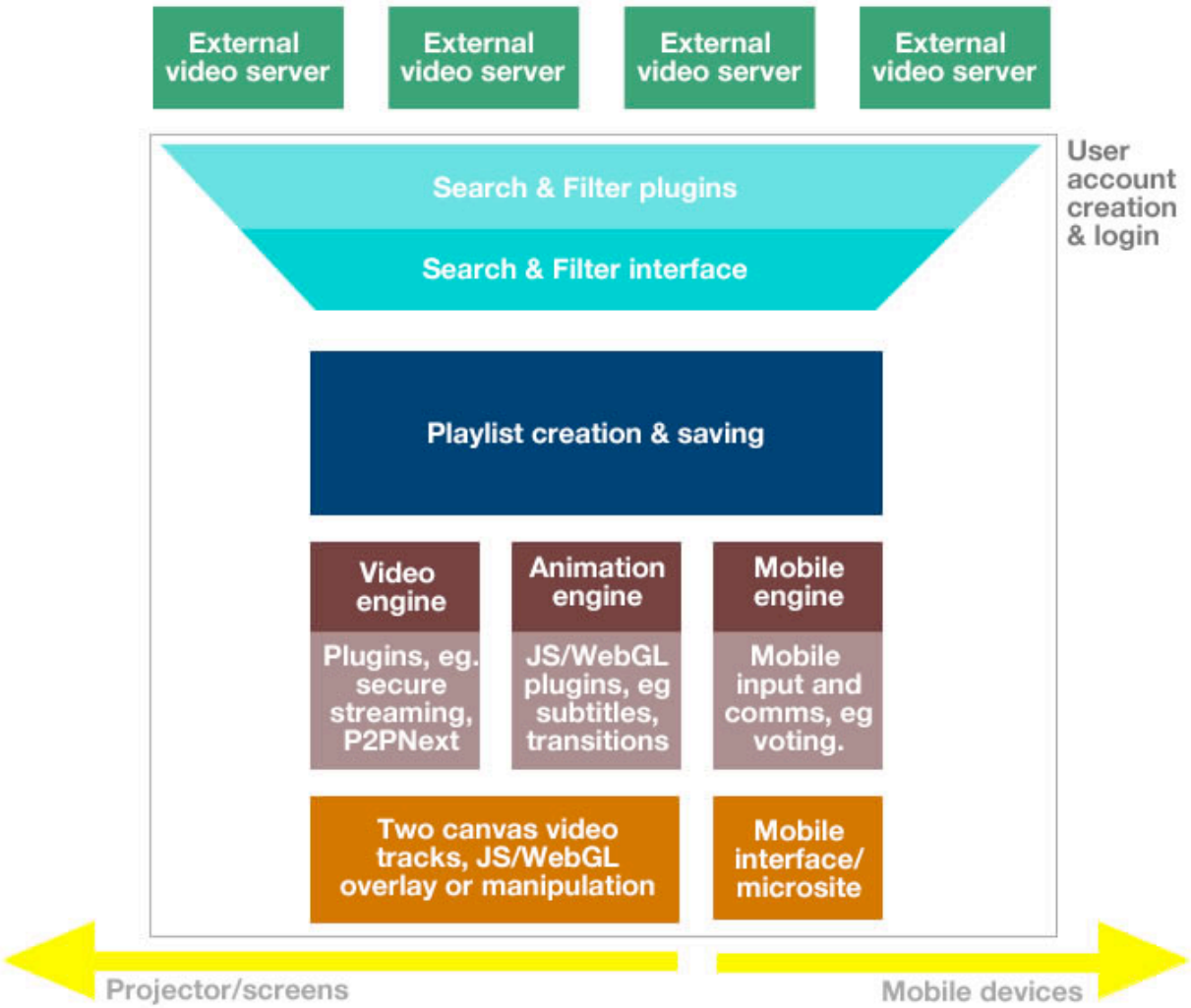
An early architecture diagram, below. In this 'Instance Scnearios' are use like templates - or Drupal's 'install profiles' to create different use cases, ie for music videos, conferences or e-cinema. In this system, the content is separated into video, plates & promos (such as title cards) and live visuals. In the final system there was only video, with plates and promos and live visuals something that could be layered on top of this video (which could just be a black background). This system also proposed using Ruby on Rails - Cake PHP was later adopted.



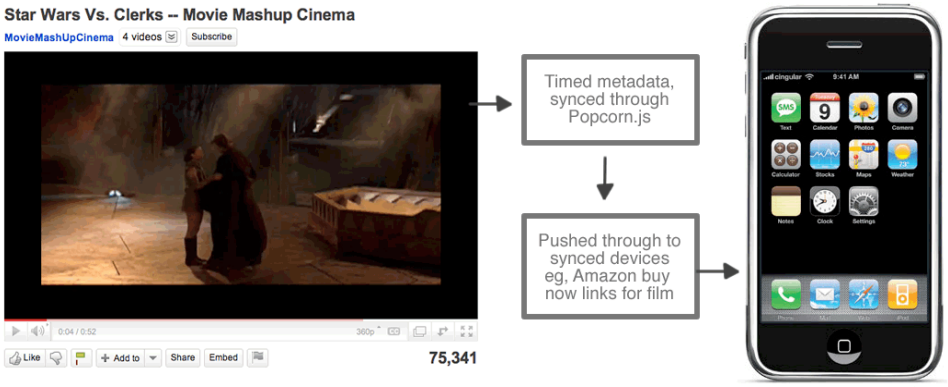
	Phase 1	Phase 2
Front End HTML5 + JS - Sencha or Capuccino framework possible	Firefox, Safari, Chrome & IE8	iPhone, Android & Desktop(?)
Instance Scenarios Context-specific front end, eg for schools or bars	Capability only	At least two cases
Core Ruby-powered user login/register, playlist building, file manager, etc		
Video Access Control License processing and resolution	Boollean only	Full metalicenses
Video Caching Engine Preload of playlist for instant playback	Flash/H.264 only	Ogg, P2P-Next
External Video Servers From video-sharing sites to private MAMs	Open servers	Private servers
Plates and Promos For title-cards, stings, trails, branding, etc	HTML & uploads	Raphael / Animation
Live Visuals WebGL powered live visuals, using beatdetektor.js for audio analysis	Audio analysis	Audience interact (Wii, iphone, etc)

In this second architectural schema below, the separation between external video services (in green) and the search and filter process is illustrated. The aim was to create something that is both a core framework and to which a huge range of plugins for different functions can be added. So to add a Vimeo video search, there would just need to be a Vimeo search and filter plugin - likewise to create a filter to find all videos with lots of the colour green, or that have a Creative Commons license.

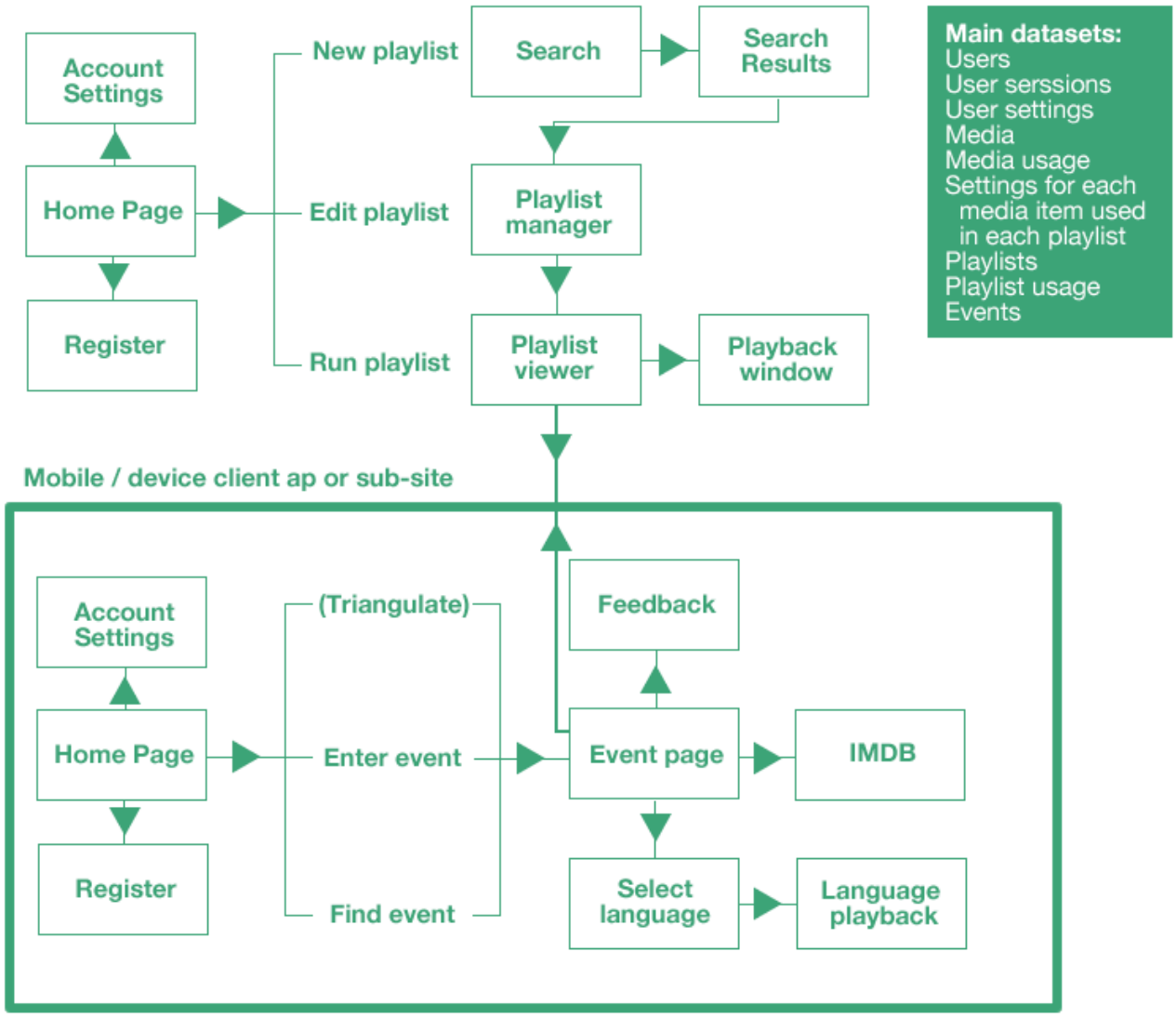
In this diagram there is a clear distinction between search, playlist creation and playback. As mentioned above, the video and animation layers ultimately get merged, but the second device layer for mobiles is kept separate (see over).



This simple graphic illustrates the connect between a video playing back in one screen, and time-synched metadata loading on a separate device.



In the walk-thru flowchart below we see the architecture as a user process. Starting with the home page on the left, the user can either login, create an account and create, edit or play a playlist. We also link with the mobile ap (which in this scenario uses triangulation to verify it is in the right location to get a feed of associated data.

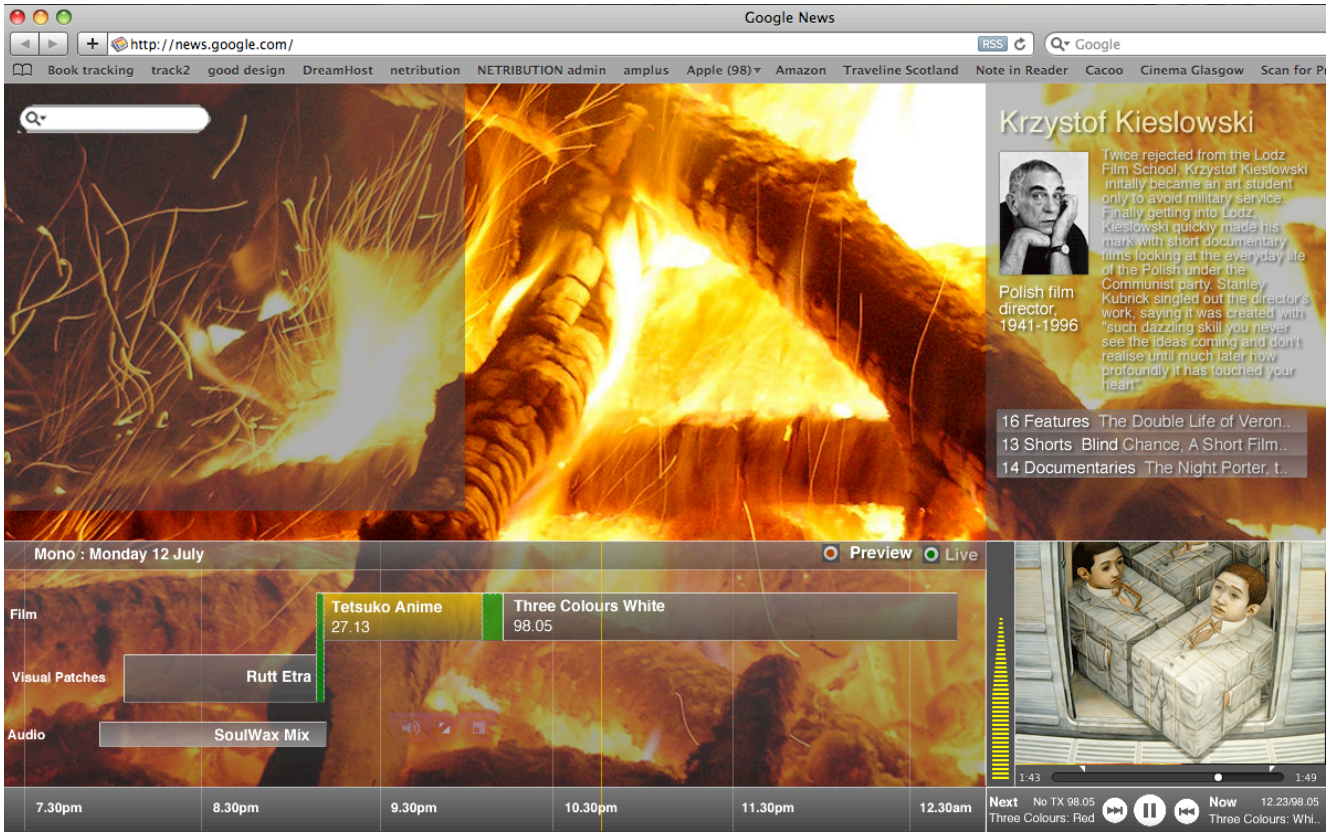


Design

This was a significant and exciting design challenge. How to get the functionality of a timeline based edit programme, with the simplicity of a tool that people should be able to pick up and start using, complete with media management like Spotify and iTunes, and all running in a web browser. The progression of designs is below.

Initial concept art

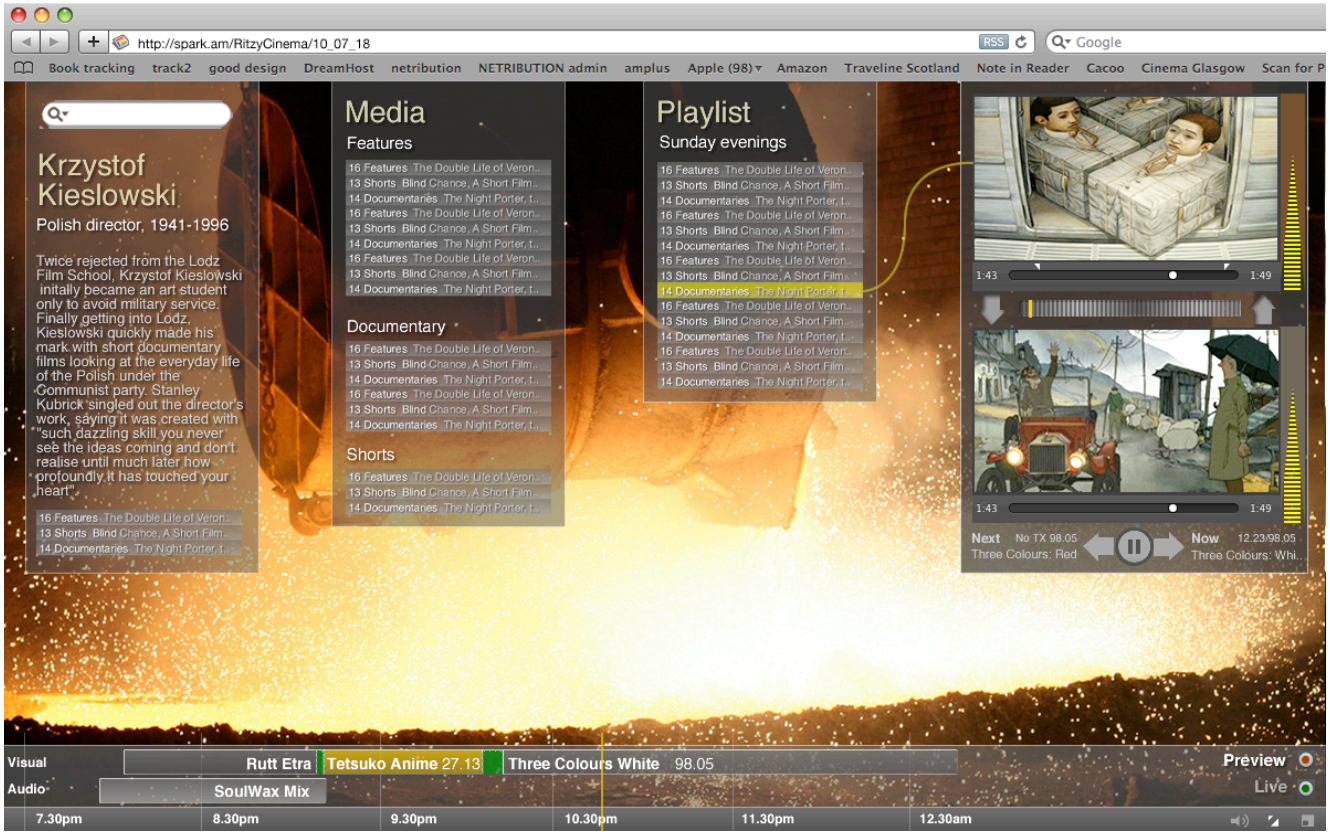
Created July 2010. Technically unfeasible, other than on the fastest computers, these concept designs made the back of the screen the video preview window (tho it could also just be a graphic, like a desktop picture). Metadata about the current video appears top right, and the timeline is set to the timing of the venue.



In the continuation of this idea below, films are patched between floating boxes with bendy lines - much like the patching metaphors used with filters and plugins in music software. This way you could connect multiple sources with a single output screen or multiple screens, and potentially add effects processors in between.

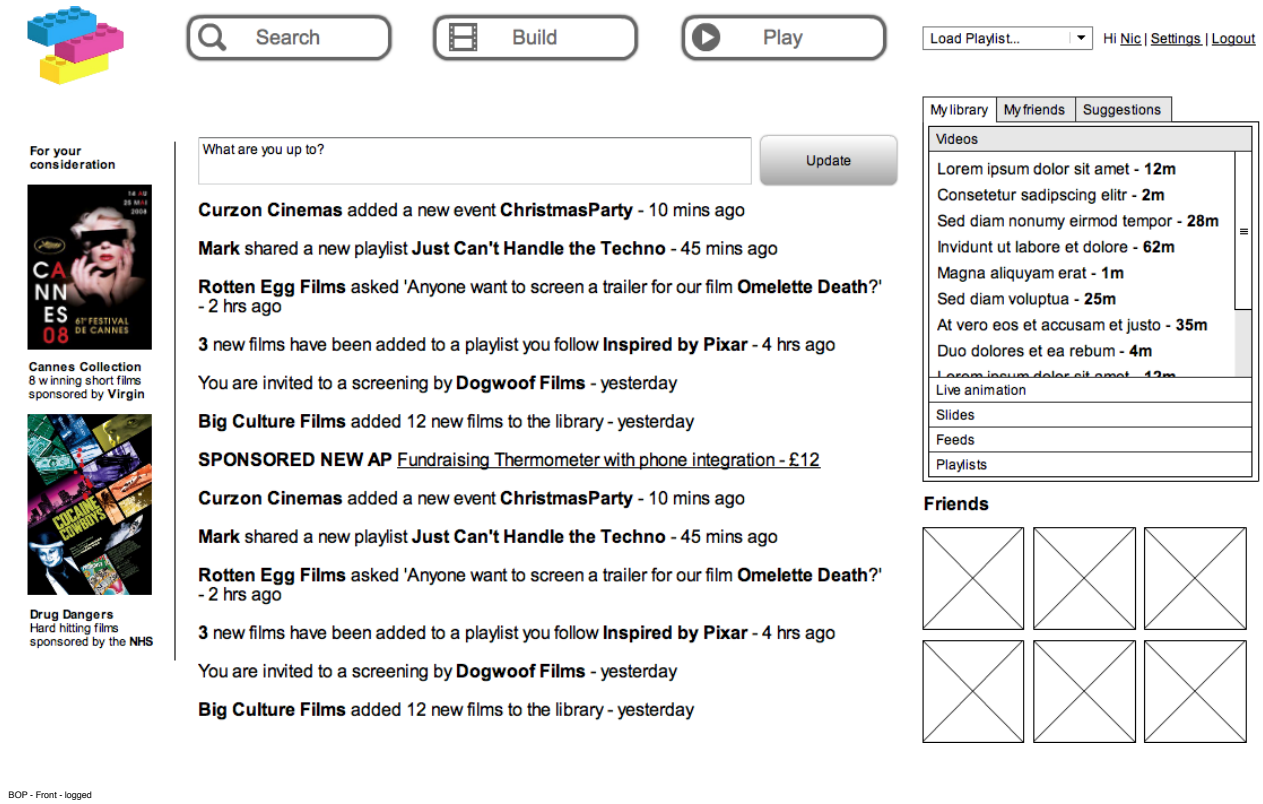
There is a UX device in this design below used to crossfade between the two videos (ie the current video and the next video in the queue). A conventional cross-fader would always have to be reset after dissolving, while a DJ programme would use an A-B fader that still would mean creating an A channel of video an a B channel of video. In this system below there is simply the playing video and the queued video. Dragging the large vertical dial (like a an old radio tuner) would cross fade from queued to live video - and because it is a dial, it would not need to be reset in its position - it could be turned continuously from left to right.

At this stage we were still exploring the idea that by layering two HTML5 video elements inside a canvas element it would be possible to change the opacity of one so as to create a dissolve effect. Although this is technical possibly under HTML5 - even with the incredible innovation in the HTML5 video space, no-one seems to have been able to make this work smoothly yet.

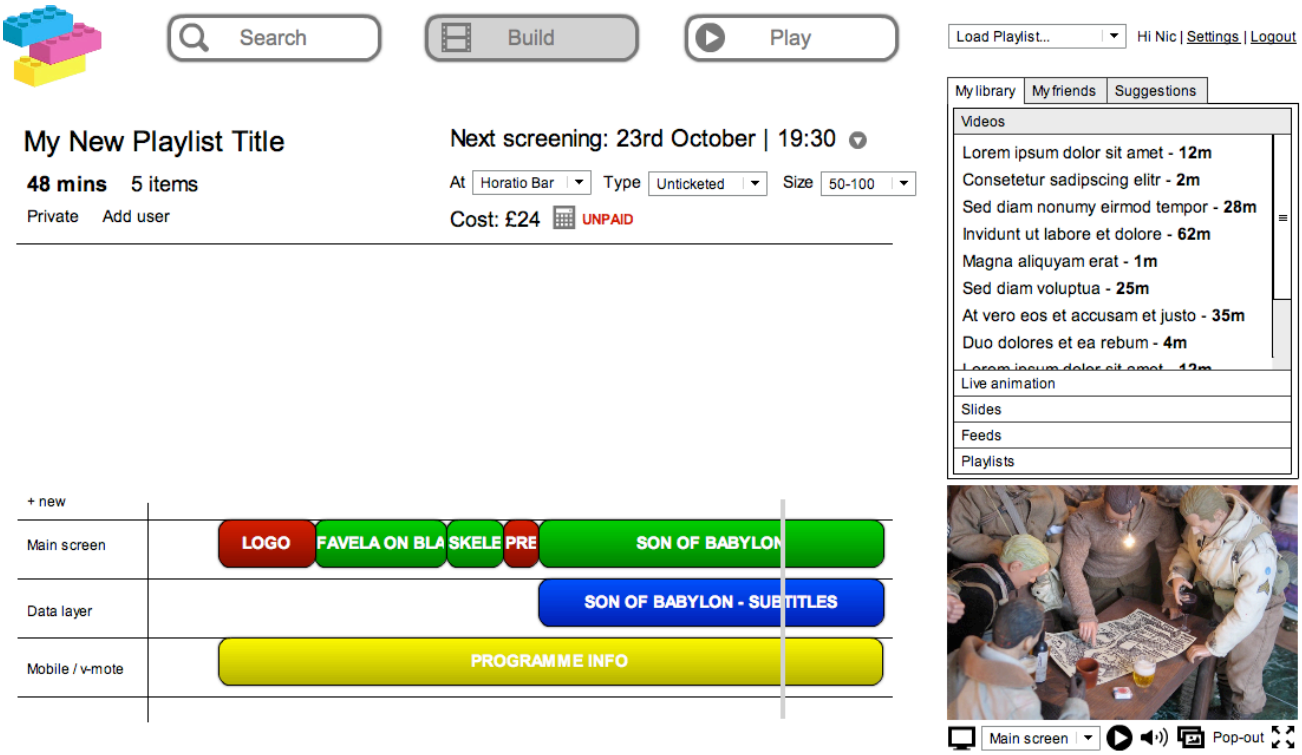


Wireframes

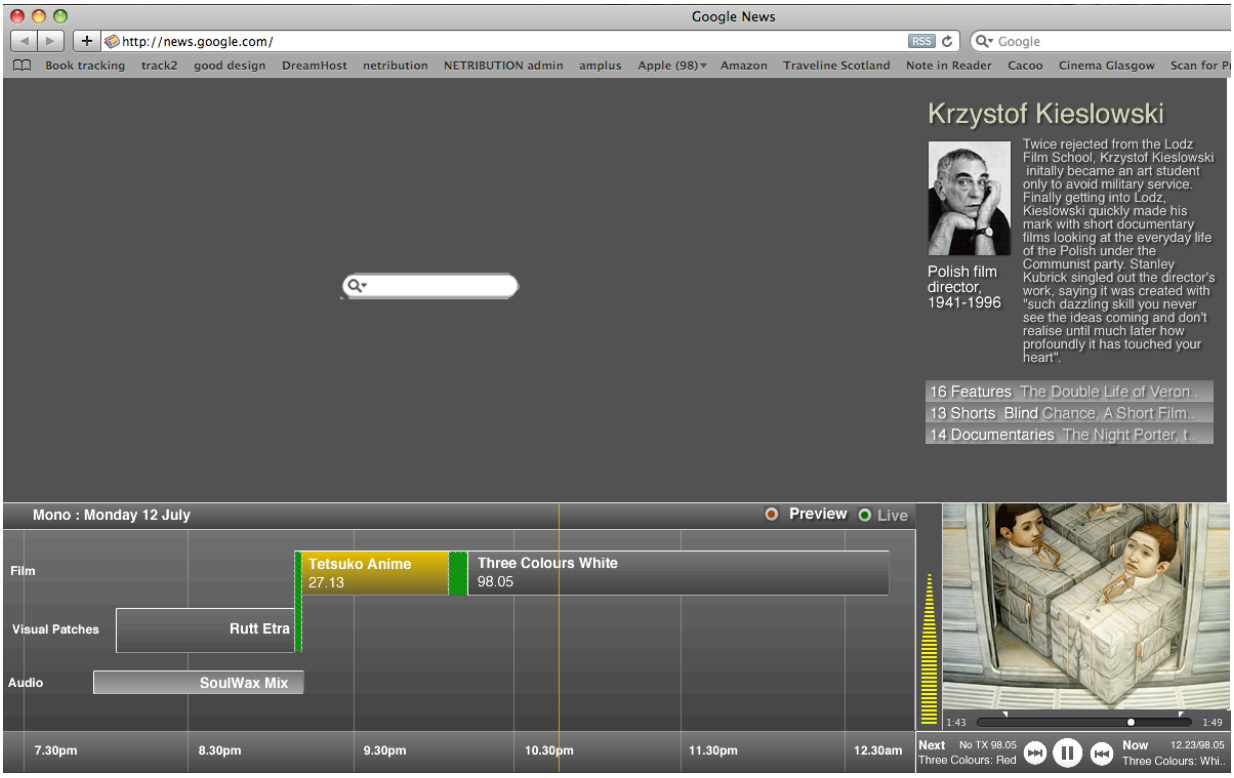
Once we begun to focus on wireframing the application, we divided the system into three functions: search, build and play, and adopted a social network structure, with an activity feed, friends and sharing.



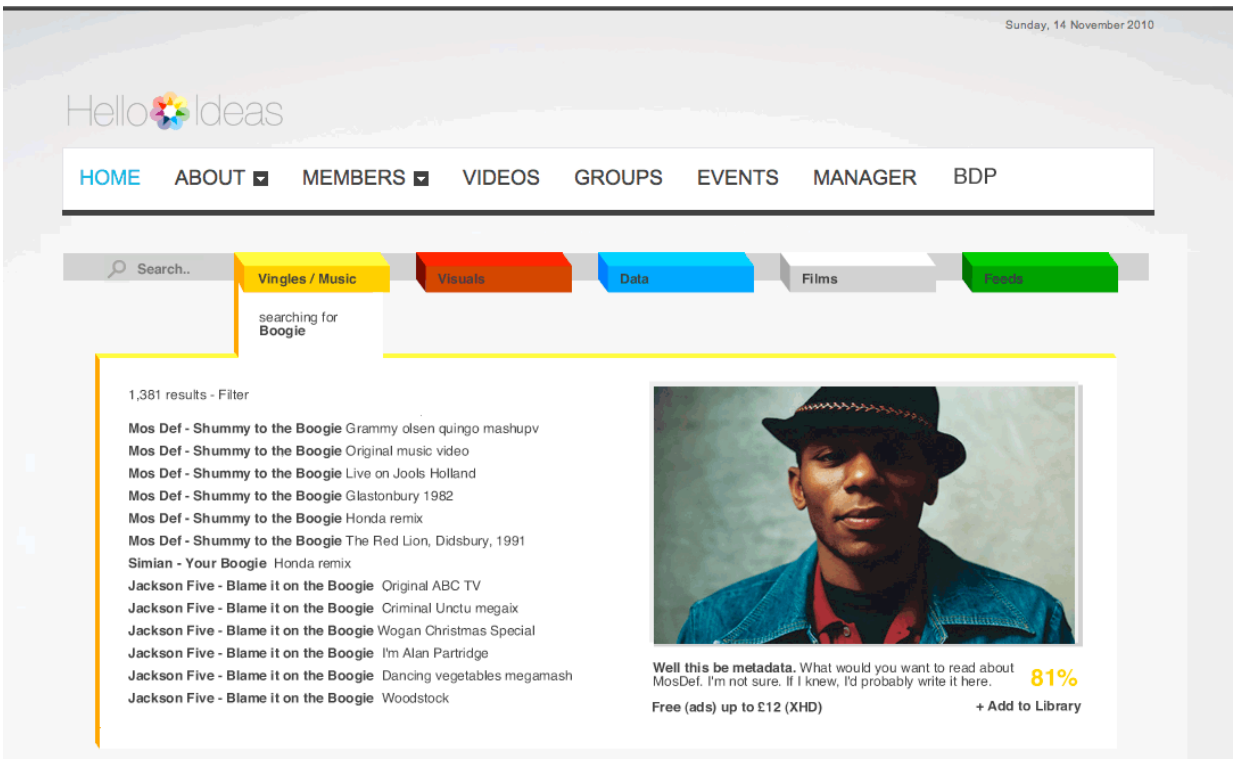
Here we incoporate license specification and pricing on the same page as the playlist builder.

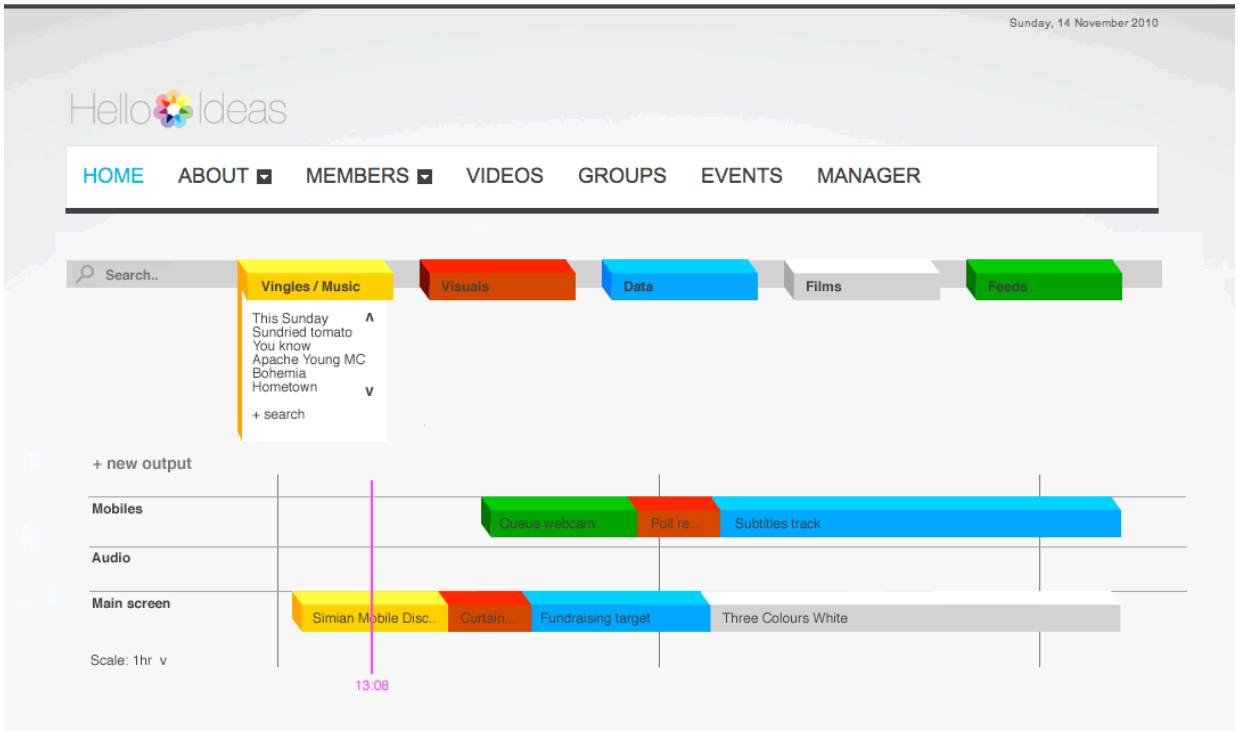


Design 1: Slate

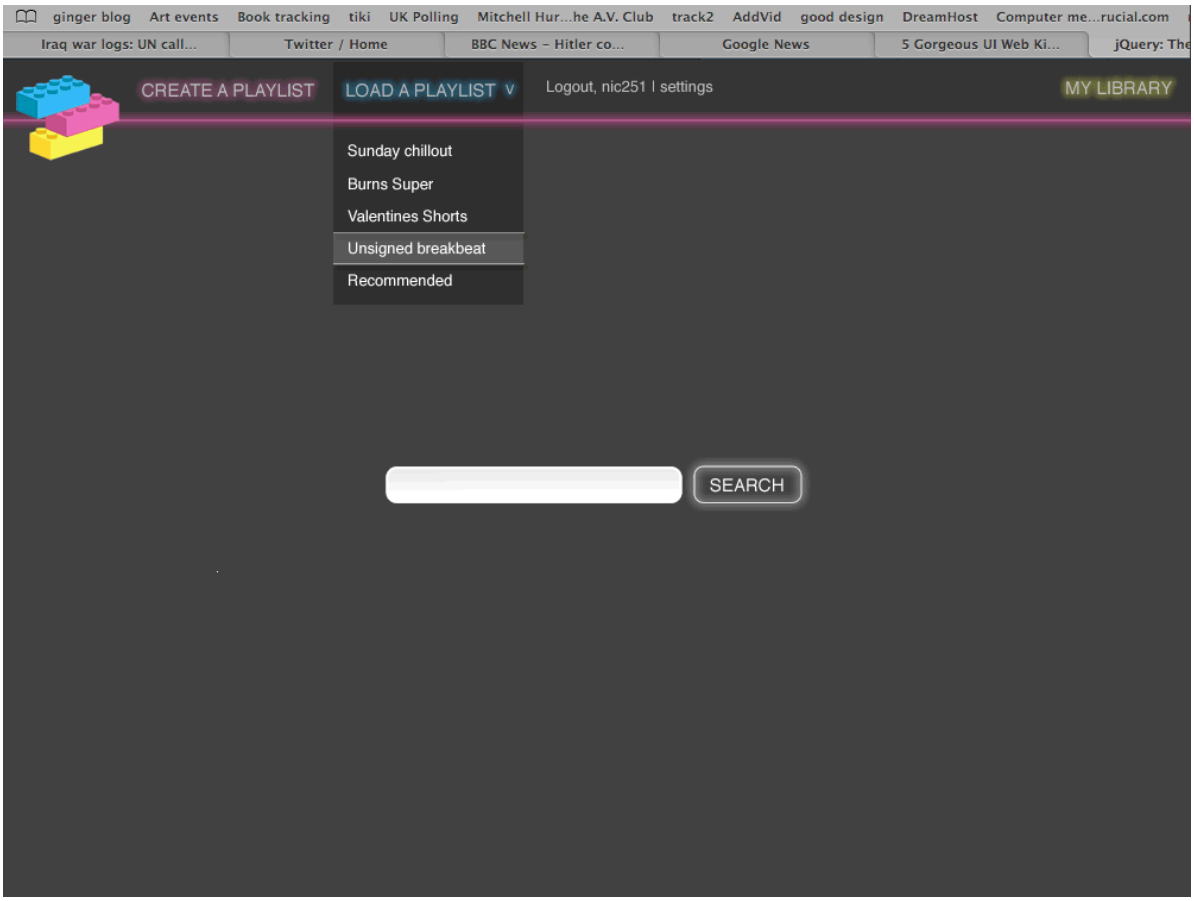


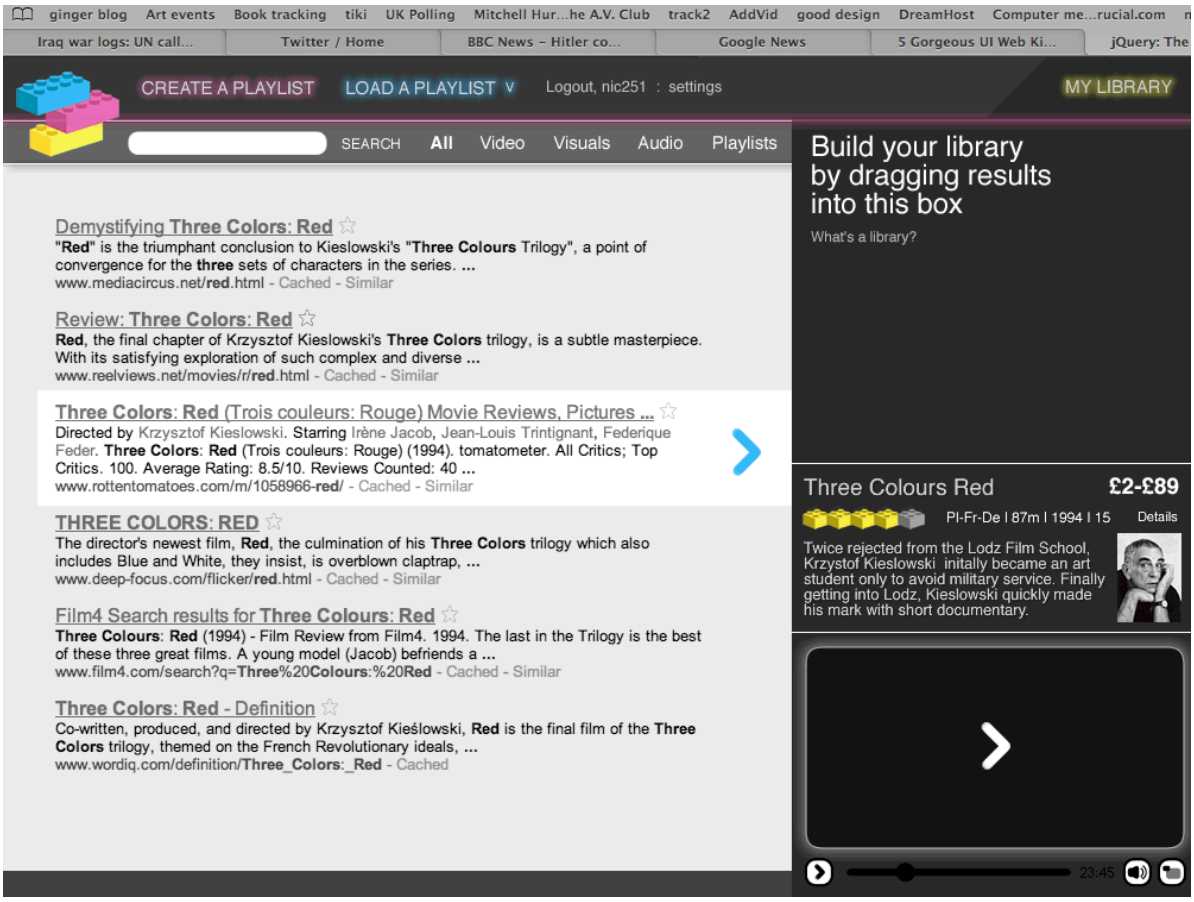
Design 2: Blocks



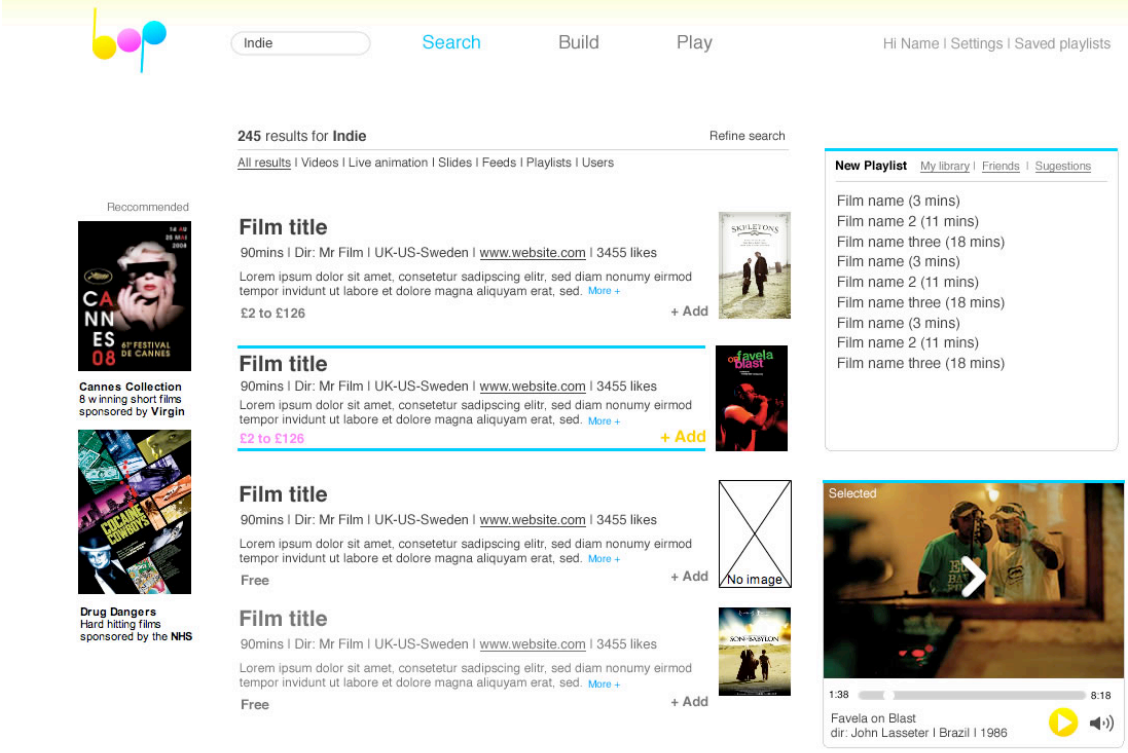


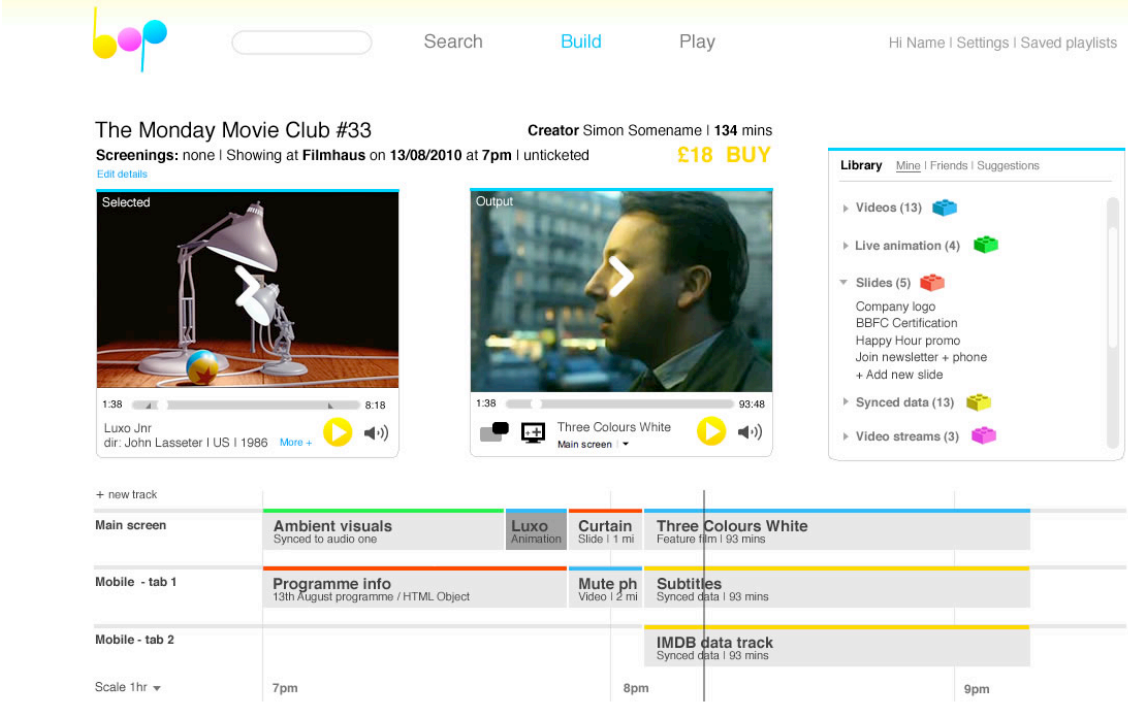
Design 3: Tron





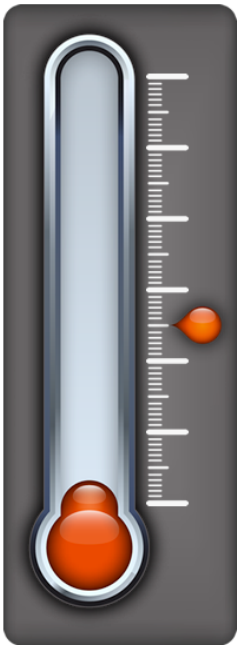
Design 4: Light

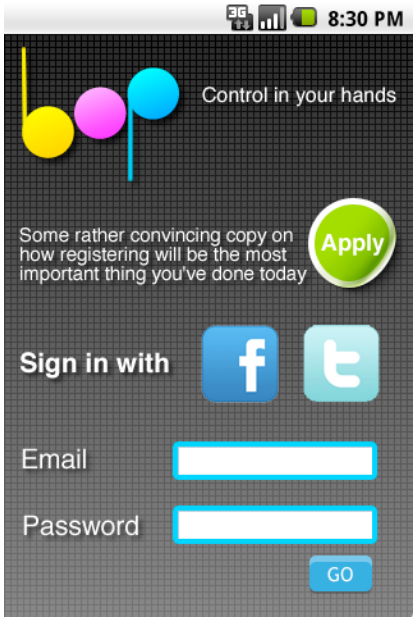




Mobile Phones

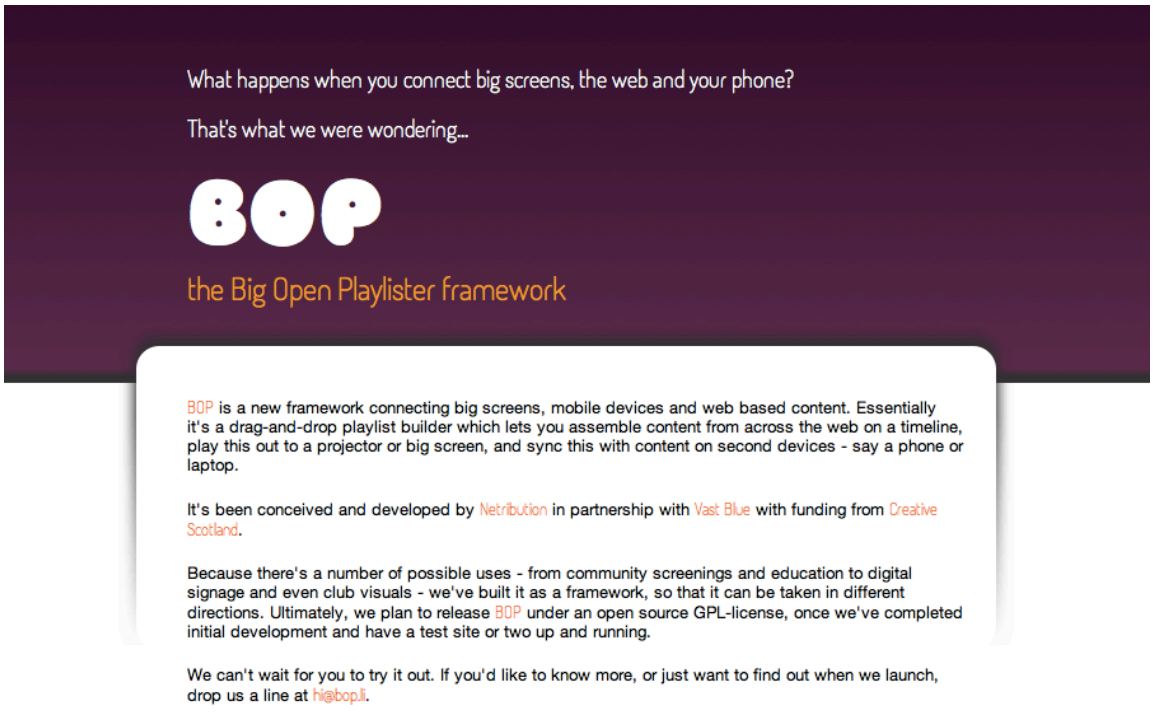
Although we decided to keep mobile development to a minimum for this part of the project, we created concept art for a phone based controller, which would let you log in with Twitter, Facebook or your own account, and then make a donation which raised and lowered a 3D thermometer on screen, which could then trigger further actions, such as playing different films. The thermometer was created by Yuva.





Holding page: Bop.li

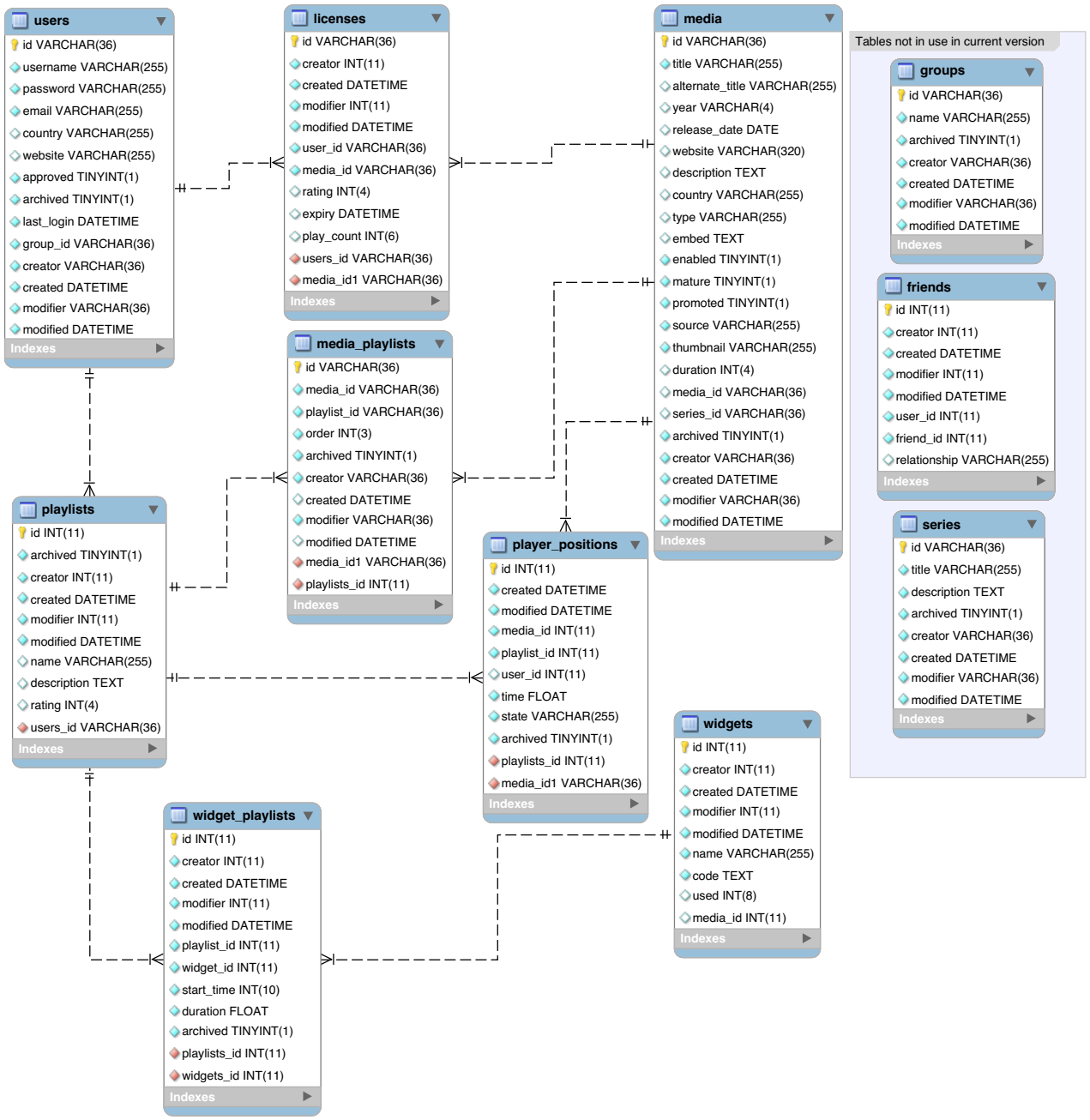
We created an project page about BOP to go at http://bop.li and utilized the latest CSS3 and HTML5 technologies to render background gradients, drop shadows, rounded corners, Google web fonts and layered gradients in browser.



Technical structure

Database structure

The database architecture as created by Vast Blue.



File structure

A top level overview of the MVC file structure (Model-Viewer-Controller) that underlies BOP's architecture:

Budget

Overview of the main budget changes:

- Vast Blue took over the combined development of Yuva, Neil Harris and the 3rd Party developer (agreed with Robbie Allan)
- Office costs rose as the project lasted twice as long as expected (11 months from start of work).
- Phone and many travel and subsistence costs were covered outside of the project and were lower than expected.
- In Kind labour costs almost trebled because of a lengthier development process than anticipated.
- Unity software not bought. Smaller software packages and domain names/hosting purchased at less cost.

Proposed budget (April 2010)

Category	Who	What	Cash	In-Kind
Staff Costs	Nic Wistreich	Research, Project management, interface design	£6500	£2000
	YUVA	Visual Ap development / research	£3000	£1000
	3rd party software development	System architecture	£4000	£1000
	Neil Harris	Video streaming / codec consultancy	£1500	£500
Materials	Unity Developer edition	3D for web / iPad developer software	£1500	
	Equipment cost		£500	£500
Expenses	Office / phone /telecoms		£600	£600
	Travel & subsistence		£600	£600
TOTAL			**£18,200**	**£6,200**
		TOTAL	**£24,400**	
		In kind %	**25.4%**	

Final budget (June 2011)

Category	Who	What	Cash	In-Kind
Staff / Contractor Costs	Nic Wistreich	Research, Project management, interface design, bug testing, outreach	£6,800	£11,200
	Vast Blue	System development	£8,500	£5,500
	YUVA	3D design (fundraising)	£300	
	Nicholas Sobey	Freelance research	£80	
Materials	Software	Wireframing, development tools / JW plugins	£311	
	Domain names + hosting	Domain name registration + hosting	£220	
Expenses	Office costs	Rental from Yuva and Digijuice	£1,275	
	Travel & subsistence		£375	£800
	Bank charges		£87	
	General admin		£251	£220
TOTAL			**£18,200**	**£17,720**
		TOTAL	**£35,920**	
		In kind %	**49.3%**	

Evaluation

What worked?

- We created the first web-based system for building and playing video and synchronised content on secondary devices in the world, as far as we are aware.
- We researched and came to understand a huge area of video innovation, and connected with many of the web's thought leaders in this space, including Mozilla, Participatory Culture Foundation and YouView.
- We created software by working in partnership with a second company - increasing the skills and knowledge base considerably and testing a process of product development that was new to us.
- We delivered within the cash budget a project that would have cost perhaps three times more if privately financed and all contributors had been paid fully.

What were the challenges?

- Management of technology development. Start-ups seem to do best when the founder(s) are also coders - as they can put in the excessive hours to perfect a piece of software (and are motivated to do so as founders). When coding is outsourced to a third party, this isn't possible. So although Vast Blue put development time and resources into the project far in excess of what they were paid and contracted to do, there was a natural limit to this which could only be resolved with further investment.
- Communication during the technical development. Netribution and Vast Blue collaborated on the same code repositories over several hundred revisions - which was a new experience for both of us. In some cases this worked very well, in others, it could mean work developed by one person was contradicting work from another, and time was spent trying to make new versions work equally well.
- Because of the technical challenges, deadlines got pushed back, with insufficient contingency from Netribution to adjust the schedules of dependent activities when this happened. This had a knock on effect on cash flow meaning other work had to be taken on to cover day-to-day costs, in turn reducing affecting labour resources.

What would we do differently next time?

- Clearer separation of project management responsibility. Vast Blue have their own internal project management process, as did Netribution. Netribution was producing designs, wireframes and testing the system, which kept costs down, but it meant a loop where Netribution managed VastBlue who needed to manage Netribution. In future there should probably be just one project manager for a technical outcome, and they alone should take responsibility for delivery on schedule. With Netribution acting as both project manager and front-end designer - time spent on interface development could also over-run.
- Better defined delivery dates and project plan to distinguish research and development. The project had stages of both research and development. Inevitably the two processes fed into each other, and for a seed fund project that was appropriate as it allowed us to adapt to opportunities and advances that emerged. But to meet delivery dates better there would probably need to be a date beyond which further research and innovation stopped, or was channelled off to feed into a second version.

Where next?

- The Virtuous Circle project. Netribution is a founding partner on the Scottish Documentary Institute's Virtuous Circle project, which has requirements for both screening management and time-synched metadata. It will give us a chance to test technology with real films and use-cases with some limited further investment
- Ongoing development. Netribution are allocating a certain amount of time to continue to improve the user-interface and experience of the system to create better demonstrations and attract further interest.
- Public launch and private demos. Now that a working beta has been completed the process of demonstrating the system to potential stakeholders can begin. Possible interested organisations include FilmFour, Dogwoof, BritDocs, BFI, Channel 4, Open Cinema, NFTS, YouView and a digital screen network for the North of England. The aim is to identify companies looking for technology like ours to enhance their existing offering, which can then be offered under license, or lead to contracted development work.