D4.6 – Delivery of the Design Pilot

This report describes the progress of the Design Pilot, from the co-creation workshop in month 16 until the final delivery of the Pilot in month 30. It includes a description of the Pilot, the content, technical developments as well as the evaluation, business model aspects and a summary of the Challenge event.

Deliverable

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Authors:

Sanna Marttila, Aalto

Christina Holm, SAT

Kati Hyyppä, Aalto

Sergiu Gordea, AIT

Neea Laakso, Aalto

Lorna Stokes, ENoLL

Enric Senabre Hidalgo, Platoniq

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Statement of Originality

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Executive Summary

This deliverable summarises progress and the delivery of the Design Pilot, which was developed between month 16 and month 30 of the Europeana Creative project. It gives insight about the prototype tool that has been created, and the process by which it has been developed. As a product prototype the Design Pilot created a new advanced visual search mechanism. The online Culture Cam tool (culturecam.eu) allows people to explore a sub collection of Europeana in an easy and intuitive way through colour, share or pattern. The report presents the developed open source software and development toolkits that enable third parties to implement their own visual search interfaces and spatial presentations of their digital cultural content.

In addition, the report sheds light on the various activities that the Design Pilot carried out in order to connect Europeana offerings to designers and artists, and creative industries in general. All together more than 7,000 people participated to the high-level events co-organised by the Design Pilot.

1. Introduction

The Design Pilot is developed within the Europeana Creative project. The project aims to demonstrate creative re-use of Europeana resources by developing test applications in five thematic areas: History Education, Natural History Education, Tourism, Social Networks and Design.

This deliverable summarises progress and the delivery of the Design Pilot, which was developed between month 16 and month 30 of the project. It gives insight about the prototype tool that has been created, and the process by which it has been developed. This includes the co-creation process, the agile development of the Pilot, the business plan behind it and the evaluation process.

In addition, the deliverable sheds light on the various activities that the Design Pilot carried out in order to connect Europeana offerings to designers and artists, and creative industries in general. These activities included e.g. hands-on workshops, hackathons, open culture exhibition, that connected the Design Pilot to the creative communities and their practices. In order to support these communities, share knowledge and good practices of creative re-use and open cultural content, the Pilot created and documented examples and experiments which will also be shared in the report.

As a product prototype the Design Pilot created a new advanced visual search mechanisms. The online Culture Cam tool (culturecam.eu) allows people to explore a sub collection of Europeana in an easy and intuitive way through colour, shape or pattern. The Pilot developed Culture Cam also as an immersive and interactive installation. It was showcased in the National Gallery of Denmark and in the National Library of Austria.

The Pilot core team consists of three main project partners and various content providers through Europeana. The Design Pilot partners were Aalto University ARTS (Aalto), Spild af Tid ApS (SAT) and Austrian Institute of Technology (AIT). The Pilot had a close collaboration with one of the project's Open Labs (AALTO) that is situated in the Media Factory in Helsinki Finland. The Design Pilot has made use of AALTO's Fab Lab[1] and other digital media and design resources. The various content partners include e.g. the National Gallery of Denmark (SMK) and British Library.

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[1] Fab Lab (Fabrication Laboratory) is a small-scale workshop offering possibilities for personal digital fabrication. More information of Aalto Fab Lab: http://fablab.aalto.fi/site/.

2. The Design Pilot

The Design Pilot was launched in May 2014 in Helsinki, Finland, with a series of events: a partners meeting, a co-creation workshop and a business model workshop.

2.1 Co-Creation Workshop

The co-creation workshop was organized on May 22, 2014 at the Aalto Media Factory, which is part of the Europeana Open Labs network. The workshop was targeted to designers and artists, and the aim was to learn about the current and emerging practices and projects related to open creative re-use of digital cultural heritage, as well as to ideate novel ways of re-using digital cultural content and data which is available through the Europeana platform.

Over 20 people, including participants from the consortium and external invited designers, took part in the co-design workshop. This one-day workshop aimed at producing concepts of creative re-use on the theme of *design*. In the workshop the invited designers and members of the consortium identified and mapped possible user of the Europeana platform and content, and developed new use scenarios, and concepts which addressed novel ways of building upon the European digital cultural heritage.
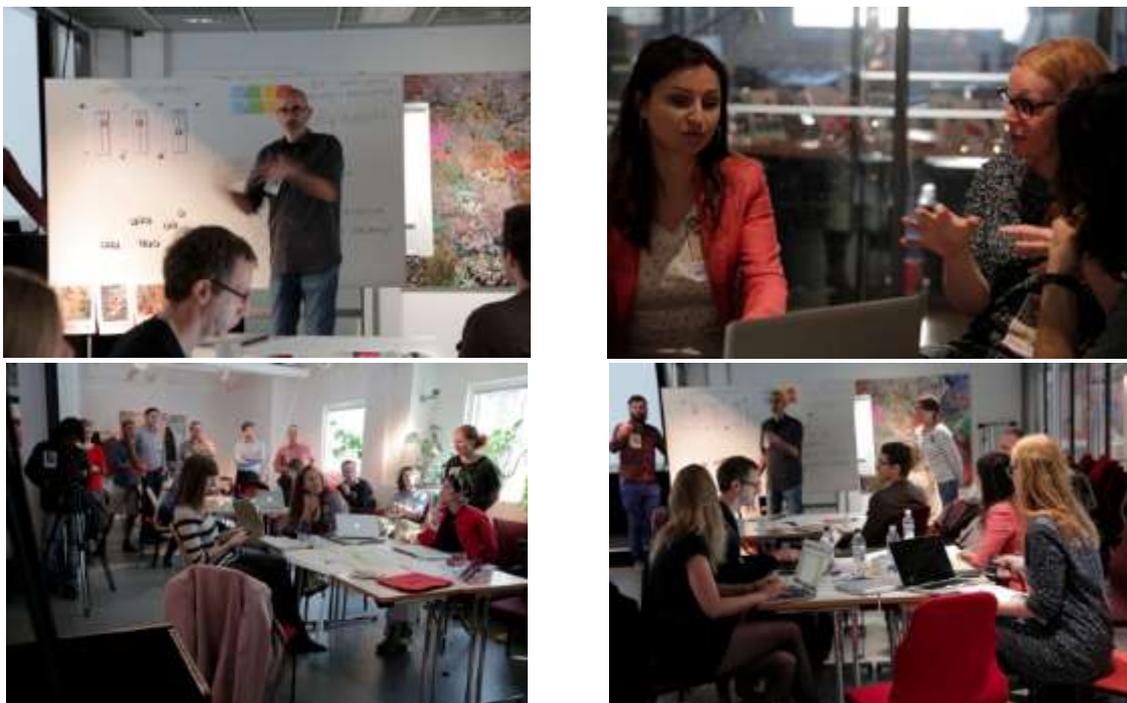
Fig. 1 Co-creation Workshop in Helsinki

The first day of the workshop, co-facilitated between Aalto Media Factory and Platoniq, included scenario building and prototyping with the local creatives. Animators, graphic designers, film makers and product designers collaborated in order to come up with new and interesting ideas on how to re-use Europeana content for design. Spild af Tid ApS had also prepared prior to the workshop example images from Europeana using their design expertise, which served as further inspiration for the participants.

Fig. 2 Co-Creation Workshop

Many ideas were generated including a collaging tool which could help people to design and produce their own comic strips, a 3D printing process aiding people to accurately recreate old artifacts, a knitting tool allowing textile designers for creating textile patterns inspired by images in the Europeana database, a paint by numbers and collage tool allowing anyone to re-create their own masterpiece at home, and finally a platform for designers, which could facilitate easier access to historical and artistic content.

Altogether five concepts and related use scenarios were developed and presented at the end of the workshop. In addition, the scenarios were evaluated according to the following key indicators: "openness", "Europeanability" and "feasibility". The developed scenarios are described in brief in the Table 1. below:

Table 1: The five concepts developed and presented in the Design Pilot co-creation workshop

Name	Description	Key Features
eFab! - Fabbing Europe's heritage one piece at a time	An ecosystem to support digital fabrication of Europeana content. This is a knowledge-sharing platform in which a variety of users can share 3D-printing files and other knowledge necessary for the digital fabrication of objects.	− Several target audiences (DIY communities, students, set designer, theater producer). − Ecosystem in which digital cultural heritage can be re-used for 3D printing and laser cutting. − Works for a variety of objects. − Creation of vector files and models is needed in order to realize the idea. − Connect it to existing platforms e.g. http://www.thingiverse.com, https://www.youmagine.com, https://www.ponoko.com
Knitty Gritty	A tool that enables use of any Europeana image for making a textile pattern, and the created patterns could be shared. Supports also (re)fabrication of vintage patterns.	− Target audience textile fabricators. − Possibility of alignment with the image similarity tool, which searches for similarity in shapes. − Not necessarily textile patterns, it could work with any kind of patterns. − Different software can be used. − Convert and export the patterns to specific software. − Each pattern should be available for further adaptation, mix and reuse. − Option to order the pattern in a specific product (addressing the business model part of the concept). − Allowance for contribution of communities. − No need to have a big data storage,

		outcomes can be exported by the user. − Priority on user interface design.
Media Mole	A collection of Europeana content organised thematically, so that people in the media industry can collect, showcase and reproduce digitised cultural heritage.	− Target audience is professionals from the media sector. − 3-step procedure: collection, showcasing, producing. − Production of own comics/collages based on digitised cultural heritage. − Includes as many tools as possible to enables an easy content selection. − Encourage users to share outcomes. − Framework allows users to build, share and collect. − Users can collect thematic content in their collections. − Challenge: most designers need only access to content. − Potential additional feature: trace what people have done with the content.
Open Art	A platform in which teachers can access Europeana's digitised cultural heritage and offer it to students. It specifically focuses on reuse of content for storytelling and narrative.	− Target audience: art- and design teachers. − Tool allows image simplification as well as reworking, remixing, reusing. − Option to print and work with the content manually. − Teachers can use it for classes, e.g. different art styles and artists. − Possibility to tell a variety of stories and narratives. − Option to personalize the content. − Option to share outcomes. − Option to create learning groups which allows permanent development. − Trace back what has been done with your produced content.

Comic Saga	Europeana's digitised cultural heritage is transformed into templates for creating comic sagas. Kids can create stories with characters, and use comic bubbles to add text.	− Target audience: 8-12 year old kids. − Build a character (choose look, strength, abilities, weapons, vehicles, home and background). − Select from different image classifications. − Present a specific set of preselected items that are classified. − Drag & drop of images. − Characters can interact together in activities (collaboration or competition, hunting, etc.). − Skills of the character determines success. Interesting opportunity to give kids/students the chance to create their own story (potential for educational purposes)

2.2. Business Model Workshop

In connection to the co-creation workshop, a business model workshop was organized on May 23, 2014, to develop further and assess the selected concepts created in the co-creation workshop. The objectives of the business model workshop were:

1. Support the Design Theme with identifying, implementing and analyzing one or more business models via interactive activities and discussions.
2. Start sketching and discussing business/sustainability model elements by using the Business Model Canvas by Osterwalder & Pigneur.
3. Propositions, infrastructure, customers and finances images.

Three concepts: eFab!, Knitty Gritty and Comic Saga were selected for further exploration and discussion. These concepts were analysed and evaluated through the Business model canvas tool which provides a structural way to address various issues from sustainability to target audience of the envisioned services. This collaborative exploration helped the Design Pilot to choose two main themes to focus on:

1. Stimulate and enable digital fabrication and creation of tangible artefacts from digital cultural heritage.
2. Create design prototypes and experiments to demonstrate alternatives uses of the Europeana content and data.

Fig. 3 Business model workshop

The further definition of the Design Pilot concepts continued with mapping some of the possible digital cultural heritage collections which could be used and promoted in the Pilot, as well as locating existing services, applications and communities of practice operating in the relevant domains.

2.3 Framing the Design Pilot

Based on the experiences obtained from the co-creation workshop and the business model workshop, four main strands of activities were identified for the Design Pilot:

1. To design a prototype that offers an online tool for searching and exploring content in Europeana through colours, patterns and forms, instead of more traditional text based search provided by the current Europeana portal.
2. To design experiments and examples which aim to stimulate and inspire professional designers, artists and practitioners – and creative industries in general – to creatively re-use Europeana content.
3. To facilitate digital fabrication and hands on workshops under the theme "Redesign your culture" where designers and makers can explore the open digital cultural heritage accessible via Europeana, and create new designs and artefacts.
4. To organize challenge and open culture events that are addressed for the wider public.

Learning from the other Pilots from Europeana Creative, more focus in the Design Pilot was given to connect and collaborate with existing communities and networks that are relevant for the theme of the Pilot. In addition, as the lack of good examples of re-using digital cultural heritage was identified in the project as a challenge hindering the wider implementation of

Europeana content and data, the Design Pilot put more effort on creating experiments and examples of various kinds of creative re-use.

The key activities and success indicators of the Design Pilot are presented in the Table 2 below:

Table 2 Key activities and success indicators of the Design Pilot

Activity	The Design Pilot Prototype – Culture Cam	Open design experiments and examples	"Redesign your culture" workshops	Open Culture event and exhibition
Stimulating reuse	The Culture Cam prototype provides an alternative, visual way for people to search and explore openly licensed digital cultural heritage online.	The design examples and experiments showcase works which aim to further inspire the creative re-use of cultural heritage content.	The "Redesign your culture" workshops offer a platform for designers, artists and makers to develop and use their skills in context of cultural heritage materials.	The design Pilot creates conditions and a framework for creative re-use activities, a forum for knowledge sharing and learning about open cultural content.
Creating various examples of creative re-use	The Culture Cam prototype creates visually similar 'collections' or views of preselected Europeana content.	The produced design experiments and examples demonstrate both digital and physical re-use cases in the fields of arts and design.	The workshop participants create small-scale derivative works using open cultural heritage content.	The exhibition event will showcase up to 13 selected works re-using open cultural heritage.
Producing and providing documentation	The developed software of the Culture Cam prototype is published on GITHub under an open source	The documentation is made publicly available and shared with Creative Commons	Written documentation on Redesignyourculturalheritage.eu (e.g. blog posts), as well as photos of the different workshops and their	Online documentation of selected artworks and designs. Documentation (e.g. blog

	license. The Design Pilot aims to enable the use of Culture Cam in other institutions and contexts beyond the project's duration.	Attribution-ShareAlike (CC BY-SA) license.	outcomes are made available online.	posts, photos) will be produced and made available online.
Using and promoting the Europeana content and data	The early prototype (v0.1) uses a set of >1,000 images that are released under a public domain mark. The objective of the Pilot is that the final version (v1.0) of Culture Cam would be using Europeana API to harvest a selection of the openly available content from Europeana (i.e. licensed under Creative Commons license or Public Domain mark).	Pilot's examples and experiments highlight the various possible creative reuses of digital cultural heritage content. Selected content is licensed under Creative Commons license or Public Domain marked.	For the workshops the Pilot has compiled a selection of open cultural heritage content from Europeana. Additionally, the workshops utilize Culture Cam in order to locate further relevant content from Europeana. The Europeana API is also promoted in the events.	All the exhibited works are making use of the open cultural heritage. Additionally the Culture Cam installation is also making use of public domain cultural content.
Expected number of participants, visitors, users by the end of the Pilot	Individual users: 5,000	Not applicable	Participants in workshops: >80-100 Online coverage: 3,000-4,000	Event participants: >7,000

3. The Culture Cam Product Prototypes

"Culture Cam" is a product prototype concept developed by Spild af Tid (SAT) in collaboration with Aalto University and the Austrian Institute of Technology. The Culture Cam prototype consists of two main elements:

a. A digital similarity search tool
b. An interactive installation

The starting point of the development of Culture Cam was an objective to create a visual search mechanism, and find a way to access and re-use Europeana content in a fun, playful and visual way. The visual search tool is targeted to designers and all creative people who would like to use the Europeana content as a basis or inspiration for new derivative works.

From a designer's point of view the Europeana portal http://www.europeana.eu can be rather complex to access. What to find? How to find it? How to get inspired and motivated for exploring the gigantic amount of content? How to find inspirational content for creative reuse?

SAT came up with the idea of developing a *twofold* concept: An online search tool based on visual similarity and an interactive installation for physical spaces. The online search tool connected very well with one of the predefined purposes of the Design Pilot described in the DoW and to be developed by the Austrian Institute of Technology (AIT): "A new advanced search mechanism to support various types of visual search among its visual contents (e.g. colour, shape, etc.)". On the other hand – and that was where the idea of Culture Cam arose – SAT wanted to explore how to answer the above question by creating a design prototype, which was also experience-based and required people to actually experience and interact with it in a physical and tactile way.

Both the online tool and the installation, which are explained in more detail below, are based on this core idea of engaging people with the Europeana content via playful interactions. While the online tool enables reaching many designers, the installation complements it by providing an even more immersive and physical experience.

3.1 Culture Cam – A Digital Similarity Search Tool

The basic idea behind the digital similarity search tool Culture Cam is to create a tool that makes it easy and intuitive for designers and artists to browse Europeana. The tool is a "live", digital similarity tool which recognizes a **colour, a shape or a pattern** via a **web camera**. A user "scans" an object in front of the computer's webcam, and the Culture Cam captures and analyzes the picture of the given object and comes up with search results of similar color, shape and pattern directly from Europeana (see introduction to Culture Cam in "The Culture Cam step-by-step" section).

The two hypothetical examples below suggest and demonstrate how a user scenario for Culture Cam could look like:

Example I:
A ceramic artist is fascinated with a particular shape of an artefact found at a flea market in Paris. She wants to further explore the shape of the artefact and uses the similarity tool with the aim of making a mood-board of inspirational images for her own creation of a ceramic artefact.

Example II:
A textile designer falls in love with a beautiful carpet in his favourite magazine "Elle Decoration". He is very inspired by the pattern and colours and wants to explore if he can find good similarities or related results in Culture Cam in order to freely re-use cultural heritage content for new derivative and contemporary textile designs.

Related similarity search tools
This way of working creatively with a similarity tool is elaborated further by the websites below. They also target creative people and illustrate very well the idea of getting inspiration from a particular colour, shape and/or pattern through similarity search. A well-known and well-working similarity tool is Google's Search by Image, also shown below.
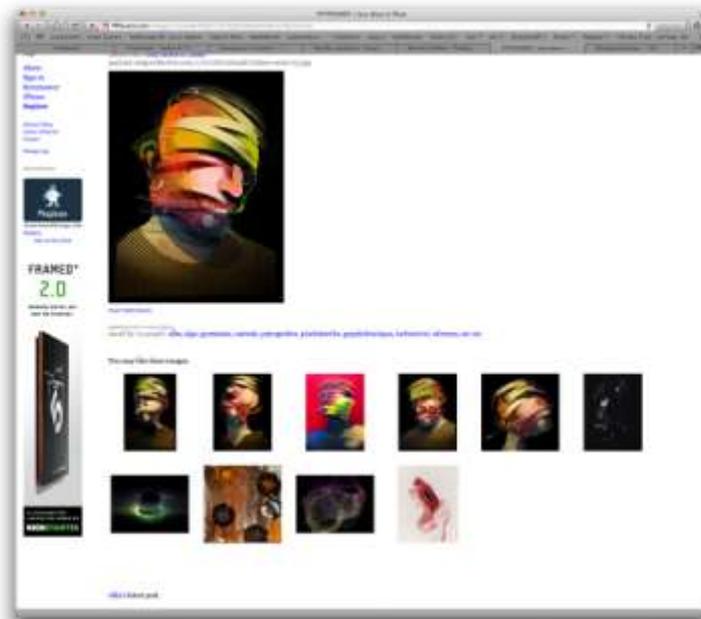
Fig. 4 Similarity feature on www.ffffound.com. See this specific page here.
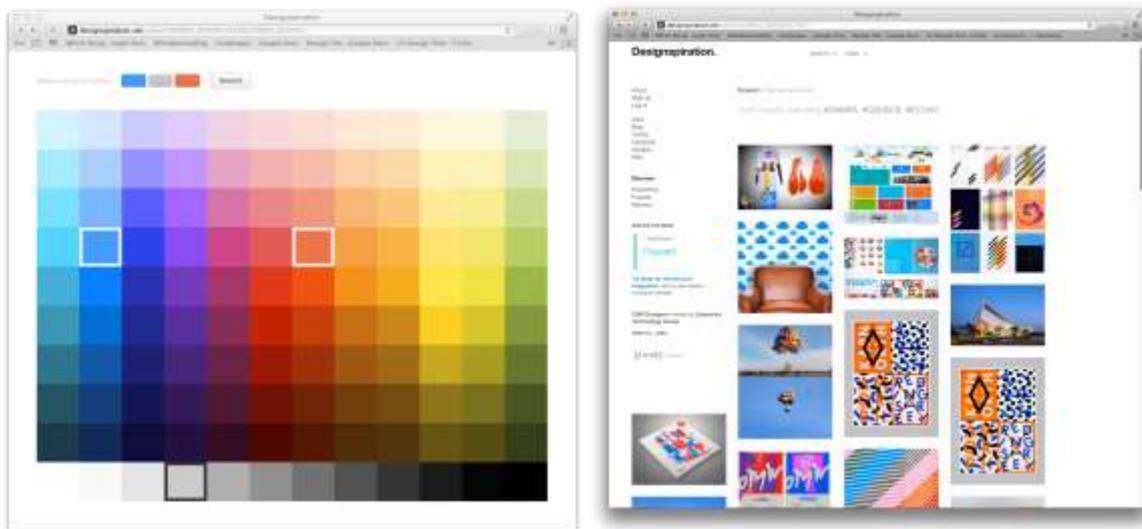
Fig. 5 Advanced color similarity tool on www.designspiration.net.
Choose a color or a color combination and get back image results based on the chosen colors.
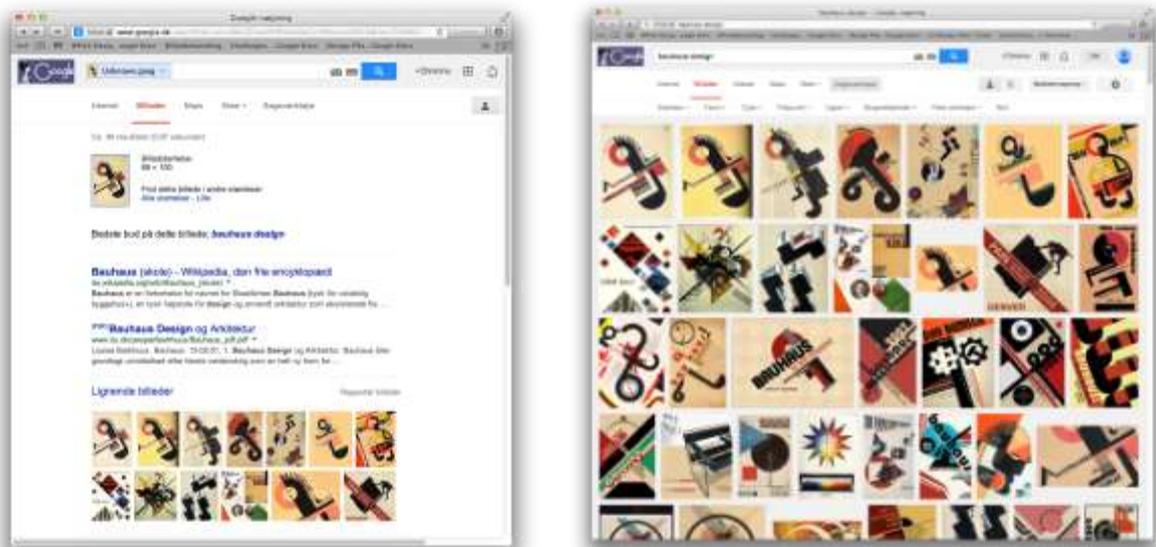
Fig. 6: Similarity search on Google by uploading an image.

How is Culture Cam different from other similarity search tools?
From a designer's point of view, the webcam-based Culture Cam differs from other similarity tools by being tactile and intuitive. Any designer or artist, regardless of profession and technical skills, can use this tool with ease.

Also, as Culture Cam is based on visual interaction via the webcam, it can be used without typing or specific language skills. It provides the designer with the possibility to find similarities with a given pattern, shape or image, which might be too complex to describe in words.

How is Culture Cam useful to designers and artists?
Like other image similarity tools Culture Cam will add value to the creative process as the designer may very likely retrieve unexpected search results leading to further exploration of Europeana content. However, Culture Cam shouldn't be thought of literally as a "similarity" tool. The main goal of this tool is to engage creative people with digital European cultural heritage in a fun, inspiring and simple way, across design disciplines, and to provide them with a tool which makes it easy to browse and search Europeana. The unexpected search results are, just as well as the expected ones, pivotal to stimulating designers and artists to take a closer look at the Europeana content, to make them explore the manifold image collections and to trigger their imagination – in order to get in return delightful and perhaps unexpected examples of how to reuse/redesign/remix European cultural heritage.

3.1.1 Initial Demo Based on Google API

The Austrian Institute of Technology (AIT) plays a significant role in the Design Pilot and had already started to develop an interesting and highly relevant demo of an image similarity tool for Europeana. Therefore, it was ideal for SAT and for the Design Pilot that AIT's knowledge could be used for the development of Culture Cam, regarding both the similarity search and the Europeana API.

In the preliminary prototype development phase, before the involvement of AIT, SAT made some initial technical experiments and built a webcam-based similarity search demo on top of Google's "reversed image search" API[2]. This early tool was working remarkably well and aimed to demonstrate the idea of a webcam-based similarity search tool. It served – and still does – as an ideal example of how to get "good" search results, both the expected and unexpected ones.
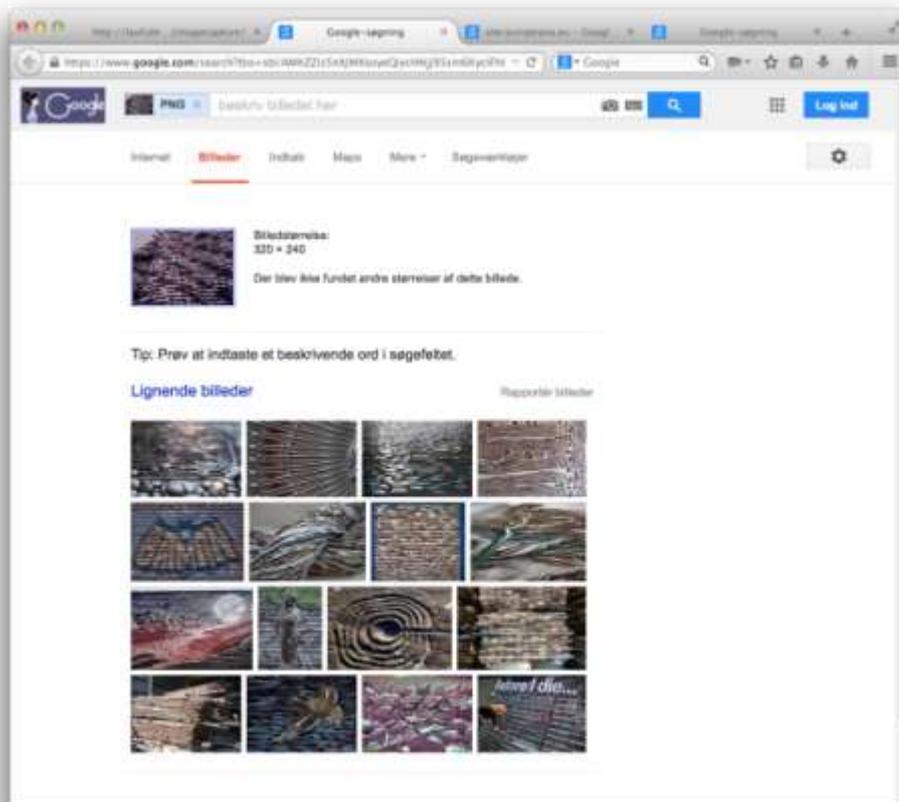
Fig. 7: Christina from SAT makes snapshot of her wool jacket to explore similarities in Google.

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[2] The initial webcam-based similarity search demo developed by SAT can be viewed on www.spildaftid.dk/desingpilot/imagecapture.
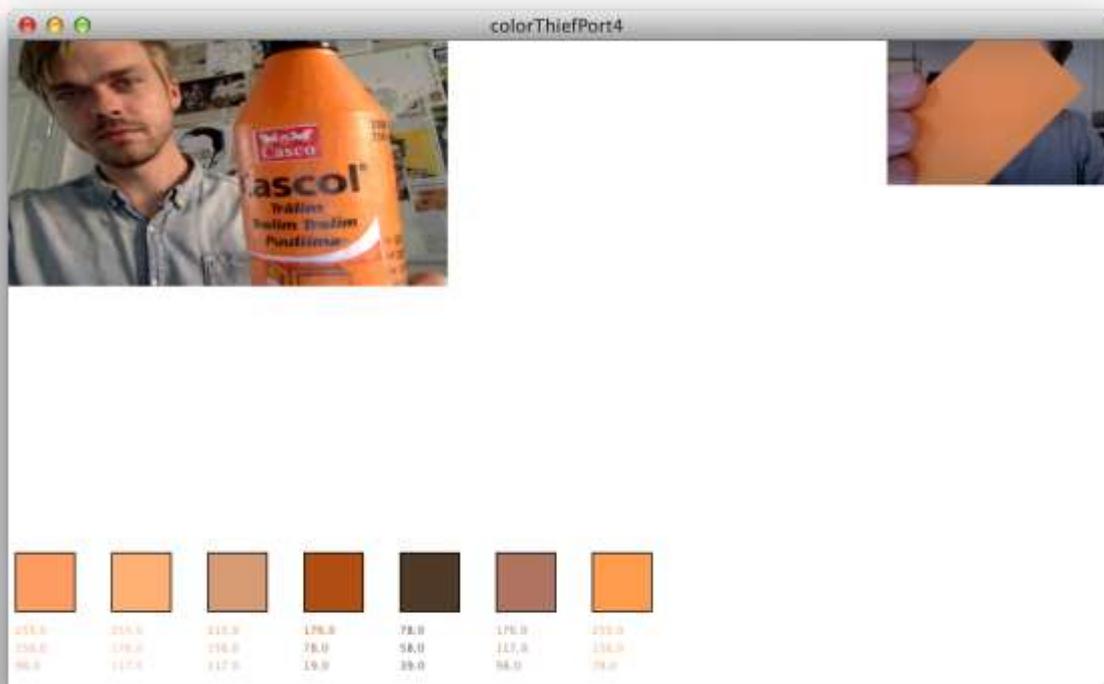
Fig. 8 Lau from SAT in the process of experimenting with color match coding using webcam.

3.1.2 Step-by-step Introduction to Culture Cam

Below is a step-by-step introduction to Culture Cam, based on the presentation by SAT in Manchester. Culture Cam can be used at the following url: www.culturecam.eu. However, the online tool is optimized for **Firefox** only. All images in Culture Cam have been curated by SAT from a number of Public Domain and Creative Commons Zero (CC0) marked collections provided by Europeana (read more about the curation of content in the section Content search). In the current version Culture Cam contains 3,584 Public Domain images from Europeana[3]. They have been selected specifically with the aim of highlighting fascinating shapes and patterns and/or color-rich content in order to stimulate creative people to dive further into the Europeana "treasure" and not least promote the Europeana archive instantly.

The following step-by-step example is based on a search made using a promotional postcard with fungus-like pattern in orange colours:
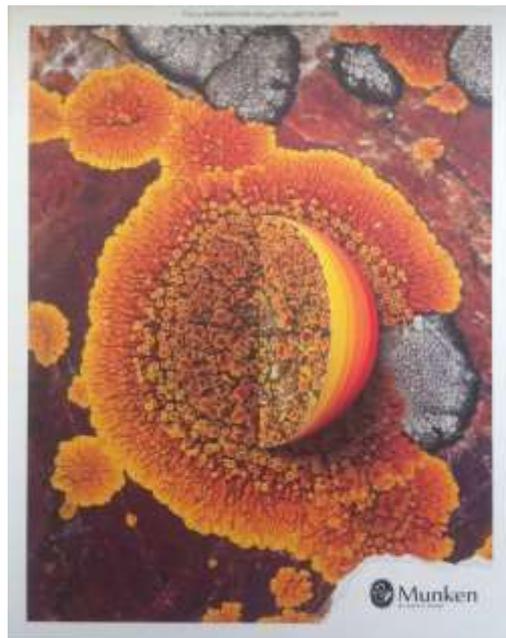
Fig. 9 Fungus-patterned postcard

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[3] For further information on the Image Selecting Process, see section 4.2.

Fig. 10 Culture Cam, homepage www.culturecam.eu
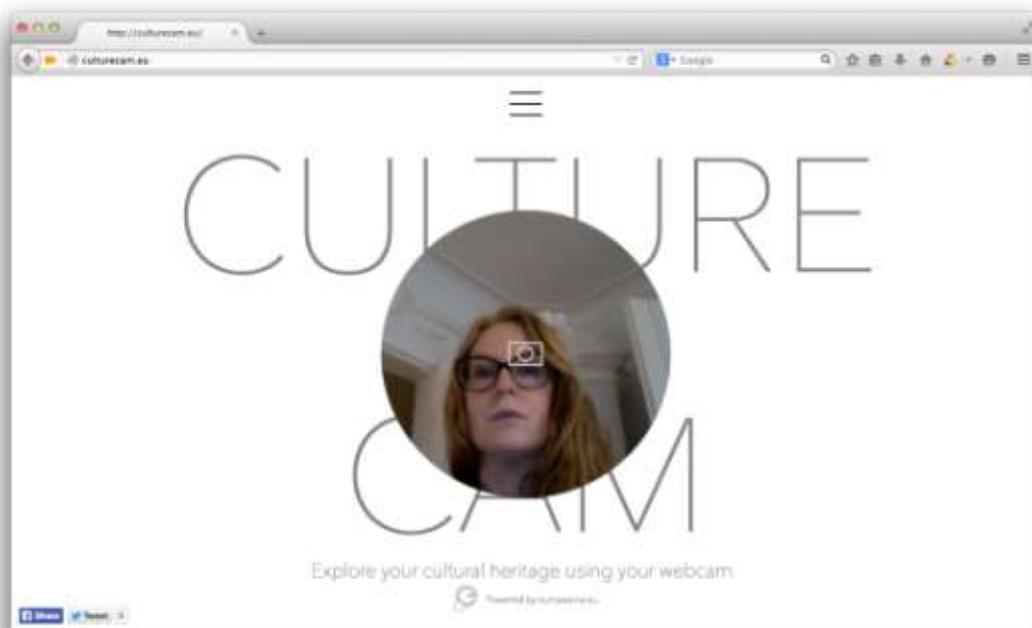
Fig. 11 1. Starting point: Click camera icon in the black circle and the webcam is on!

Fig. 12 2. Take a snapshot of any item (pattern, shape etc.) by clicking the camera icon.

Fig. 13 3. These are the similarity search results!
The best are shown first, browse more results by clicking arrow in the circle. You can also share your search result page on Twitter or Facebook or save a url of the search result by clicking on the chain icon.

Fig. 14 4. Move mouse to the result you find interesting (pops up) and click image.
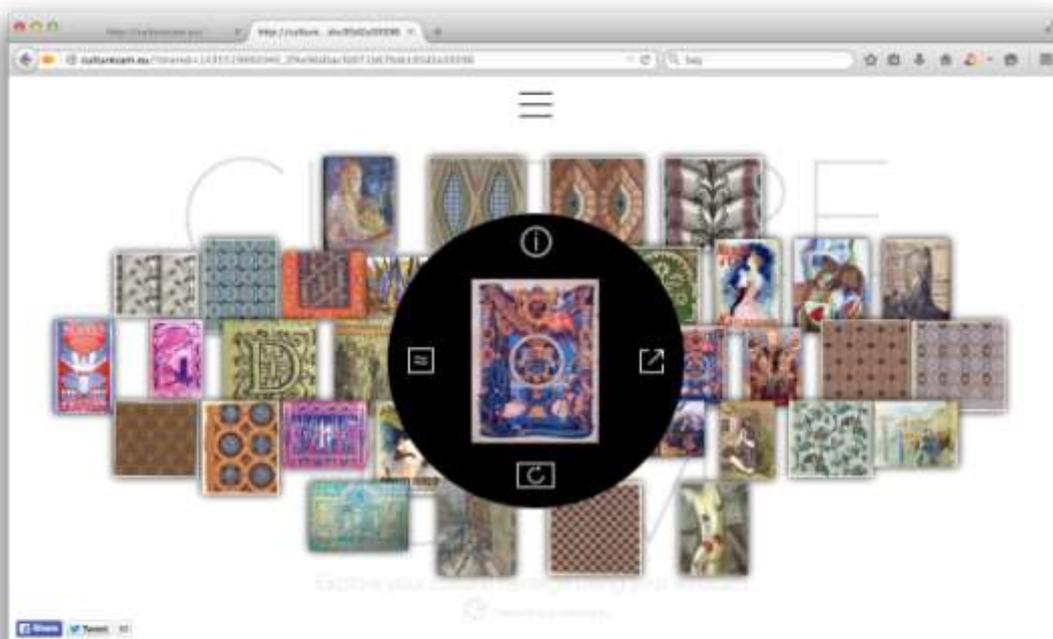
Fig. 15 5. When clicking the image it jumps into the circle and four icons appear.
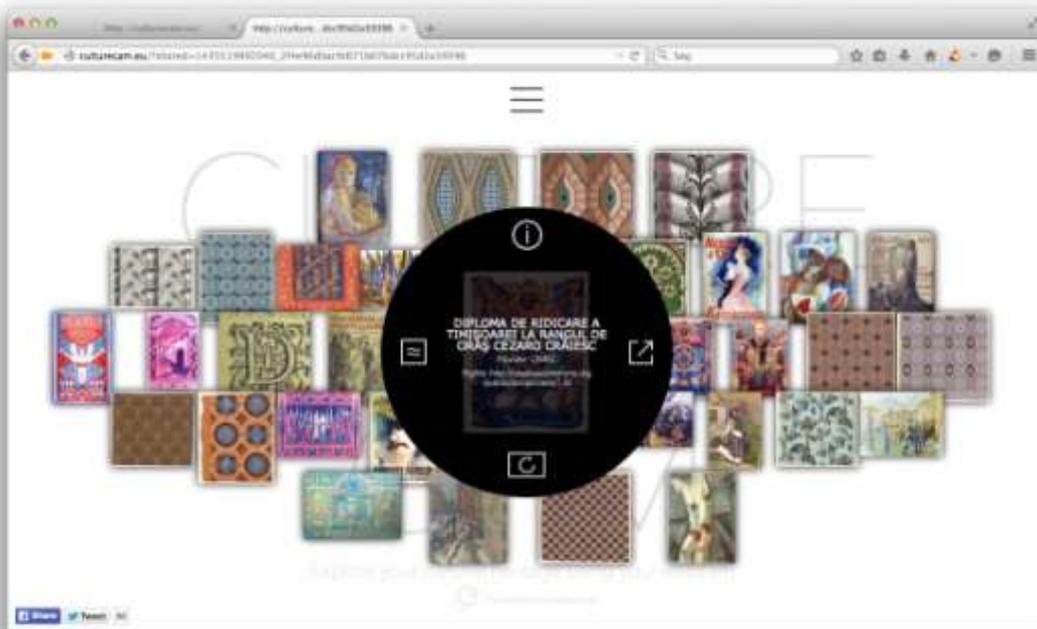
Fig. 16 5.1. Click "i" icon on top and get information about author, publisher and rights of your selected image.
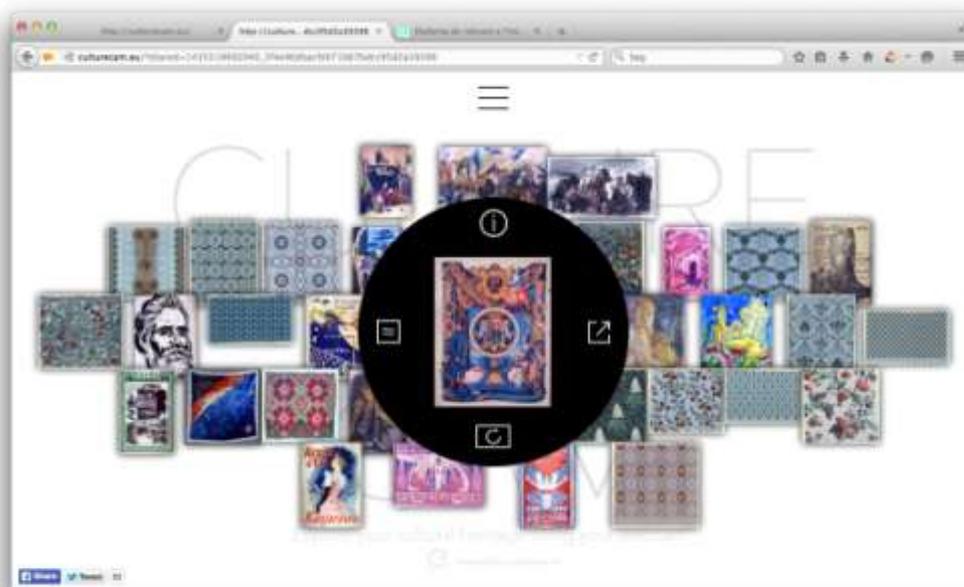
Fig. 17 5.2. Click "similar" icon to the left and find more images with similar shapes, colours or patterns based on your selected image.

Fig. 18 5.3. Click the arrow icon to the right and you get directly to the Europeana portal.
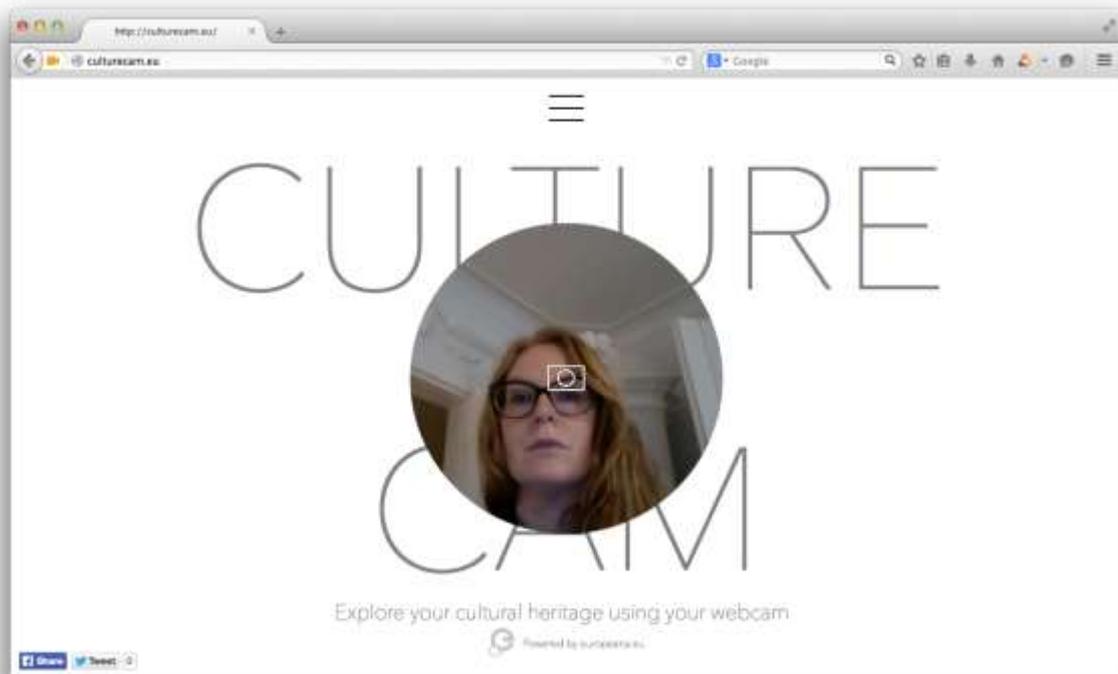
Fig. 19 5.4. Click on "redo" icon to take a new photo with your webcam.

Benefits of the digital tool
In continuation of this introduction to Culture Cam the benefits and aims of the tool are summarized and highlighted below:

- Simple and easy to use
- Tactile and intuitive
- No text input required in making a search
- Playful way to search using the webcam
- Easy access to reusable and visually interesting Europeana images
- Inspirational and "unexpected" search results
- Search results can be used as a basis for new searches
- Invites to look closer into Europeana content
- Search results can be shared in social media

It was clear from the experiences achieved at the Mozilla Festival (October 2014, London, UK) that Culture Cam was also attractive for children and practitioners teaching children. The possibility of getting immediate feedback from the visitors (which were both adults and kids) was a great benefit of attending the festival. This early, informal "user test" suggested that the playful interaction via the webcam was valued highly, and that the interface design was intuitive, as it suited kids as well.

The design of the interface
As the current search interface of Europeana is rather complex with several text-based filters and an enormous amount of possible search results, one of the main goals from the start was to make Culture Cam as simple and intuitive as possible. For that reason the interface design is remarkably minimalistic, yet the name of the tool is shouted out loud on the main page, accompanied by the guiding tagline "Explore your cultural heritage using your webcam", which is further accompanied by "Powered by europeana.eu".

The minimalistic design aims to create a subtle frame for the spectacular Europeana content, highlighting images and thus presenting the search result pages as beautiful gallery pages. Additionally, the intention has been to keep the user's journey short by providing a flat navigation design. The main purpose of the tool is to provide an effortless access and to stimulate reuse of Europeana content in a playful, simple and intuitive way, which means that the number of user's steps and features in the tool has been kept to a minimum. There are no conventional menus/submenus except for the single menu icon, which is inspired by the iPhone's user interface, and has the purpose of providing a simple user interface.

Fig. 20 Simple and clean interface design including menu page.

Social media share buttons are located in the bottom left corner on all pages during the user's journey. The search results, which are presented on the very visual "gallery pages" (see below) have proven to provide great promotional value when shared on social media because they convey well the crucial message of finding inspirational content of great diversity on the Europeana portal.
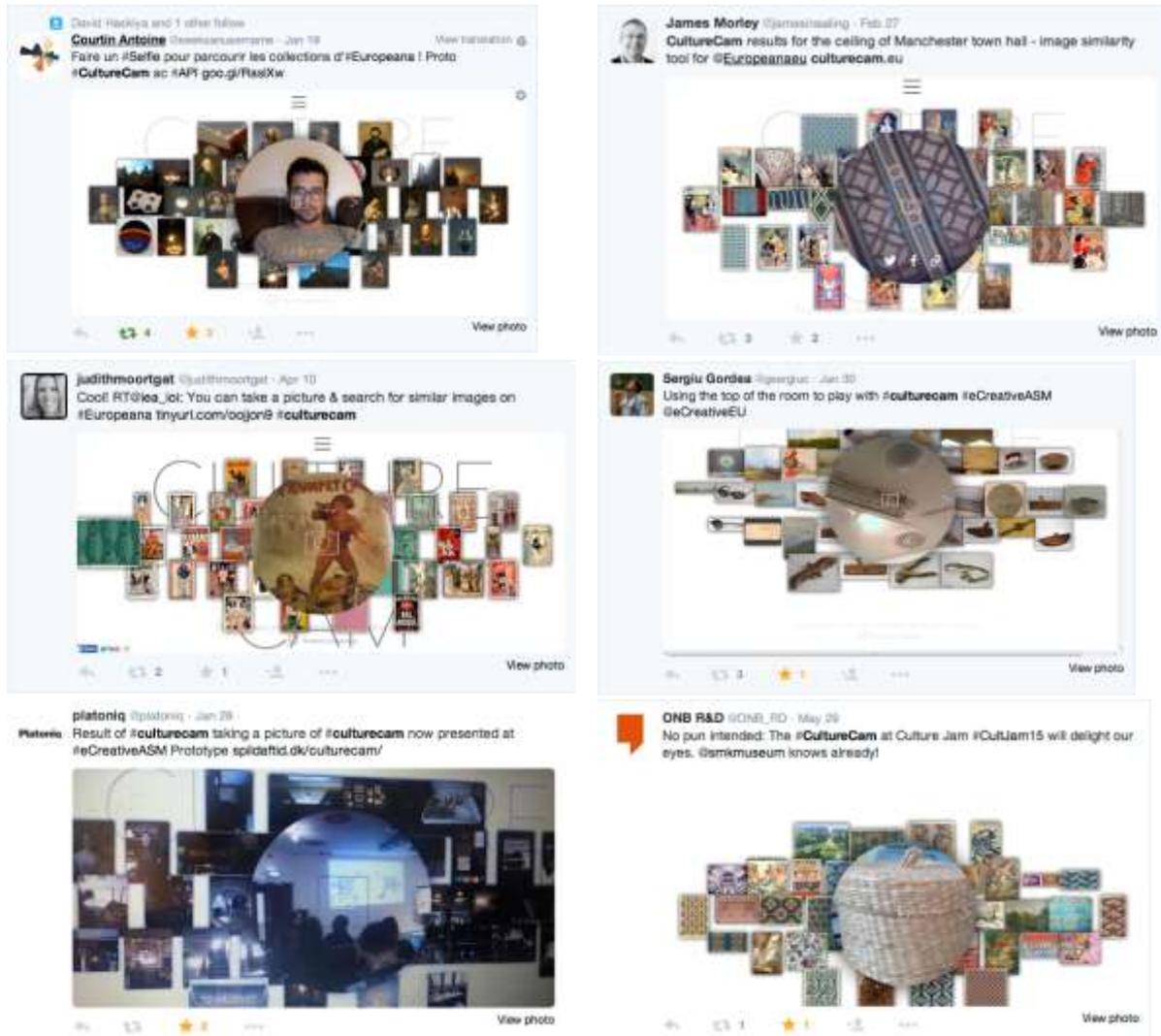
Fig. 21 Culture Cam users sharing their search results on Twitter.

Culture Cam mobile version

Developing a mobile version was an obvious next take on Culture Cam due to the playful and intuitive user interface (UI). According to today's Web design standards, the Culture Cam UI was made responsive, so that it works seamlessly across devices. As the quality of mobile phone cameras is relatively high compared to the webcam of a laptop, the mobile version has proven to provide very good search results.

Fig. 22 Mobile version of Culture Cam.

3.1.3 Iterative and Participatory development of Culture Cam

Culture Cam was launched as a pre-beta demo version with a temporary beta URL at the Mozilla Festival in London on October 25, 2014 as part of the "Redesign Your Cultural Heritage" session, which was facilitated by the Europeana Creative partners Aalto University, SAT and Europeana. At this early stage SAT also launched a preliminary mobile version of the Culture Cam demo. The feedback from the participants of the session was used to redefine the culture cam tool, and develop new use scenarios around the visual search tool.

On February 27, 2015 the official launch of Culture Cam took place at the Future Everything Festival in Manchester in conjunction with the Open Innovation Challenge on Design (see section 7.1). This version of the Culture Cam tool – both the desktop and mobile version – were evaluated with representatives from the targeted user groups (read more of the usability tests in the section 6 of this document).

Fig. 23 Culture Cam was officially launched by SAT at the Future Everything Festival in Manchester February 2015.
Photo by Lizzy Komen CC BY-SA 4.0.

3.2 Culture Cam – An Interactive Installation

As already highlighted the concept of this prototype is twofold. The idea of Culture Cam as a digital similarity search tool originally derived from the main idea of creating a non-web based, physical prototype which would actively engage the audience. More specifically, SAT wanted to develop a spatial, interactive installation for exhibition use in connection to the Set art free! SMK Fridays event. This interactive installation was the experience-based counterpart to the digital tool Culture Cam, developed from this statement:

Could we somehow bring Culture Cam to the people? Bring the Europeana content from the Web into a tactile, emotional and immersive space.

The idea of a spatial similarity search tool "mirroring" the digital tool (and vice versa) arises from SAT's preferred cross-disciplinary approach to design where the end result can be both tangible and non-tangible. SAT is highly experienced within exhibition design, visuals and scenography and wanted as a crucial part of the prototype work to experiment with the idea of removing amazing Europeana content from the online context into a physical, tactile, emotional and immersive space – and thereby literally "re-use" the Europeana archive.

In parallel with the development of the online Culture Cam tool SAT created preliminary drafts of the early interactive installation concept. The main idea was to build the installation of iron frames mounted with "Bobinette" which is a fabric that is ideal for projection due to its great spatial effect. SAT has worked in several client-based design projects successfully with Bobinette screens, in particular for scenographic purposes. The images below are pictures taken from the theatre concert "In the House" at the The Royal Danish Theatre in Copenhagen in October 2014, performed by Danish artist Caroline Henderson. The pictures highlight the use of Bobinette screens, in this specific case in the shape of a video installation adding storytelling and spatial effects to the performance. The video installation was made for touring.
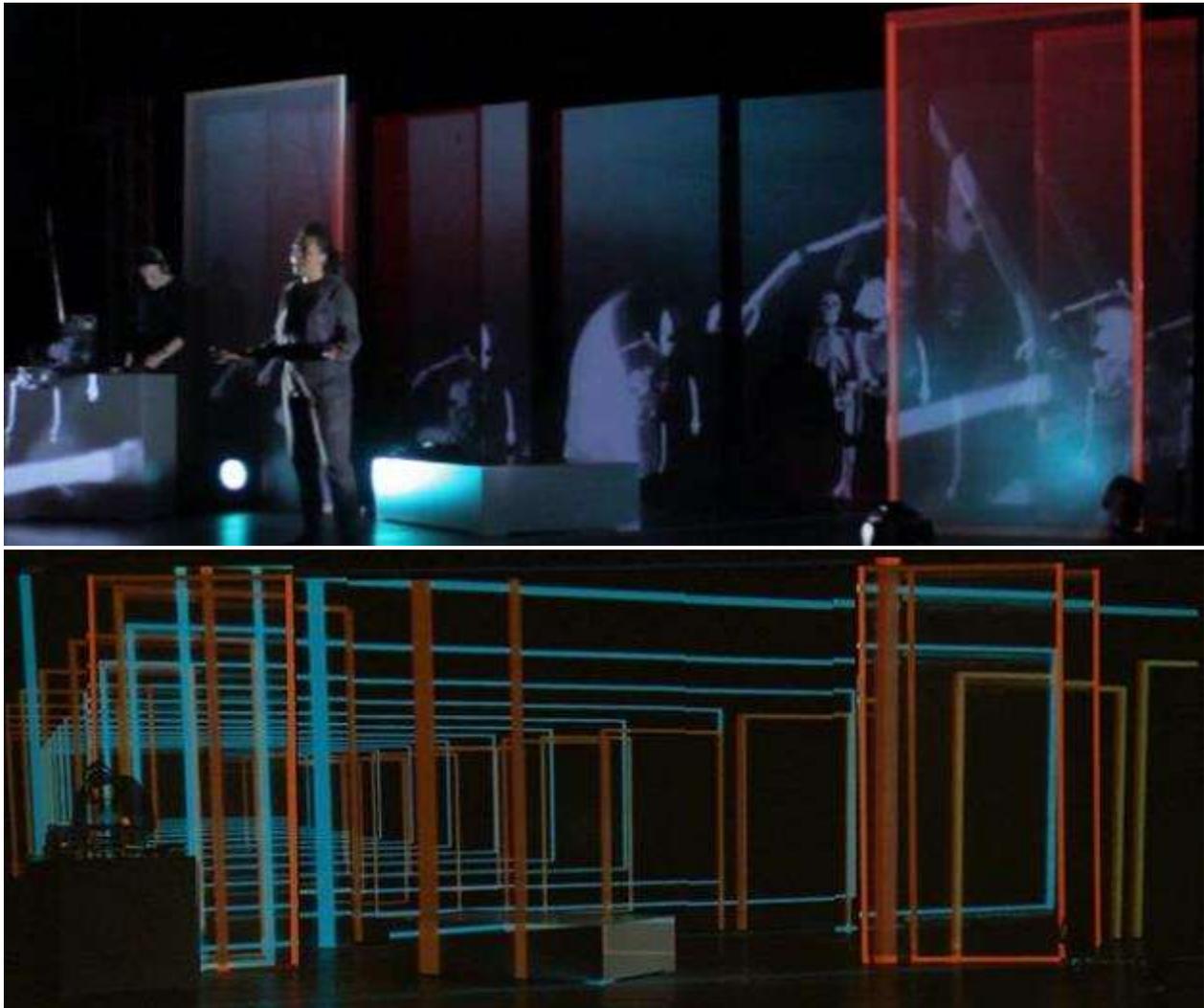
Fig. 24 Bobinette screens used for the theatre concert "In the House"

A 75 minutes long live music video performed by Danish artist Caroline Henderson.
Scenography and visuals by Spild af Tid.

The scenographic work for "In the House" was developed simultaneously with Culture Cam and the physical building of the interactive installation was thus strongly inspired by this theatre play. The idea was to place webcams within the installation, which would capture the visitor who could then browse and explore the Europeana content in a highly embodied and interactive way based on what he/she is wearing – yellow pants, a striped shirt, a floral dress etc. The installation would then appear as a customized experience to the visitor by reflecting what they are wearing, and responding to the behaviour of the people interacting with it. Below is a preliminary three-dimensional sketch of the initial installation concept.

Fig. 25 Female visitor wearing red dress retrieves Europeana content in similar colour.
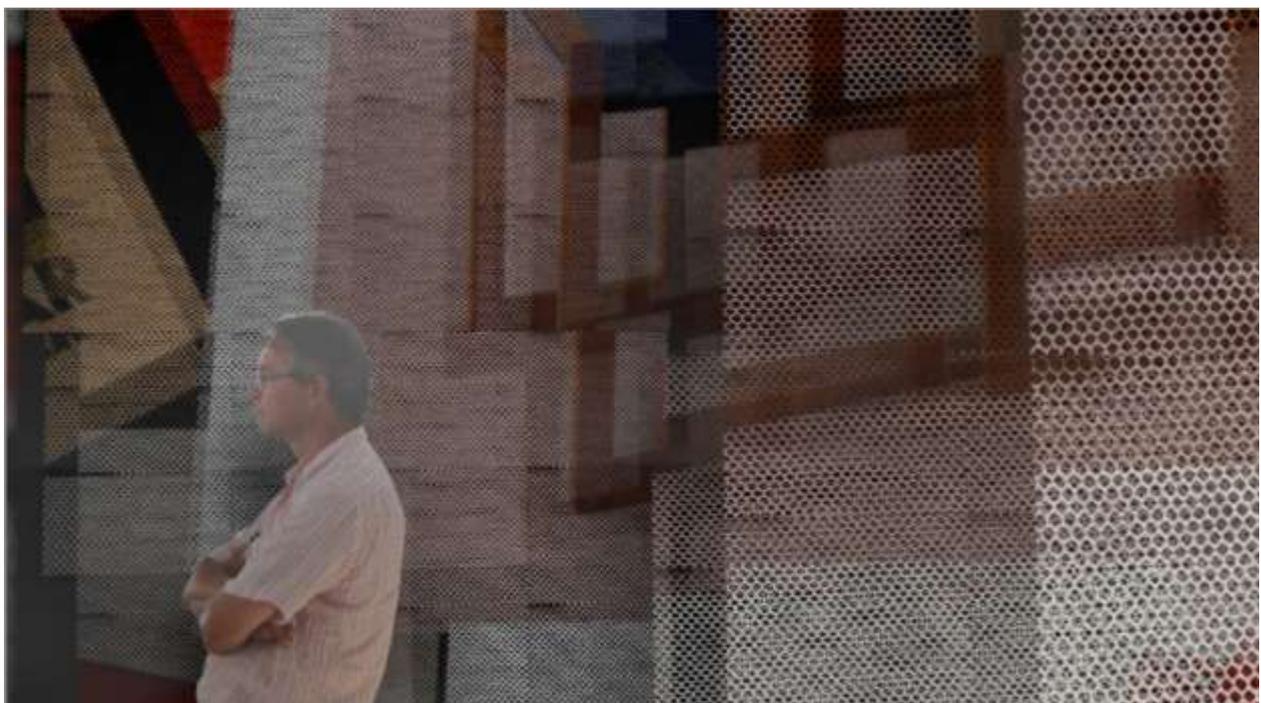
Fig. 26 Male visitor wearing shirt in light colour retrieves Europeana content in similar colour.

Fig. 27 Multiple reflection related to the behavior of each visitor.

Fig. 28 Girl exploring Europeana content.

In order to add humor to the installation experience, a selection of "props" was envisioned to be available for the visitors: A neon coloured raincoat, a bright red dress, a spectacular shaped hat etc. – artefacts that will intensify visually the experience of interacting with the installation.

Benefits of the interactive installation
Several objectives are to be derived from this concept. The interactive installation:

- meets the user/exhibition visitor with an experience-based (fun, fascinating, intriguing) version of Europeana;
- demonstrates how to re-use and work creatively with European cultural heritage;
- creates attention to and promotes Culture Cam, the digital tool;
- promotes Europeana in a novel and unexpected way, and can also reach audiences who are not familiar/using the Europeana portal;
- can be developed as a travelling exhibition (i.e. exhibition kit) for other venues and cultural institutions;

The Culture Cam installation at the Set art free! Open Culture event

Based on several meetings between Spild af Tid/The Aalto University and the National Gallery of Denmark (SMK) it was confirmed in October 2014 that the Culture Cam interactive installation would be exhibited in the SMK building in May 2015 as part of a wider Open Culture event initiated by the Design Pilot partners, e.g. the fourth strand of activities predefined for the Design Pilot. This was made possible in connection to SMK's concept "SMK Fridays", a recurring cultural event which was launched in September 2013 as a free entrance evening event targeting primarily the younger, urban citizens of Copenhagen and tourists in general. The museum invites people inside for a beer or drink and spectacular art events created specifically for the evening – side by side with the permanent/main exhibitions. SMK Fridays rapidly became a huge success among Copenhageners and the number of visitors has increased dramatically (in spring 2015 the event was awarded "Art experience of the year" by the national Danish newspaper Politiken).

Under the overall title of the Open Culture event, "Set Art Free", the Culture Cam installation then became a significant part of the 14# edition of SMK Fridays on May 29th, 2015. This was a good setting for the installation in accordance to Design Pilot's concept and vision of engaging with people in a fun and playful way. In addition, the event attracted creative people, and people interested in arts and culture.

Lastly, based on the large number of visitors (up to 6,000 people were expected to visit "Set Art Free") it was an unique opportunity to promote Culture Cam and Europeana in general and to watch and learn from the behaviour of people interacting with the installation.

Fig. 29 Gallery wall of projected Europeana images in National Gallery of Denmark. Photo by Christina Holm CC BY-SA 4.0

Conceptually the installation "mirrored" the Culture Cam online tool very well – and the installation became also easier to transport. The idea of engaging people individually in an immersive space by walking around in the installations changed into a *shared* experience. As the enormous projection filled the whole wall, people could watch other people interacting with the installation and see how the images on the wall changed based on the interacting person's clothes. Different kinds of props and textiles with different colours and patterns were also provided for interacting with the installation.

**Fig. 30 Museum visitors of all ages interacting with the installation using props.
Photos by Ida Tietgen Høyrup CC BY-SA 4.0.**

As the above pictures from the SMK Fridays event demonstrate, the Culture Cam installation invited one user at a time to scan/photograph her/himself in front of a black box covering a digital device named "Kinect". The area on the floor where one should stand was highlighted with pink tape and infographics in order to ensure the best possible scanning result. Kinect is a motion sensor device which allows users to interact via movements intuitively and without any intermediary device. It is typically used for gaming consoles like Xboxes.

For the purposes of the Culture Cam installation, SAT developed a software application that uses the Kinect device for capturing the colors and patterns represented by users standing within the pink marked field. The software application is connected to the Europeana dataset and the similarity search algorithm developed by AIT. Once the motion sensor of the Kinect has detected a person standing on the "scanning spot", a picture is taken and analyzed in order to retrieve Europeana images which match the colors and patterns in the photo. The interface of the installation resembles the online version of Culture Cam in that a circle shaped area is used for displaying the captured photo of the person.

Fig. 31 The circle on the wall of projected images shows the image taken by the Kinect device.

The image results are generated from this image, similar to Culture Cam the online tool.
Photo by Christina Holm CC BY-SA 4.0.

3,231 images of Europeana content are used for the interactive installation, credited Public Domain and CC0. SAT defined the search results of each captured image to be the initial 90 images. Due to the large size of the wall, the relatively small data set and the impact of the similarity functionality, the images were repeated to fill out the projection area on the wall and to provide the audience with a clear and immediate visual understanding of the colour *similarity* concept of Culture Cam.

Fig. 32 Red, green, blue similarity search results.

Photos by Christina Holm CC BY-SA 4.0.

The tactile aspect of the installation

As SAT was striving for a gesture-based interaction and immersive user experience when developing the Culture Cam installation, the Kinect device was used not only for capturing images of one person at a time, but also for further gesture-based interaction. Besides the pink, footprint marked area on the floor, a larger pink area around the footprint area was marked to define the space of another interactive feature. Within this larger area, up to six people were able to interact with the projected images on the wall by making movements that would enlarge and animate the images. The Kinect device captured specifically movements of the hands and the feet. By pointing at a certain area of the wall with the hands or the feet, the images in this area were enlarged and animated in a three-dimensional universe, providing the user with the feeling of touching or getting closer to the images. Furthermore, when the Kinect captured a new image, all the current images on the wall were rotating, indicating the process of similarity search for a new set of images. All in all, the installation appeared as highly dynamic and spatial.
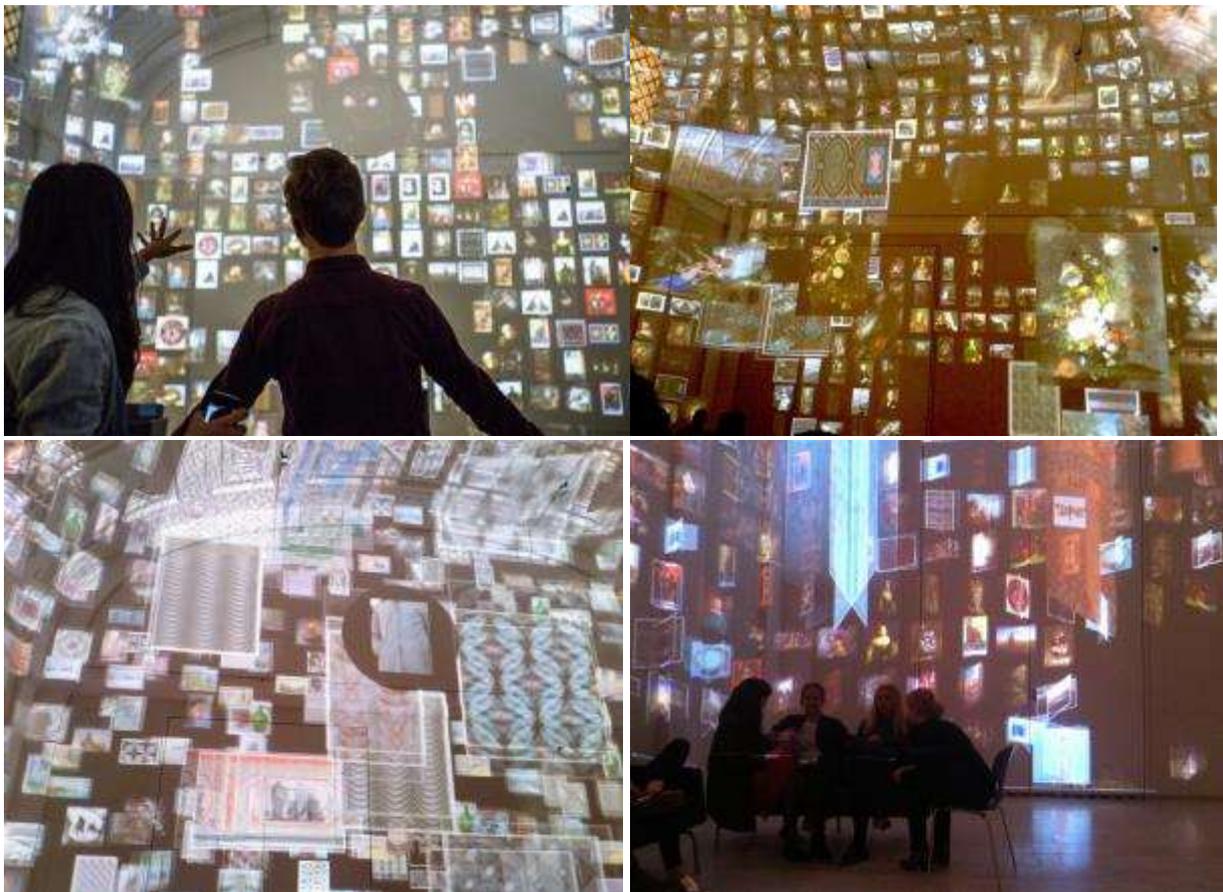
Fig. 33 Moving images.

Photos by Christina Holm and Ida Tietgen Høyrup CC BY-SA 4.0.

The additional installation in occasion of SMK Fridays #14

Apart from the Culture Cam installation visitors were greeted by another separate installation, located on the other end wall of the Old Ballroom of the Museum. This installation was technically derived from the main Culture Cam installation, and based on public domain images from the National Gallery of Denmark. SAT had made cut-outs of body parts (hands, legs, arms, faces, torsos, feet etc.) from the images of SMK's artworks which were randomised and positioned on the joints and bones user skeletons generated by the Kinect, creating a jumping jack like figure that could be controlled by moving around. Using the Kinect's gesture recognition the users could switch to a new set of random body parts by closing their right hand while holding it above their head. Every minute the installation shifted between two graphical modes. In one of the modes every frame was drawn on top of the last, enabling the users to draw with the body parts, leaving trails of graphics covering the wall.

Fig. 34 The "jumping jack" installation re-mixing artworks from the National Gallery of Denmark.

Photos by Laia Puigdollers and Christina Holm CC BY-SA 4.0.

At the SMK Fridays "Set art free" event the installation was promoted as an interactive installation developed for the specific occasion, allowing visitors to instantly re-mix and interact with spectacular SMK artworks in a highly playful way – in perfect line with the overall re-mix theme of this specific SMK Fridays #14 event.

Fig. 35 Visitors interacting

Photos by Christina Holm and Ida Tietgen Høyrup CC BY-SA 4.0.

Observations of user experiences

Both installations were exceptionally well visited during the Set Art Free! evening event. Due to the high degree of playfulness, in Culture Cam emphasized by the props (hats, scarfs and shirts in different colors and patterns), the installations attracted people of all ages. In the afternoon especially children had great fun wrapping themselves in the textiles and drawing with the body parts on the wall while the parents and other people were observing the interactions. Generally both installations had many observers, learning from watching each other how to use the installation. The interaction itself and the response on the wall to human movements were intuitively understood by the audiences while the exact reason why (where and when to make what happen, questions highly related to the exact positions in regards of the Kinects to get the best capture result) seemed to be less obvious until it was explained to the museum visitors.

Fig. 36 Visitors interacting

Photo by Ida Tietgen Høyrup CC BY-SA 4.0.

The Culture Cam installation in particular stimulated people's emotional responses. In addition to the playful nature of both installations, they added aesthetic value to the experience, boosted by the beautiful exhibition room and the amazing large-scale-ness. The similarity search algorithm developed by AIT was adjusted just few days before the event in order to primarily register colors and secondarily patterns and shapes. This improved the intuitiveness of the installation dramatically, as it became obvious what the installation responded to. People seemed amazed about and overwhelmed by the transformation of the gigantic wall from entirely blue images to a wall of entirely red images. The aesthetic impact played a significant role in the total user experience and, influenced by the decreasing natural light in the room, both installations were aesthetically in transition all evening.

All visitors and passers-by in the Old Ballroom were met by two large posters explaining in Danish and English about the Culture Cam prototype and Europeana Creative project.

Fig. 37 Exhibition space

Photo by Ida Tietgen Høyrup CC BY-SA 4.0.

Culture Cam at the Culture Jam Conference

During spring 2015 it was decided that the Culture Cam installation will be also exhibited at the final event of the Europeana Creative project – Culture Jam was hosted by Austrian National Library (ONB) in Vienna on July 9-10,2015. For that reason SAT has developed a step-by-step manual for ONB, based on the specific room that ONB has chosen for the installation. In the Culture Jam event the Design Pilot also tested also the "travelling version" of the installation. The aim of the Design Pilot is that everyone could implement a version of Culture Cam to their specific needs and collection, making use of the open source software development kits and algorithms, and the step-by-step manual that has been developed in the Design Pilot.
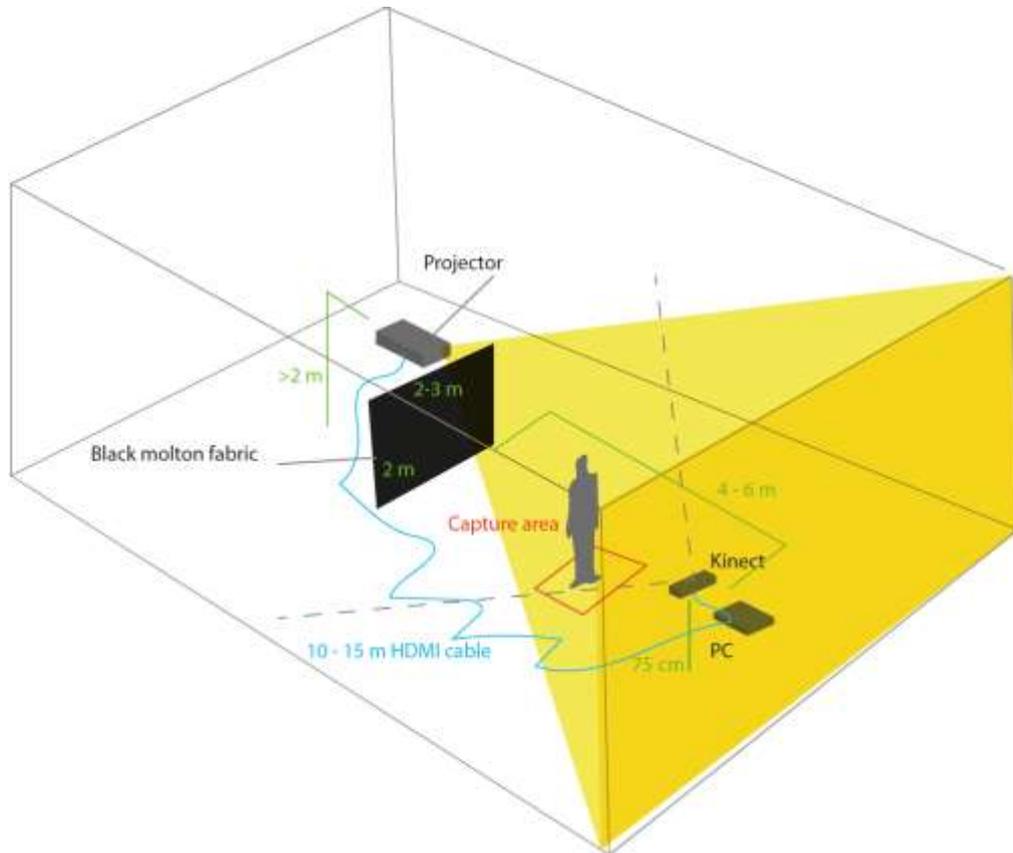
Fig. 38 Illustration from the step-by-step manual developed by SAT demonstrating the components of Culture Cam and measurements specifically related to the exhibition room in Vienna.

Fig. 39 Culture Cam at Europeana Creative Culture Jam

Fig. 40 Culture Cam at Europeana Creative Culture Jam

Fig. 41 Culture Cam at Europeana Creative Culture Jam

4. Technical Development

The Culture Cam Pilot is a web application following the service oriented[4], client-server[5] architecture, based on the web based Graphical User Interface (Culture Cam Frontend) and the web service based Backend (Image Search Service).
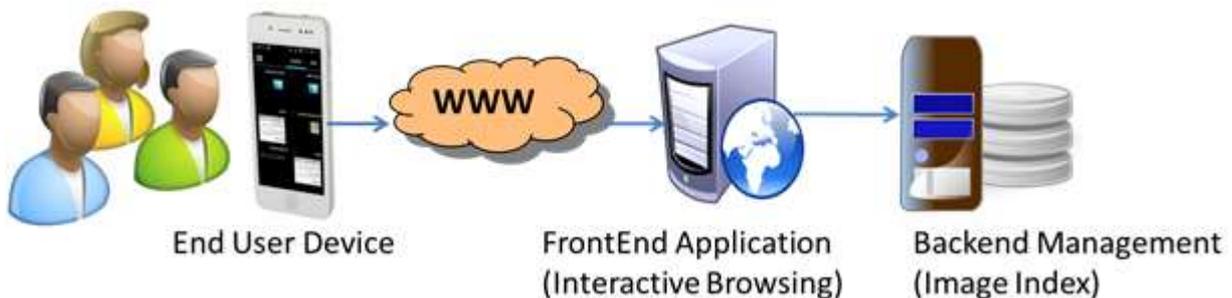
Fig. 42 System Architecture

The figure above presents the architecture of the system. The system allows end users to use their favorite mobile devices (phones or tablets) or computers (notebooks or desktops) for accessing the Frontend (web) application (presented in Section 2.5.1). The interactive access and browsing of images is empowered by the search functionality provided by the backend service in charge of managing the Image Index (presented in Section 2.5.2).

Fig. 43 Dataset aggregation process

The dataset used by Culture Cam includes items from different collections featured in Europeana Labs as a result of a three-step workflow. In the first step a manual pre-selection of the images was performed. By using the standard functionality of the Europeana Portal, items were marked as being relevant for the Culture Cam dataset either by tagging them or by storing them as saved searches in MyEuropeana. A special account was created in Europeana for managing this information. The saved queries return selected items that are related to relevant

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[4] see http://en.wikipedia.org/wiki/Service-oriented_architecture
[5] see http://en.wikipedia.org/wiki/Client%E2%80%93server_model

subjects in the given collections. A filter that selected Public Domain and CC0 only materials was used to ensure unrestricted reuse of the Culture Cam items.

As second step, the Europeana API was used to retrieve the images of the selected items and some image processing algorithms were applied to select the most colorful, information rich images, and to reduce the information redundancy.

Within the last step of the workflow, the dataset that includes various subsets of images was aggregated in the dataset stored in a CSV (comma separated values) file. This file contains a map storing the IDs of the Europeana items and the web locators of their images (thumbnails). A HTML preview was generated for the last visual inspection by the domain expert, and the last "low quality" were eliminated from the dataset. This file is used as an input for the image indexing service. The Europeana search API is used for downloading the thumbnails and for accessing the metadata of the Europeana objects. A Java client library was developed for accessing remotely the API, the source code is publicly available within the GitHub repository https://github.com/europeana/europeana-client/.

4.1 The Culture Cam Website

Capturing the image
Video is live streamed from the user's camera using the getUserMedia API which is currently only fully supported by Firefox, Chrome and Opera. Clicking the camera icon saves the current video frame to a canvas element. The content of the canvas is then converted to a data-URL using canvas.toDataURL and saved to the webserver using PHP. If the image is successfully saved to the server a call to the image similarity API is made, containing the URL to the image. The API returns a JSON string which is parsed on the client side. The images are then shown to the user.

Quality issues
The results are influenced a lot by webcam quality, room lightning and surroundings, however there seems to be a pattern; the images are usually undersaturated and a bit grainy.

Improving quality
The PHP script saturates the images a bit to overcome some of the quality issues. More image manipulation might be implemented in the future to further improve the results. E.g. automated contrast, brightness and sharpness adjustments or more advanced features like masking and background subtraction which would be done by the user before submission.

Mobile version

As most mobile device browsers do not allow getUserMedia access to the camera, the mobile website works a bit differently. Clicking the camera icon opens the native camera app, giving you the option to either upload an image from your camera roll or to take a new image. The image is then uploaded to the Webserver. The rest of the process is similar to the desktop version.

4.2 Image Search Service

The backend application serving the Culture Cam Pilot is a dedicated instance of the image search service, which provides search and retrieval functionality for the image dataset selected for this Pilot.

The software used here was developed within the T2.2.1 Image Similarity Service and described in the deliverable D2.2 Services and messaging APIs. However, several adaptations were made in order to implement the functional requirements of the Culture Cam prototype such as:

- Analyzing and indexing the selected image set provided as a .csv file.
- Local caching of image thumbnails and inclusion of the thumbnail URL in the search results.
- Tuning the retrieval performance in order to optimize the results for a small and heterogeneous dataset.
- Evaluating alternative algorithms for pivot selection.

Image search service reusing Assets IR-Image

IRImage

IRImage is the service, which allows to search visually similar images performing images content-based searching
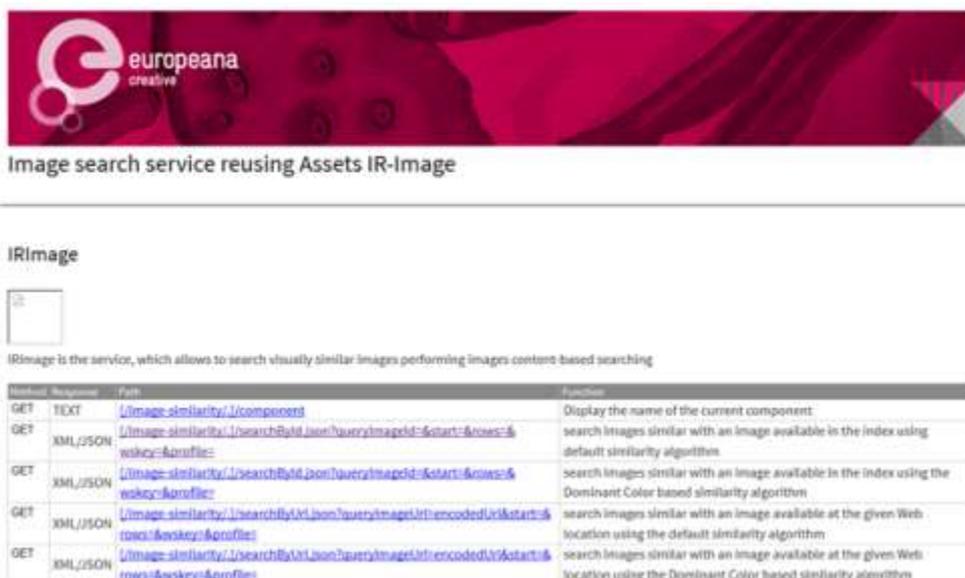
Method	Response	Path	Function
GET	TEXT	/image-similarity/.1/component	Display the name of the current component
GET	XML/JSON	/image-similarity/.1/searchById.json?queryImageId=&start=&rows=&wskey=&profile=	search images similar with an image available in the index using default similarity algorithm
GET	XML/JSON	/image-similarity/.1/searchById.json?queryImageId=&start=&rows=&wskey=&profile=	search images similar with an image available in the index using the Dominant Color based similarity algorithm
GET	XML/JSON	/image-similarity/.1/searchByUrl.json?queryImageUrl=encodedUrl&start=&rows=&wskey=&profile=	search images similar with an image available at the given Web location using the default similarity algorithm
GET	XML/JSON	/image-similarity/.1/searchByUrl.json?queryImageUrl=encodedUrl&start=&rows=&wskey=&profile=	search images similar with an image available at the given Web location using the Dominant Color based similarity algorithm

Fig. 44 Image Search API used by Culture Cam

The image search service provides remote access to its functionality through a REST API is depicted in the Figure above and it is publicly available at the following location http://image-similarity.ait.ac.at/culturecam-web/.

This deployment of the search API is used by the online version of the Culture Cam tool and included 3,584 images. A second instance of the search engine using a slightly different dataset was developed for the interactive installation version that was used for presentation at SMK Fridays in May 2015 (see Section 2.4.3). An additional search algorithm based exclusively on a custom implementation of dominant color feature was deployed for this purpose. The API for searching this dataset is also publicly accessible at the following location http://image-similarity.ait.ac.at/smk-web/, and provides access to the dataset that includes 3,231 images. A small part of them (~150) are provided as public domain images by the SMK museum in Copenhagen.
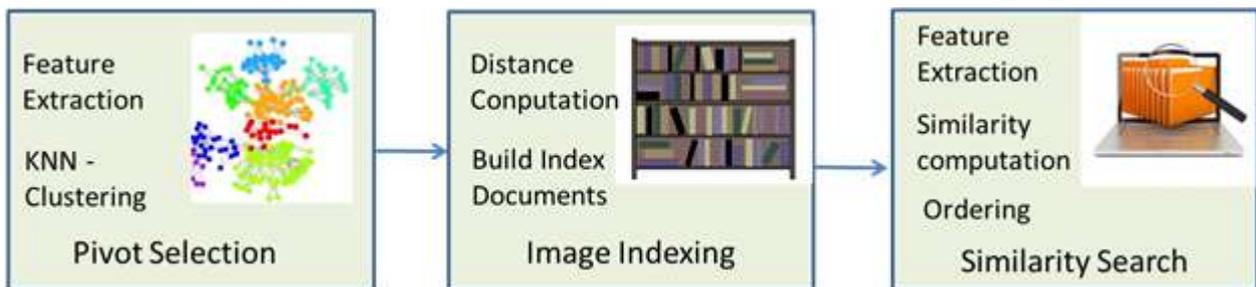
Fig. 45 Image indexing and Retrieval Process

The process followed for analyzing the images available in the dataset, building an image index and developing a similarity search service can be represented as a 3-step workflow as presented in the above figure. The image indexing functionality is based on the inverted index solution introduced in [Amato et al. 2011]. This requires a pre-computation step for selecting the image pivots used for building the index. Both the pivot selection and the image indexing steps require high computational efforts (in terms of time, CPU and memory usage) and are performed offline. In contrast, the similarity search is performed in real time, supporting (multiple) simultaneous search sessions users and it is optimized for high throughput and low resource consumption.

The pivot selection process firstly extracts the image features for all the dataset images and employs a K nearest neighbours clustering method for identifying the groups of images that have a higher similarity to each other. The set of K images that have the highest distances between each other is the best pivot set to be used for indexing, while the distance computation is based on cosine similarity and standard MPEG7 descriptors (ScalableColour, ColorLayout and EdgeHistogram). Additional information and evaluation experiment using Europeana images can be found in [Gordea2013].

The inverted indexing method is based on the real world experience, where two people sitting near each other have a similar view on the surrounding world (i.e. they see the same objects in the surrounding area and perceive these objects as being located at comparable distance from their positions). Analog to this paradigm, the images that are similar to each other will have similar distances to the individual items in the pivot set. In this way, the indexing time is reduced as only the similarities to the K items in the pivot set needs to be computed, and not the distances to all items available in dataset. For example, the Culture Cam dataset has, 3,584 items from which 350 pivots were selected out of each the most similar 100 are stored in the image index. The index management functionality is built on the top of Lucene open source project, which is the most advanced open source solution for indexing numeric and textual data. These similarity computations and the preparation of the data structures stored in the index are part of the image indexing step of the presented workflow.

At runtime, the user of the image search service can retrieve images that are similar to one available in the dataset (by using the Europeana object ID) or by providing their own image that is accessible using an http URL. Similar to the indexing process, at search time the visual features for the given image are collected and the similarity to all pivots in the pivot set is computed. The Top Q pivots are used to build the search queries, where Q is usually set to a lower value than N. In the case of Culture Cam we use 30 pivots for building the Lucene search queries, however this is again a parameter that is provided in configuration files.

The source code for the image search APIs, content selection and content preprocessing is publicly available in github under the image-similarity module of the Europeana Creative project https://github.com/europeana/Europeana-Creative/tree/master/image-similarity. This reuses the MelampoVir libraries that were kindly provided as open source by the NMIS research group from ISTI CNR[6]. Several enhancements were added to the source code and submitted to the public github repository https://github.com/melampo-vir/.

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5. Content Selection for Culture Cam

As described earlier in this document, the Design Pilot has four main strands of activities: the Design Pilot product prototype (Culture Cam), the design experiments and examples, digital fabrication and hands on workshops and Open Culture event and exhibition. All of the activities have special requirements and needs regarding the content inventory.

As explained in the previous sections, the basic idea of Culture Cam is to create a tool that makes it easy and intuitive for designers and artists to browse Europeana.

For the prototype of Culture Cam, the following content requirements were agreed:
- Digital objects need to be labelled with the Public Domain Mark (PDM) or CC0 in Europeana;
- Minimum image resolution 300x300 px;
- Direct links to the digital objects are not required;
- A selection of around 1,000 images;
- The images should be widely represented in colour, pattern and shape;
- Contemporary (design) content as part of the selection (e.g. Bauhaus).

A MyEuropeana account was created for this prototype. The Europeana content sourcing team selected suitable datasets that met the above requirements and saved the queries in MyEuropeana. SAT was then informed about the progress and started to hand pick suitable items from these sets to build the content base for the Culture Cam prototype. This was finished in early October 2014 with more than 1,000 images saved in MyEuropeana. The majority of the selected images for the prototype is from the following data partners / institutions:

- Armémuseum (SOCH)
- Atria, Institute on Gender Equality and Women's History , Amsterdam
- Biblioteca Valenciana Digital
- Bibliothèque municipale de Lyon
- Bibliothèque nationale et universitaire de Strasbourg
- Bibliothèque nationale de France
- CIMEC - Institutul de Memorie Culturală, Bucharest, Romania
- Institut für Realienkunde (Kulturpool)
- Koninklijke Sphinx BV, Sociaal Historisch Centrum voor Limburg
- Music Library of Greece "Lilian Voudouri"
- National Library of the Netherlands
- Östasiatiska museet (SOCH)
- Rybinsk State Architectural, Historical and Art Museum Preserve
- Skoklosters slott
- The State Tretyakov Gallery
- Uměleckoprůmyslové museum, Praha (eSbirky)
- Universitat de Barcelona
- Ville de Bourg-en-Bresse

Content curation by SAT

A significant part of the development of Culture Cam has been to browse image collections from the Europeana archive in order to curate suitable content for the building of the prototype. That means images with fascinating shapes and patterns and/or color-rich content. In the early development phase of the online tool SAT took lead in curating a selection of 950 public domain images. For this purpose SAT was provided with 36 different data sets from the Europeana content sourcing team via MyEuropeana (listed above). SAT was then browsing, handpicking and "tagging" the 950 images in MyEuropeana as preparation for the work of AIT.

The curation/handpicking was made with attention to both the online tool and the development of the interactive installation later in the process. And obviously with great attention to the beta-launch of Culture Cam at the Mozilla Festival in London October 2014. In the interim period up to the final launch of Culture Cam at Future Everything Festival in Manchester February 2015, SAT in collaboration with the Europeana content sourcing team and AIT explored how to expand the content and integrate larger data sets in Culture Cam in a way that wouldn't involve the time consuming handpicking process. The overall premise of the content expansion was that all images should be under a public domain – free for re-use – in order to stimulate creative people to actually make use of the content found via Culture Cam. Soon the premise also included images marked Creative Commons Zero (CC0) as the procedure of finding suitable public domain images proved to be a rather demanding task. Especially the high preference of getting diverse and color-rich content, additionally within the public domain, was found to be very challenging.

Due to a more embedded and focused content curation SAT went through all the data sets in Europeana Labs and selected those collections that seemed to be a good match. They were integrated in Culture Cam by AIT but soon it was clear that the diversity of the collections was too weak against the (rather small number of) hand curated images of great diversity. The functionality of Culture Cam was no longer optimal as the search results became visually undifferentiated due to an overweight of all too many similar images. Based on this learning it was concluded by SAT that it shouldn't be a goal to expand the data set of Culture Cam significantly as thought initially. Rather it should be emphasised that Culture Cam, by a limited number of hand curated images, is to be considered as a playful and visually appealing tool to creative people, leading to further exploration of Europeana content on europeana.eu. In other words Culture Cam should be comprehended as a promotional tool by being an attractive "door opener" to the gigantic Europeana portal.

On the basis of this conclusion it was decided in the Design Pilot project team that the end goal of the Culture Cam dataset should be minimum 3,000 PD/CC0 images. During Spring 2015 SAT continued the hand curation, partly by adding more images from the data sets provided by Europeana content sourcing team and partly by browsing europeana.eu. Again the images were "tagged" in MyEuropeana as preparation for the work of AIT. In addition, in June 2015 SAT hand curated images from a smaller collection provided by ONB. The total number of images in the data set for Culture Cam the online tool is now 3,584 PD/CC0 images.

Prior to presenting the Culture Cam installation at the Open Culture event at SMK (May 29, 2015) a separate dataset was made for the interactive installation based on the data set for the online tool. – There were two reasons for this. Firstly, the SMK's public domain collections were to be integrated into the dataset for the the SMK event (the SMK collections are on their way to europeana.eu). Secondly, SAT checked the dataset in order to delete those images which were too light colored or motif wise too slight for the projection. The total number of images in the dataset for Culture Cam the interactive installation was 3,231 PD/CC0 images.

6. Pilot Evaluation

The final and detailed evaluation results of the Pilot were delivered within WP6 in D6.3 "Pilot and Infrastructure Evaluation Report". This chapter summarises the approach and some of the core findings. Apart from the adapted agile "Scrum" development framework, where one of the main focus of activity has been to keep on participating in regular feedback calls during the development of the prototypes, once there was a stable alpha version of Culture Cam the evaluation team organised UX testing sessions like in the case of the previous Pilots.

The UX testing of the Culture Cam prototype took place in March 2015 at the Platoniq office in Barcelona and at two collaborative designer working spaces in Helsinki, where two separated teams interacted with the desktop and mobile (responsive design) of the application. Participants, who were designers of different fields, such as textile designers, illustrators, graphic designers and UX designers, had to solve a specific task with Culture Cam on their own, summarising them on cards related to the usability indicators (see table below). Specifically, they had to show objects to the camera and browse results, progressively interacting with the interface.

Fig. 46 User testing

While solving the tasks the groups discussed their experience and gave written feedback when needed. Once the prototypes were tested, the results from each session were discussed in a focus group with the participants of the workshop.

Among the main areas of improvement identified, some relevant ones were:

- Positive comments from participants were generalised in relation to the tool, especially about simplicity, the responsive version, the initial display design and attractiveness of the different elements on the starting screen.
- Participants' positive responses indicated that navigation was easy and intuitive.
- Design and layout comments were generally about the simplicity and familiarity, specifically of the camera and menu icons, and also mentioned that the display results in the mobile version were pleasing.
- Unsurprisingly, comments received about improvements were quite diverse and specific in this category, given that the users work in design-related fields.
- Improvement-related comments made reference to several points of confusion about things such as finding the number of displayed images, problems with refreshing, the need for a "zoom" feature, and the difficulty in learning how to download images for use.
- Many very positive comments were received in relation to efficiency, and a favorable comparison was noted with Pinterest several times, noting the relative benefit of using this app for finding items of quality and cultural relevance, and that having GLAM institutions behind it gave a strong sense of credibility, and useful as a tool for benchmarking and inspiration in higher culture.
- Suggested improvements included several mentions of a need for more filtered and defined searching options, saving image searches, several more mentions of a zoom option, requests for an option for uploading an image (rather than using a cam), and multiple references again to Pinterest in requests for share button.

Table 3 Usability Indicators

Criteria	Explanation
● *Starting screen*	The test person has a positive first impression and is willing to start using the product. It is clearly visible what kind of actions can be initiated. The screen displays the purpose of the application and raises awareness on the value proposition.
● *Accessibility*	The applications pricing is transparent. The test person can easily access the content. The user control and navigation matches the requirements of the application and its hardware. Important fields to fill in are labelled with terms that match the real world.
● *Navigation*	The status within the application is visible and test persons are aware of it. The navigation is consistent and standardized. Test persons can recognize easily how to navigate to a desired destination. Links and buttons are described in a manner that allows test persons to identify the purpose clearly.
● *Design & Layout*	The design follows aesthetic criteria, addresses the target audience and is consistent through the whole application. Relevant content is identifiable and displayed accordingly.
● *Efficiency*	The application can be used by a broader audience than the target group. Expected objectives can be reached by the application.
● *Help options*	During the use of the application the test person is provided with hints (e.g. error prevention), search and help options.

In order to monitor the development progress for the prototype, WP6 executed a second UX testing online. Overall the testers experienced the Design Pilot with few usability or accessibility issues, and with positive feedback confirming the good acceptance and UX experience from the previous testing. Answers to the questions of intuitive use of Culture Cam, its high value for designers and if it can support specific work tasks from a designer's point of view were answered positively in all cases.

7. The Open Design & Art Challenges and Workshops

One of the key objectives of the Design Pilot was to stimulate and facilitate innovative uses of European digital heritage within the theme of arts and design. The Pilot organised two Challenges that were directed to designers, markers and artists. The first one, the Open Innovation Challenge on Design was an open call for everyone to experiment and explore with Europeana content. In the second one, 13 artists and designers were invited to create interpretations and appropriations from a digital collection of old artworks that were under public domain. The challenge and the "Mix it up!" exhibition (May 29-31, 2015) where the works were presented, where organised in close collaboration with the National Gallery of Denmark (SMK)

7.1 Open Innovation Challenge on Design

The Europeana Creative Open Innovation Challenge on Design opened for applications on October 30, 2014 and was coordinated by WP5 with the support of WP7 for the dissemination and promotion of the Challenge. This was the 5th and Final Europeana Creative Challenge[7].

The Design Challenge aimed to engage designers, artists, developers and entrepreneurs to explore and experiment with cultural heritage content available in Europeana on the theme of Design. The challenge welcomed a wide range of applications and appreciated contemporary and creative approaches to the digital cultural heritage materials. Example applications were including but not limited to results of digital fabrication, media art, design objects, web/mobile applications and services.

WP5 collaborated with the Design Pilot in order to develop an updated version of the Design Challenge call text and the inputs from the Design Pilot team assisted in framing the call in order to engage those active in the design community. Additionally, the Design Challenge welcomed, for the first time in the Europeana Creative Challenges, both digital and physical designs and artwork submissions helping to connect the Design Challenge more with the arts and design community and not just the developer community who had been the main focus for the previous two rounds of challenges. More information about the Design Challenge is available on the dedicated Challenge submission page and the Europeana Creative website at: http://ecreativedesign2015.istart.org/ and http://bit.ly/1Eavd4U

All the Pilot prototypes developed during the course of the Europeana Creative project acted as great inspiration to potential challenge applicants as they were a clear and tangible demonstration of what you can do with Europeana content and a little bit of imagination. In this way, the work developed in WP4 for the Design Pilot prototype showcased what can be done with Europeana content on the theme of design and Culture Cam was actively used by WP5 and WP7 as a promotion and engagement tool for the Design Challenge.

During the application period 31 applications were received for the Europeana Creative Design Challenge. From all the Challenges the Design Challenge received the best and widest range of

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[7] For more information on the Challenge, see **D5.4 Challenge and Incubation Support Final Reviews.**

applications demonstrating Europeana content reuse, which can maybe also be attributed to the fact that this Challenge was open to physical as well as digital reuse projects to reflect the nature of the design community the challenge was aiming to engage with. This reflection was also highlighted by WP5 in *D6.2 – Evaluation Report on Challenges and Uptake* is that the success rate of the Design Challenge can be attributed to the attractiveness of the Design theme and that the Challenge was also opened more directly to non-digital submissions.

The 3rd and final Europeana Creative Challenge Event was hosted at FutureEverything Festival on February 27, 2015 in Manchester, UK. As a large scale cultural event encompassing art, music and discussion with new technology, novel research methods and playful social experiments WP5 felt it was a great fit with the Europeana mission of making cultural heritage openly accessible in a digital way. The Challenge event took place at the Town Hall in Manchester on February 27, 2015 attracting an audience of over 100 people and festival wide exposure. The Europeana Creative session addressed what is currently happening in the realm of digital cultural heritage reuse and demonstrated the potential it offers to the creative industries. An open discussion of the challenges, opportunities and future scope of digital cultural heritage reuse animated by representatives of the design world, cultural heritage institutions and Europeana and included pitches from the chosen applicants and the Design Pilot application Culture Cam. Christina Holm (SAT) presented the concept prototype, the co-creation process, how they built a prototype with a specific community of experts in mind and their experiences of working with reusing Europeana content. Participants in the event were invited to demo Culture Cam on their tablets and smartphones after the session in order to play interactively with the tool developed and realise its user potential sharing their results on social media. Following the presentation the Design Pilot received positive feedback and commentary on Twitter.

More information on the Design Challenge & the Design Challenge event can be found in *D5.4 Challenge and Incubation Support Final Reviews*.

7.2 Art & Design Challenge - the Mix it up! Exhibition

Since the launch, the Design Pilot was seeking collaborators from European memory and cultural institutions to host an open culture event that would exhibit designs and artworks, which are inspired by cultural heritage content. In October 2014 collaboration with the National Gallery of Denmark (SMK) was confirmed, and during the last weekend of May 2015 an open culture event titled "Set art free!" took place in Copenhagen. Aalto University and Spild af Tid ApS were representing the Design Pilot and the Europeana Creative project in this partnership. The "Set art free!" event was organized as a part of the Gallery's monthly admission-free "SMK Fridays" and included various activities ranging from the exhibition to workshops and interactive installations. The event was a success with over 6,000 visitors.

One of the main activities in the event was the "Mix it up!" exhibition, which consisted of remixes of the Gallery's art collection (http://www.smk.dk/en/visit-the-museum/exhibitions/past-exhibitions/exhibition-mix-it-up/). Altogether 13 artists and designers were invited - or challenged - to create artworks based on the Gallery's public domain image collection, which

consisted of pictures of paintings and other artworks (http://www.smk.dk/en/use-of-images-and-text/free-download-of-artworks/). Prior to the exhibition, the invited participants submitted descriptions of their planned designs and artworks, which were then reviewed by the organizers and invited guest curators, some of which were established artists and designers. As the participants came from different backgrounds, the submitted designs and artworks varied also greatly and included projections, photographs, textiles, ceramics and other tangible artworks.

All the remixes made for the exhibition were shown next to the original art pieces which had inspired them, giving the spectators the chance to reflect on the connections between the two. Guided tours were also organized through the exhibition where the artists and the designers could shed further light on their works. As SMK is a large museum, a "Mix it up!" booklet was also made, which included a map of the remixes in addition to description of each work. Two installations made for the exhibition, "Free?" and "As Light Goes By", are explained in more detail in section 7.2.1 in order to shed light on the creative process and how cultural heritage content can inspire new artworks.

Fig. 47 Mix it up! Exhibition

Photos by Ida Tietgen Høyrup / CC BY-SA 4.0 (top, middle right, bottom left), Jonas Smith / CC BY-NC (middle left) and Kati Hyyppä / CC BY (bottom left).

As mentioned, the "Set art free!" included various other activities in addition to the exhibition, which celebrated open cultural content. One activity, which made also use of the Gallery's public domain images hands on, was the animated GIF workshop, which is described in section 7.3.3. People could also explore the Culture Cam (http://culturecam.eu/), which was presented as an interactive installation that filled one of the Gallery's high walls (see chapter 2.3. The Culture Cam prototype). VanGoYourself (http://vangoyourself.com/category/vango/) was also present at "Set art free!" and people could re-enact paintings from the National Gallery's collection using various props, such as hats, which were collected specifically for the event.

Fig. 48 VanGoYourself

Photo by Ida Tietgen Høyrup / CC BY-SA 4.0

More records of "Set art free!" and related activities can be found in the following blog posts:

- http://pro.europeana.eu/blogpost/set-art-free-and-the-rest-will-follow
- http://redesignyourculturalheritage.eu/set-art-free-event-exploring-and-remixing-open-collections/

The collaboration with SMK was a great experience and exemplifies how working together with an established cultural institution with an open mindset can enrich and facilitate sharing of cultural heritage resources. The possibility to organize the "Mix it up!" exhibition in the context of the original artworks was also a unique opportunity and a format that we highly recommend. In general, having an event and a shared physical space for enjoying various aspects of cultural heritage content is a good way to truly engage people with our heritage, and we hope that more such events will be organized in the future.

7.2.1. Free? Installations created for the Mix it up! exhibition

Fig. 49 The Eldest Daughters of M.L. Nathanson' (1820)

Fig. 50 Harald Slott-Møller's (1864-1937) Danish Landscape (1891)

Free? is a laser cut light-and-shadow installation remixing two artworks from the SMK collection: C.W. Eckersberg's (1783-1853) double portrait of the sisters Bella and Hanna 'Bella and Hanna. The Eldest Daughters of M.L. Nathanson' (1820) as the main base, and Harald Slott-Møller's (1864-1937) Danish Landscape (1891) as the secondary source. The piece was made by Neea Laakso for the Mix it up! exhibition held at SMK.
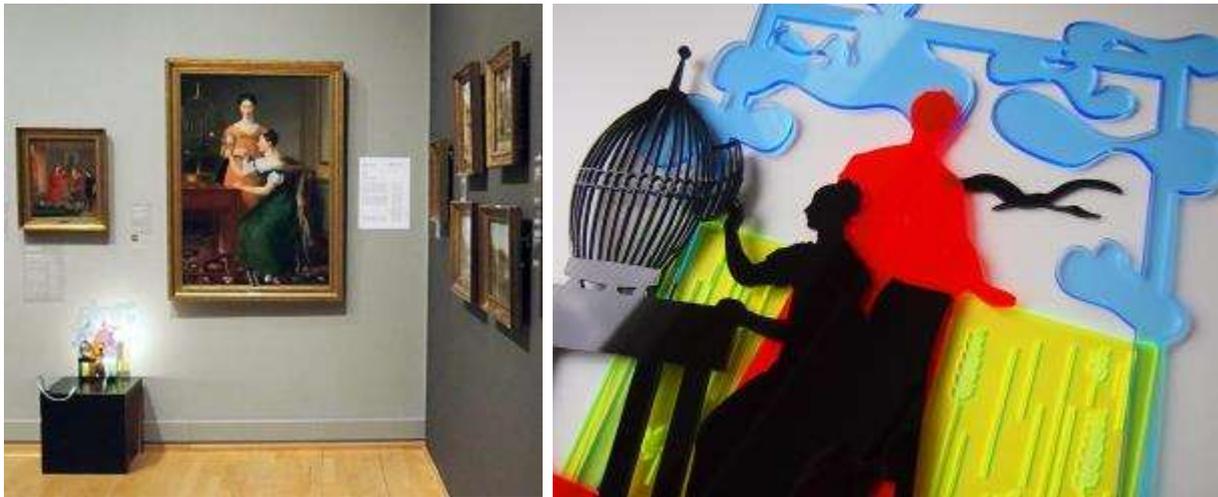
Fig. 51 Creation stages of "Free?"

The inspiration for the piece came from the content: when Neea saw Eckersberg's painting for the first time, she felt sorry for the bird in the cage. And somehow she also felt sorry for the girls portrayed. In the painting, the birdcage has been interpreted as a symbol of the lives of young women at the time, who were also trapped in a way, within their family and by society's expectations to them. The other piece used in the remix portrays a bird flying in a traditional countryside landscape, something that must be true freedom to a bird. The two paintings are brought together in the remix with a small modification – the cage door is opened and the bird is set free.

So the main thought behind the piece is freedom from a wider point of view. Today everyone has a lot of freedom, yet still many feel trapped within thoughts, beliefs, expectations, habits etc. How to free oneself from all that?

Fig. 52 Creation stages of "Free?"

The medium ended up being laser cut acrylic sheet, as Neea wanted to create a tangible, multilayered object out of the digitized material. The idea was also to add yet another layer by using light to picture the new composition on the wall as a shadow/reflection, as freedom is such a wide and multifaceted concept. The multi-coloured, see-through material adds detail and depth to the shadow instead of only a black, flat silhouette.
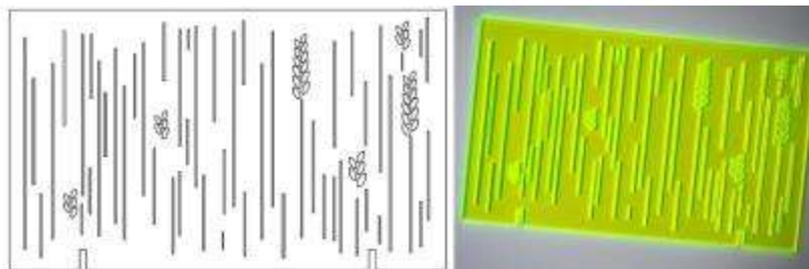
Fig. 53 Creation stages of "Free?"

The laser cutter operates with vector files, so the original images were redrawn in Illustrator with hairline width. A frame had to be made in order to have the bird fly free. Also the stand for the piece was cut out of acrylic; two legs with holes to place the cut pieces, which also had corresponding holes for the legs.
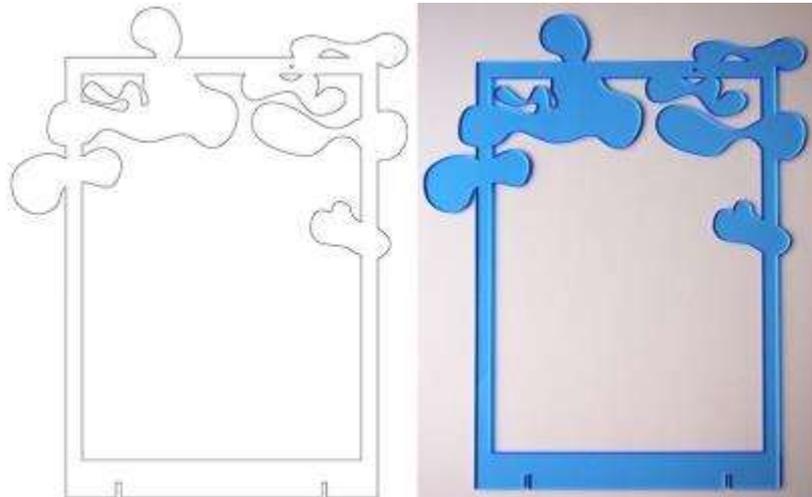
Fig. 54 Creation stages of "Free?"

Four cutting files were prepared, one for each colour. The lines are thicker in the image here than in the real files used for cutting.
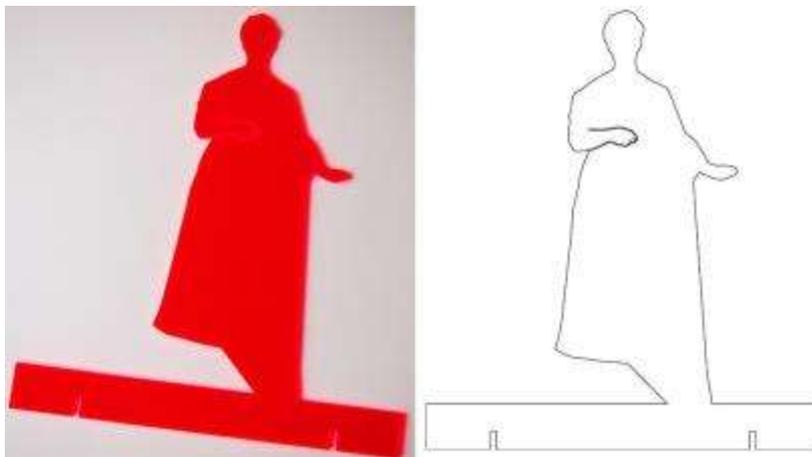
Fig. 55 Creation stages of "Free?"

The material used for the piece is 3 mm acrylic sheet. The lamp is a led lamp due to security restrictions – led lamps don't heat up. However due to the lamp the cut piece had to be located close to wall so it remained fairly small; further away from the wall the more blurry the reflection became. The lamp could have been more powerful, or for example a halogen lamp, if it had been safe enough, would have made possible to locate the acrylic pieces differently and the shadow would have been bigger.

Fig. 56 Creation stages of "Free?"

Like the majority of the works in the exhibition, Free? was also presented next to the main original source, the portrait of Bella and Hanna. It was interesting to see the works side by side, as the shape was recognizable but the medium completely different. Perhaps the remix even brought new thoughts or opened up new interpretations regarding the original painting?

As Light Goes By
This installation was made by Kati Hyyppä, and it is a remix of Vilhelm Hammershøi's (1864-1916) below painting called "Interior in Strandgade, Sunlight on the Floor" (1901). The painting depicts a peaceful room with a quiet figure and a pattern of sunlight on the floor. While capturing a particular moment, the painting also conveys the passage of time, as one can imagine the light pattern moving along with the sun.

Fig. 57 Vilhelm Hammershøi's (1864-1916) "Interior in Strandgade, Sunlight on the Floor" (1901).

Intrigued by the serene atmosphere of the painting, Kati built an electromechanical machine, which is essentially a pop-up version of Hammershøi's room, where a repeating scene takes place. A light coming through the window moves across the floor like a day from dawn to sunset, and when it is night-time, sleepy tones from a music box accompany the silent figure.
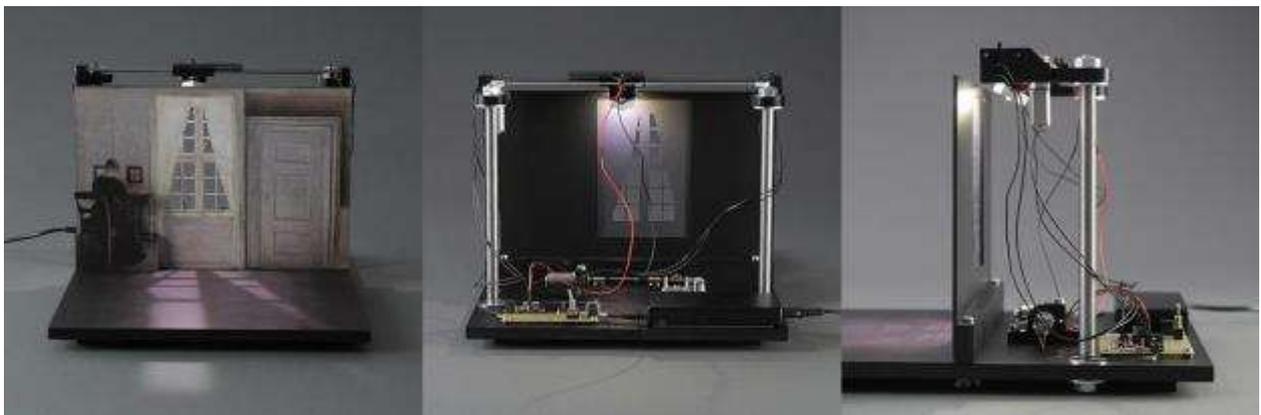
Fig. 58 Electromechanical machine "As Light Goes By"

Making of the installation started with editing the image of the painting into three separate pictures: floor, wall and the sitting figure. These images were then printed on paper and constructed into a simple pop-up style scene using cardboard, plastic sheet and wood. The next step was to build the "electronics backstage", which included both mechanical parts and an electronics board with a power supply.

The most complicated part was the track mechanism, which moves the LED back and forth. It is driven by a small gear motor and includes 3D printed parts, metal rods, and thin rope. The reciprocating motion of the LED is achieved with a bistable relay and microswitches at each end of the track. When a switch is pushed by the LED carriage, the relay changes the state of its output switches, which results in changing the direction of the carriage. The installation includes also an another motor, which drives the music box, producing a slow melody. The light and the music alternate such that when the LED is on, the music box is silent, and vice versa.
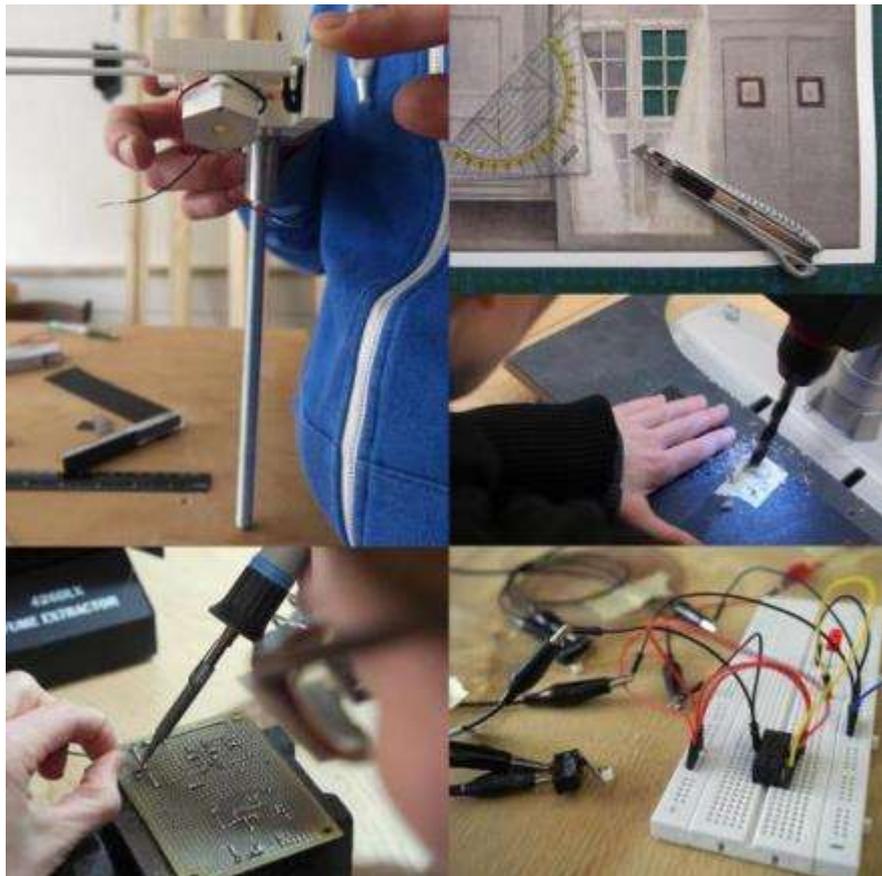
Fig. 59 Electromechanical machine "As Light Goes By"

As was the case for all the artworks in the Mix it up! exhibition, the installation was displayed next to the original painting, which had inspired it. According to Kati, it was a great opportunity to be able to show her work in this context, in the actual Vilhelm Hammershøi room at the SMK. This way the connection of the source material and the remix was immediately visible, and it was possible to show the physical work to a large audience.

Fig. 60 Electromechanical machine "As Light Goes By"

More documentation and a video of the installation can be found on Kati's website: http://katihyyppa.com/as-light-goes-by/

7.3 Redesign Culture Workshops

7.3.1 GIF animation jam session at Open Knowledge Festival

In order to develop a workshop format for the Design Pilot, a Pilot workshop titled "GIF animation jam session" was organized at the Open Knowledge Festival on July 15, 2014 in Berlin Germany (http://2014.okfestival.org). The main objective of the session was to explore how to stimulate and enable fun and rapid creative reuse of public domain cultural heritage images. The session was organized as a part of the festival opening evening by Aalto in collaboration with Public Domain Review (PDR), which is an initiative for promoting archival public domain images and other media (http://publicdomainreview.org). Altogether 15-20 participants created animated GIFs using public domain content, some of which was from Europeana, and more people just came to see the activities in the workshop.

The description, documentation and guidelines how to create an animated GIFs can be accessed from the workshops website: http://publicdomaingifs.tumblr.com. In addition a selection of animated GIFs was published on the PDR website (http://publicdomainreview.org/collections_categories/animated-gifs/).

As the "GIF animation jam session" was a very positive experience, another GIF workshop was organized later in May 2015 at the Open Culture event called "Set art free!", which is described in more detail in section 6.2.

7.3.2 Redesign your cultural heritage at Mozilla Festival

The Design Pilot organized a session called "Redesign your cultural heritage!" at the Mozilla Festival, in London on October 25, 2014. The session was described and advertised as follows:

The aim of the Redesign your cultural heritage! session is to connect the digital cultural heritage offered by Europeana to communities of designers and artists who wish to use open cultural content - data, pictures, sound, videos - as inspiration and sources for new derivative works, such as animations and films, media art and installations, textile patterns, and other design artefacts. In this hands-on session the facilitators guide through making of open cultural works on specific themes and introduce participants to digital and open cultural heritage online. Participants can also work on their own and build upon the materials and digital cultural heritage content gathered and provided by the session. The aim is to facilitate creative reuse in multiple levels and accommodate various skills of participants - both more experienced and beginner open cultural hackers.

Fig. 61 Christina Holm, SAT at the workshop

The workshop was running all day, and the morning session was dedicated for introducing Europeana, the Europeana Creative project and especially the Culture Cam prototype. The

team collected ideas, comments and feedback on Culture Cam, and provided guided sessions how to use the tool. Additionally there was a possibility to get familiar with the Europeana API and try out making animated GIFs from public domain content. In the afternoon about 15 people participated in a creative re-use workshop called "Downsampling masterpieces" where people could make 8-bit melody cards using Public Domain content from Europeana together with DIY electronics".
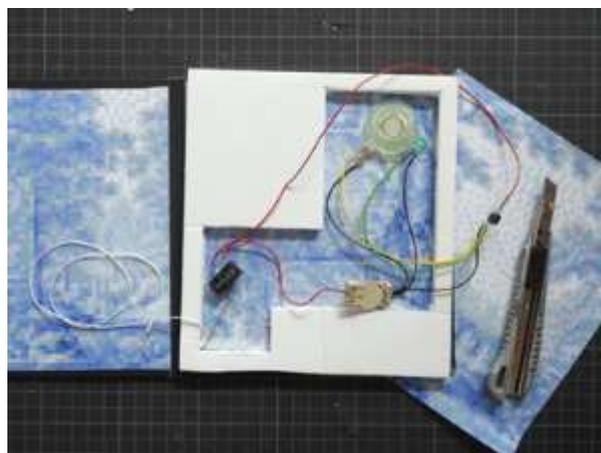
Fig. 62 Melody card

Above is a picture of a melody card (in the making), which was the theme for the DIY workshop at the Mozilla Festival October 2014.

The Redesign your cultural heritage! session was organised by the Aalto University, Spild af Tid ApS and Europeana.[8]

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[8] More information about the session please visit the workshop blog:
http://redesignyourculturalheritage.eu/europeana-creative-at-mozilla-festival-2014-redesign-your-cultural-heritage/&http://redesignyourculturalheritage.eu/downsampling-masterpieces-workshop/ or
or the Mozilla Festival's Art + Culture track's blog at
http://redesignyourculturalheritage.eu/downsampling-masterpieces-workshop/.

7.3.3. Animated GIF workshop at Set Art Free!

One of the activities organized by the Europeana Creative project at the SMK Fridays "Set Art Free!" event (May 29, 2015) was a workshop where people could make animated GIFs. The workshop was facilitated by Sanna Marttila, Neea Laakso and Kati Hyyppä (Aalto University), and aimed at inspiring creative reuse of digital cultural heritage materials.

The team had already some experience of GIF workshops, as they organized a "GIF animation jam session" also at the Open Knowledge Festival in July 2014 in Berlin. In their experience animated GIFs are a great and playful way to introduce image and video collections. Anyone without prior experience can create an animated GIF relatively fast, while there is also room for more elaborate creations for the experienced ones. Working hands on with the cultural heritage materials and remixing different content items is also more immersive than just browsing through collections - and not to forget, the Web is full of GIF blogs and fans.

As the "Set Art Free!" event and the animated GIF workshop took place at the National Gallery of Denmark, the animations were made using the Gallery's public domain image collection (http://www.smk.dk/en/use-of-images-and-text/free-download-of-artworks/).The collection contains a variety of images of paintings and other artworks, such as drawings and sculptures. The SMK collection of 25,000 images under Public Domain mark will be made available also through Europeana (ongoing process).

The participants for the workshop were recruited via an open call, which was published beforehand on the Redesign Your Cultural Heritage blog, on the National Gallery's website and on various social media channels. Anyone could join the workshop without prior experience of making animated GIFs.

The workshop began with a brief introduction to the Europeana Creative project and open cultural heritage collections in general. After the introductory presentation the participants started to make animated GIFs using the freely available GIMP, as well as Photoshop, which some participants had on their laptop. Some people were already familiar with making GIFs, while others were eager to learn how to make them for the first time. The workshop was organized in the afternoon, so that the animations created in the workshop could be shown later in the evening on the main screen of the "Set Art Free!" event. The animations can also be found on the Redesign Your Cultural Heritage blog:
http://redesignyourculturalheritage.eu/animated-gif-workshop/

Fig. 63 Animated GIF workshop at the SMK Friday

Our Open GIFs blog (http://publicdomaingifs.tumblr.com/), which we started at the time of the "GIF animation jam session" remains also still open for further submissions, namely animated GIFs made using public domain materials.

7.4 Hackathons

7.4.1 Hack your heritage! hackathon

The first Finnish hackathon with open cultural materials was held 6-8 February 2015. Hack4FI – Hack your heritage hackathon gathered together over 50 artists, graphic designers, programmers, designers, scriptwriters and others interested in multi-professional collaboration and a new way of working with cultural heritage. As a result over 15 ideas and concepts were created and several collaborations formed. The hackathon was part of a project the purpose of which is to bring open cultural materials to use. The project run by Open Knowledge Finland, Aalto University Media Lab and Aalto Media Factory culminated in a final gala organised March 26th.

Fig. 64The Hack4FI – Hack your heritage Final Gala was held in the National Archives of Finland.

Photo: Avoin GLAM. CC BY-SA.

Europeana Creative's Design Pilot participated to the hackathon with the Culture Cam session. Neea Laakso (Aalto University) from the Pilot presented the Culture Cam tool, and afterwards participants of the Hack your heritage! hackathon could explore openly licensed Europeana content and create tangible creations with various digital fabrications tools in the Aalto Fab Lab.

7.4.2 The Hacking Culture Bootcamp hackathon

Within the framework of Europeana Space a number of hackathons are organised to develop tools for using Europeana content. The Hacking Culture Bootcamp hackathon, held in Amsterdam between May 8 and May 10 2015, focused on creating multiscreen experiences with digitalized historical footage from Europeana. In the hackathon seven teams of participants from different backgrounds created new multiscreen digital tools to engage with cultural heritage. The Design Pilot took part of the hackathon as a part of a multidisciplinary design team.

The Carrot team[9] – consisted of two developers, two designers and content-experts – developed a tool for classroom setting. With the tool people can collaboratively view, discuss,

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[9] The Carrot team consisted of: Mariana Salgado (Aalto University- EUScreenXL), Sebastian Zelonka (independent developer and designer), Willemien Sanders (UU- EUScreenXL), David Ammeraal (Noterik-

comment on, and tag videos related to a specific topic and subsequently to extract clips and produce video posters as a final assignment. The Carrot integrates multiscreen elements using content from the EUscreen portal and Europeana.

This is how The Carrot works: While watching a video on a main screen, students tag this video using their own mobile devices. This collaborative interaction with video content will ultimately stimulate discussion and participation, enhancing students' engagement with audiovisual cultural heritage. Following discussion of the tagged scenes, students select and make clips and subsequently design and create video posters, in which they combine video clips with text, thus creating a rich argument about the material. The Carrot allows teachers to adopt contemporary media didactics and to make students from different levels interact with audiovisual cultural heritage. It allows for enriching archive collections in the process.

Fig. 65 Carrot

The Carrot has potential for students at various levels as well as for different video collections and working environments.

Taking part in the Europeana Space hackathon was interesting and fruitful for several reasons from the Europeana Creative viewpoint. It brought wider understanding of the use of different cultural heritage materials available in Europeana, as work at the hackathon focused on reusing video material, whereas the project had so far mostly focused on the use of still images available in Europeana. Obviously video material can be used in education as such, but the

group came up with an idea how to use the videos in a classroom setting in a way that is collaborative, educational, but also fun for the students.

The work done at the hackathon is a good addition when thinking how to use the cultural heritage materials available: it is not only about what kind of new remixes can be done with the material, but how the remixing is actually done. Culture Cam prototype focuses how the material can be accessed, Carrot prototype takes an another angle and focuses how the found material can be handled. This kind of collaborative viewing, editing and compiling tool could be developed further, for example to be used with still images, for example in an art history setting.

7.5. Open Design experiments

The Design Pilot created and collected some open design experiments to demonstrate the various possibilities and value of creatively re-using digital cultural heritage. The experiments are collected on the website http://redesignyourculturalheritage.eu. These small scale experiments aimed to showcase creative re-use potential of openly licensed or public domain cultural heritage content in the context of art and design, and share knowledge about e.g. tools, methods and techniques of re-using digital cultural heritage.

Fig. 66 Teapot Machiine

One of the prototype that was develop is "Teapot machine", which is a physical artwork based on digital cultural heritage content that is findable via the Europeana portal. In more practical terms, the "Teapot machine" is a wall-mounted, mechatronic relief, which brings alive old pictures of everyday objects from Europeana. The idea is to attach cutouts of printed pictures onto a three-dimensional structure made of board material, and to create an animated collage. The prototype was created by Kati Hyyppä (Aalto University).

8. Business Model for Design Pilot

The starting point for the development of the business models in Europeana Creative was to get a shared understanding of what a business model is and how it could be used in the context of the project. Therefore, a concept that everyone could easily understand and apply was needed. Within the Europeana Creative context, several stakeholders, especially people dealing with design issues, are not particularly familiar with business modelling. A simple but robust concept and methodology was needed. Since the business model canvas developed by Alexander Osterwalder and Yves Pigneur had proven to be a successful methodology, allowing an individual or group of individuals to discuss and develop business models by using a simple but effective canvas as a working tool, the decision was made to use this methodology.

Following the development of the Culture Cam, the project team produced the following business model canvas for the tool:

1. Customer's world and desire for ideal value:
   - Designers
   - Artists, creators/makers
   - Creative People (general)
   - Professional Designers
2. Value Proposition:
   - Easiness of use
   - Inspirational images
   - Finding new art patterns/images or shapes
   - High quality images
   - Awareness of cultural heritage
3. Co-creation value with the customer:
   - Alternative way of searching for cultural heritage online

The development was also supported by a continuous evaluation of the implementation of the business models throughout the duration of the project. The business model itself is an incremental part of the product concept. This concept and the working prototype will be discussed and evaluated in online focus groups consisting of relevant representatives from creative industries and memory institutions. A discussion about success indicators was started that can be assessed on a regular basis. Another important aspect for a successful business model is the acceptance by end users. Usability tests carried out by Europeana Creative will help to get feedback from potential end users.

For more information please refer to **D3.4 Final report on Open Labs sustainability plan and generic business models** and **D6.3 Pilot and infrastructure evaluation report**.

8.1. Capturing Value: Culture Cam

For the creative community in general, the Culture Cam offers the possibility of enhancing European cultural heritage awareness among the broad community, providing a service that promotes creativity and art. The creative community will increase its knowledge on the subject, giving them a possibility to access a database of creative design materials. The creative community can use the content taken from the tool to disseminate the European cultural heritage to the general public and at the same time promoting the Culture Cam tool.

For active users (designers, artists, professionals, creators, etc.), the Culture Cam provides an opportunity to access an extensive database of European Culture Heritage materials, leading to further exploration of the project content. Active users will be able to obtain inspiring images and patterns (which can have personal and professional purposes) in an easy and fun way, stimulating designers to explore the creative content of Culture Heritage. In addition, the tool can serve as a new way of enhancing the creative side of the users, providing new ideas for future projects. As the tool is simple to use, the active users do not have to possess high expertise in the IT area to use the product.

Regarding the Culture Cam tool developed within Europeana Creative some specific actions have to be taken into account. This chapter outlines the requirements for the business model developed for the Culture Cam tool that reuses cultural resources in Europeana for design purposes:

- Open access: The vision of the European Commission's Comité des Sages that "public domain material digitised with public money should be freely available for non-commercial reuse by citizens, schools, universities, nongovernmental and other organisations" is considered as the most widely held view among heritage institutions in Europe, and most access models rely on open access.

- Revenue from (in)direct beneficiaries: In our search for strategies to generate revenue for the Culture Cam it was essential that the revenues can be generated through both direct beneficiaries of the service as well as indirect beneficiaries that value the service but do not directly use them. The basis for developing a sustainable revenue model for the tool should reside on digital marketing strategy, involving the direct beneficiaries.

- Additional services and goods: Another strategy to generate revenue while keeping access to the application for free for direct and indirect beneficiaries is to focus on transaction dependent revenues generated by charging fees for specific additional services (e.g., charging fees for tutorials or tips) or additional unspecified services (e.g., membership fees, donations) or goods (e.g., fan merchandising) from direct beneficiaries.

For more details, please refer to the White Paper: *Business Models for Design. Identifying business models for the re-use of cultural objects for design* produced by the WP3 in the Europeana Creative project. (***D3.4 Final report on Open Labs sustainability plan and generic business models)***

9. Conclusions

The Design Pilot developed a twofold product prototype: a new advanced visual search mechanism and an interactive installation. The online Culture Cam tool (culturecam.eu) allows people to explore a sub collection of Europeana in an easy and intuitive way through colour, share or pattern. The Culture Cam installation enables people to explore digital cultural heritage in a physical space in a playful and intuitive way. All the software developed in the Design Pilot is licenced and published under Open Source license, and is free for everyone to utilize and build upon.

In the Design Pilot the collaboration with various stakeholders was a key for developing Culture Cam. The tight collaboration with designer and maker communities assured that the developed product prototype would be meaningful and useful for the target user group. Participatory and co-creation design workshops, user testing and evaluation sessions with various stakeholders provided the Design Pilot in depth understanding of the communities needs, wishes and expectations. Furthermore the co-operation with one of the Europeana Living Labs, the Aalto Media Factory, supported the design and development work by providing thematic expertise, access to various digital fabrications tools and existing local community of makers.

The Pilot co-organised several open culture events and workshops with high-level collaborators and settings e.g. in Open Knowledge Festival and Mozilla Festival to connect the offerings of Europeana and the Design Pilot to the existing creative communities and networks. In addition, the *Mix it up!* exhibition placed 13 new designs and artworks using open digital cultural heritage back to the museum context at the National Gallery of Denmark, and invited public to rethink and discuss the nature and practices of art and design in the digital age.

There are many challenges in supporting and facilitating open creative re-use of creative industries and other stakeholders. The key challenge in the Design Pilot was to locate suitable digital content for the actual product prototype and for the various hands-on workshops that were organized by the Pilot. Even though Europeana provides access to 10s of millions digitized objects available for legal re-use, finding high-resolution and suitable content was extremely difficult and time-consuming. However the Design Pilot was able to choose and curate more than 3,000 images for the Culture Cam collection that do not have any copyright restrictions. In the future searching and browsing hopefully becomes easier due to the *Europeana Content Reuse Framework* that enables filtering content through various technical and IP related attributes.

The Design Pilot was very successful and the feedback from both the envisioned user groups and the wider public has been positive. At Culture Jam 2015 in Vienna, Culture Cam won the audience award and thousands of people have already used the online Culture Cam prototype. After the Europeana Creative project the hosting and development of the tool will be continued by Europeana and its partners, and also by the open source community.

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