Hello. The National Maritime Museum in Greenwich is the largest maritime museum in the world. It also incorporates the Royal Observatory, home of Greenwich Mean Time and the Prime Meridian line.

I should point out at this stage that while I commission and produce a lot of design, I don't have the craft skills to consider myself a designer.

Sorry Nelson

So what I try to do in my role at the museum is use technology in a creative way to interpret the museum's unique collection and historic site. To design understanding.

Recently, much debate recently about the practice of museums, especially in context of funding cuts - not enough objects on display, too many screens, loss of spaces for quiet contemplation. But many of those arguments set up a false opposition between objects and digital.

Nelson's Trafalgar uniform

Material culture is the heart of all museums. They're full of objects. The particular strengths of objects over other forms of media: aesthetic qualities, resolution and density of information, appreciation of scale; their **authenticity** --- sense of personal connection between the visitor and people from the past - especially if can get up close, alone, or touch.

Here is our most popular, or 'hero' object - the uniform Nelson was wearing at the Battle of Trafalgar, where he sustained a fatal shot.

Ben Gammon: 'Rarely are visitors attracted to an object because they recognise its inherent significance. For visitors most objects are **relics not icons**.'

You might display Nelson's uniform in the context of its collection type, to tell a story of 'rank and style'.
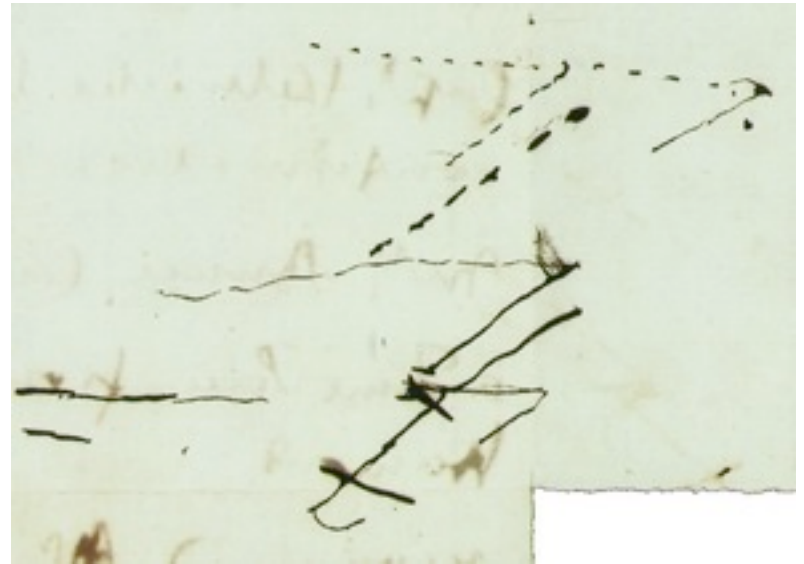
Or you might display it alongside a hand-drawn battle plan and a ship model of the Victory to tell the story of the Battle of Trafalgar.
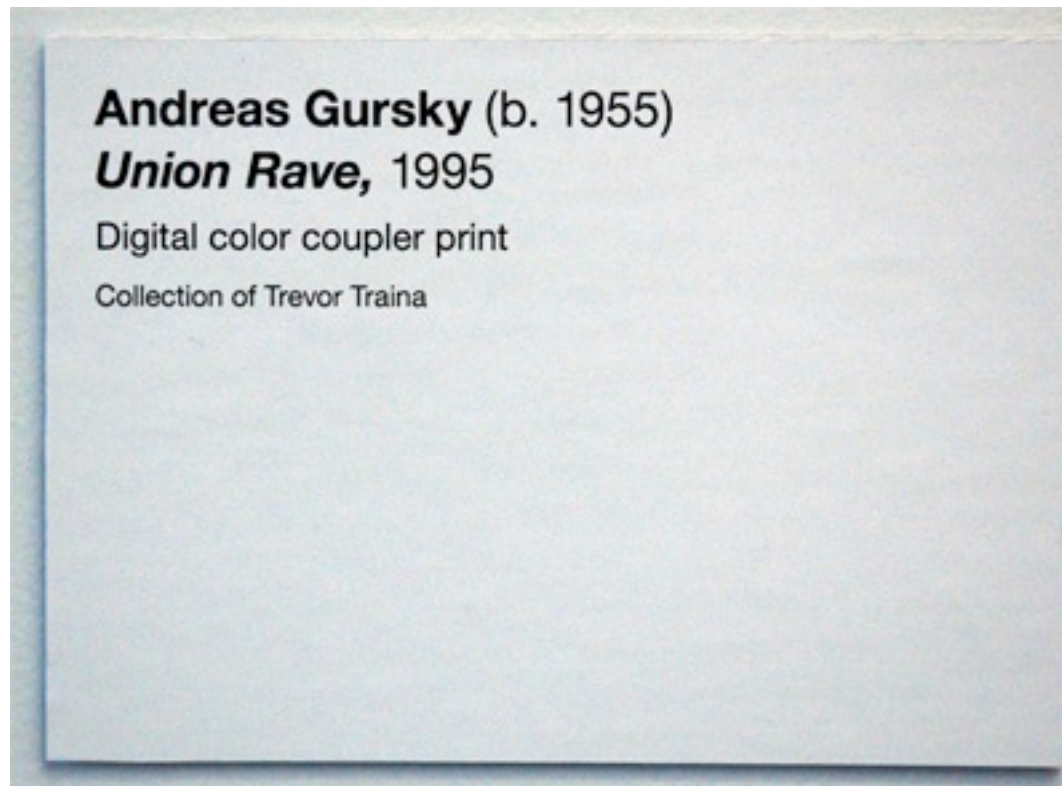
Wellcome Collection, First Time Out

Wellcome Collection, bit.ly/h6F68U

This act of considering objects in new contexts is much of the intellectual work of museums. This importance of context is demonstrated in the recent 'First Time Out' project by the Horniman, Kew, Natural History Museum, Science Museum and Wellcome Collection. Five objects that have never been on display before pass between five museums where different curators will write the story from their own perspective.

So, what's the role of digital in the interpretative work of museums?

Andreas Gursky (b. 1955)
Union Rave, 1995
Digital color coupler print
Collection of Trevor Traina

flic.kr/p/PwXZw

1) The choice is not usually between digital media and authentic objects, the choice is between digital media and printed labels

The paper label made sense when collection records were written on paper cards and contained limited information (the name of the object, the history of ownership, the dimensions and material, and the maker.) They also work, largely, for art.

But there are some collections for which paper labels just don't do enough.

Dr Tilly Blyth, 'The Material of the Digital'

Science Museum computing collection

Tilly Blyth, Keeper of Technologies and Engineering at the Science Museum, London:
'Computers don't explain their function, use or what they do in the same way that earlier technologies did... You can't see the fundamental principles operate in the same way you might with an early clock or a sextant....'
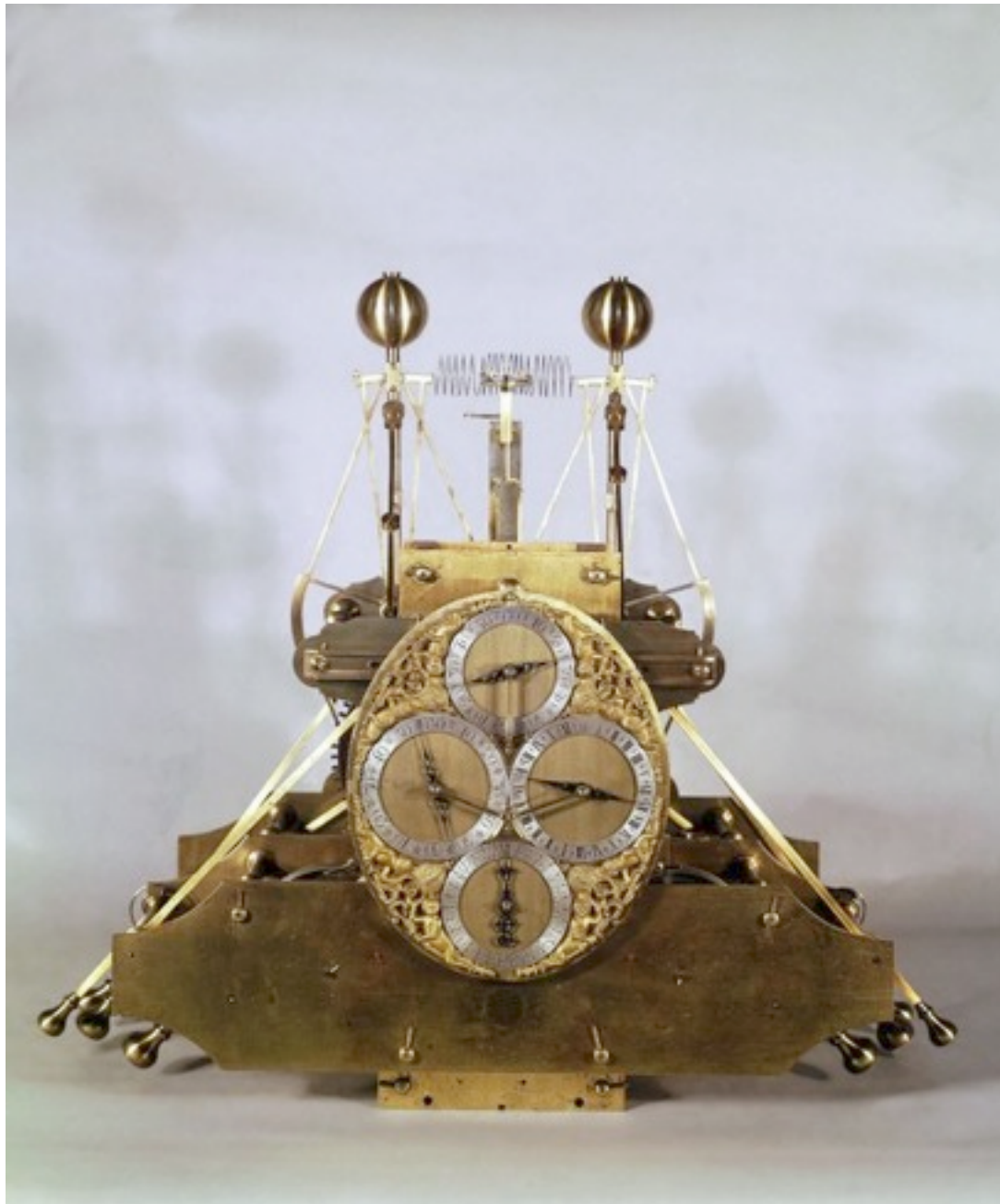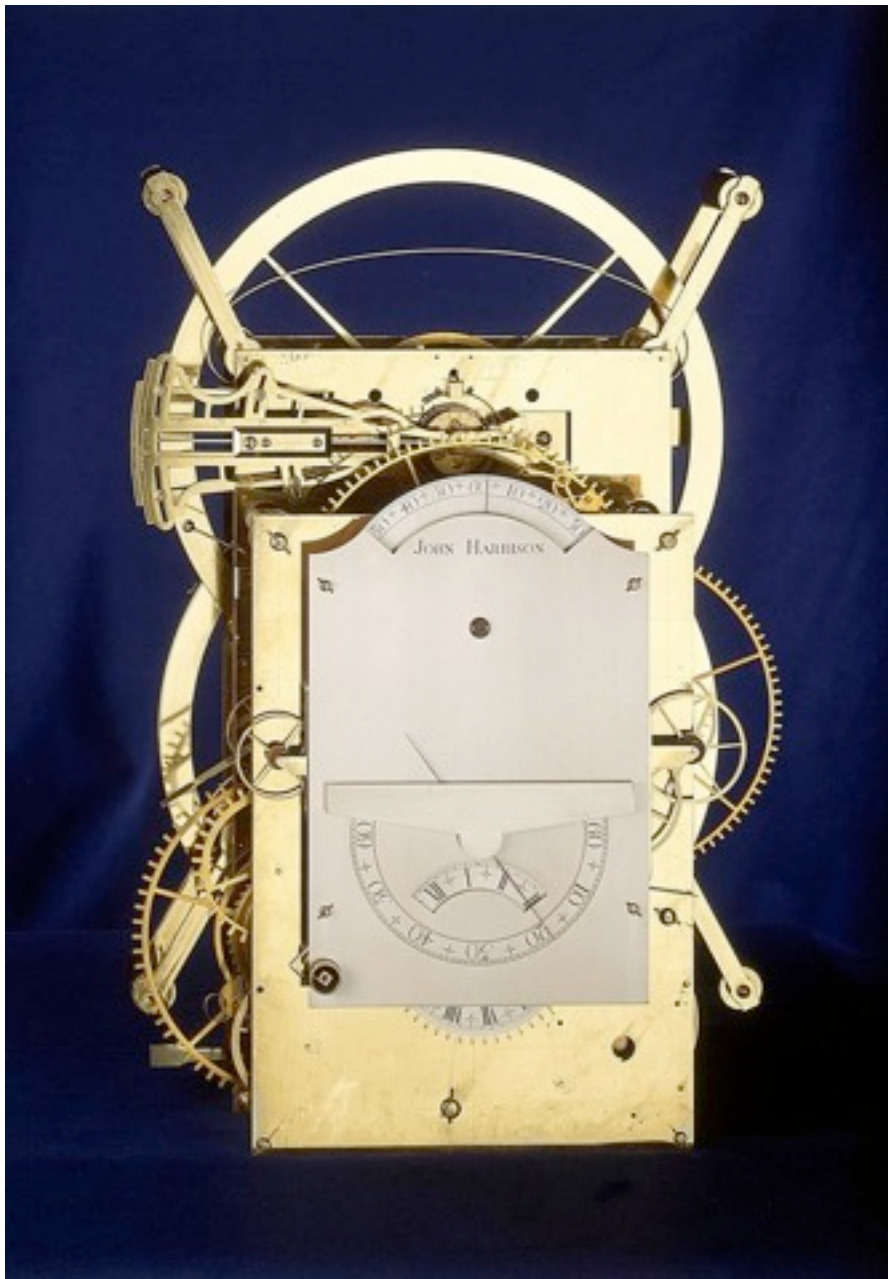
H1
673mm

In fact, you even see this story play out in the 18th century, before computers. This is the Royal Observatory's hero object: Harrison's chronometers, which solved the longitude problem of establishing location at sea. Pictured here is the H1 in 1735. Looking at Harrison's early models, you have a sense of the mechanisms at work.
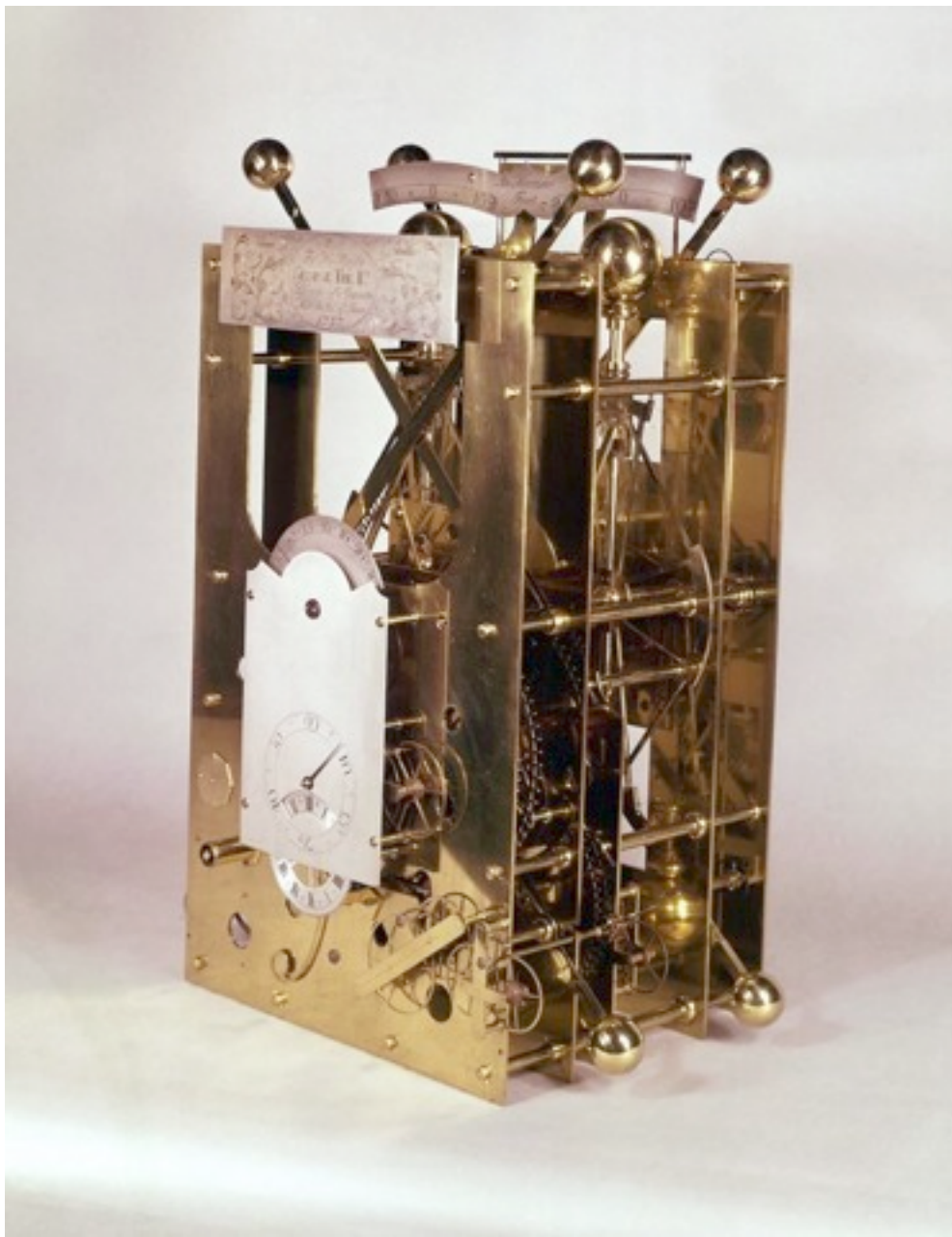
H2
686mm

H3
622mm

H4
132mm

Over 20 years later, problem was solved. Displayed alongside the other Harrison models, you see the incredible imaginative and technological leap that made the chronometer solution viable, and a story about miniaturisation, but, in isolation, the H4 is the hardest to read.

Dr Tilly Blyth, 'The Material of the Digital'

'Artefactual identity of the computer is lost"

bit.ly/hPCsUT

An even bigger issue for computers. Idea of the universal Turing machine: internally stored program, no one use, no one function.

Tilly Blyth: "**artefactual identity of the is computer lost**."

Mike Kuniavsky, 'Service Avatars'

"Virtually any device can now do what every other device does... They're all essentially the same device in different form factors...The primary value of these devices is that they provide access to services in the cloud."

bit.ly/i48nSW

I was at the Microsoft Social Computing Symposium a week ago, where there was a focus on smart objects. Many people talking about the move to devices as surface, or 'service avatar'.

Timo Arnall and BERG, Immaterials
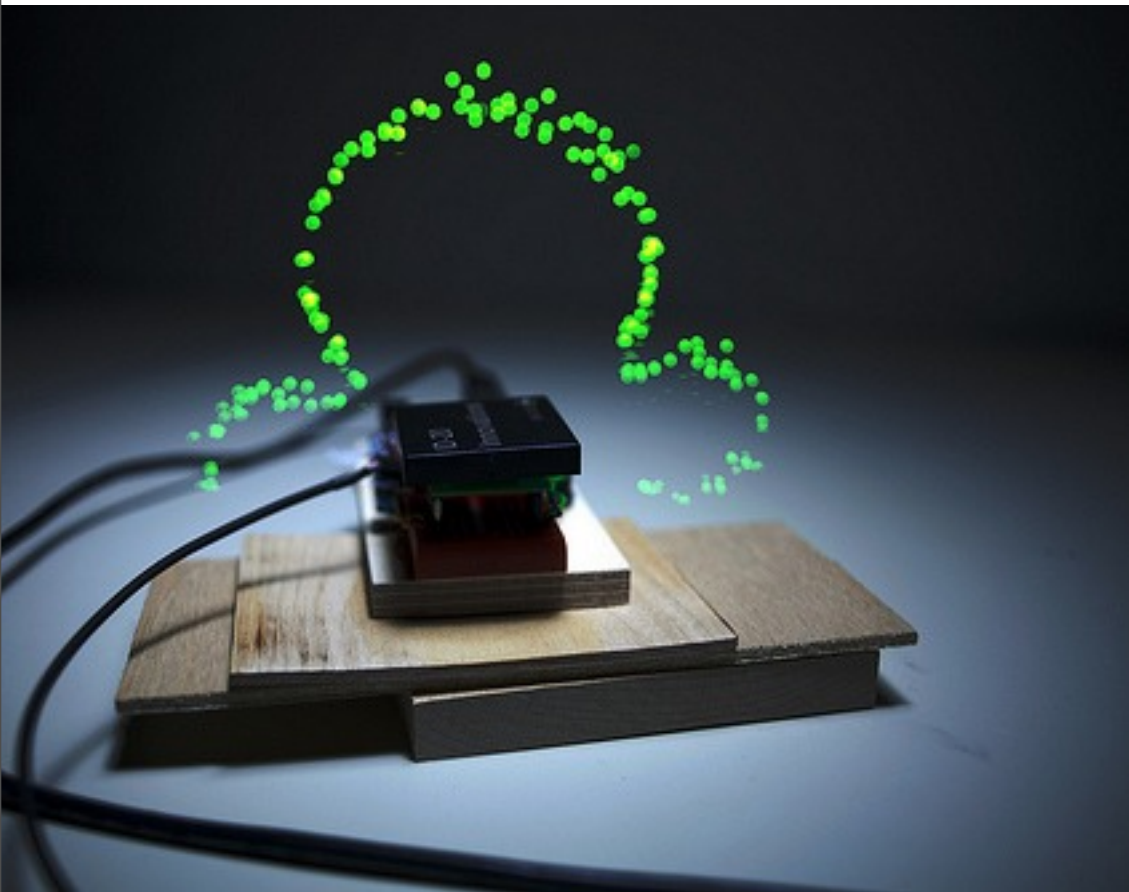
"Used [film] as a tool, material and a communicative artefact that enables us to approach complex, obscure and often invisible emerging technologies such as RFID"

bit.ly/9JrNAj

Inevitably you need a way of communicating services and other non-physical aspects of an object's history of use.
Timo Arnall talks about the role of film in design research. Uses film as a tool, a material and a communication that enables designers to approach complex, obscure and often invisible emerging technologies such as RFID. You could have a paper label in a museum attempting to explain RFID in 100 words or less, or you could show a film.

Bridget Riley, Arcadia 1 (Wall Painting 1), 2007

2) **What is an object anyway?**
The definition of 'authentic' or 'real' objects has already broadened to include photos, film and multiples.
I recently went to the small Bridget Riley show at the National Gallery. I was struck by the date on a wall painting: 2007. This painting is essentially a copy: when Riley sells a painting, she sells a license. There can be an unlimited number of instances on an unlimited number of walls but only one at a time. This particular photograph shows an installation in a private collection, presumably now erased?

Paola Antonelli, Curator of Design, MoMA

"I've been trying to expand the idea of design beyond chairs and posters to embrace also interfaces, interaction and even the @ sign."

bit.ly/eLWYPM

And, increasingly, there are born-digital materials. The MoMA recently acquired the @ sign and 23 digital typefaces.

OCR-A

Aa Bb Cc Dd Ee Ff Gg
Hh Ii Jj Kk Ll Mm
Nn Oo Pp Qq Rr Ss Tt
Uu Vv Ww Xx Yy Zz
1 2 3 4 5 6 7 8 9 0

MOMA, 23 digital typefaces, bit.ly/gVU2Oq

Here is the typeface OCR-A, which you find at the bottom of barcodes.

Paola Antonelli: 'Helped by a panel of expert advisors... we based our decisions on the same criteria—ranging from aesthetics to historical relevancy, from functionality to social significance, from technological ingenuity to economy—that we use when evaluating objects...'

Canadian Museum for Human Rights

'Collecting objects is not our main focus. We will house some artefacts but our stories will be told through dialogue. This means, among other things, that our collection will be predominantly digital"

humanrightsmuseum.ca
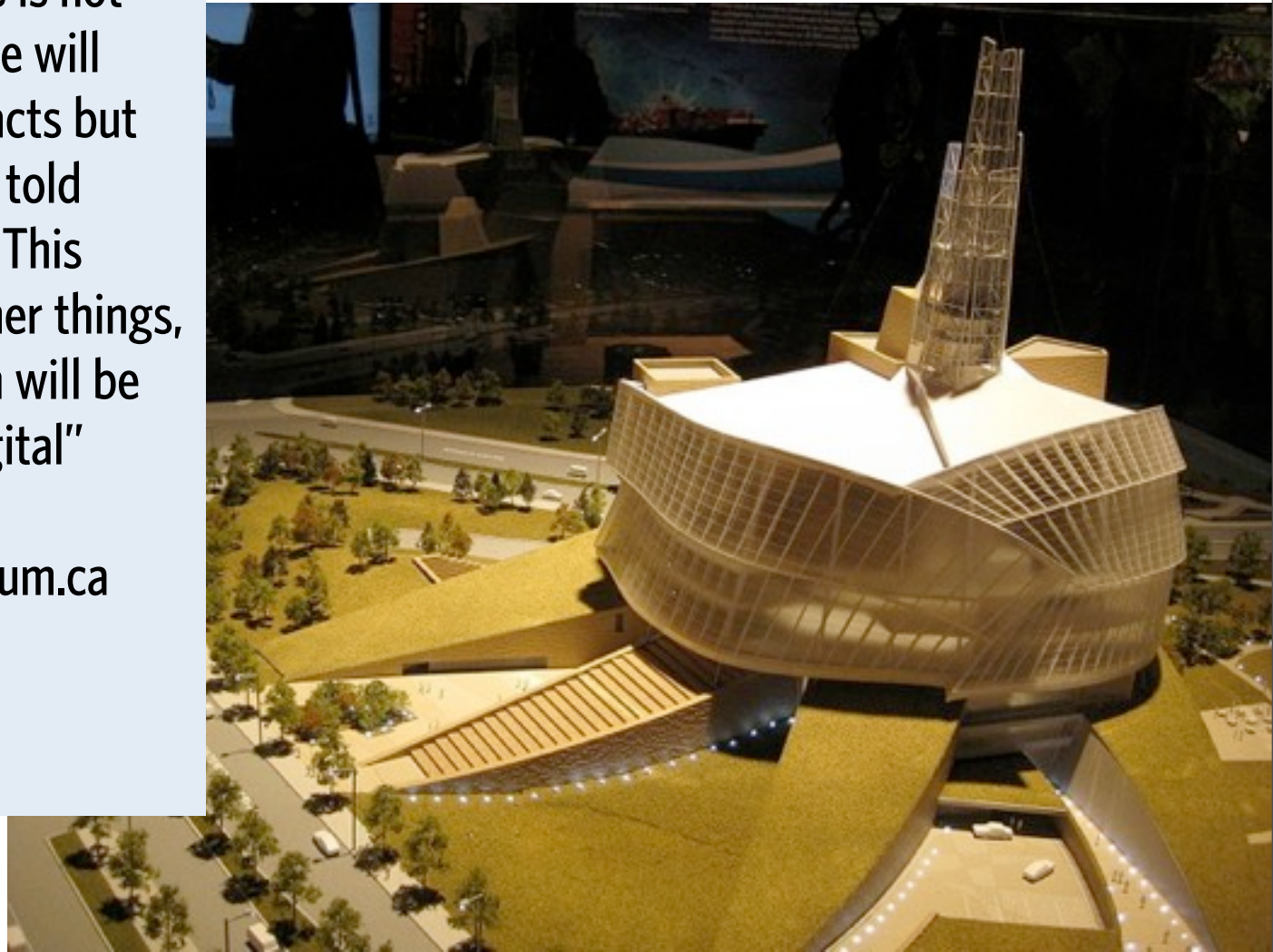
Similarly, the 9/11 memorial and the Canadian Museum for Human Rights have focused on community and digital collecting.

In my own museum, materials that we've historically collected are now born-digital: ship plans are now CAD drawings, sea charts are now databases, and glass-plate negatives are now JPG files. Having not yet grappled with the challenges of digital preservation, we currently collect paper copies of the digital original for charts.
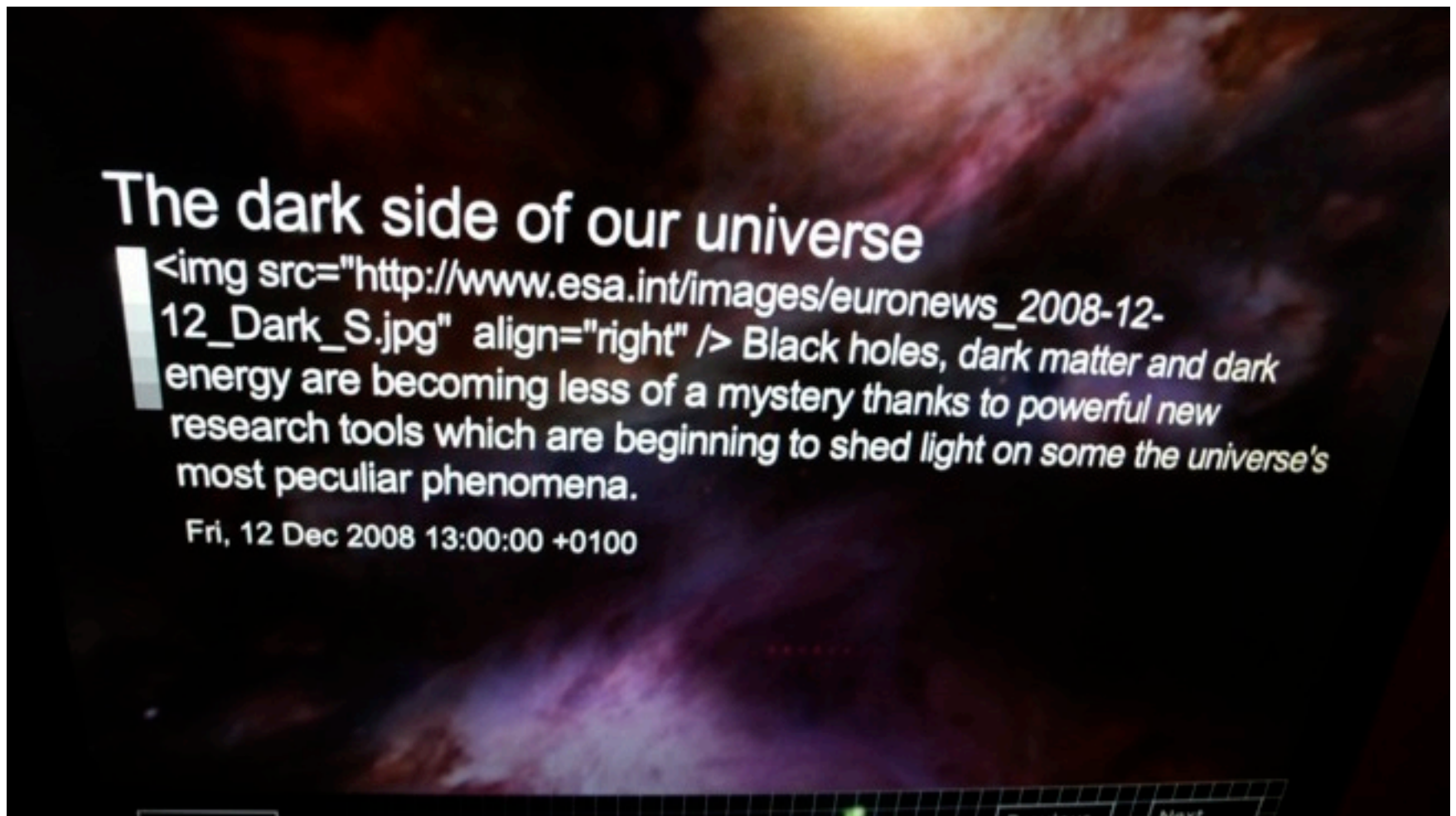
Learning styles

1 LINGUISTIC

2 LOGICAL-MATHEMATICAL

3 BODILY-KINAESTHETIC

4 INTERPERSONAL

5 SPATIAL

6 AUDITORY-MUSICAL-RHYTHMIC

3) We need to design museum experiences for a range of visitors, with different learning styles
Howard Gardner's theory of multiple intelligences.
The first two styles are well served by formal education. Only the first is well addressed by written labels in museums.
We don't just want visitors to leave the museum with improved knowledge and understanding. Other outcomes include: skills; attitudes and values; enjoyment, inspiration & creativity; and changes in behaviour.

The dark side of our universe
 Black holes, dark matter and dark energy are becoming less of a mystery thanks to powerful new research tools which are beginning to shed light on some the universe's most peculiar phenomena.

Fri, 12 Dec 2008 13:00:00 +0100

flic.kr/p/5KdoY7

Having made this argument for digital, I'll still concede that there are good and bad digital exhibits. Just as there are good and bad paper labels.

A big part of my job is saying no to interactives: only yes if they're the best means of delivering learning outcomes and designed for clearly-identified audiences.

The use of technology in museums is not interesting in itself, as surprising as that might be to some who work in museums. I therefore seek to use appropriate technology to create novel experiences that play against the context of its **historic buildings and site,** unique **collections** and the **visiting public.** We have some predefined opportunities that we look for in new projects.
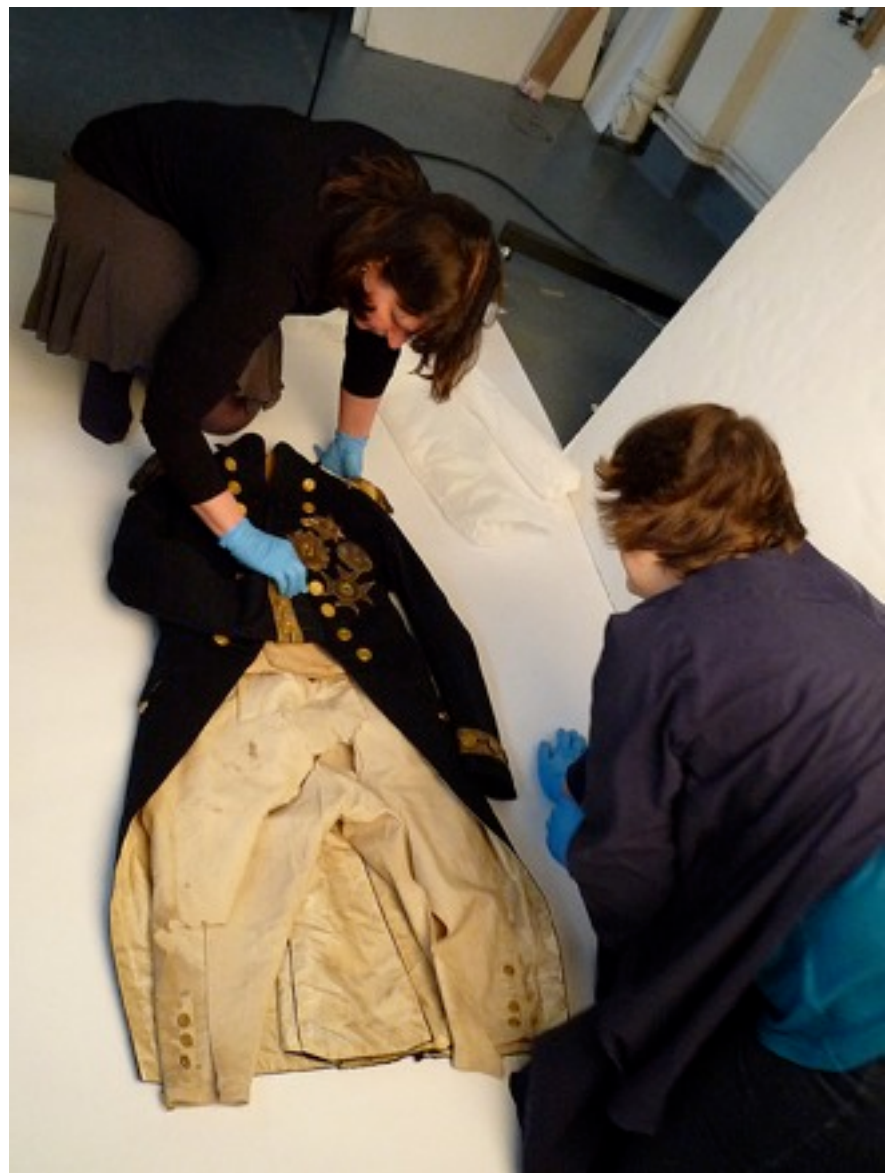
## 1   Co-locate interactive exhibits with collections

Extend object-based learning by co-locating interactive exhibits with collections

For Nelson's uniform, we created a life-size digital replica housed in a re-created Victorian display case and providing in-depth information about the details of the uniform, including the bullet hole. We installed the original silver label, which we held in our collections.

Our intention was to re-direct visitors' attention back to the object. Gallery observations have shown that visitors flow from object to interactive and back to object.

ART + COM, Jurascopes

Brachiosaurus
Dicraeosaurus
Elaphrosaurus
Allosaurus
Dysalotosaurus
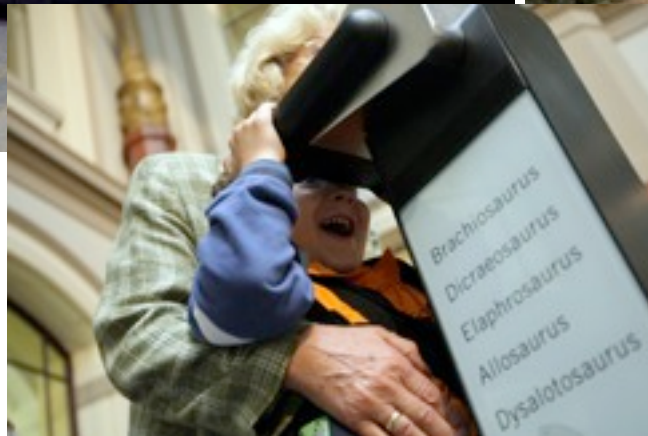
Berlin's Museum of Natural History

Here's a best practice example from elsewhere, an augmented reality treatment of skeletons in Berlin's Museum of Natural History.

2   Use a range of media and innovative interfaces to create multisensory experiences that engage visitors' different learning styles

Many exhibits, including duplicate stations to cater to different access needs.

Multisensory options, e.g. a lock-picking exhibit had three versions (logical, mathematical/musical, colour/creativity).
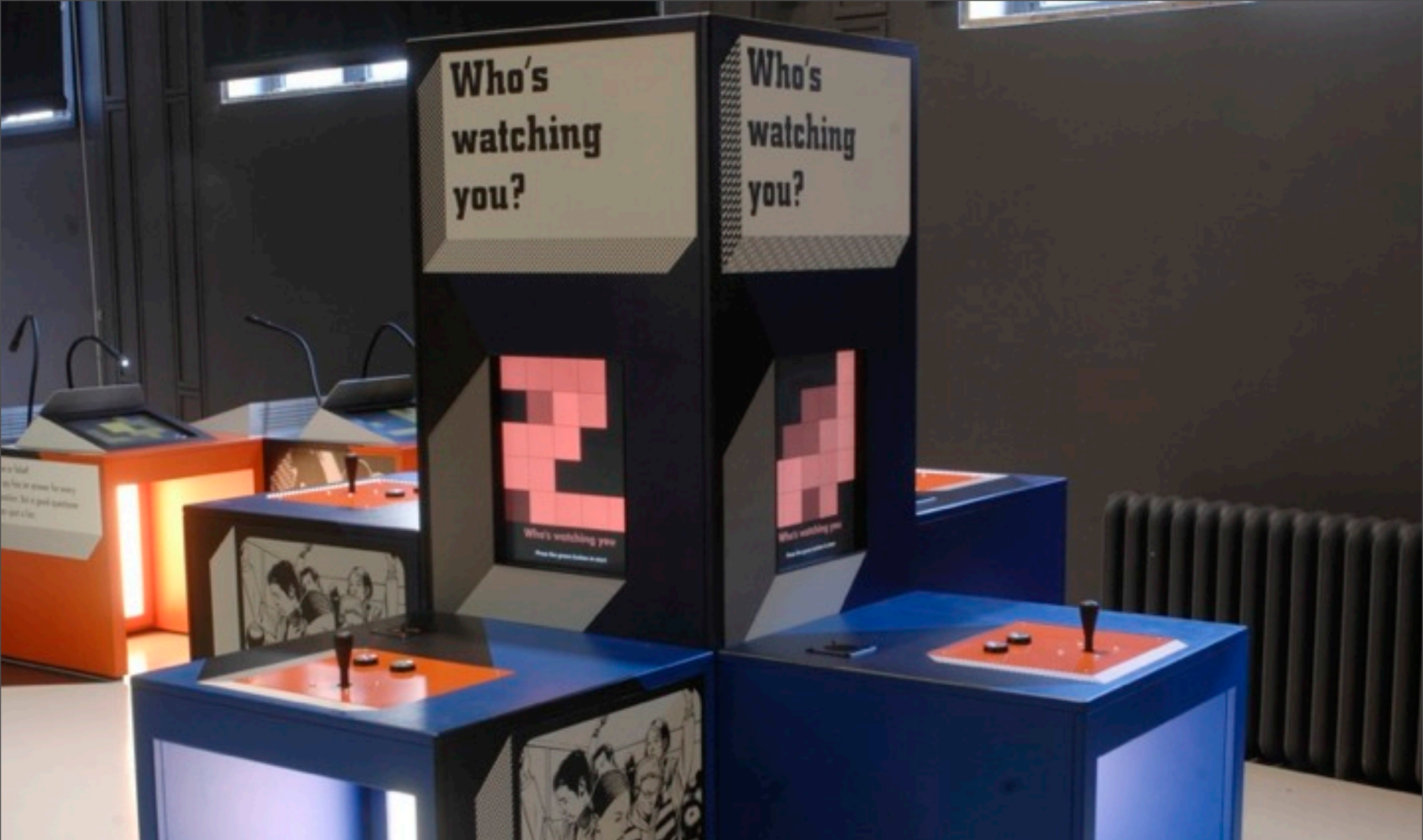
Astronomy galleries, Royal Observatory

Tangible
interfaces

3 **Design social experiences**
– from game-like exhibits that facilitate parallel play...

The most obvious and easy thing to do for an exhibition audience is to recognise that they will mostly come to the exhibition in small groups and want to have a good experience together.

In the Science of Spying we worked hard on every single exhibit to design an experience that worked with small groups, as well as for individuals. Especially important because of our extensive use of technology.

This example is arcade style, inviting light competition: call out to each other, comparing results.
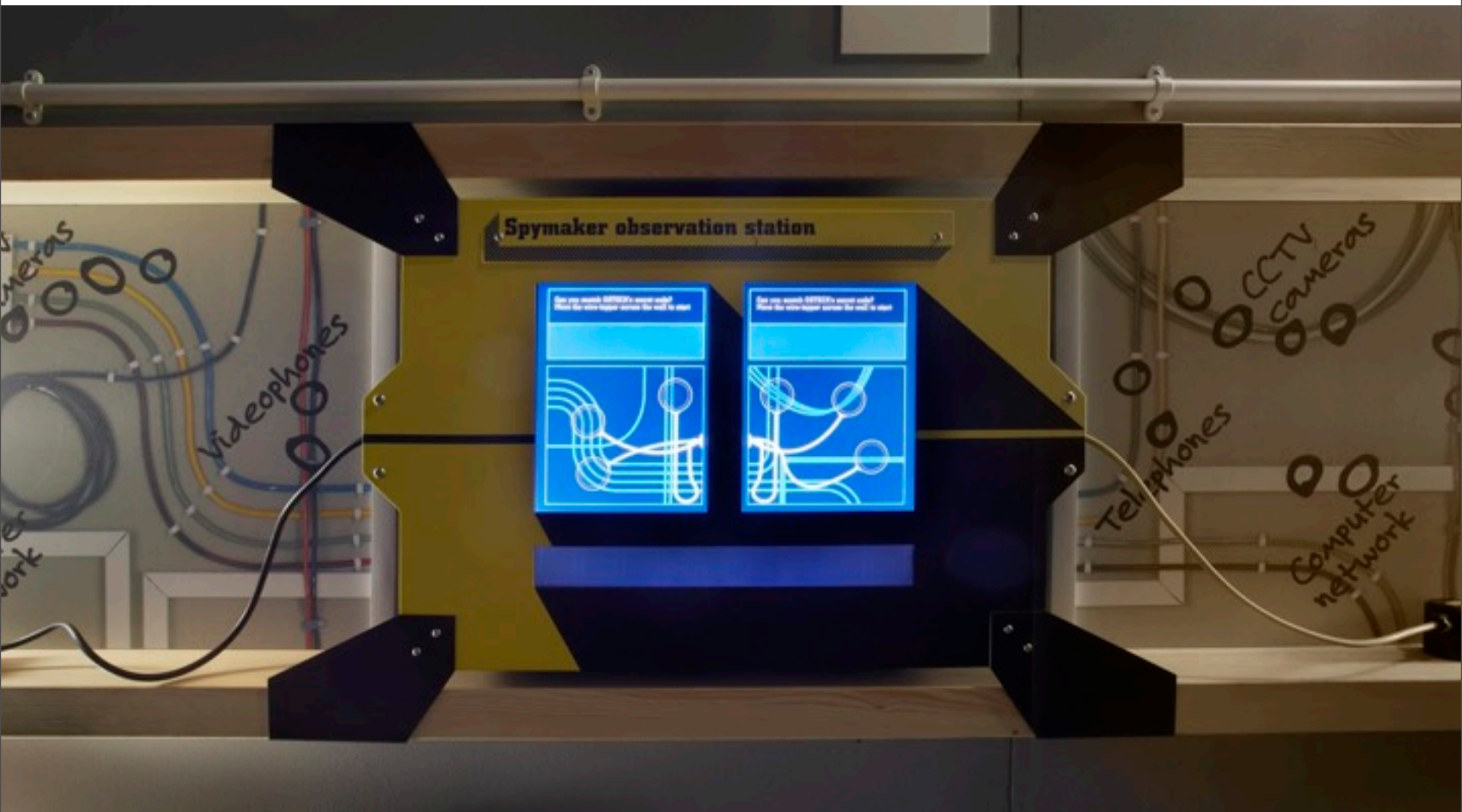
Parallel play, with variations

Each contributes a vital half of the code, so they can compare results, experiences.

Cooperation, or assistance

Corporate hacking game: Very difficult to win alone. People would often start alone, then pull others in to help. One person takes the lead, giving instructions to others.

Wire toy: Was originally a design mistake: the exhibit was physically challenging to complete due to bad ergonomics. But evaluation showed that this led to cooperation with parents and older siblings, resulting in interesting conversations about the underlying privacy questions. So we left it that way.
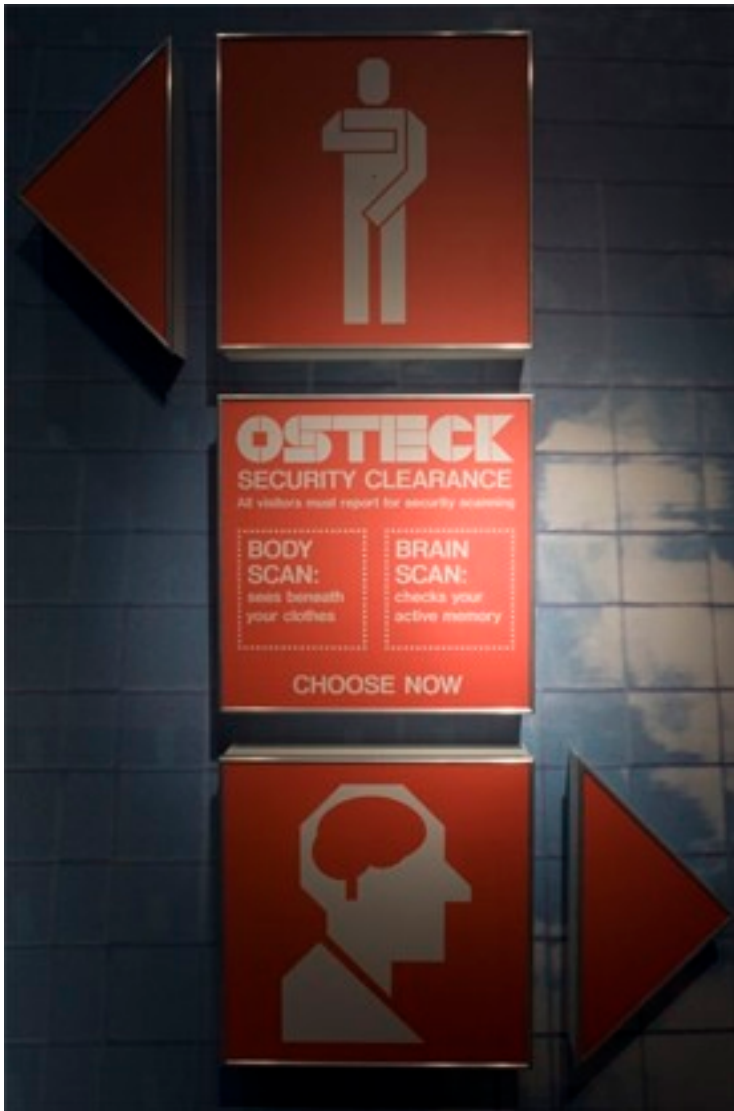
Competition

Choose your equipment: A four-person multiplayer game with visible choices and scores and the potential for playful 'griefing'.

Spot the liar: An interrogation based on the board game Guess Who. Inclusion of lights added to the drama: people would direct them into the face of their opponent.

Conversation starters

Exhibits that pose questions or dilemmas for immediate discussion provoke conversation.

Intelligent CCTV observation station: Not only some of the most enjoyable discussions within family groups but the best in terms of outcomes - people more questioning of CCTV after interacting with this exhibit.

Body scanners: To get in you must pass through a hi-tech security scanner, either a body scanner that can see under your clothes or a brain scanner that can check your memory.
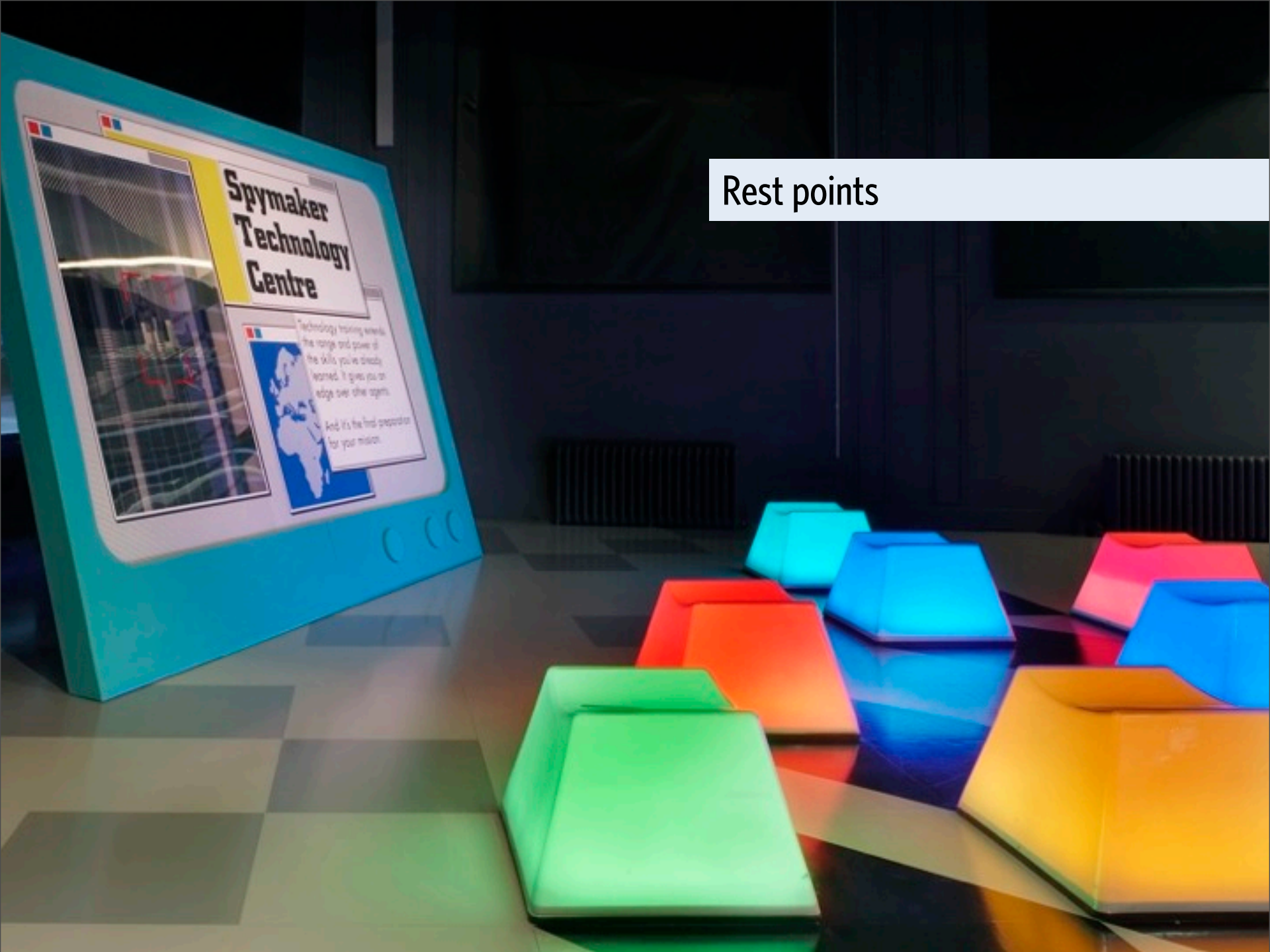
Finally, rest points for conversation. This example of seating doubled as a playful, multisensory experience for under-8s who would lay across the vibrating seats.

Klima X, National Museum of Science, Technology and Medicine, Oslo, Norway

Create exhibits that are platforms for our visitors' own performance, either giving them direct control of a display, or using a combination of technologies (sensors, cameras, tracking) to respond to their actions.

Initiate the 'audience' into a role play, or light performance. Here's a best practice example from elsewhere, the distribution of wellingtons at the Klima X exhibition in preparation for entering a flooded first gallery.

Phil Worthington, Shadow Monsters
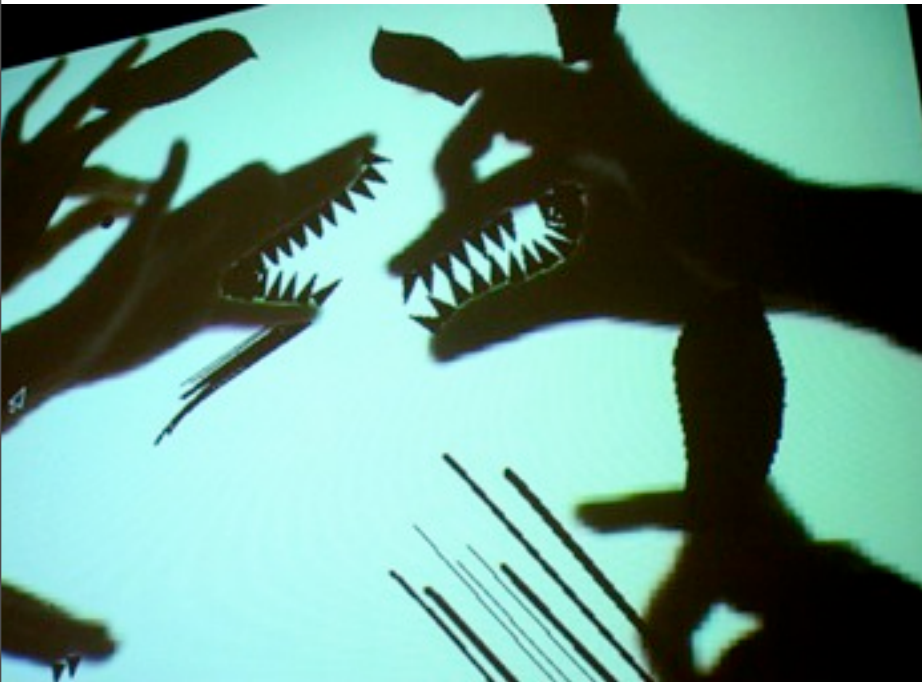
Design Mart, Design Museum, bit.ly/fxQRTT

The most ubiquitous form of this is interactive is wall installations. My favourite is Shadow Monsters by Phil Worthington.

Same approach can be made to work harder, to communicate content. In The Science of Spying we used a responsive wall installation to illustrate the concept of gait recognition for surveillance. Such technology was still in the research labs, somewhat speculative then (2007), now it powers your Kinect.
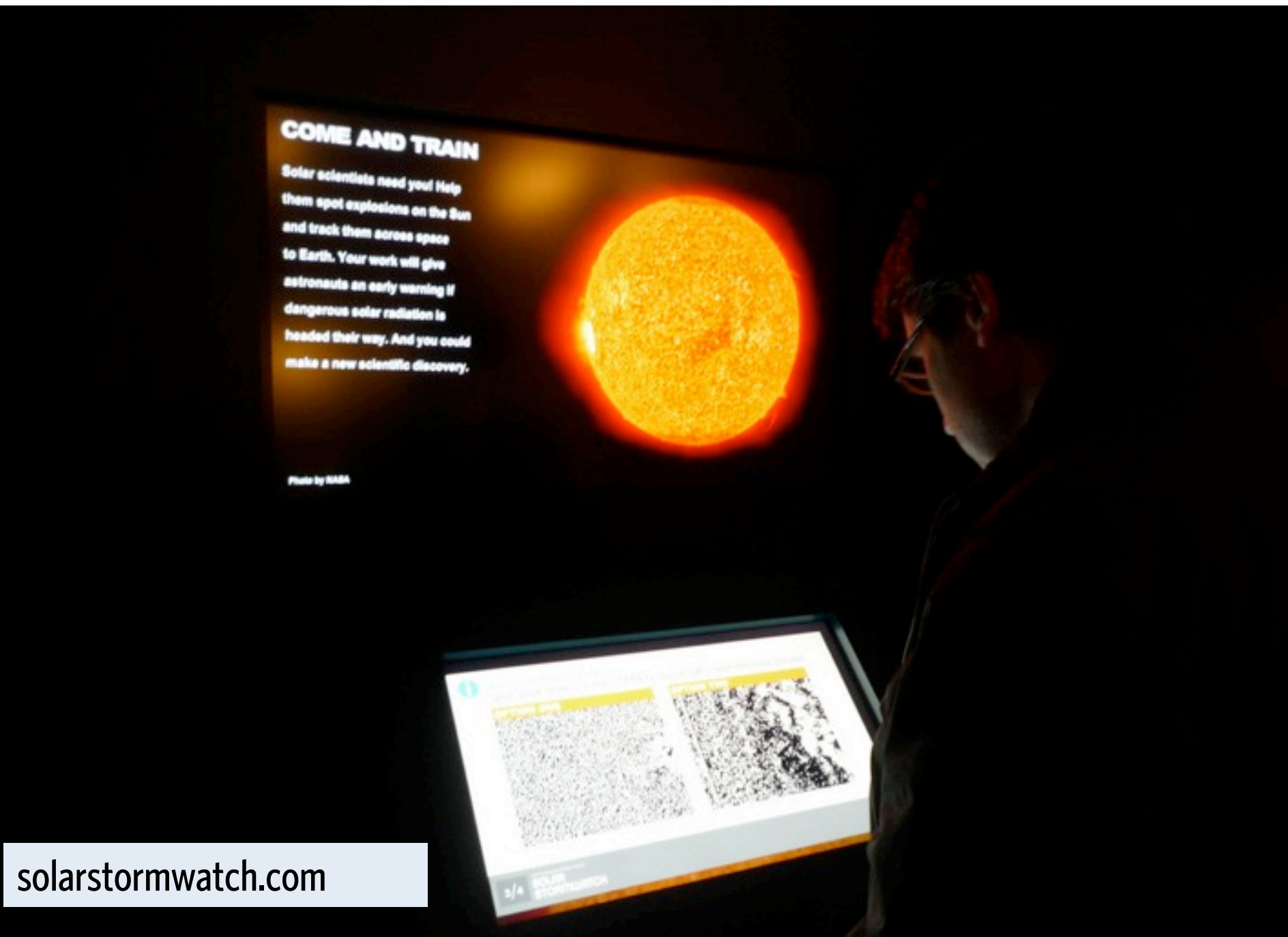
flickr.com/groups/astrophoto

Connect our visitors over time and represent our online communities within physical spaces. Invite and use visitor contributions - but only in a meaningful way. The most ubiquitous form of this is the community-curated or contributed photo exhibition, e.g. Click at Brooklyn Museum, How We Are Now at Tate. Shown here is Astronomy Photographer of the Year at the Royal Observatory: an annual competition and exhibition with an ongoing community of amateur photographers hosted online at Flickr.com. This community is represented in the exhibition through an interactive exhibit that showcases all photographs from the group.

COME AND TRAIN

Solar scientists need you! Help them spot explosions on the Sun and track them across space to Earth. Your work will give astronauts an early warning if dangerous solar radiation is headed their way. And you could make a new scientific discovery.

Photo by NASA

solarstormwatch.com

Solar Story exhibition at the Royal Observatory came out of our online citizen science project, Solar Stormwatch. People who completed their training in the exhibition had a special status online.

Ben Rubin & Mark Hansen, Listening Post, 2003

Science Museum, bit.ly/fxDwxe

Listening Post at the Science Museum, London, is a 'dynamic portrait' of online communication, displaying uncensored fragments of text, sampled in real-time, from public internet chatrooms and bulletin boards.
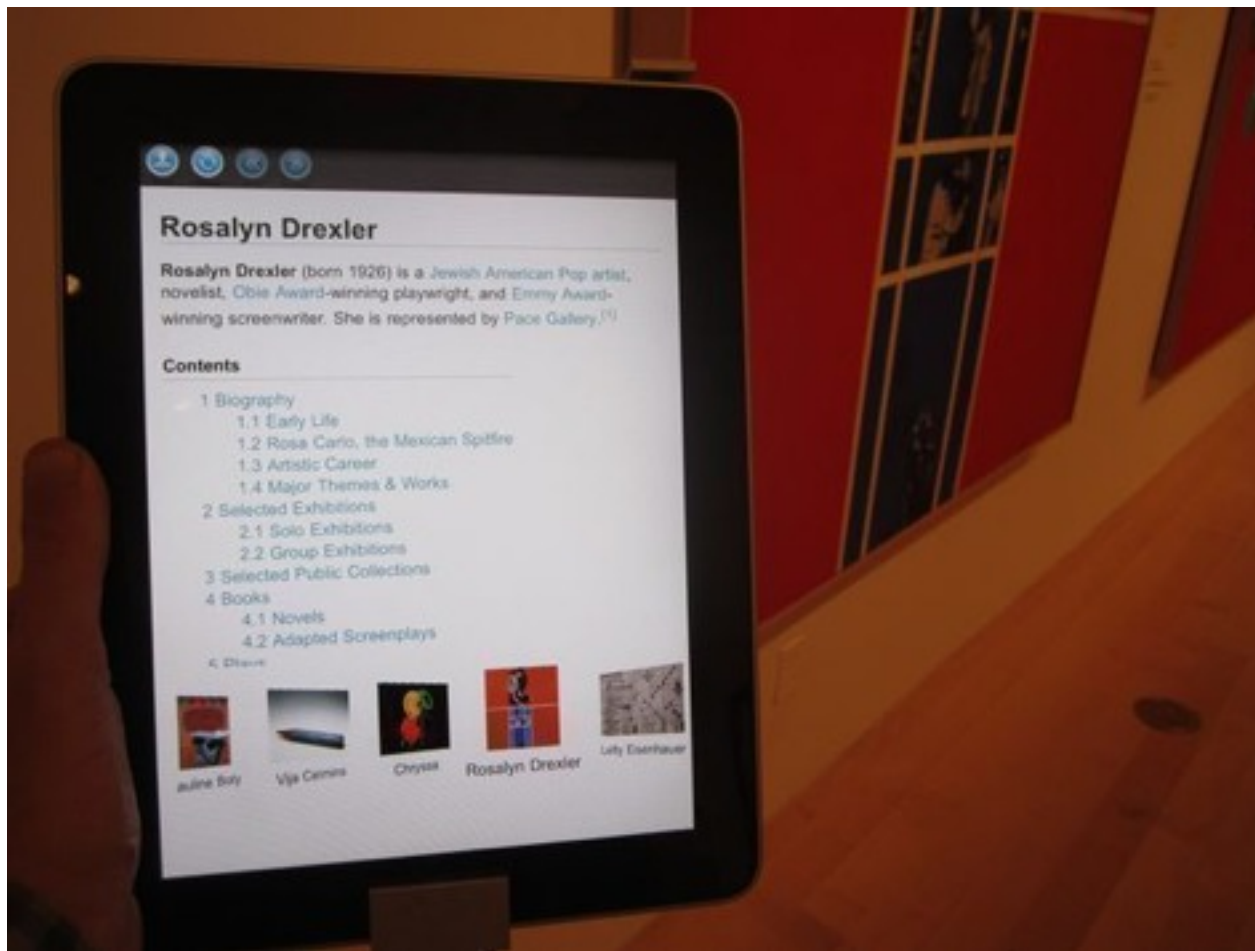
Free2choose

Anne Frank Museum Amsterdam, bit.ly/g2ZpFV

At a much simpler level, visitors can leave their mark by voting. Best example of this is the interactive film exhibition at Anne Frank Museum, Free2choose. Poses dilemmas around different human rights stories.

Seductive Subversion/ Wikipop

Brooklyn Museum wanted limited interpretation on paper labels of their art exhibition, Seductive Subversion. Digital team balanced this approach with WikiPop: curator edited 25 Wikipedia pages - one for each artist - and these pages were displayed on iPads at each end of the gallery. Creates an opportunity for visitors to add their own knowledge after the exhibition.
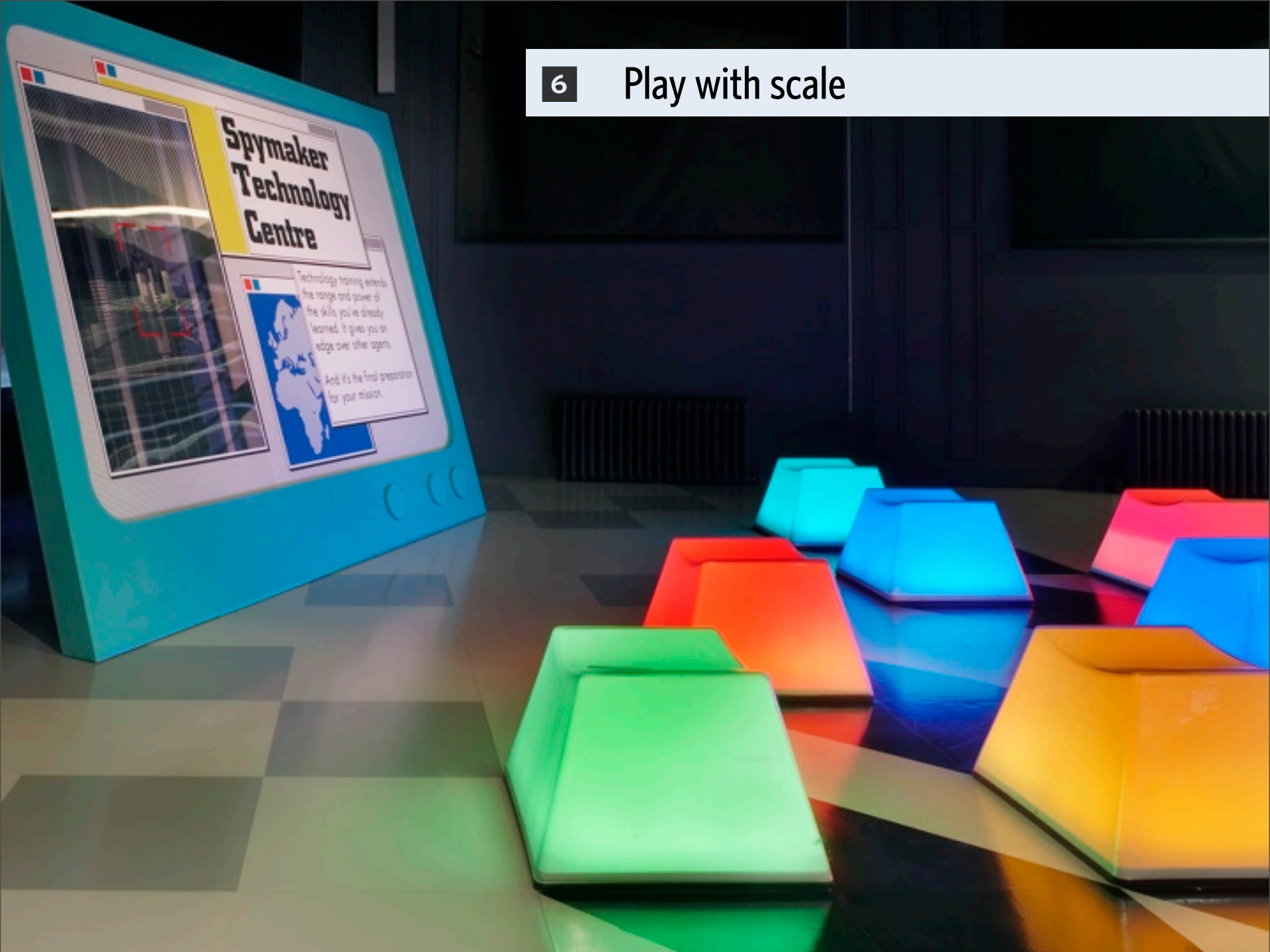
Play with scale – the very small and the very large – to take visitors beyond their everyday experience of technology.

United Visual Artists, Chorus

uva.co.uk/archives/101

Huge pendulums swing to play a chorus.

Astronomy galleries,
Royal Observatory

Can be as simple as secondary displays and actions. In this exhibit at the Royal Observatory, visitors' actions replayed with a large mechanical telescope.
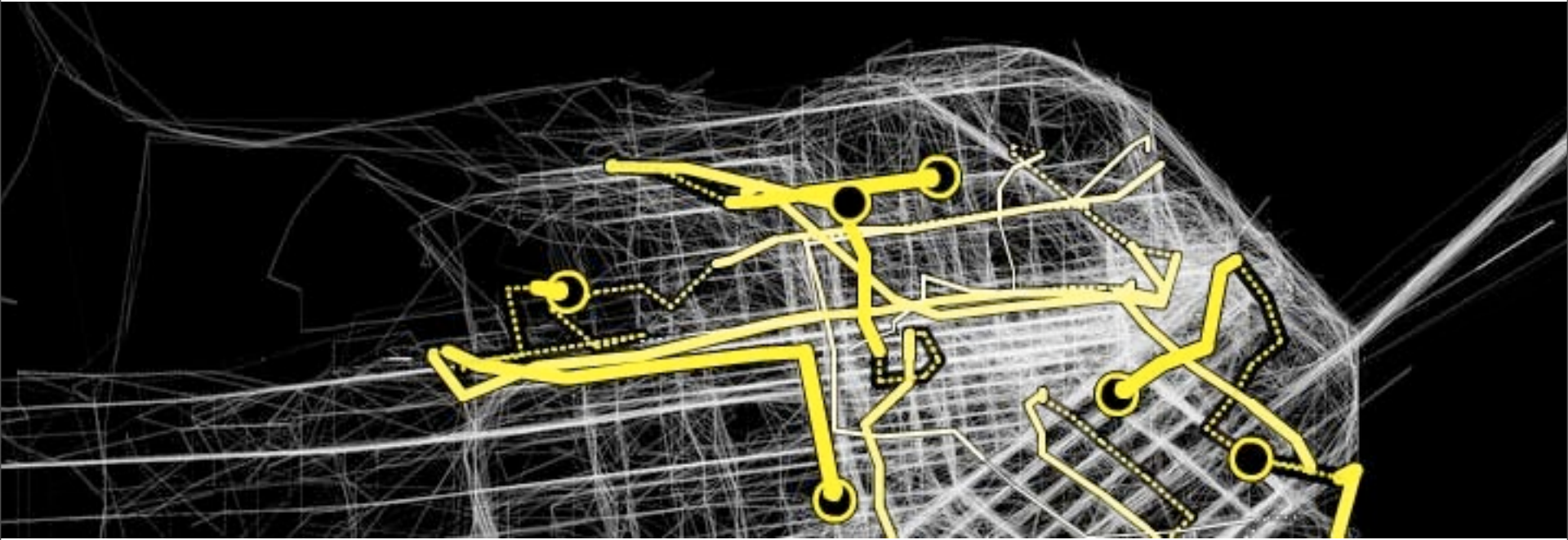
Chris O'Shea, Hand from Above

BBC Big Screen, Liverpool, http://bit.ly/eW5GFU

The most fun example is Chris O'Shea's Hand from Above installation.

Stamen, http://cabspotting.org/

Finally, you can network exhibits to visualise and respond to live data. There aren't many examples of this yet but the best one is Stamen's Cabspotting.

Interpretative approaches

1 Extend object-based learning by co-locating interactive exhibits with collections

2 Use a range of media and interfaces to create multi-sensory experiences that engage visitors' different learning styles

3 Design social experiences

4 Create exhibits that are platforms for our visitors' own performance

5 Connect our onsite visitors over time and represent our online communities within our physical spaces

6 Play with scale – the very small and the very large – to take visitors beyond their everyday experience of technology

7 Network exhibits in order to visualise and respond to real, live data

So these are the interpretative approaches that have informed my work at the Science Museum, Royal Observatory and National Maritime Museum. I hope you'll see much of it reflected in the new Sammy Ofer Wing, which opens this Summer. But recently I've been thinking about a very different approach...

Looking ahead...

Many museums are moving towards having more publicly-accessible storage: galleries with limited interpretation and a high density of objects, arranged pretty much as they would be in a back-of-house store. Here, the accession number - unique code for each object accessioned into the collection - is the key to all information and media held for that object. And so I think that ultimately digital will allow us to have more objects on display - especially as optical recognition and augmented reality develop the possibility to refine this interaction and make it more magical. The object becomes service avatar: all of the evocative, power of an object, used to access the cloud. Where the cloud is all human culture and history.