



E-WASTE

the risk of the unknown



HOW WE DECIDED



Waste ending up in unexpected places in devastating ways and how we can get people interested in reversing that.

HOW WE DECIDED



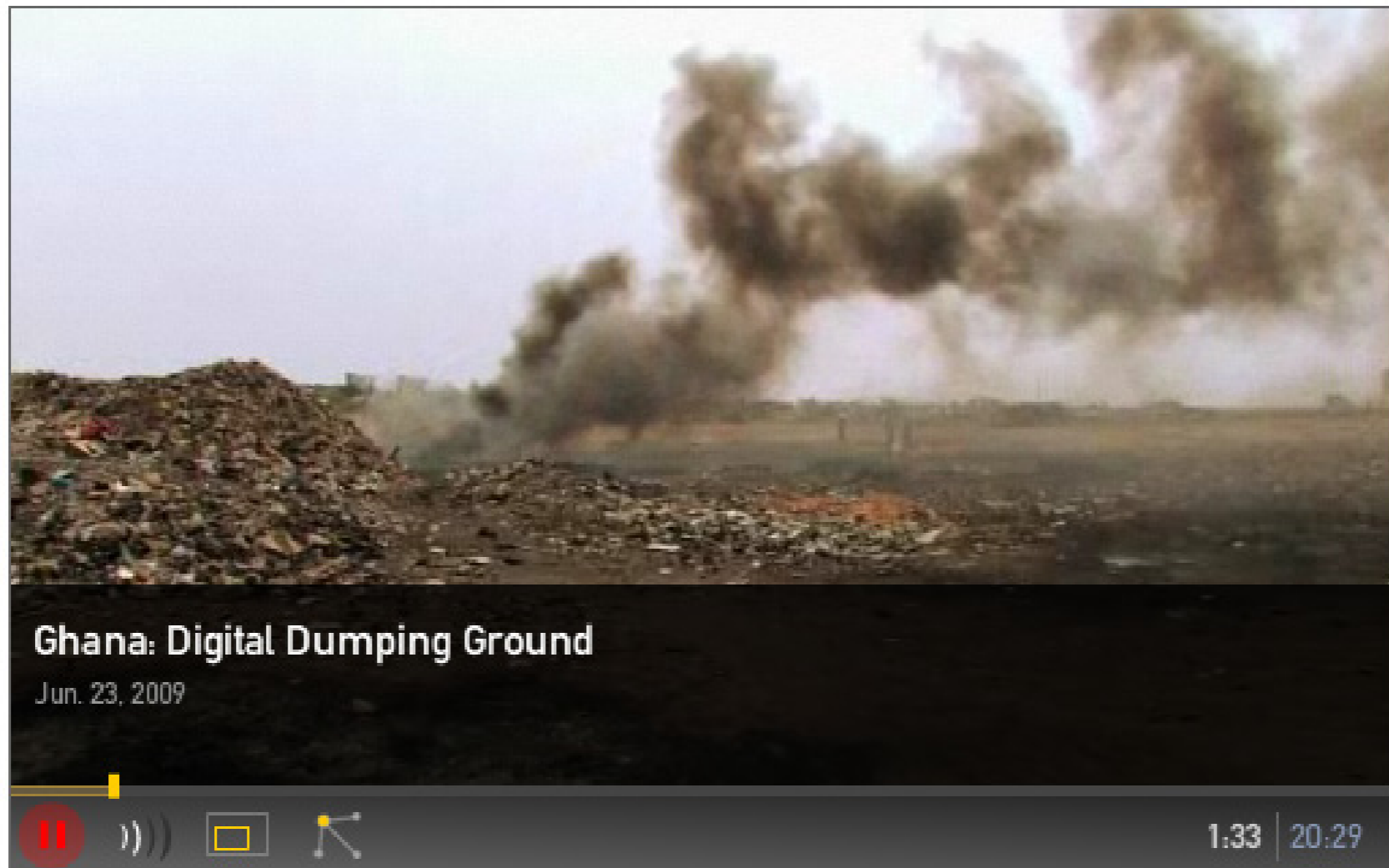
WHAT IS E-WASTE?

The term e-waste encompasses all old electrical appliances either in a state of disrepair or simply obsolete. This includes everything from fridges and microwaves to mobile phones and computers.

HOW WE DECIDED



GHANA: Digital Dumping Ground



http://www.pbs.org/frontlineworld/stories/ghana804/video/video_index.html

HOW WE DECIDED



Key Findings on the Management of Select Electronic Products in the US in 2007

Storage

- Of products sold between 1980 and 2007, approximately 235 million units had accumulated in storage as of 2007.

Estimated Number of Units in Storage as of 2007

Product Type	Number (million units)
Desktop computer	65.7
Computer monitors	42.4
Portable computers (notebooks)	2.1
Televisions	99.1
Hard copy peripherals	25.2
Total	234.6
<i>*EPA does not have information to estimate the number of cell phones currently in storage.</i>	

Recycling vs Disposal

- Of the 2.25 million tons of TVs, cell phones and computer products ready for end-of-life (EOL) management, 18% (414,000 tons) was collected for recycling and 82% (1.84 million tons) was disposed of, primarily in landfills.
- From 1999 through 2005, recycling rate was relatively constant at about 15%. During these years, the amount of electronics recycled increased but the percentage did not because the amount of electronics sent for end of life management increased each year as well.
- For 2006-2007, the recycling rate increased to 18%, possibly because several states have started mandatory collection and recycling programs for electronics.

	Generated (million of units)	Disposed (million of units)	Recycled (million of units)	Recycling Rate (by weight)
Televisions	26.9	20.6	6.3	18%
Computer Products*	205.5	157.3	48.2	18%
Cell Phones	140.3	126.3	14.0	10%

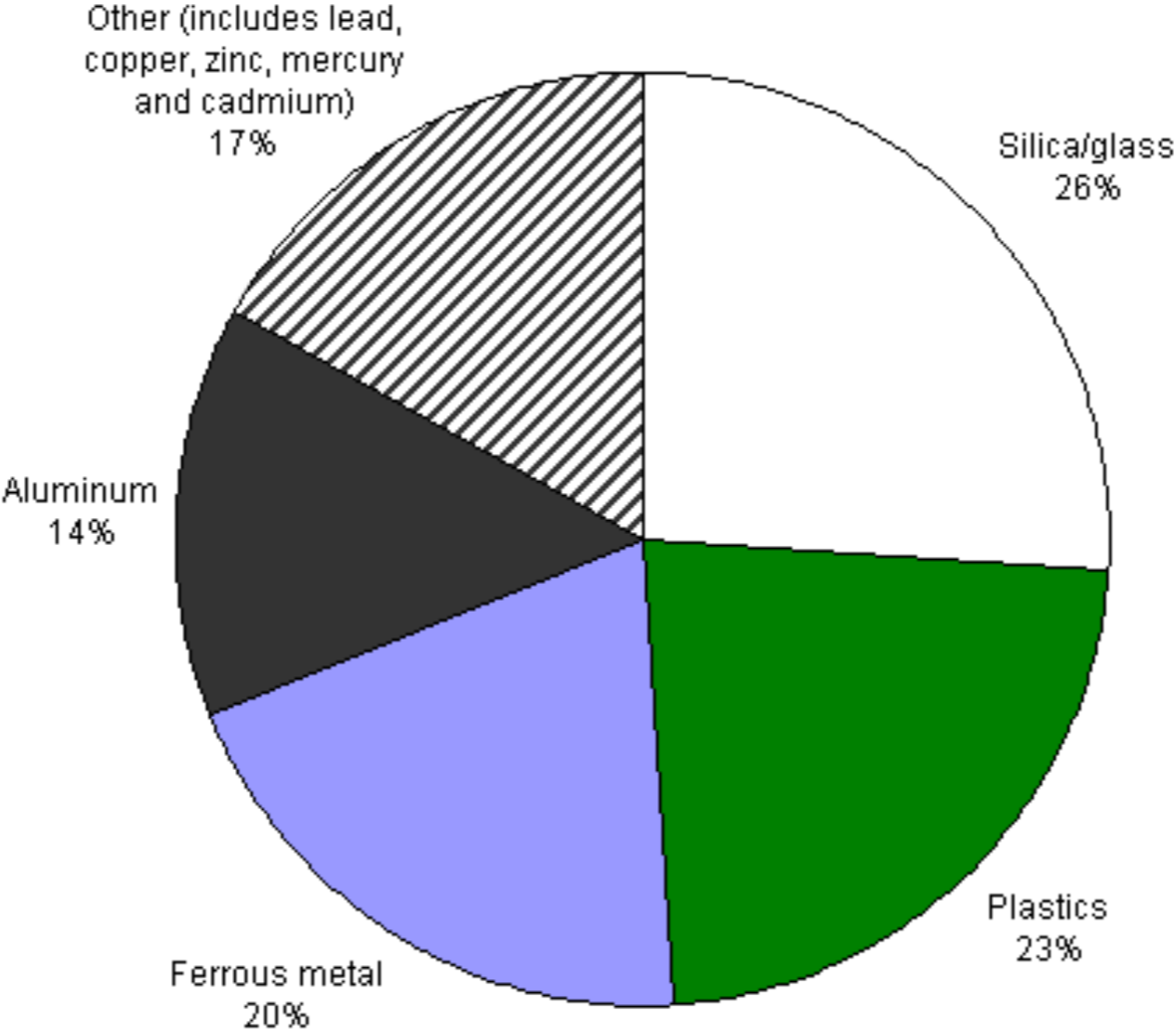
*Computer products include CPUs, monitors, notebooks, keyboards, mice, and hard copy peripherals.

Source: US EPA

HOW WE DECIDED



Material composition of personal computers



Source: Environment Canada.

HOW WE DECIDED



MIT TRASH TRACK PROJECT

Trash | Track

[introduction](#)

[visualizations](#)

[how it works](#)

[exhibitions](#)

[press](#)

[TT in Seattle](#)

For more information,
please contact:
senseable-trash@mit.edu



"Nobody wonders where, each day, they carry their load of refuse. Outside the city, surely; but each year the city expands, and the street cleaners have to fall farther back. The bulk of the outflow increases and the piles rise higher, become stratified, extend over a wider perimeter"

– Italo Calvino, Invisible Cities

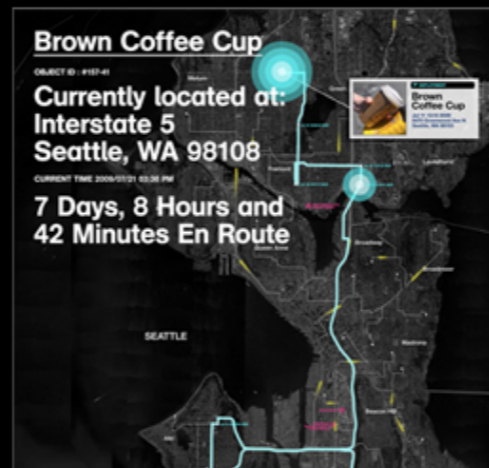
why do we know so much about the supply chain and so little about the 'removal-chain'?

team

Carlo Ratti *Director*
Assaf Biderman *Assoc. Director*
Dietmar Offenhuber *Team Leader*
Eugenio Morello *Team Leader, Concept*
Musstanser Tinauli *Team Leader, First Phase*
Kristian Kloeckl *Team Leader, Second Phase*
Lewis Girod *Engineering*
Jennifer Dunnam
E Roon Kang
Kevin Nattinger
Avid Boustani
David Lee *Programming*
Alan Anderson

Imagine a future where immense amounts of trash didn't pile up on the peripheries of our cities: a future where we understand the 'removal-chain' as we do the 'supply-chain', and where we can use this knowledge to not only build more efficient and sustainable infrastructures but to promote behavioral change. In this future city, the invisible infrastructures of trash removal will become visible and the final journey of our trash will no longer be "out of sight, out of mind".

Elaborated by the SENSEable City Lab and inspired by the NYC Green Initiative, TrashTrack focuses on how pervasive technologies can expose the challenges of waste management and sustainability. Can these same pervasive technologies make 100%

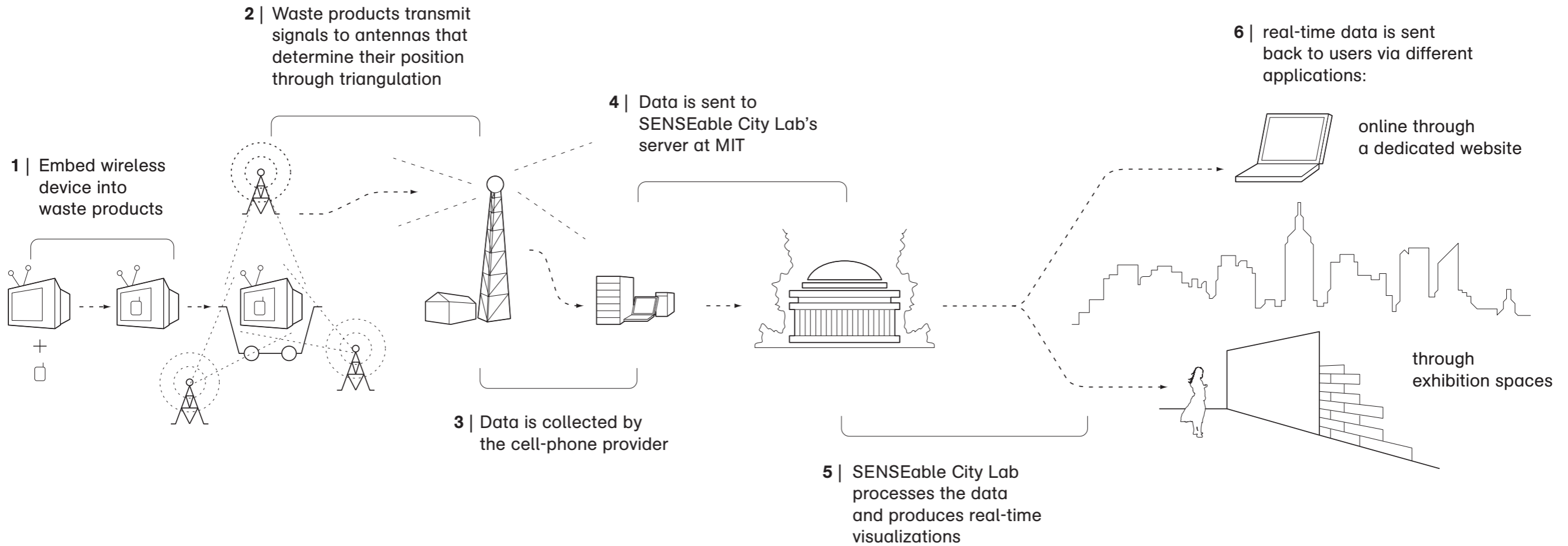


- By SENSEable Lab at MIT
- Cell phone receptors attached to trash (in Seattle and NYC) to track where waste goes

PRECEDENTS



MIT TRASH TRACK PROJECT



- Cell phone towers triangulate where trash is; once no signals are received, the last location tracked is deemed as the "end of life" location.
- Information goes to server at SENSEable lab, where they process data and send information to users, website, and exhibition spaces.



GREENPEACE ELECTRONIC WASTE TRAIL

- Similar project to MIT Trash Track, except GPS locator attached to electronic waste.
- E-waste mostly travels from developed countries to developing countries, often illegally.



<http://www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/where-does-e-waste-end-up/>

PRECEDENTS



THE FUN THEORY

<http://www.thefuntheory.com/>



- A project that creates fun and interactive experiences to encourage better behavior (like throwing away litter, taking the stairs, etc.)
 - Positive experience causes behavioral change.

PRECEDENTS



BEN FRY

<http://benfry.com/>



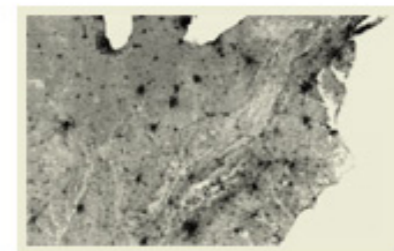
San Francisco
A detail of the West shows the relative lack of roads in mountainous areas, punctuated by the densely populated Bay Area.



Kansas City
The white blocks seem to be rural routes and unnamed roads, their alignment to lat/lon boundaries suggests differences in how adjacent counties identify streets.



The Great Lakes
Chicago and the shore on the left, Detroit to the right: a wonderful range of sparse and complex in this crop.



Appalachian Mountains
The ridges of the Appalachian mountain range emerge from the roads that avoid them (or follow their contours).

VISUALIZING DATA



BEN FRY

<http://benfry.com/>



genome
valence

The most recent version of **Valence** (shown above) visualizes biological data, and was created for the **2002 Whitney Biennial**.

I also developed the **ACGT Keyboard** to use with this Installation.

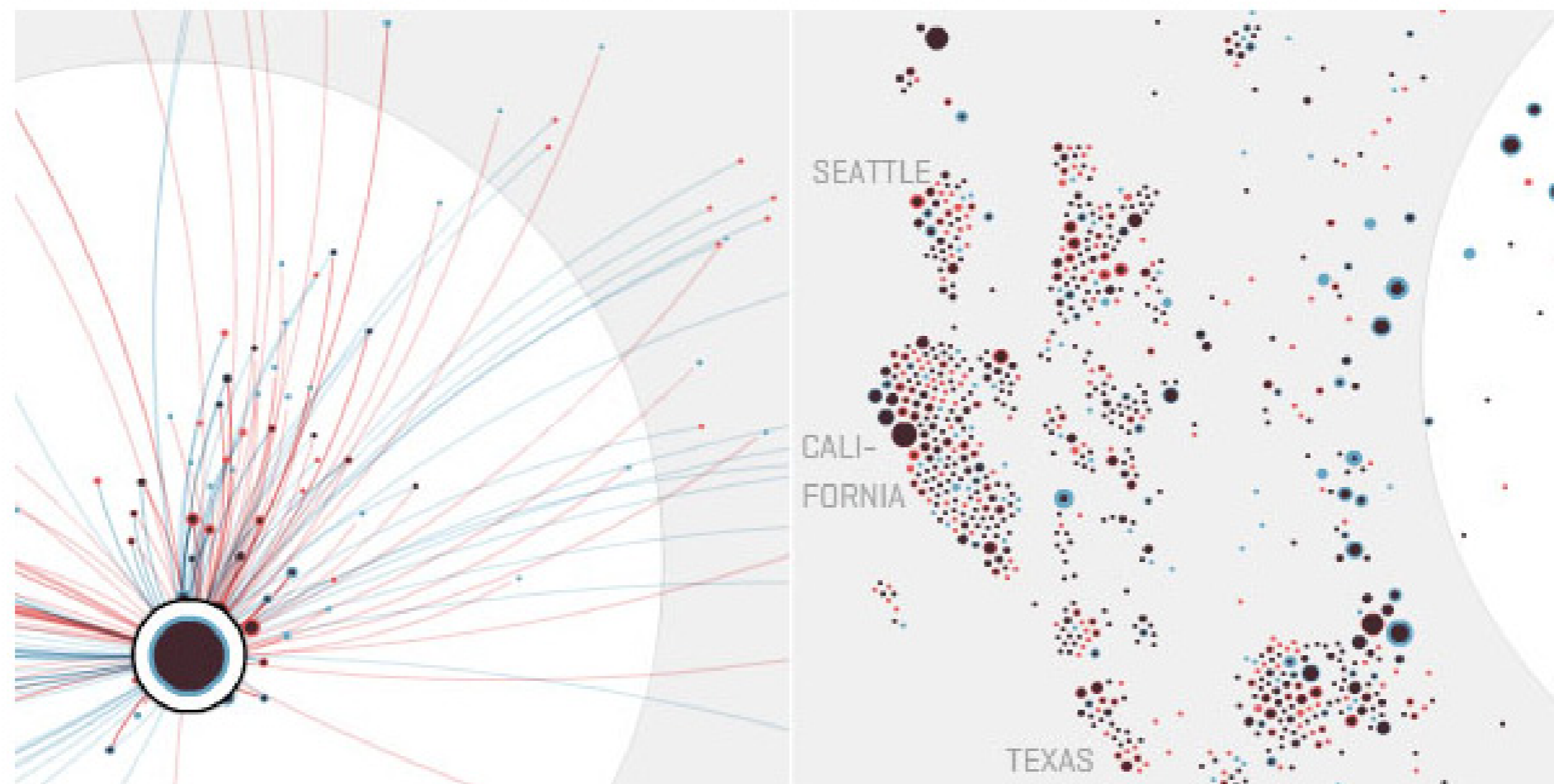
Jennifer Connelly makes use of Genome Valence in the **Hulk** movie.

VISUALIZING DATA



INFOSTHETICS

<http://infosthetics.com/>



Map Your Moves [moritz.stefaner.eu] represents more than 4,000 geographical immigration and emigration patterns from over 1,700 people in a beautiful, interactive interface. The data was collected during an **informal survey** by **WNYC**, a New York based public radio station.

VISUALIZING DATA



INFOSTHETICS

<http://infosthetics.com/>

Weaving Meteorological Data into Artful Baskets

ATTRIBUTE

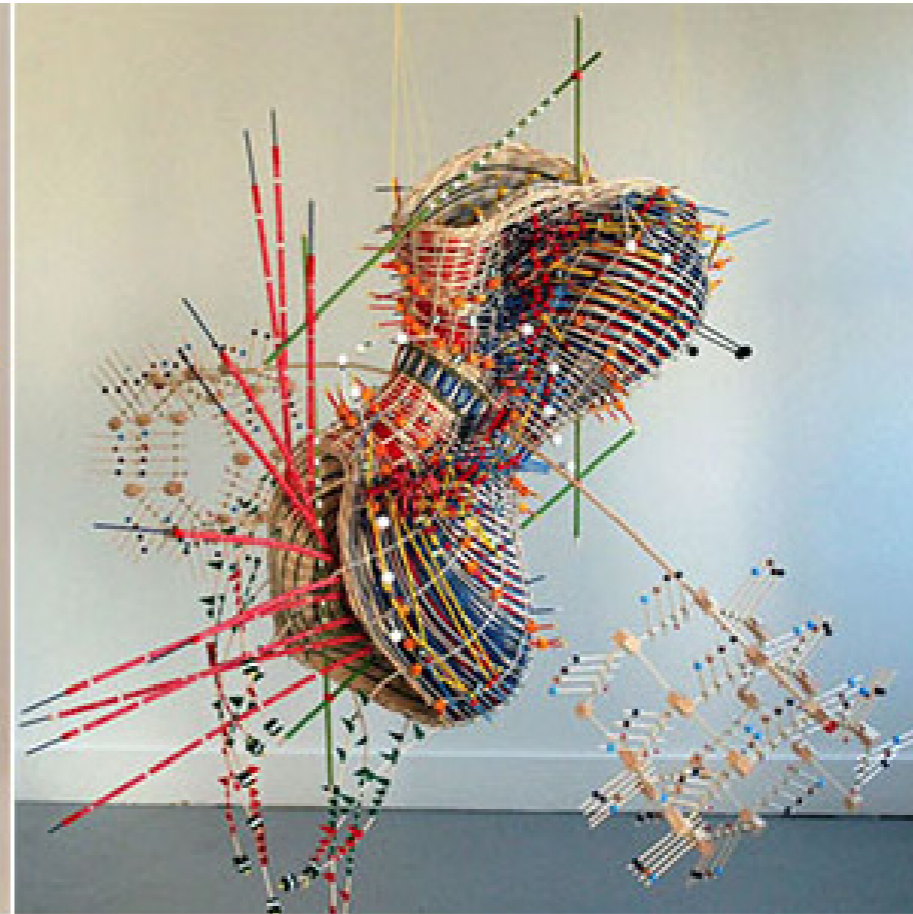
Tue 07 September 2010 at 1:29 PM
by [infosthetics](#)

CATEGORIZE

art / collection / infographic /
physical

PARTICIPATE

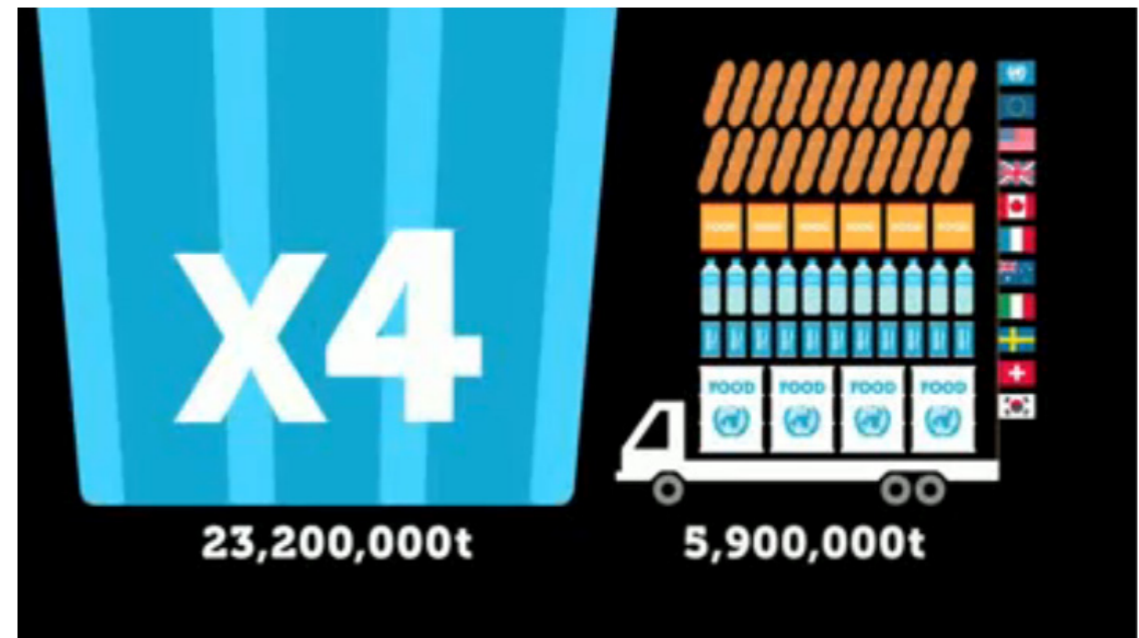
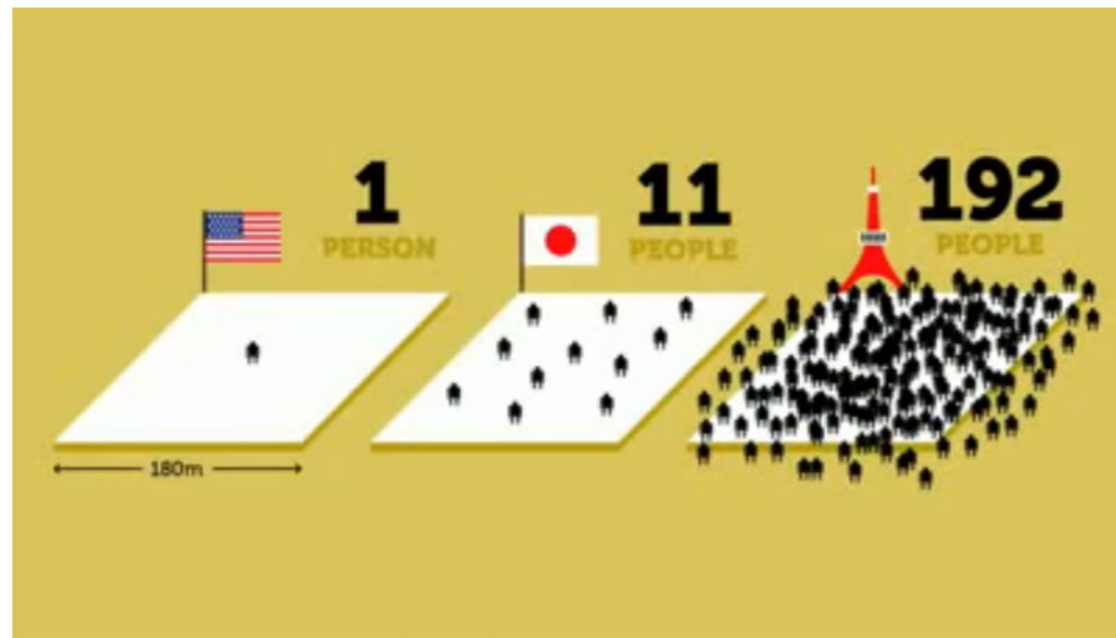
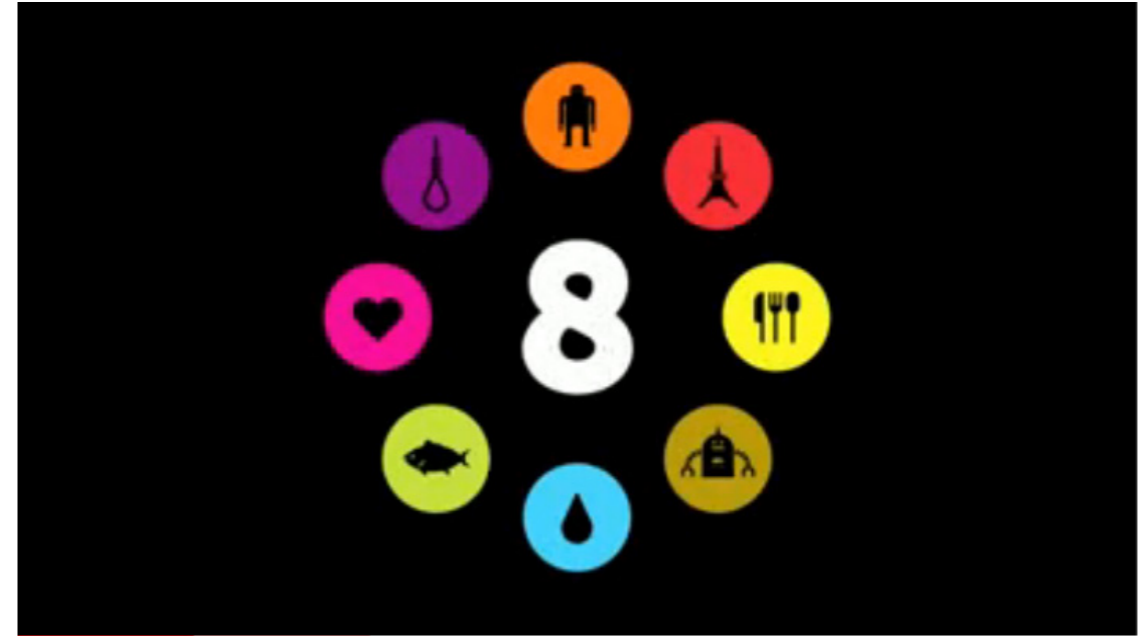
add to the 1 comment
save or share this post



VISUALIZING DATA



JAPAN: THE STRANGE COUNTRY



VISUALIZING DATA



FROM **ESCAPING FLATLAND**, BY EDWARD TUFTE

“Escaping this flatland is the essential task of envisioning information - for all the interesting worlds (physical, biological, imaginary, human) that we seek to understand are inevitable and happily multivariate in nature. Not flatlands”.

CONNECTIONS



FROM **GENEALOGY OF MEDIA ART**, BY PETE WEIBEL

“The intention is for our fields of knowledge to be extended and driven forward through a alliance of the mechanical media arts with the natural sciences, and hence for platforms and practices of democratic processes to be created with the aid of new technologies and methods”. (9)

Media art has developed into an outlet for the masses.

CONNECTIONS



“The receiver is an integral component in the creative act. The view switches to become an artist; the consumer becomes producer”. (18)

“Interactive art works no longer exist autonomously, but only through their use by the receiver, the user”. (22)

Interactive art allows the viewer/user to be an artist, to help create the piece.

CONNECTIONS



WALL-o-WASTE *phase 1: collecting data*

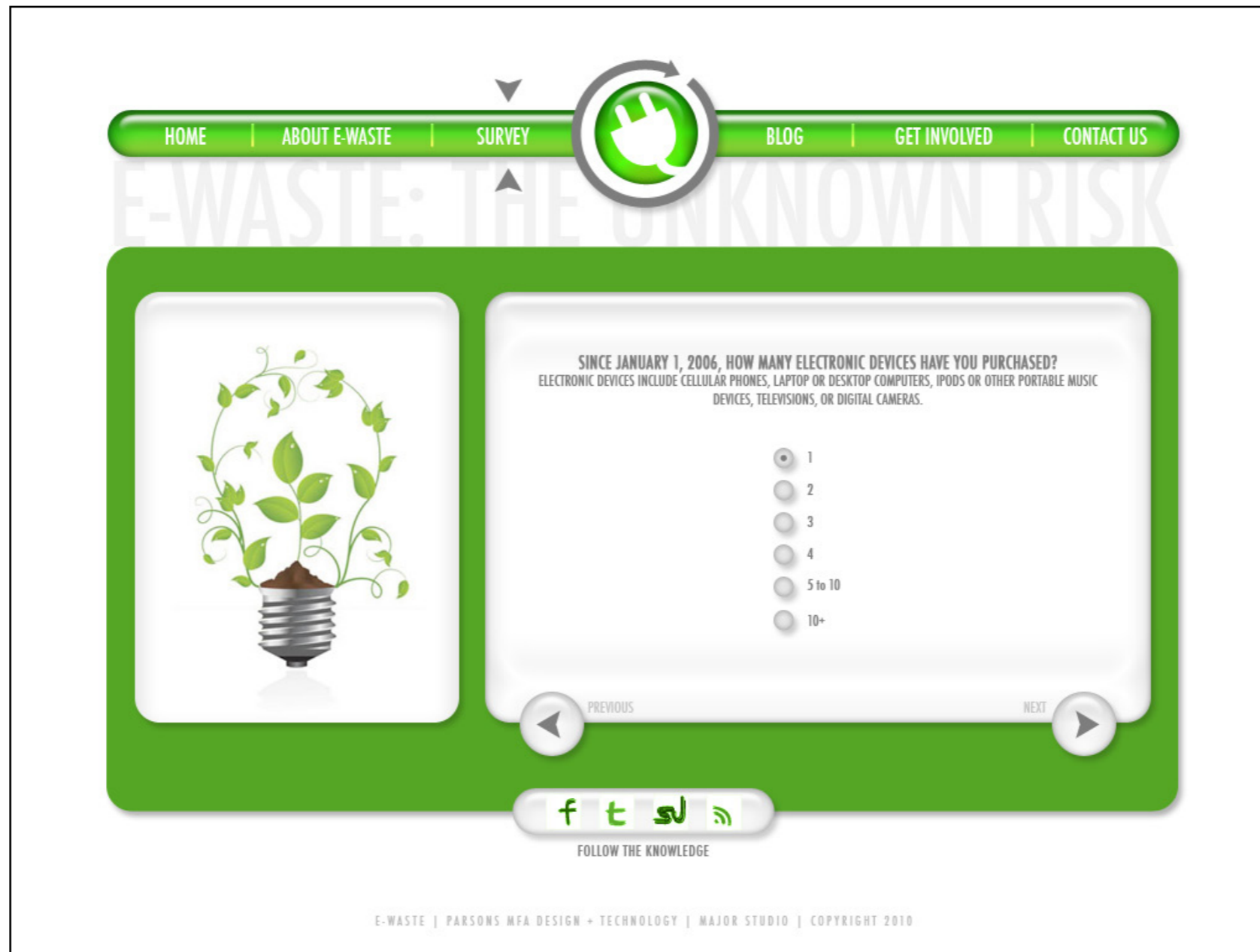


- Collect data in a survey, via multiple platforms (web page, cell phone app, etc).

PROJECT IDEAS



WALL-o-WASTE *phase 1: collecting data*

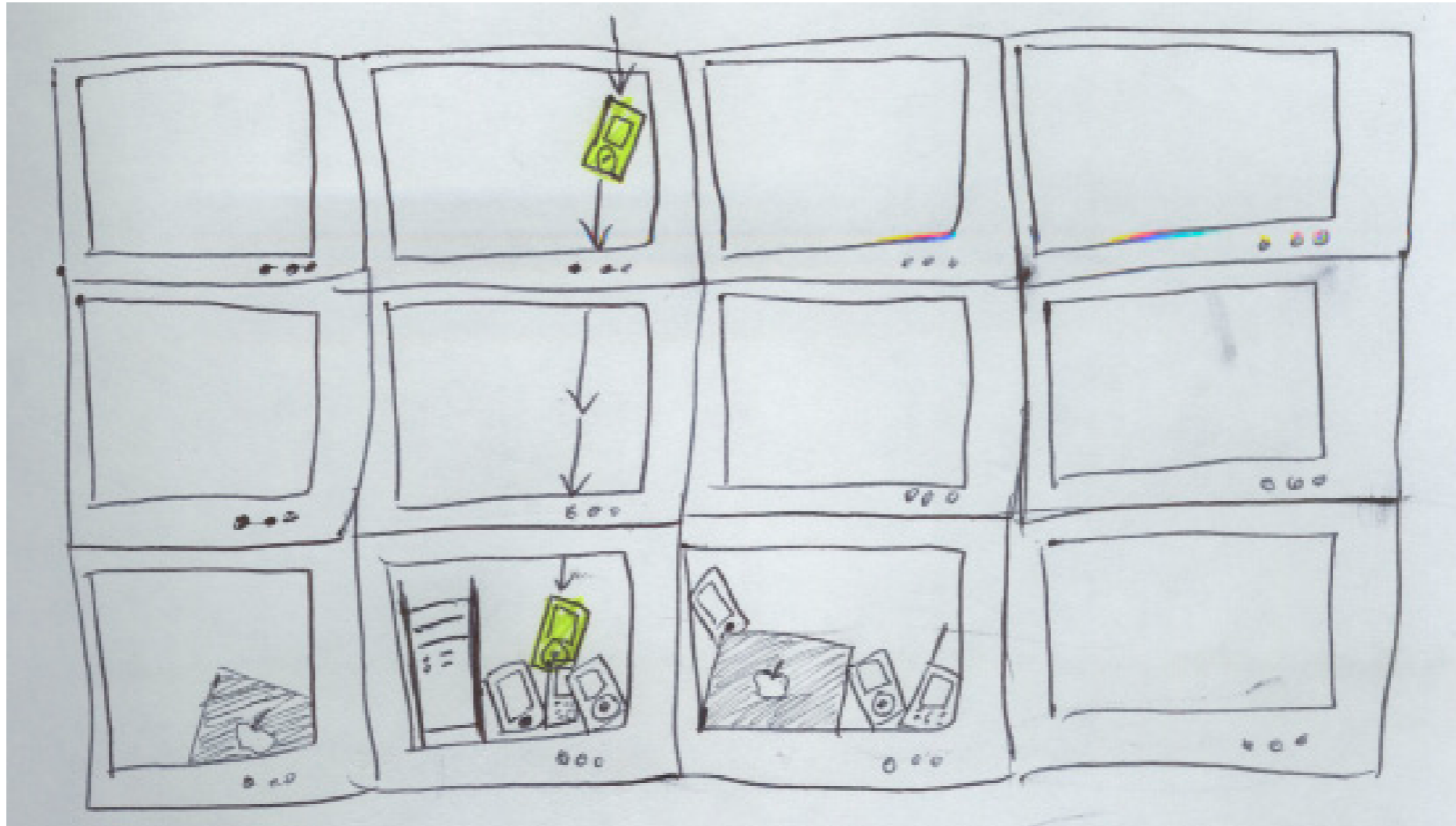


- The survey would ask information about how many electronic devices a person has had in the last X number of years, where they think their waste goes, and demographic information.

PROJECT IDEAS



WALL-o-WASTE *phase2: visualization*



- One visualization we would like to have is a Pile of E-waste, generated by the data we collect. As users input the number of electronics they have had, that number of electronics “drop” from the top of the screen and create a large pile of wastes.
- We want viewers to have a visual sense of the amount of waste created by few people.

PROJECT IDEAS



WALL-o-WASTE *phase3: final installation*



- We would then visualize this collected data by projection onto a wall of e-waste computer monitors, iPods, TV screens, etc.
- The user could interact via a small touch-screen device to the side, allowing them to toggle between different visualizations.

PROJECT IDEAS



WALL-o-WASTE *list of materials*

Interface Device:

Refurbished Eee PC 900A Atom N270 1.6GHz 1GB 4GB SSD

\$149.98 from unclevic.com

<http://www.unclevic.com/ASUS-WFBB01-Eee-PC-900A-Atom-N270-16GHz-1GB-4GB-SSD>

Projector:

Nec NP110 DLP Projector

\$319.90 from powersellernyc.com

<http://powersellernyc.com/product/view/NEC-NP110-DLP-Projector-25513.html>

Extension Cord:

Mountain 5850EC 50' Heavy Duty 16/3 SJTW Extension Cord

\$24.95 from sjdiscounttools.com

<http://www.sjdiscounttools.com/mtn5850ec.html>

PROJECT IDEAS



WALL-o-WASTE *list of materials*

VGA Cord:

BELKIN 20 ft. OmniView ExpandView HD-15 Male to HD-15 Female Cable Model F1D9003-20

\$30.99 from newegg.com

<http://www.newegg.com/Product/Product.aspx?Item=N82E16812107499>

Projection Paint:

Goo Systems CRT White Basecoat Acrylic Paint - 1000ml

\$54.95 from bhphotovideo.com

http://www.bhphotovideo.com/c/product/337537-REG/Goo_Systems_4193_CRT_White_Basecoat_Acrylic.html

4-16 Broken Monitors:

Make, model, and specs not important just all need to be roughly the same size

\$free from garbage

PROJECT IDEAS

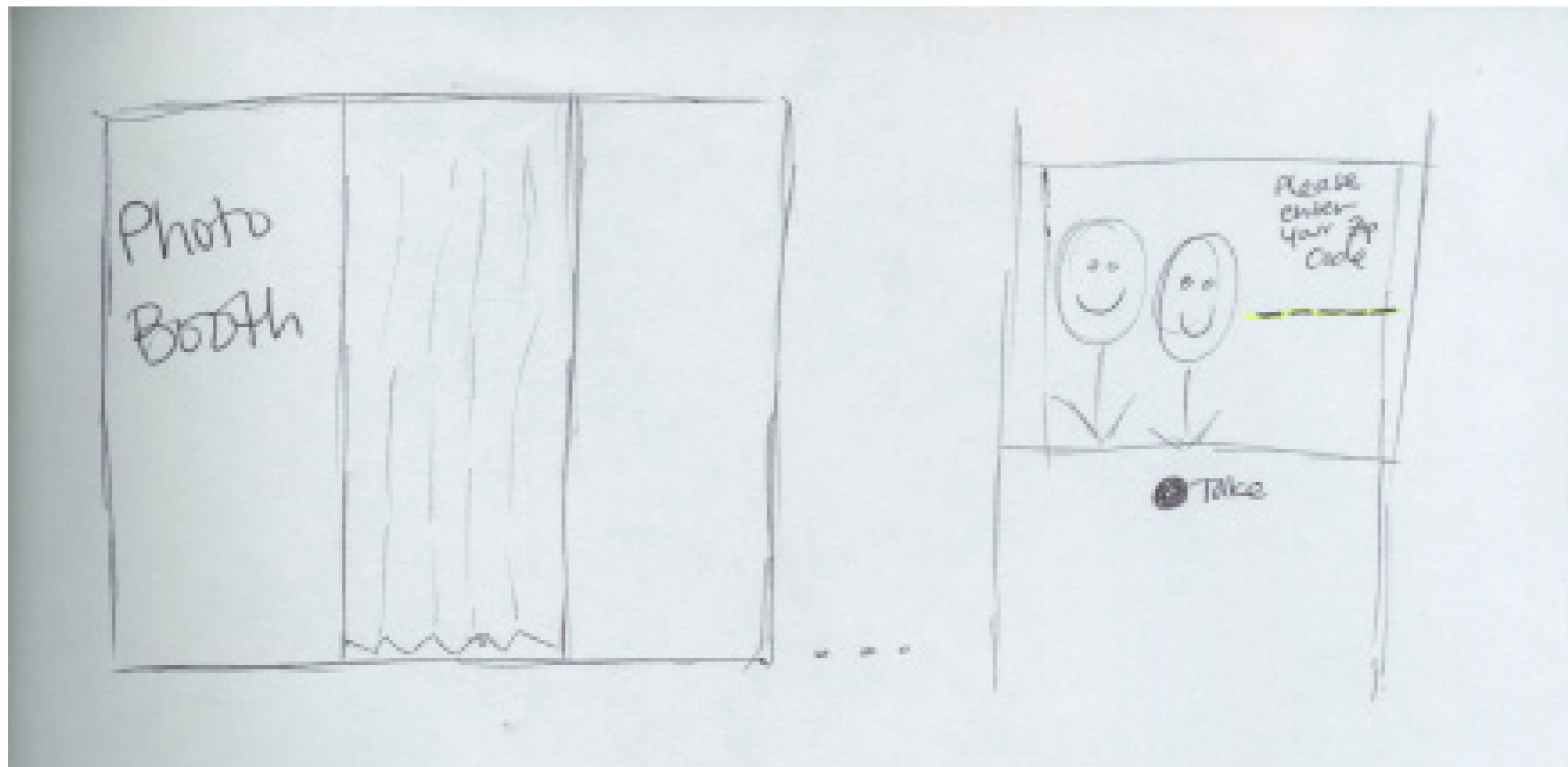


- Put piles of e-waste, like ones found in developing countries, in unexpected places around NYC
- This is an example of an e-waste pile in Central Park. Viewers would be surprised to find their waste in the middle of this beautiful space.

FUTURE PROJECTS



PHOTOBOOTH

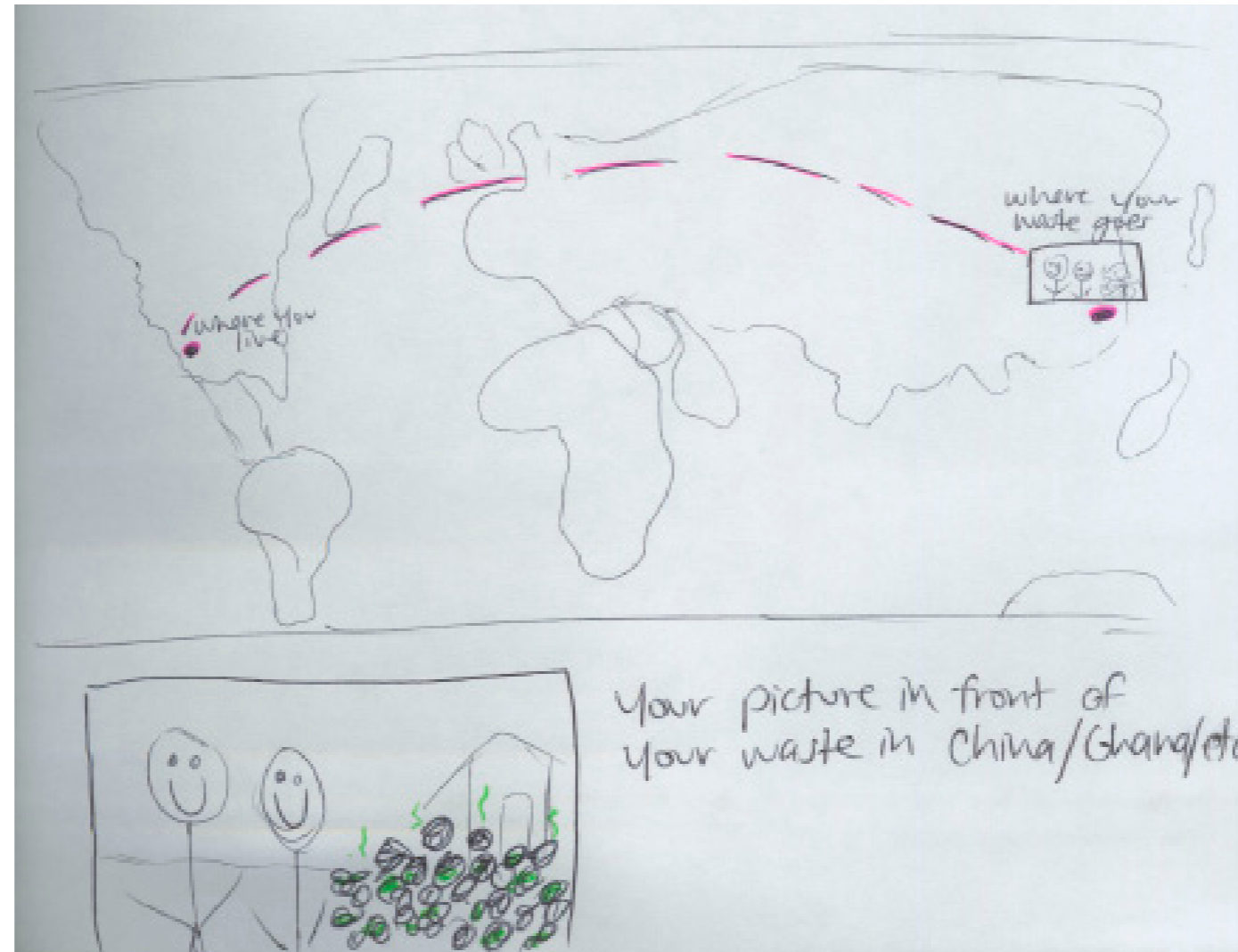


- A final idea is to attach users to their waste and show, on a map, just how far their e-waste travels once they dispose of it.
- Users sit in a photo booth in the exhibit, input their Zip Code, and take a picture.

FUTURE PROJECTS



PHOTOBOOTH



- Their image is imposed onto a picture of pile of waste. On a large screen in the exhibit, their photograph “travels” from their home Zip Code to a remote location on the other side of the world, based on real data we collect about E-waste travel.
- This would help users to understand where their waste ends up, that it doesn’t just disappear once they dispose of it.

FUTURE PROJECTS