

Tangible Domestic Technology

Ryan Aipperspach

Tangible User Interfaces

I290-13


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warm-up exercise

Example Nurturing Place in the Home

Please describe a nurturing place in a home you have lived in or visited.

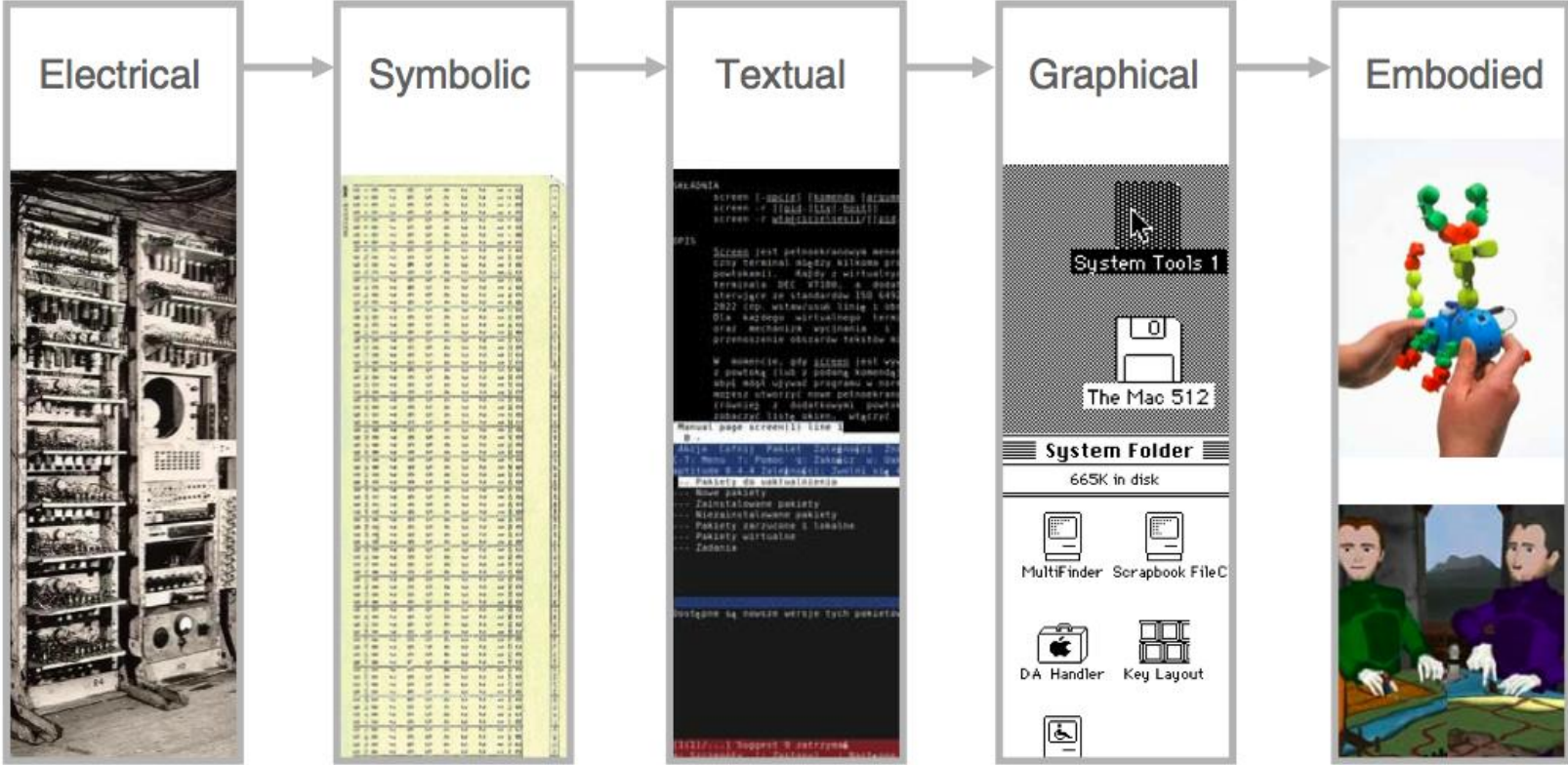
Your Name:	Location:
Place name:	
Three words that describe this place:	
Things you did in this place:	
Image:	
How does the place respond to these needs:	



from *Some Place Like Home* by Toby Israel

[Ame Elliot, PARC]

migration from work to home



too big!

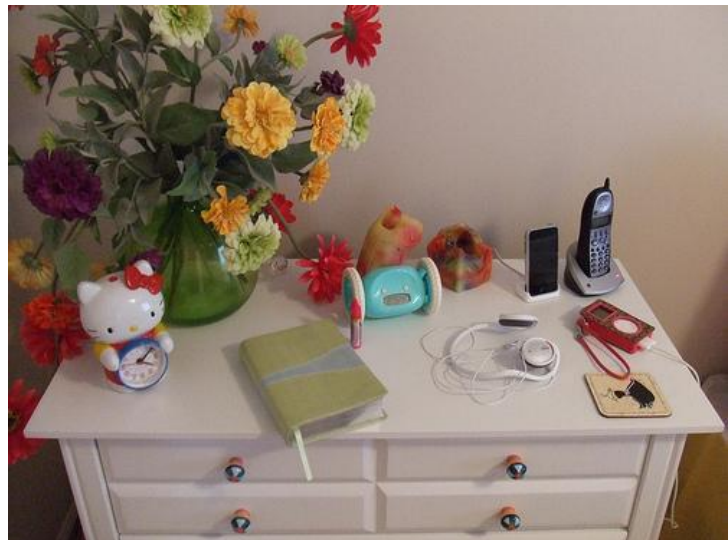
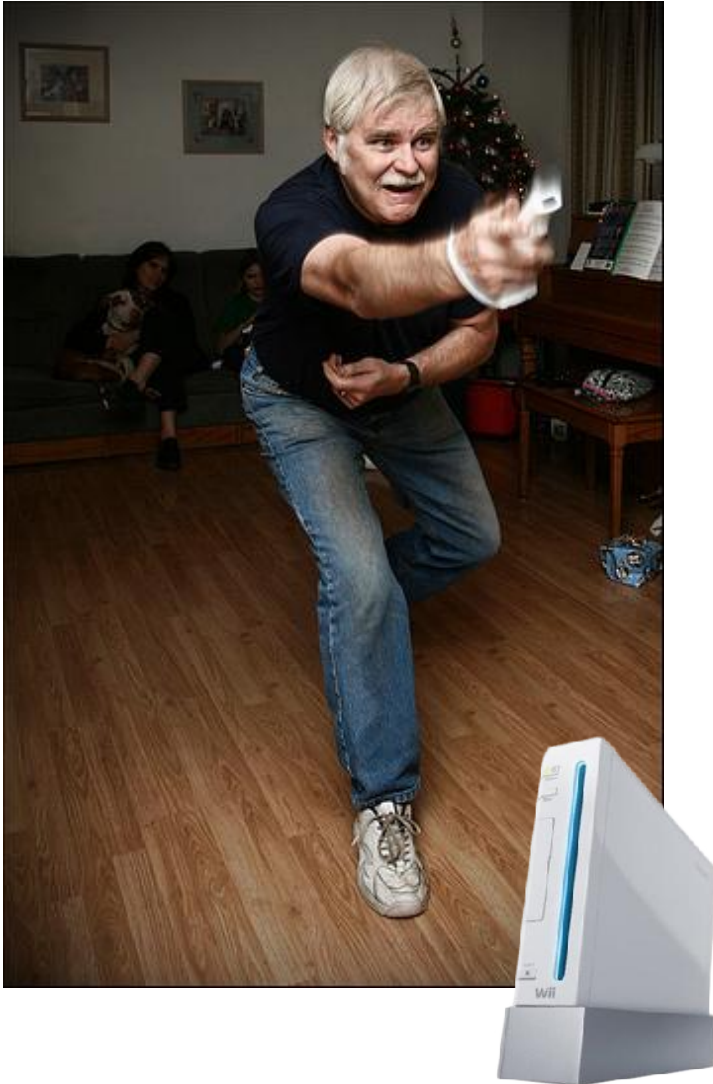
too hard!

closer...
(but bland)

closer...
(but stationary)

just right!

migration from work to home



outline

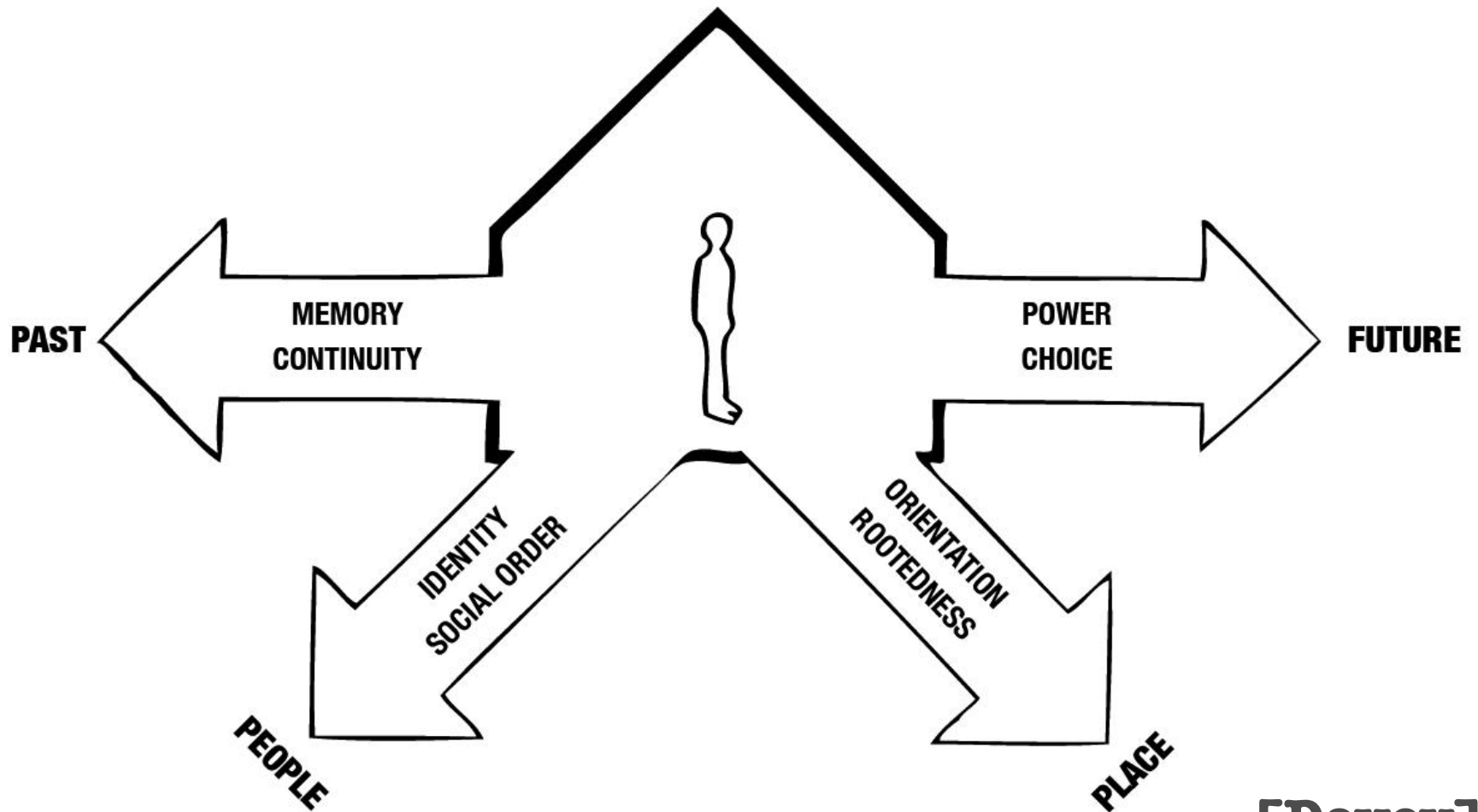
1. Why is the home a good place for tangible interfaces?
2. What tangible interfaces exist or have been proposed for the home?
3. How does technology relate to the physical space of the home?

Why is the home a good place for
tangible interfaces?

(What is the purpose of the home?)

the purpose of home

Home as connectedness



[Dovey]

the purpose of home

The home contains
meaningful objects ,
representations of an idealized self (displaced meaning), and
symbols of friends & family .

[Csikszentmihalyi, McCracken]



a Jewish mezuzah



The house we were born in is more than an embodiment of home, it is also an embodiment of dreams.

Each one of its nooks and corners was a resting-place for daydreaming.

[Bachelard]

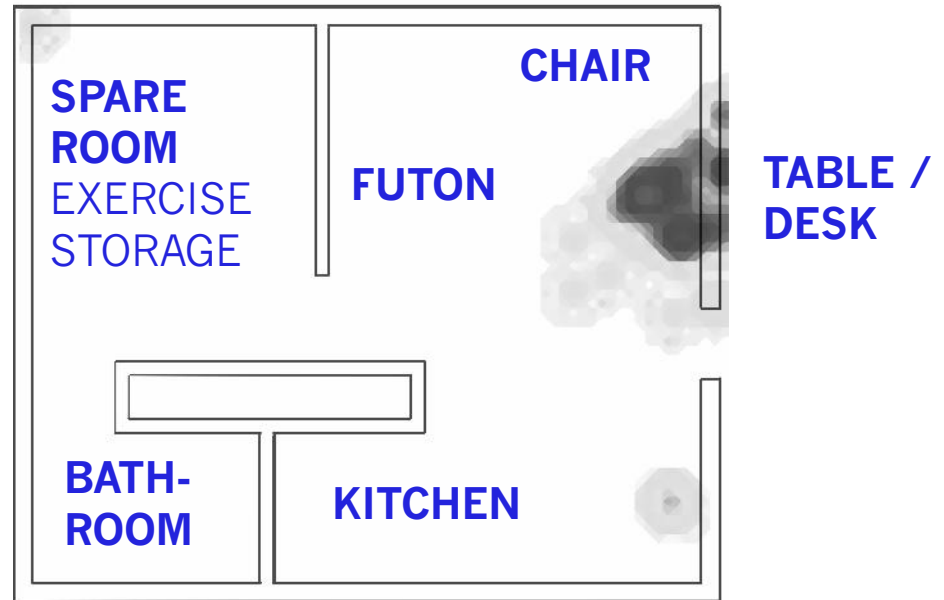
Each one of its nooks and corners
was a resting-place for
daydreaming.

How often do you take your desktop
PC into a daydreaming nook?

laptops and desktops in the home

Traditional computers like **laptops** and **desktops** inhabit a small portion of the home.

(Some, but not all, people do take them into their bedroom.)



the purpose of home

The home contains many meaningful, symbolic objects.

Every corner of the home is used for play, work, and reflection.

Both the objects in the home and its structure are well suited to tangible interfaces.

What tangible interfaces exist or have been proposed for the home?

there are *lots* of commercial examples...

... especially toys!



smart homes



Georgia Tech Aware Home



MIT House_N

smart homes

“Smart homes” use **sensing** and **context aware** technologies that try to determine what users are doing.

Applications include

assisting with everyday tasks,
monitoring **activities of daily living**,
automatically **adjusting** the environment,
etc.

smart homes

Virtual Recipe

the recipe for your meal is projected onto the hood and the counter. users navigate through recipe by waving their hand in front of 'virtual buttons' recognized by a webcam on the cabinet door.

HeatSink

LEDs in the faucet head represent the temperature of the water by fading from blue (cold) to red (hot). users no longer have to touch the stream of water to know whether they have the right temperature.

Augmented Cabinetry

RFID tag readers and capacitive sensors determine the location and quantity of utensils. the virtual recipe prompts LEDs in the drawer handles to show users where needed tools are located, avoiding the time wasted in a serial search of the cabinets.

4D FridgeCam

the contents of the refrigerator are projected on to the door in four dimensions: two view are captured each time the fridge is opened, and newer views are superimposed in transparency over old views. by seeing what's inside the fridge and where it is, users will spend less time with the door open.

RangeFinder

a remote infrared thermometer measures the surface temperature of pans on the range to make certain that food does not burn and to inform the user when attention is needed. the virtual recipe projects directly onto the range and countertop with information about the state of food, including the time elapsed, task-based instruction and images of the food as it should appear when ready.

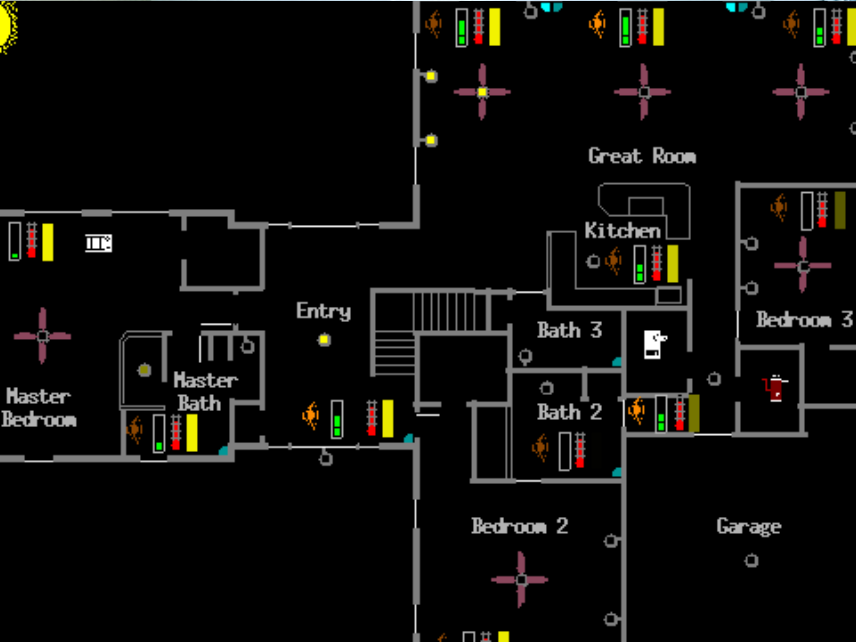
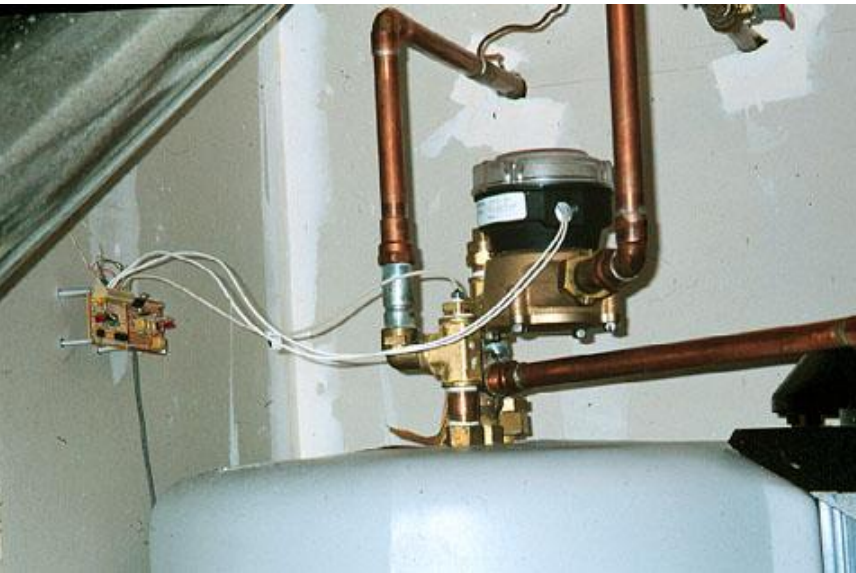
**The
Augmented
Reality
Kitchen**

smart homes



**Monitoring
Activities of Daily
Living** [Philipose et al.]

smart homes



The Adaptive House [Mozer]

What do you think about smart homes?

smart homes

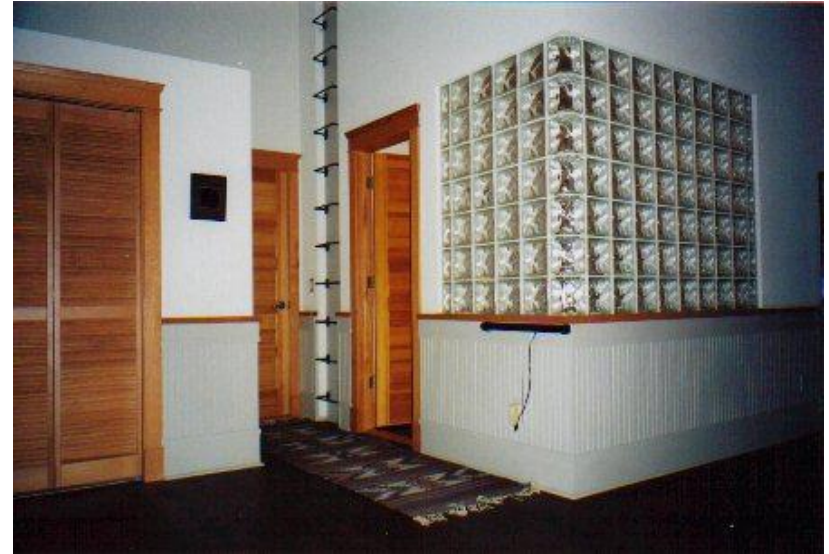
Building proactive
“smart homes” is
difficult!

Will people **happily
wear sensors?**

Can they really infer
what someone **wants**
to happen?

What if the sensors
are **wrong?**

How will people **pay**
for it?

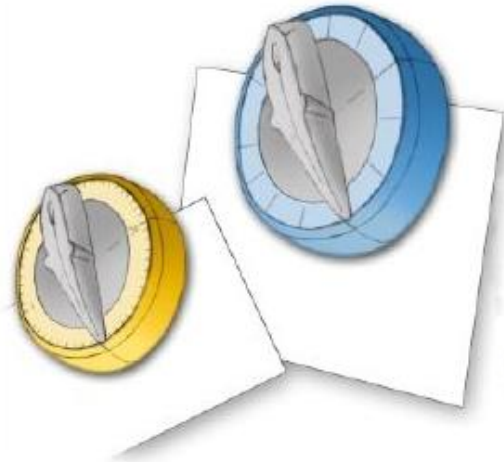


The bathroom from the
Adaptive House

... it is people who imbue their homes with intelligence by continually weaving together things in their physical worlds with their everyday routines and distinct social arrangements.

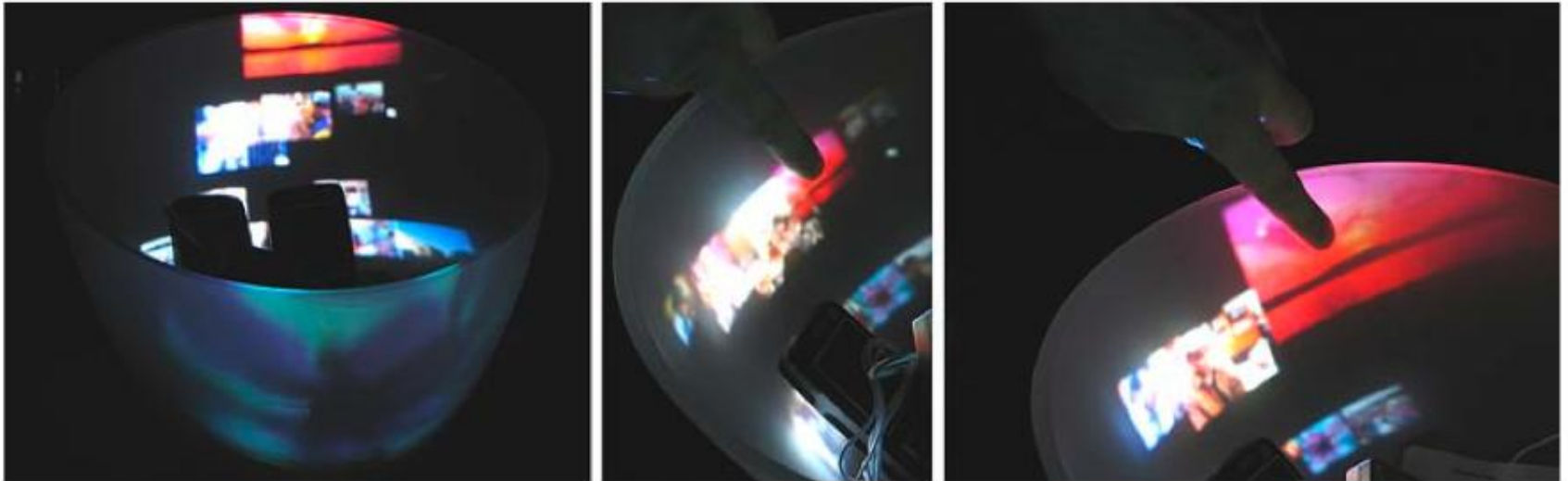
[Taylor, et al.]

“homes that make us smart”



Augmented Magnets

“homes that make us smart”



The Clutter Bowl

“homes that make us smart”

connections between homes



Feather, Scent, and Shaker
[Strong and Gaver]

“homes that make us smart” critical design



Electricity Drain



Compass Table



The Loft

The Placebo Project
[Dunne and Raby]

“homes that make us smart”



[\[Video Link\]](#)

The History Tablecloth
[Boucher, et al.]

“homes that make us smart”



[\[Video Link\]](#)

The Key Table
[Gaver, et al.]

“homes that make us smart”



[\[Video Link\]](#)

The Drift Table
[Gaver, et al.]

What do you think about “homes that make us smart”?

differences

“Homes that make us smart” can be more **ambiguous** and **playful**.

Their relative **simplicity** allows them to be better understood and co-opted to create **meaning**.



Many of these examples are “furniture like” and shape the domestic space. So...

How does technology relate to the physical space of the home?

the “homogeneous home”?

Increasing domestic homogeneity

Spatial homogeneity: lots of “suburban, single-family homes”, even though only $\frac{1}{4}$ of the US population is married with children [Ahrentzen]

Temporal homogeneity: 24-hour culture that has Blackberries on the bedside table

Technological homogeneity: screens and connectivity everywhere, all the time

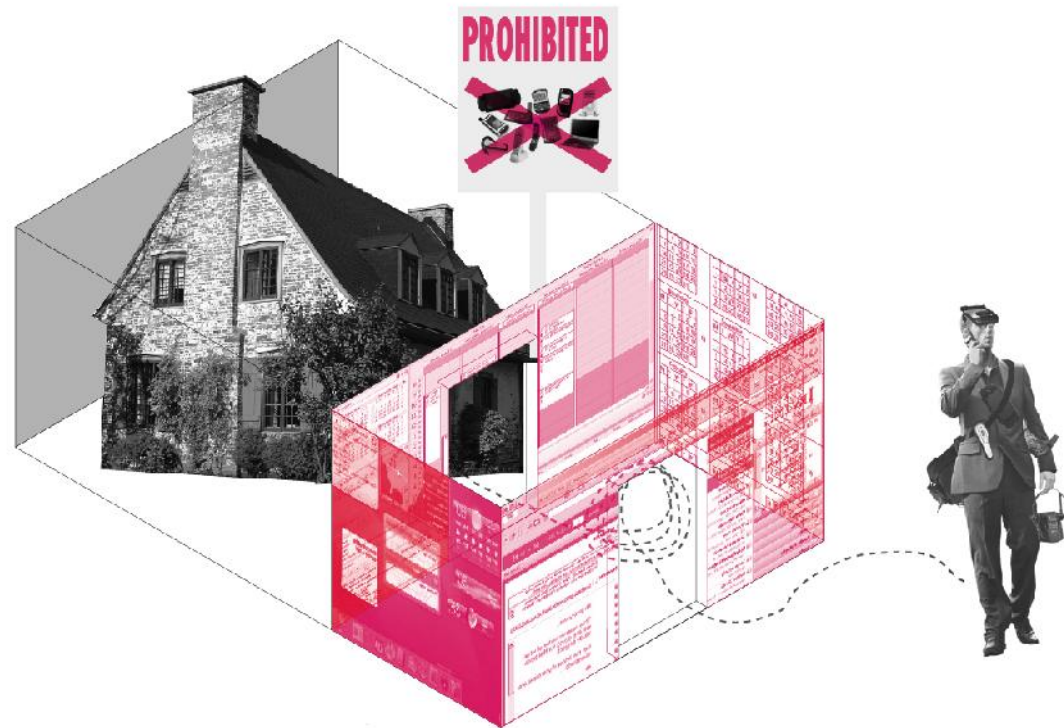
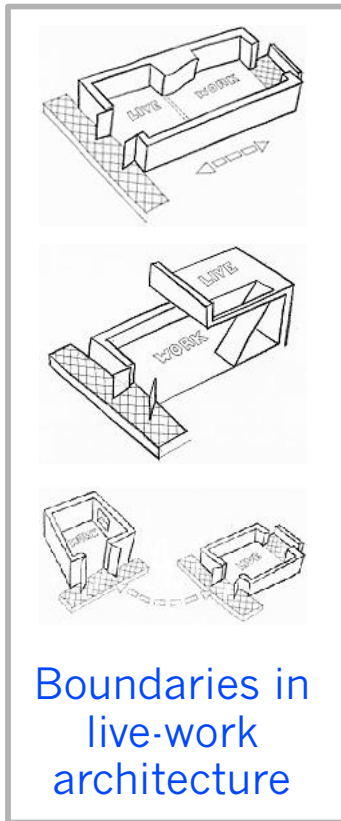
None of this is **bad** (or universal), but it's worth pushing back on...



[Aipperspach, Hooker, Woodruff]

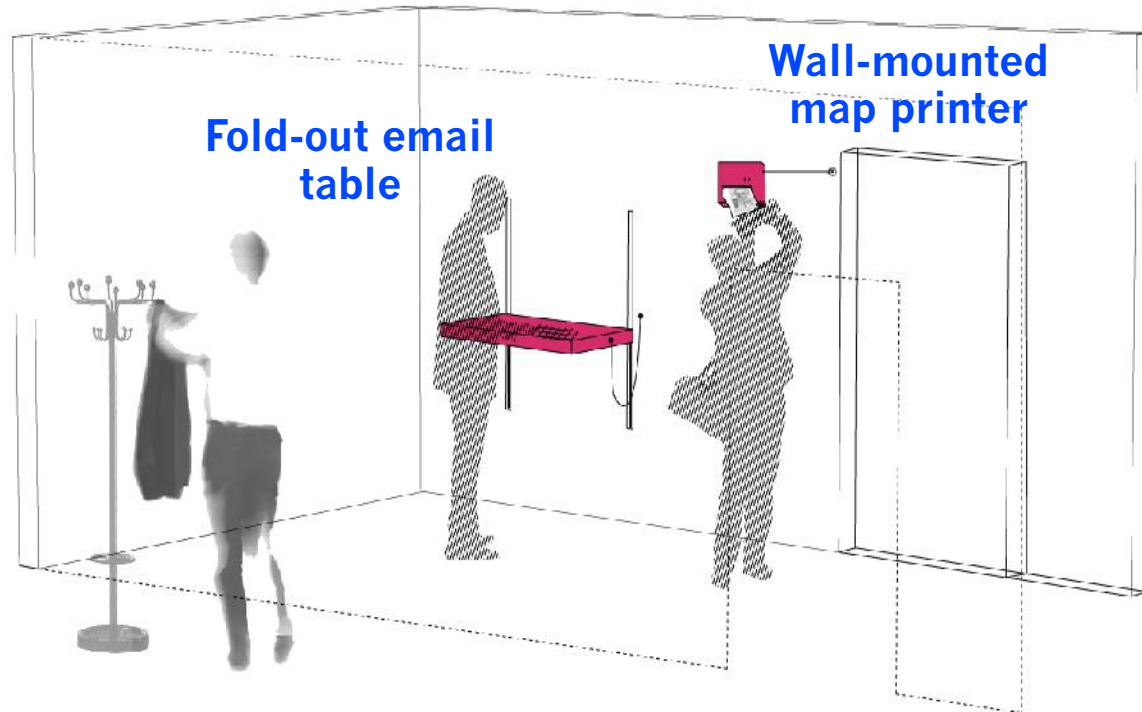
boundaries: house vs. home

What about “technology free zones”?



boundaries: house vs. home

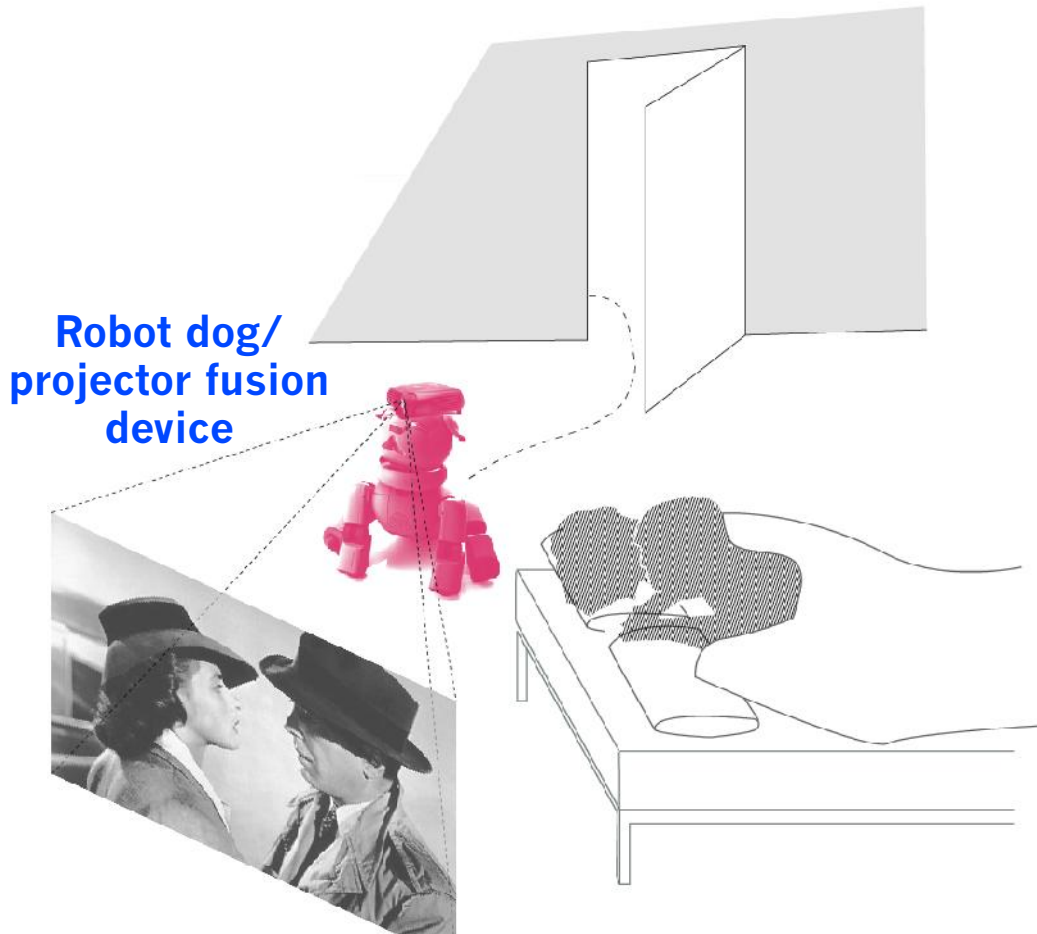
What about “technology free zones”?



The
“Work-at-Home”
entryway

tourist objects

Portable technology that softens the boundary



We keep the bedroom technology free but, as a treat, at the weekends we like to watch a movie in bed.

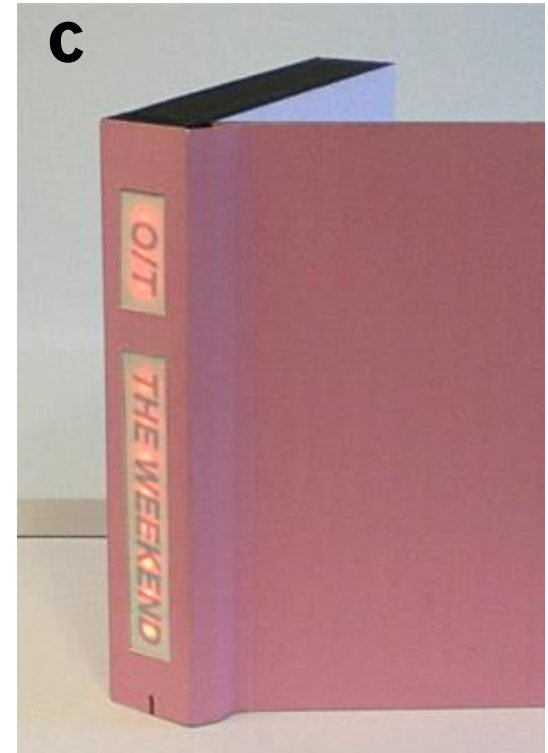
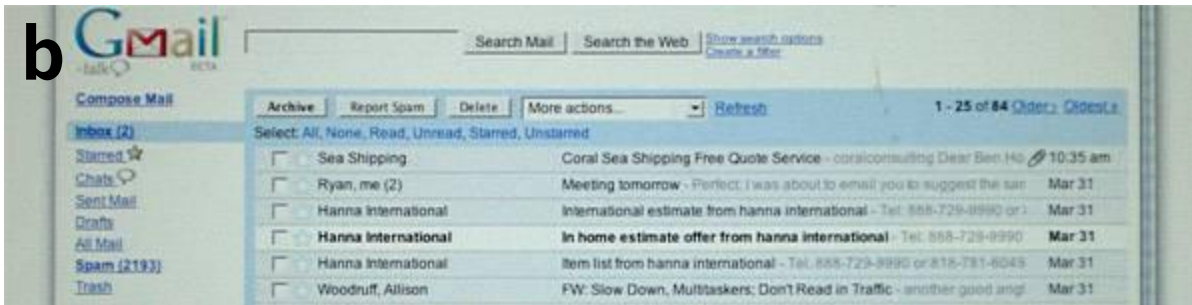
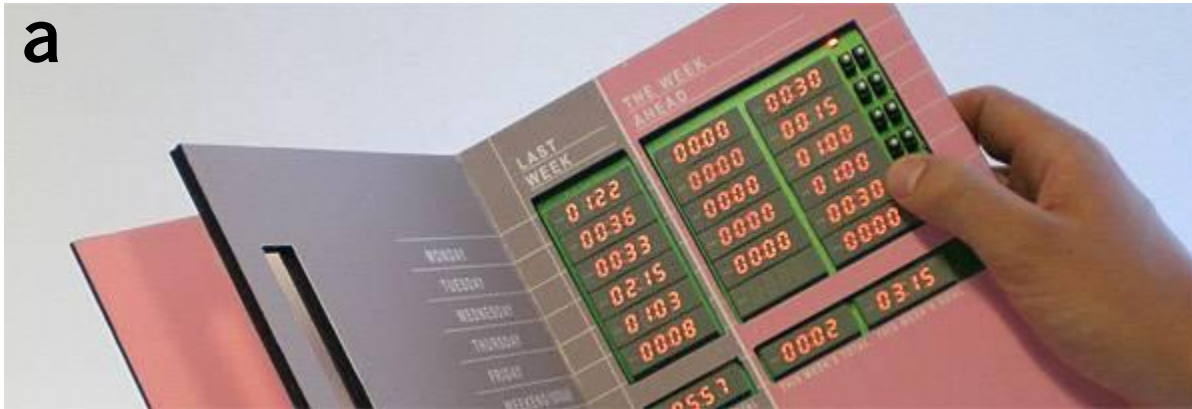
tourist objects: data souvenirs



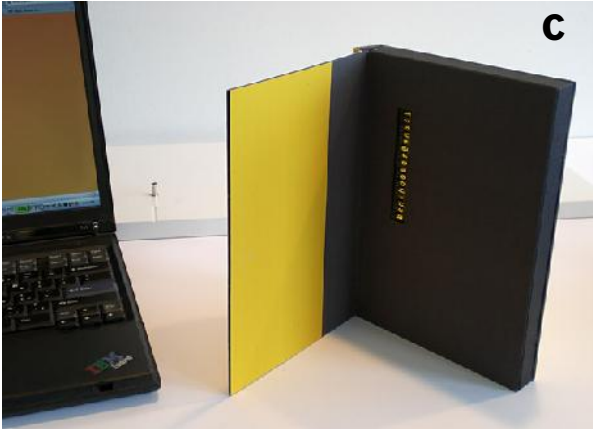
The need for a **charging station** gives tourist objects a place where they **live**, subtly encouraging heterogeneity.

[Aipperspach, Hooker, Woodruff, Canny]

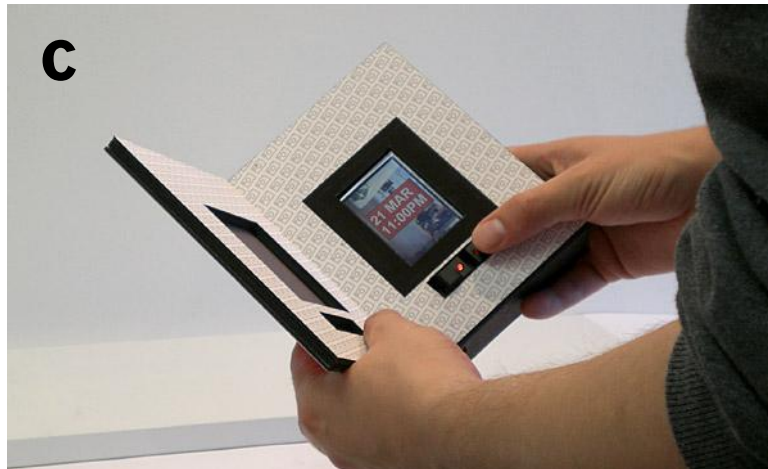
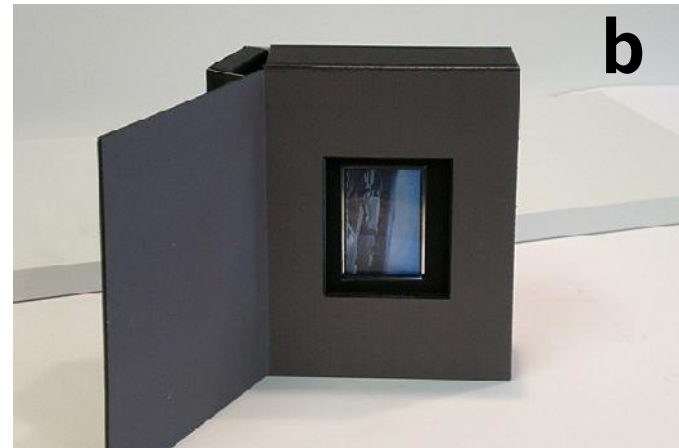
email management souvenir



email notification souvenir



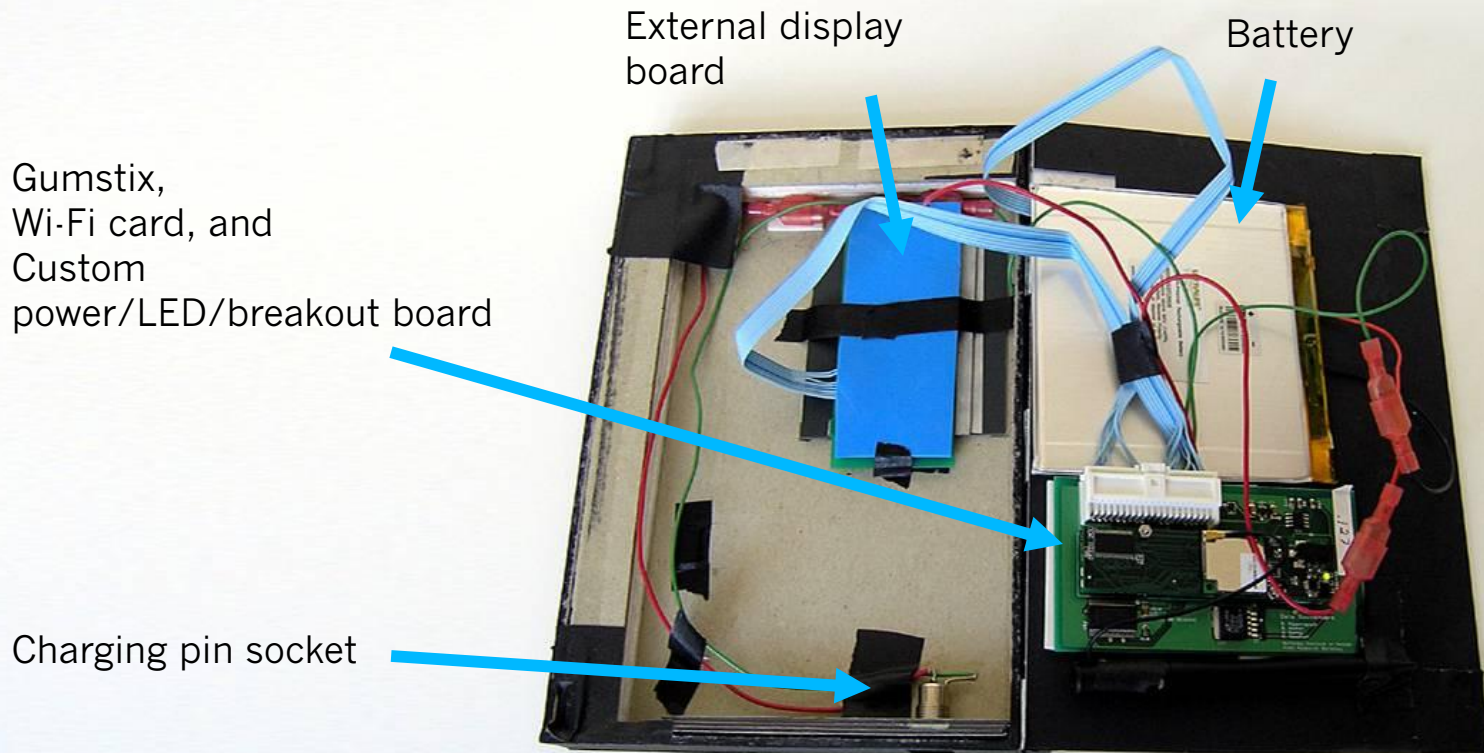
webcam photo album



real-time journey souvenir

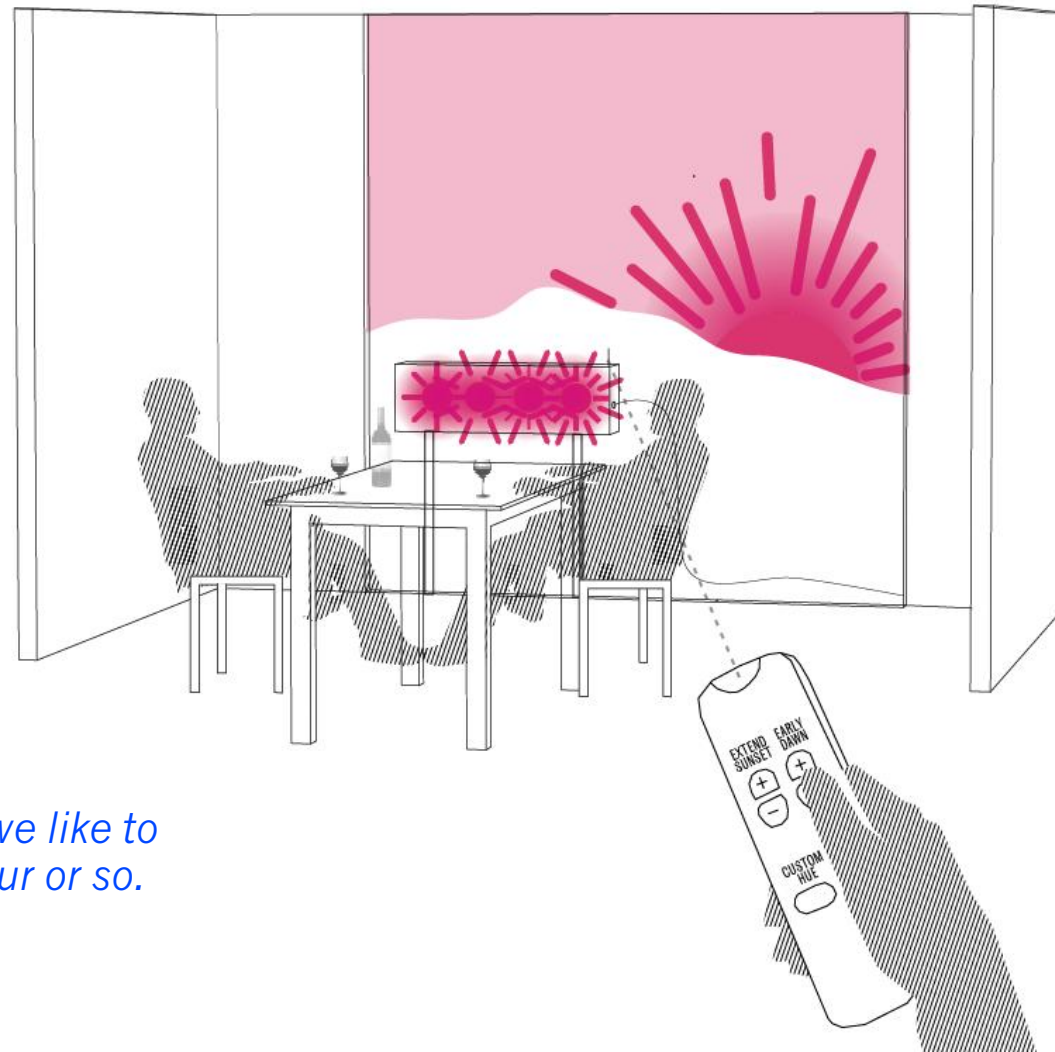


data souvenirs technology



the temporal home

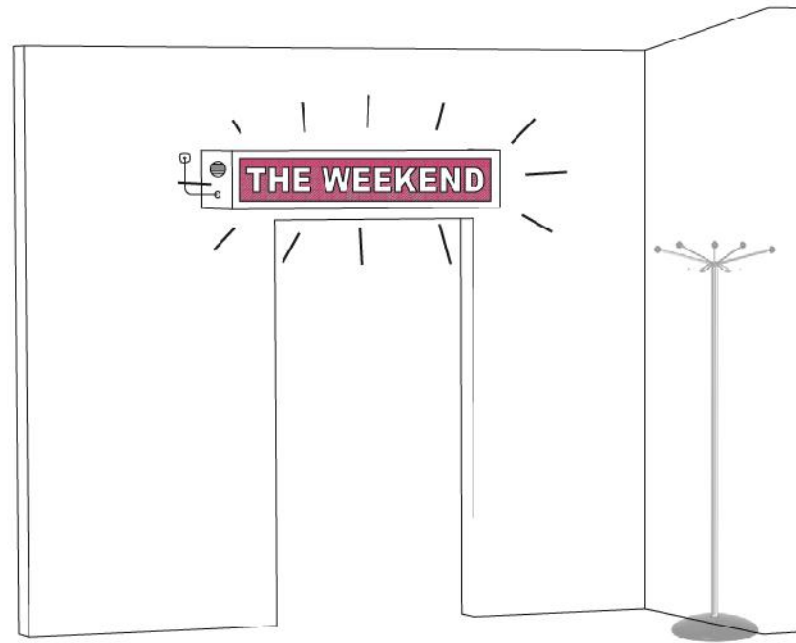
Revealing rhythms of time in everyday life



When we have guests we like to extend sunset by an hour or so.

the temporal home

Revealing rhythms of time in everyday life



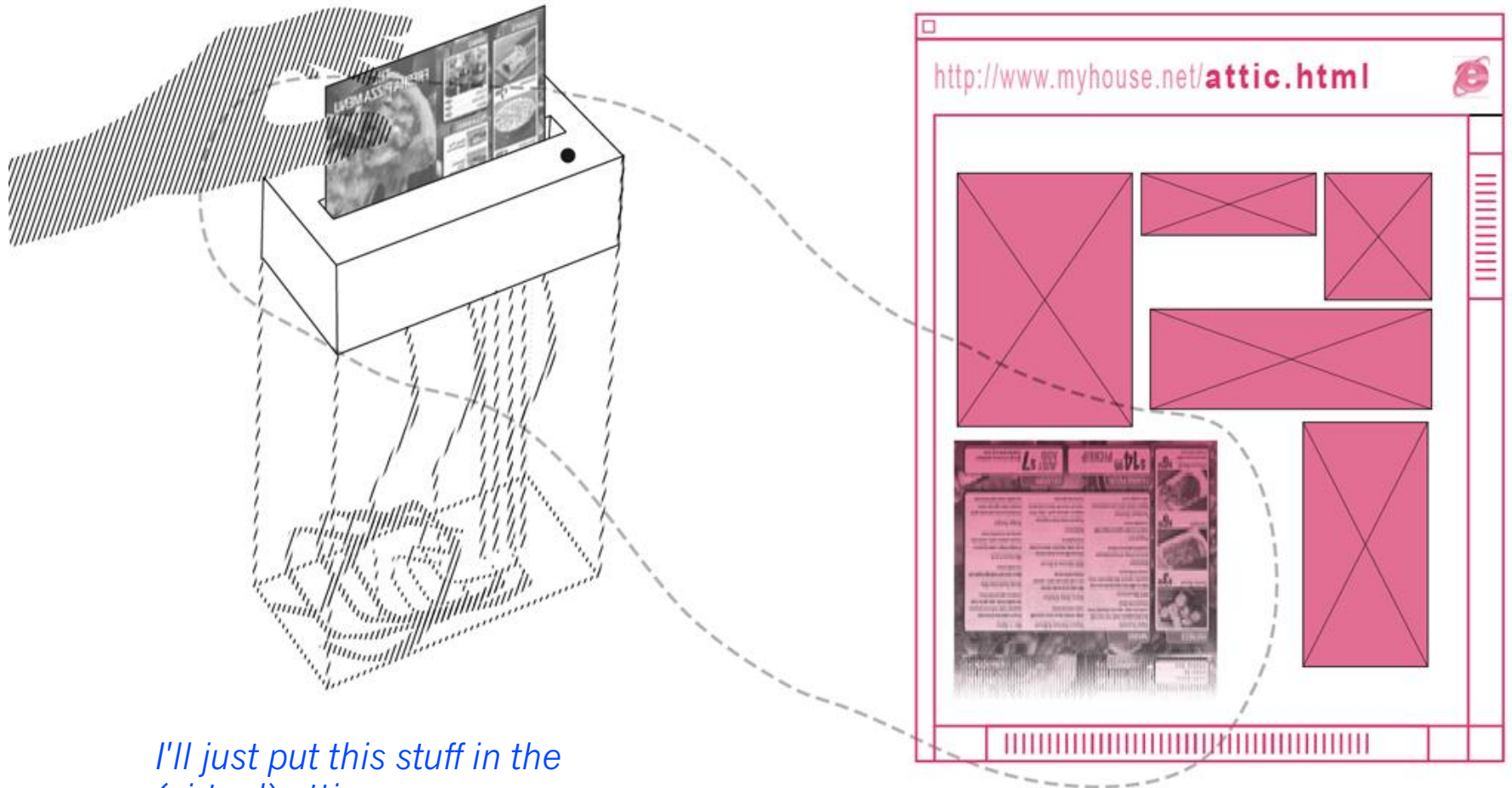
the temporal home

Revealing rhythms of time in everyday life



boundaries

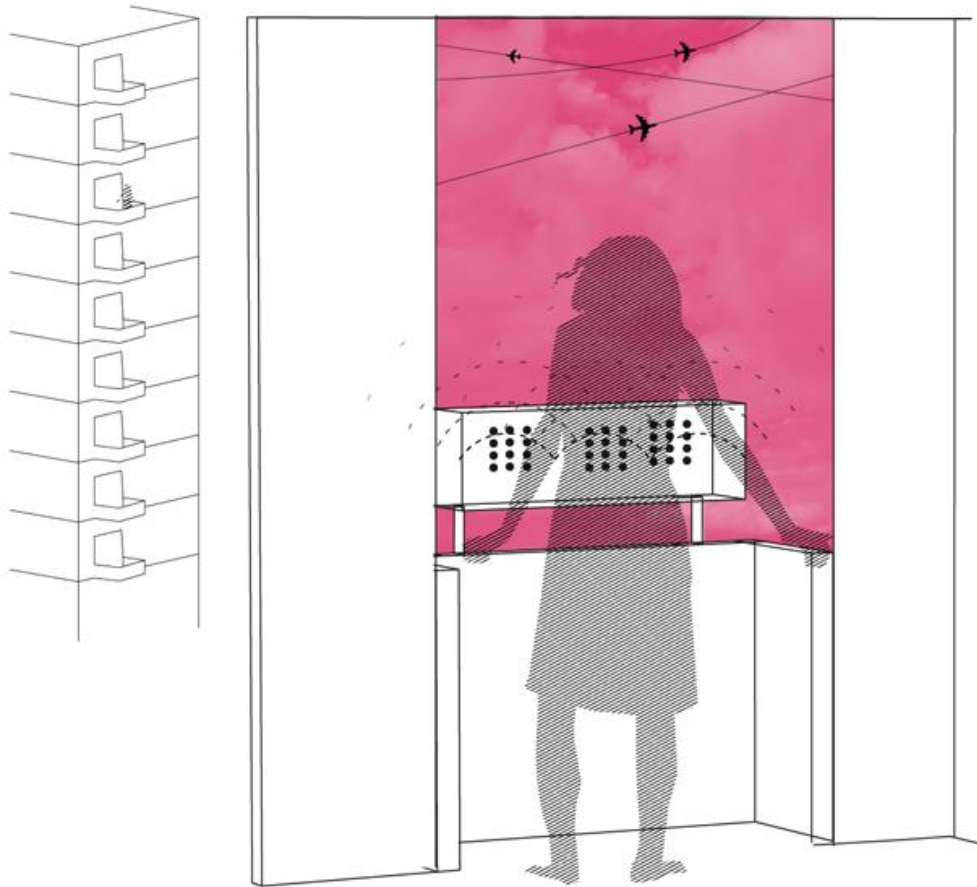
Between **physical** and **virtual**, **inside** and **outside**...



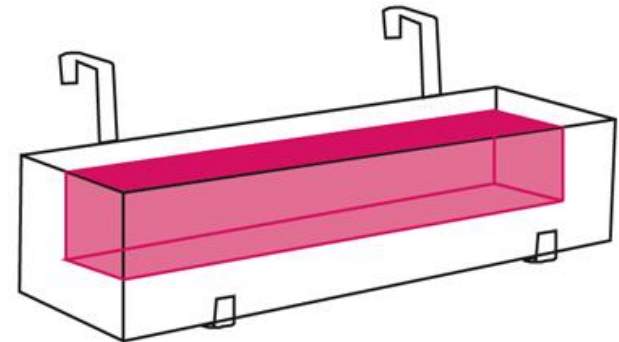
I'll just put this stuff in the (virtual) attic...

boundaries

Between **physical** and **virtual**, **inside** and **outside**...

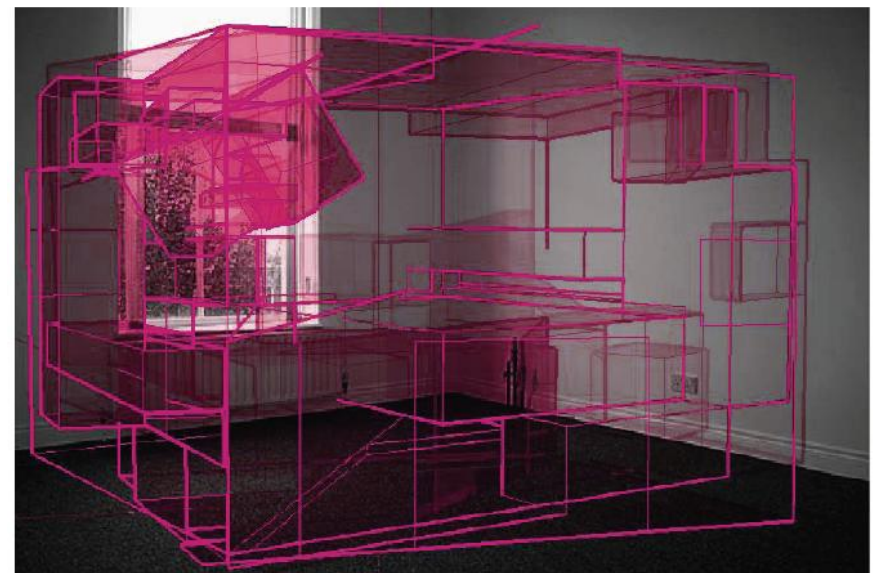


In the evenings, when most of the long haul flights depart, I like to watch the planes dispersing from the airport. I can hear pilots calling in their route plans and signing off before they head out over the ocean.



the fractal home

A spectrum from primarily **physical** to primarily **virtual**, allowing for different types of interaction in different parts of the home.



reactions?

key points

1. The home is full of physical, meaningful objects that occupy every corner.
2. Existing interfaces in the home range from “smart homes” to simple information displays.
3. Technology and physical design can both give nuance to the space of the home.