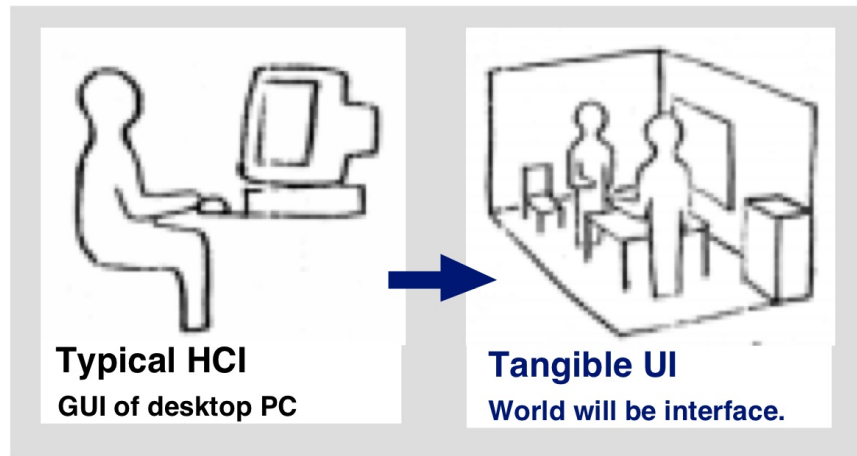


ambient displays

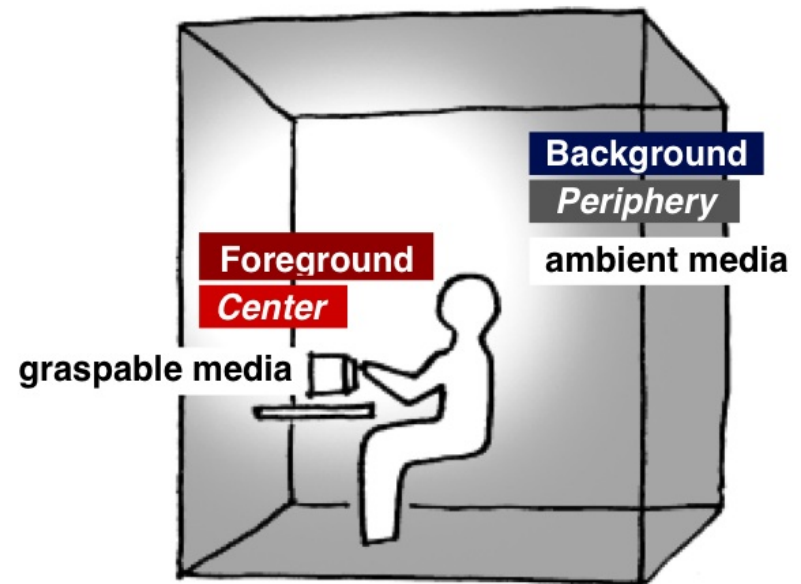
Anastasia Bezerianos

tangible bits [Ishii & Ullmer, 1997]

Remember? It introduced the concept of « tangible interface »



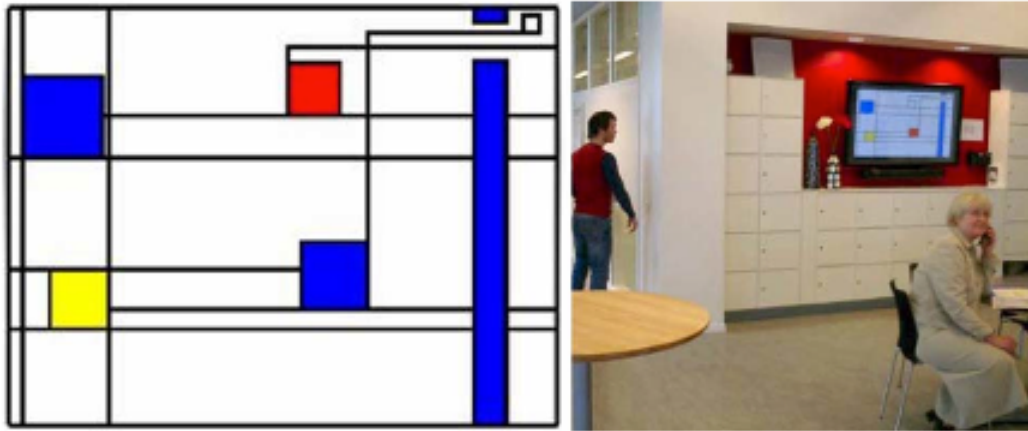
« Human interfaces that employ physical objects, surfaces, and spaces as tangible embodiments of digital information and processes. These interfaces explore interactions in both the foreground and in the background. Foreground interfaces use graspable objects and augmented surfaces, exploiting the human senses of touch and kinesthesia. Background interfaces use ambient light, sound, airflow, and water movement as indicators of activity at the periphery of awareness. »



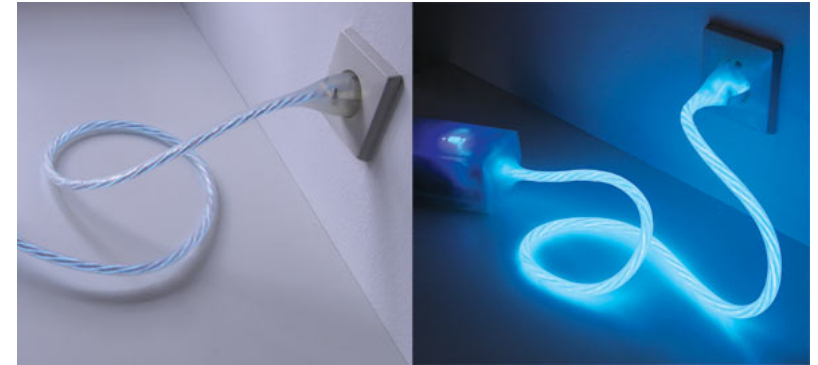
center and periphery of attention
in the physical environment

From the MIT tangible media mission

ambient displays



[Redström et al., 2000],
[Skog et al., 2001]



[Gustafsson & Gyllenswärd, 2005]



Ambient Orb

ambient displays

- communicate digitally-mediated activity and presence at the periphery of human awareness
- ambient light sound, airflow, water movement, object motion...
- peripheral displays

ambient displays

related term: calm technology

- rely on peripheral awareness
- in immediate environment, but not the focus
- often symbolic

peripheral awareness

What we are attuned to without attending to explicitly
[Weiser, 2005]



some characteristics

calm technology [Weiser, 1995]

- connected to familiar details of the world around us
- can be at periphery or center of our attention, moving between the two

ambient media [Pousman & Stasko, 2006]

- information conveyed through calm changes
- users can focus on other primary tasks but still be aware of them
- can be related to primary task

Tasks in foreground & background

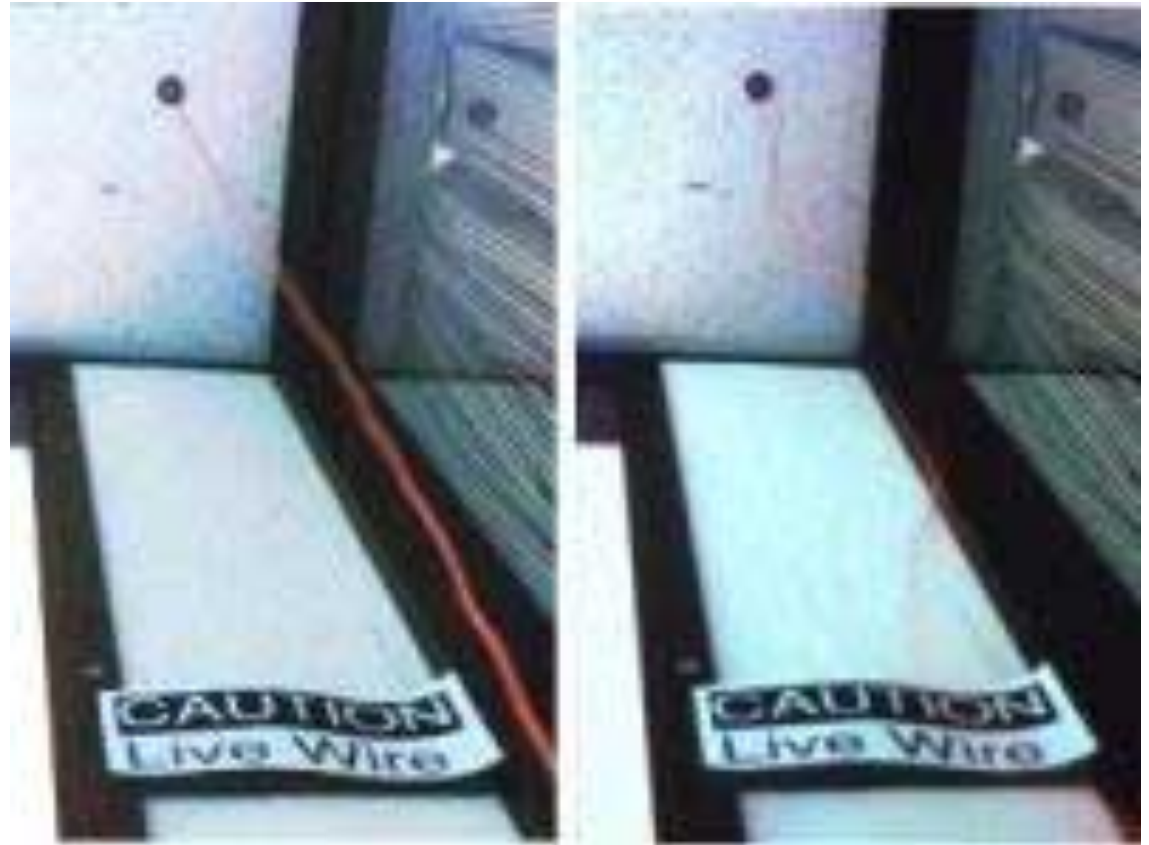
[Buxton, 1995]



ambient display pioneers

Live Wire [Jeremijenko, 1995]

- network traffic
- uses movement



Personal ambient display

[Wisneski, 1999]

- personal
- subtle: temperature, movement, shape



PinWheels [Ishii et al., 2001]

- moving pinwheels
- different info, such as stock market ...

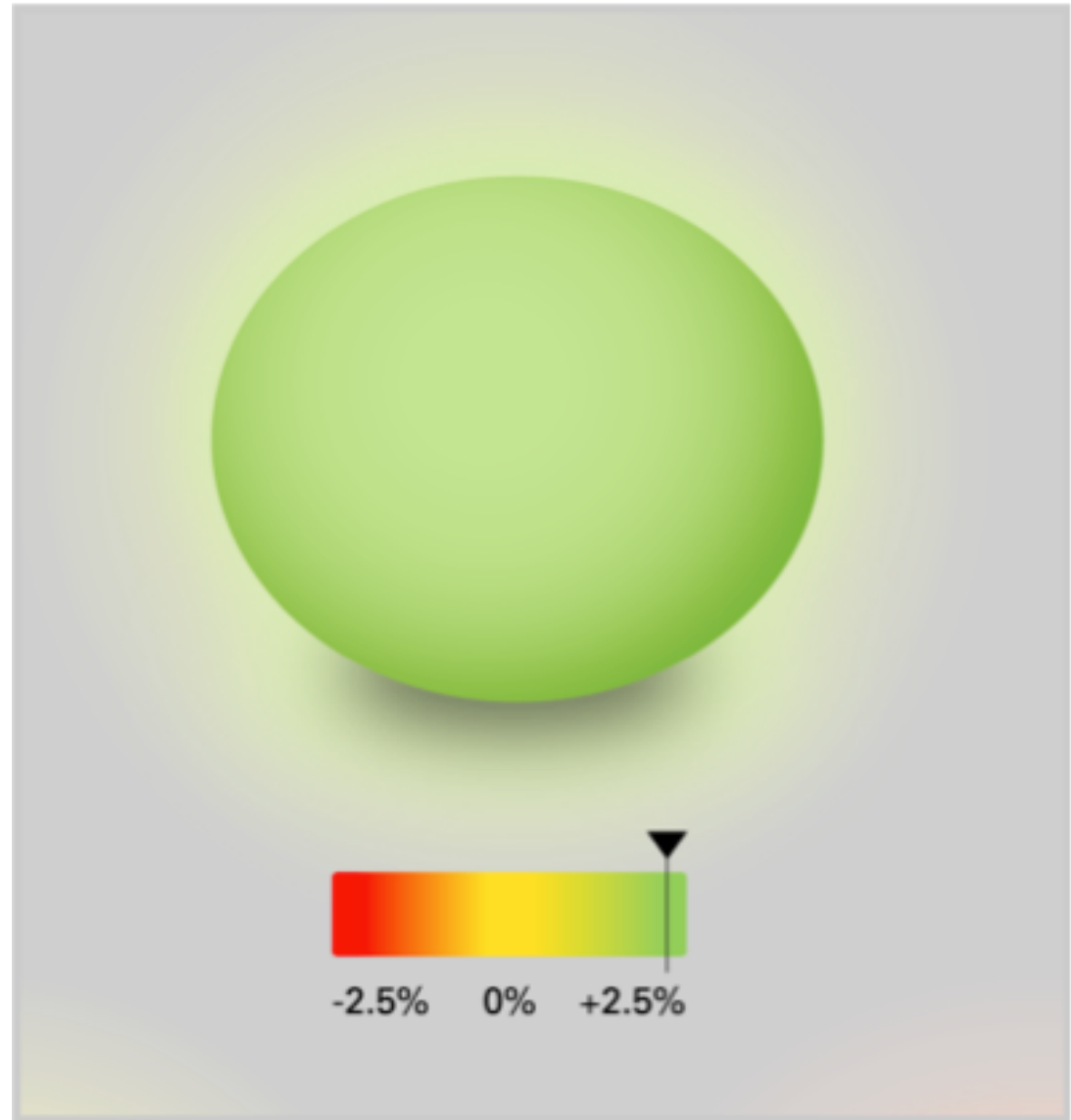
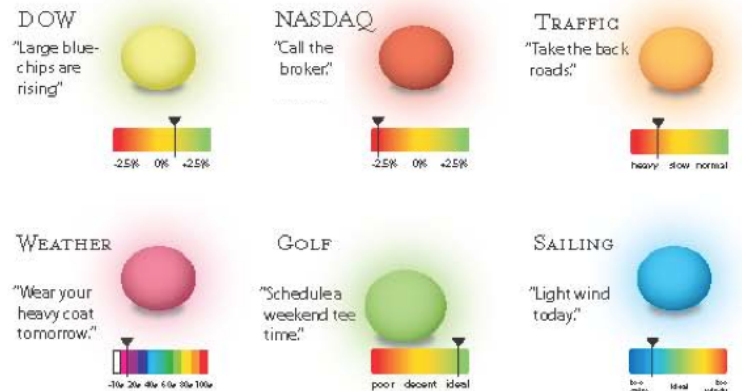


BusMobile and Daylight [Kientz, 2001]

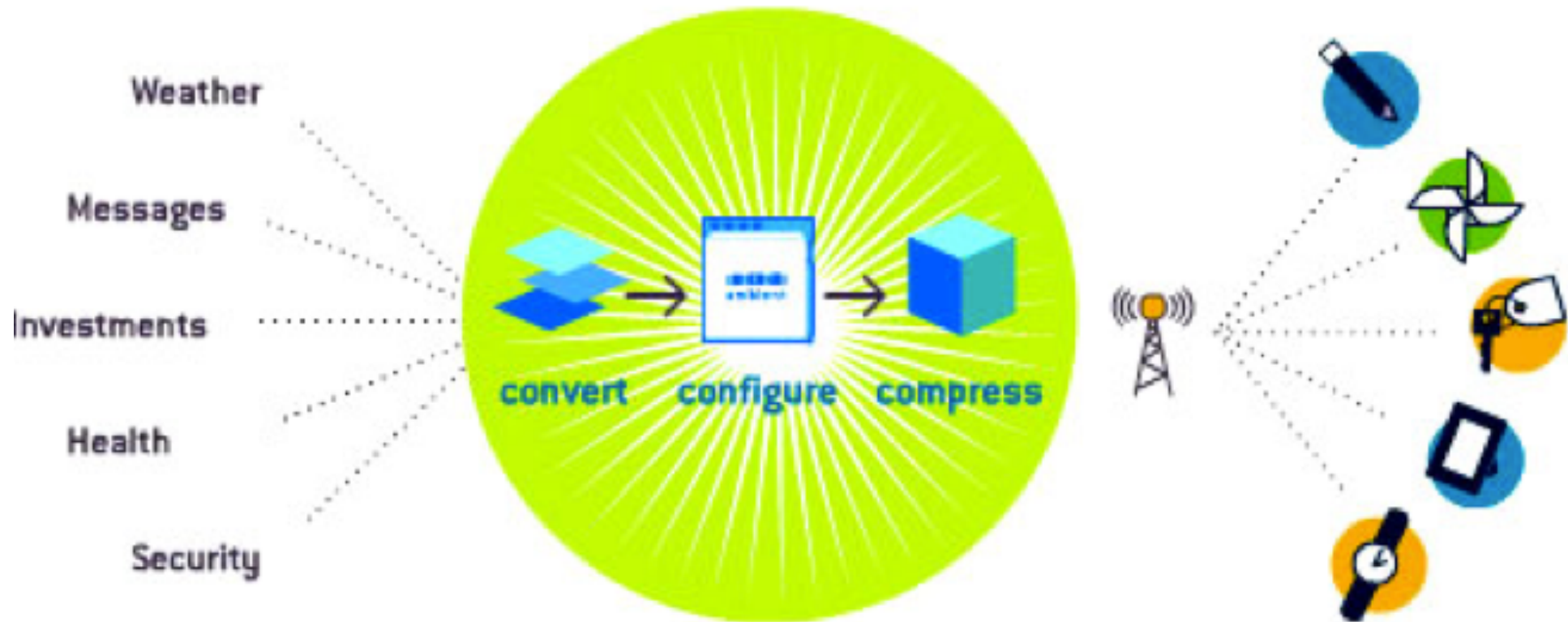


programmable devices

Ambient devices, the Orb



Ambient devices, the Orb

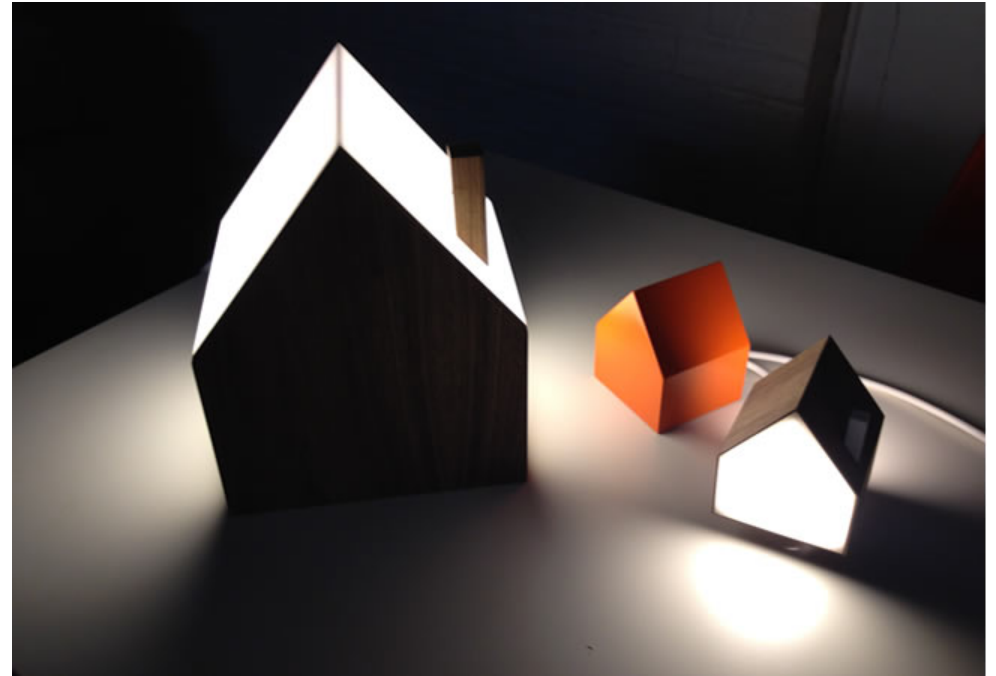


www.ambientdevices.com

Ambient devices, Nabaztag



Nabaztag



Good Night Lamp

**ambient home
(displays related to the home itself)**

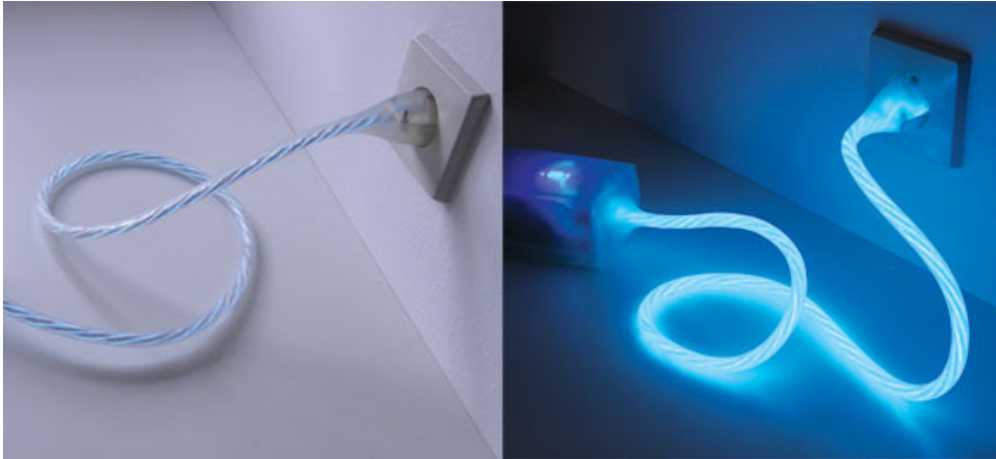
home ideas



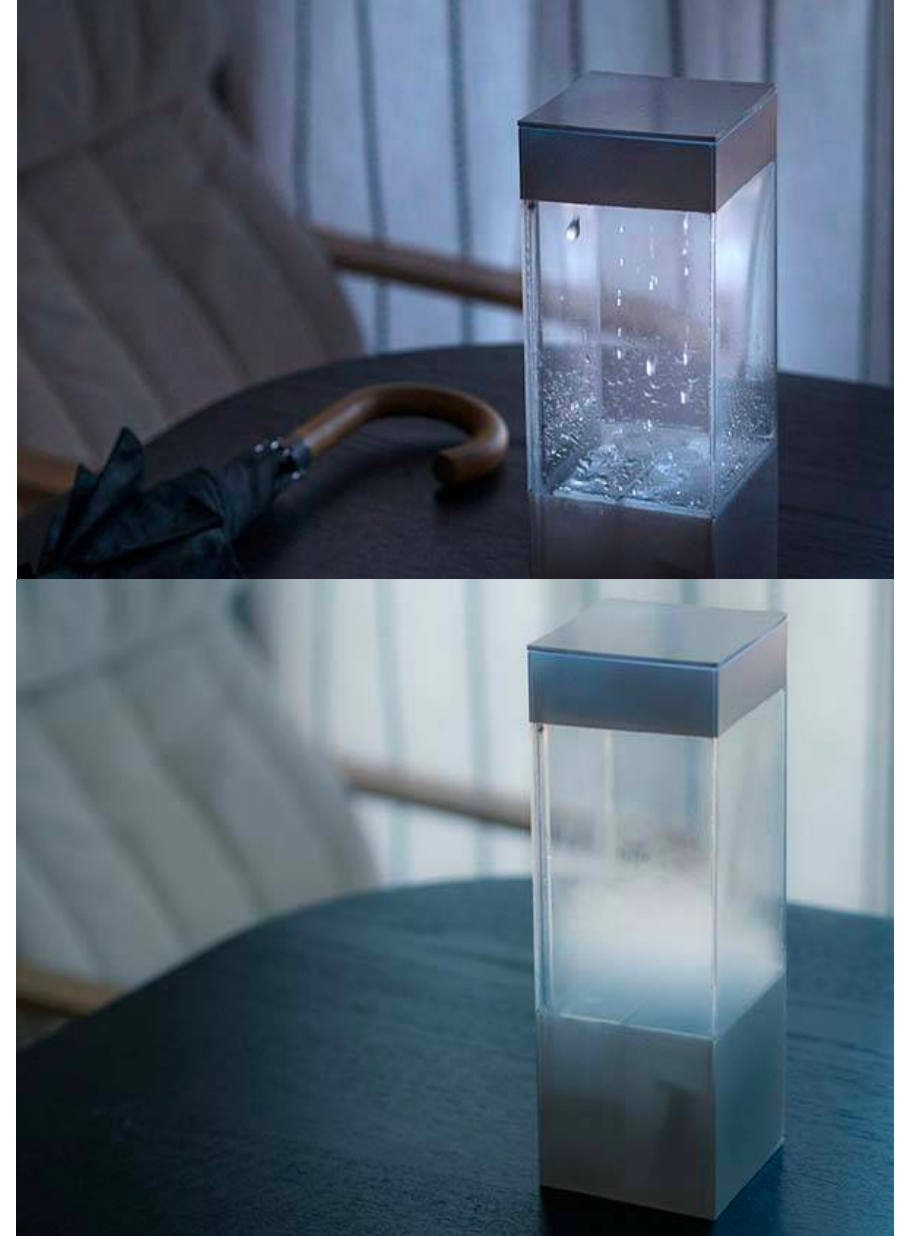
[Bonanni et al., 2004]



home ideas



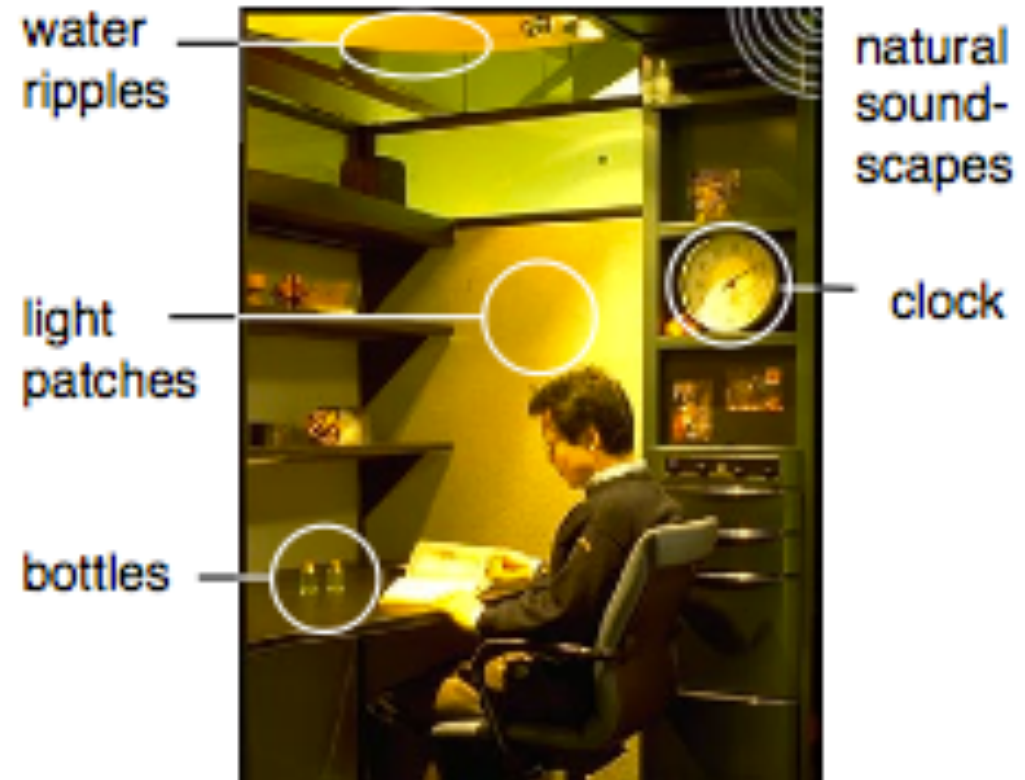
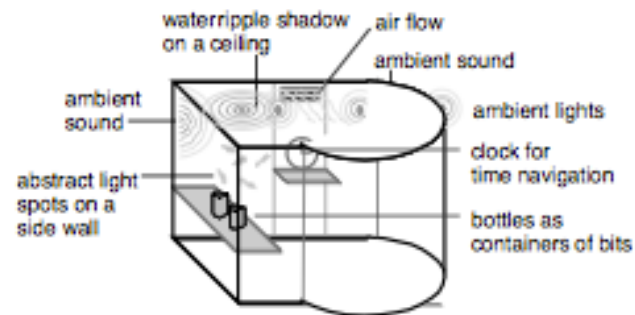
[Gustafsson & Gyllenswärd, 2005]



<https://www.temlescope.com/opentemlescope/>

ambient office

Ambient room [Kientz, 2001]

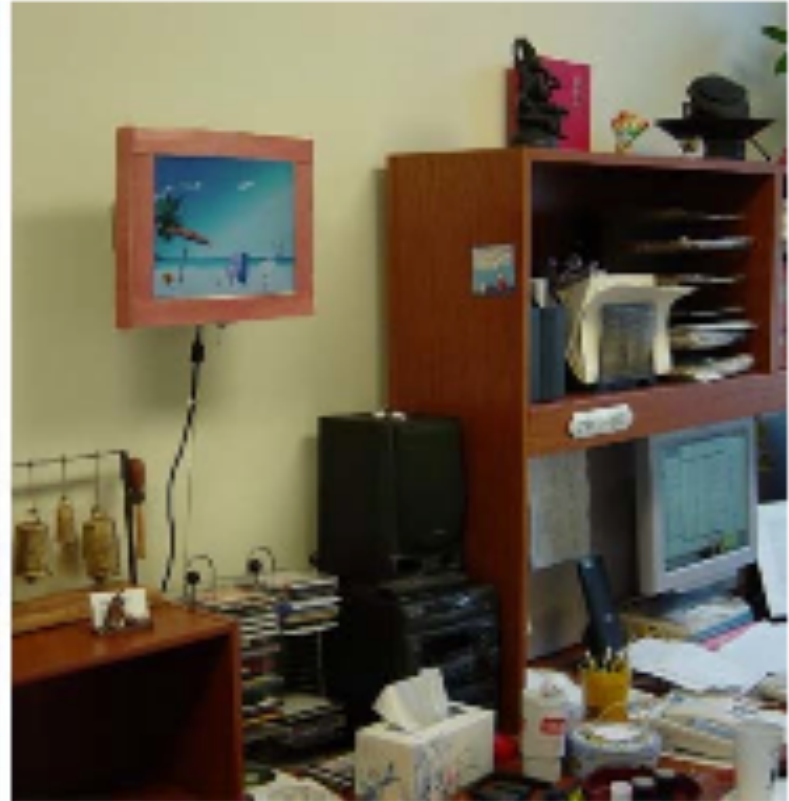


<http://tangible.media.mit.edu/project/ambientroom/>

Kimura [MacIntyre et al., 2001]



InfoCanvas [Miller & Stasko, 2002]



http://youtu.be/w_J2ojj5Fu0

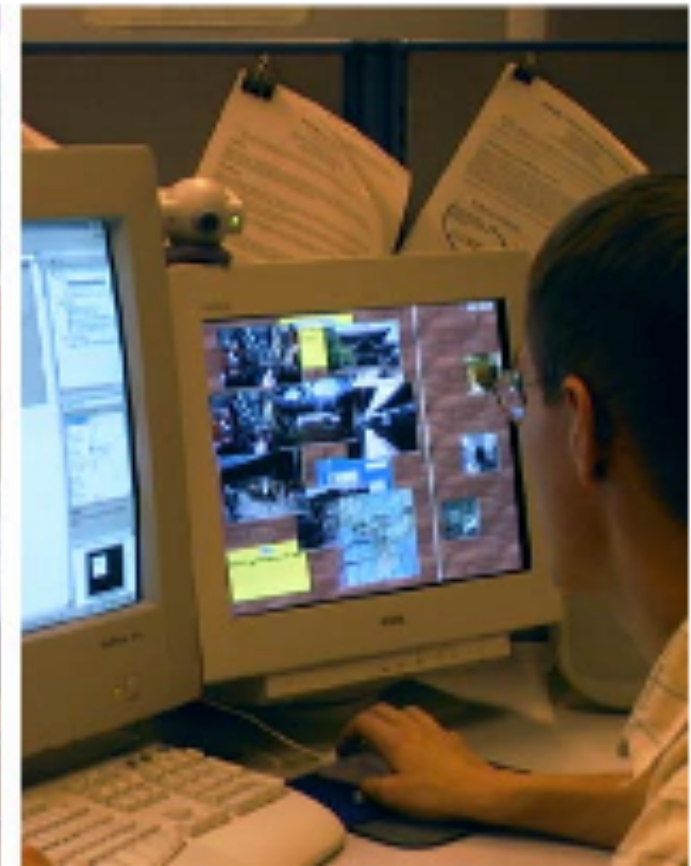
human communication

InTouch – collaborative haptics

[Brave & Dahley, 1997]



Notification Collage [Greenberg et al., 2001]



iCom [Agamanolis, 2003]



LumiTouch [Chang et al., 2001]



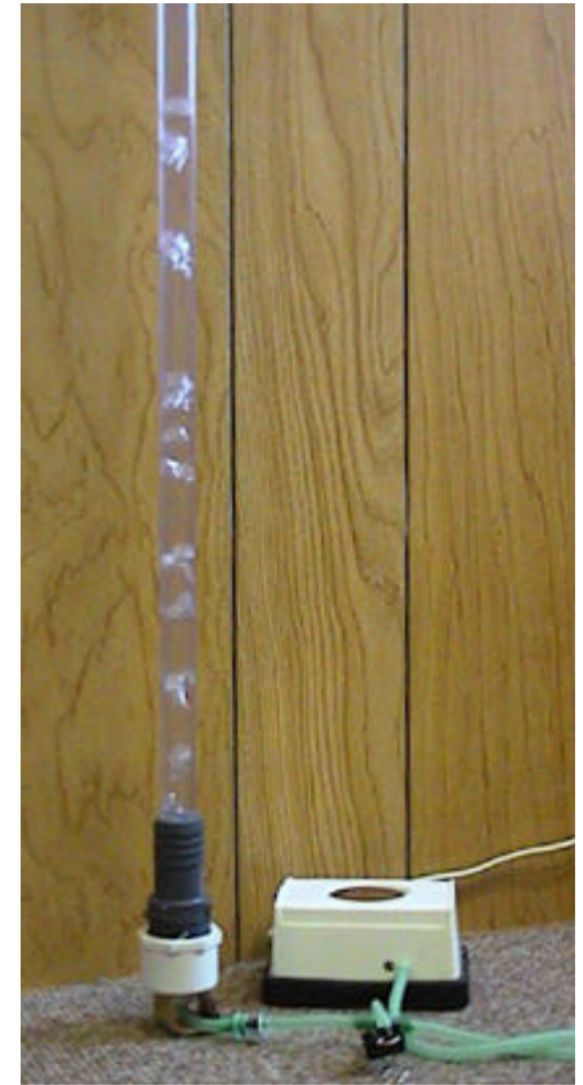
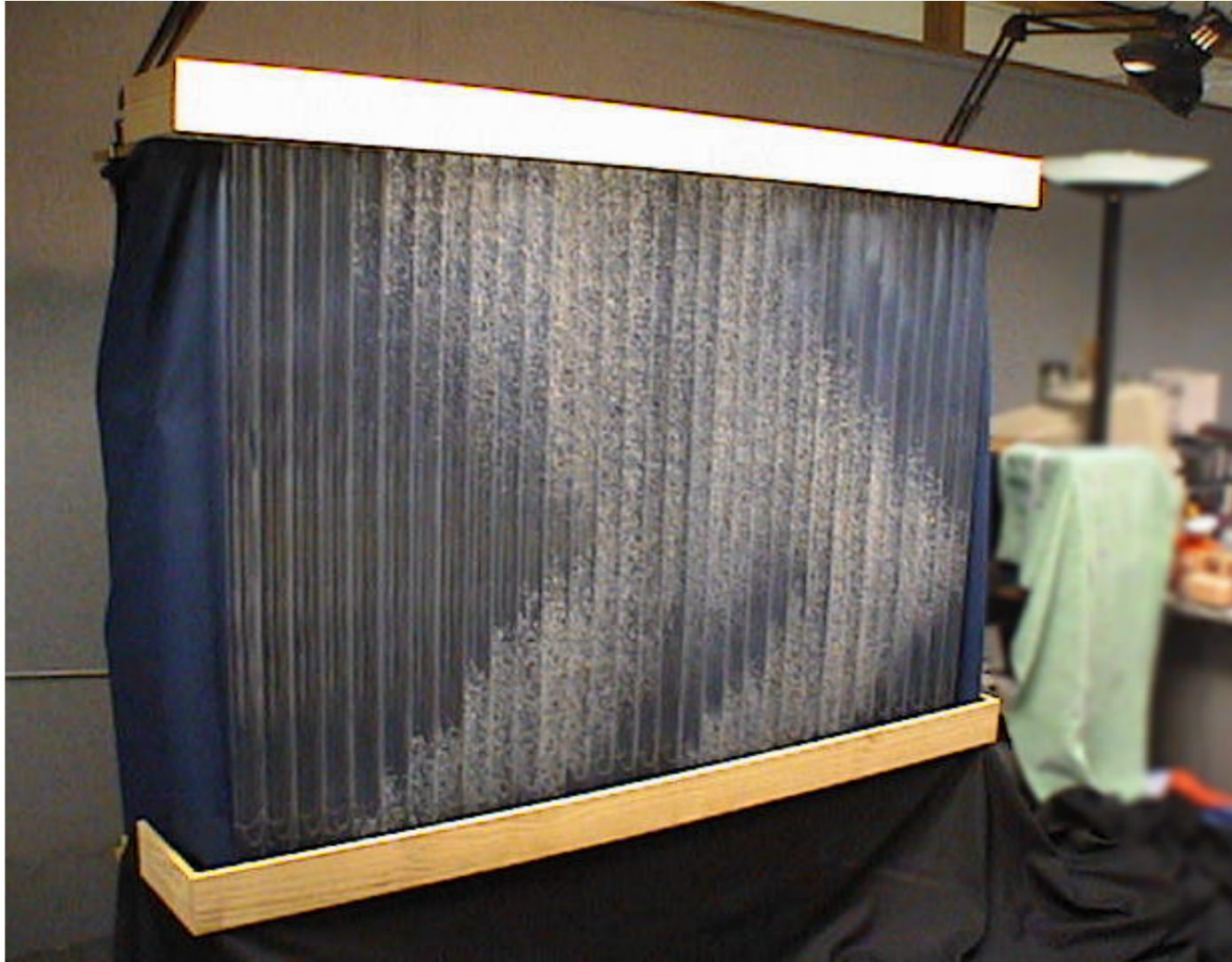
Digital Family Portrait [Mynatt, 2001]



informative art

Informative art

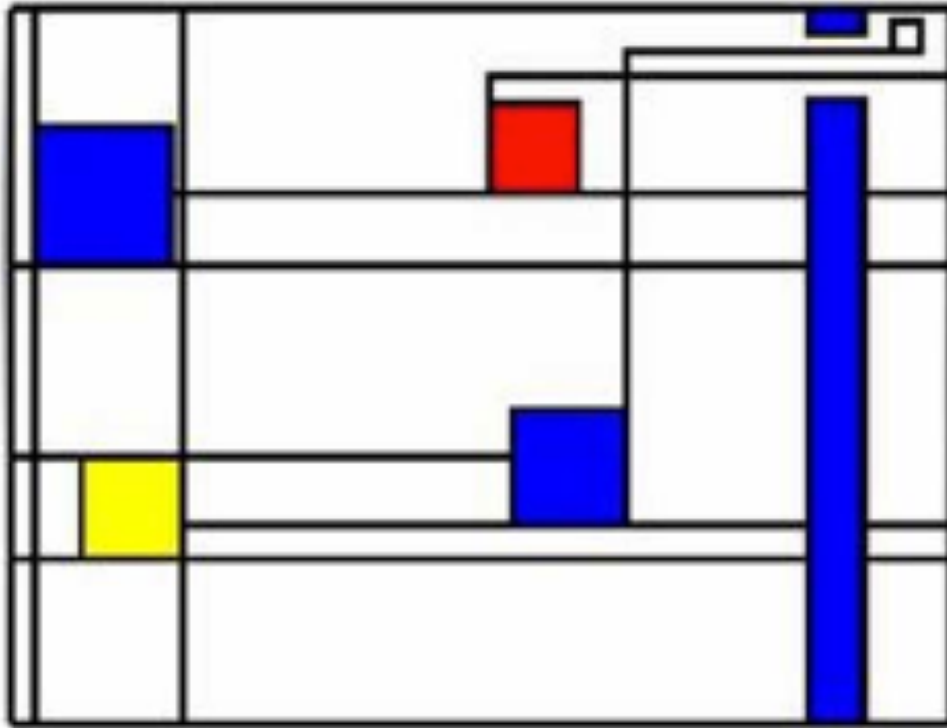
(eg. Information Percolator [Heiner et al., 1999])



Bubbles in water tubes create basic shapes

Informative art

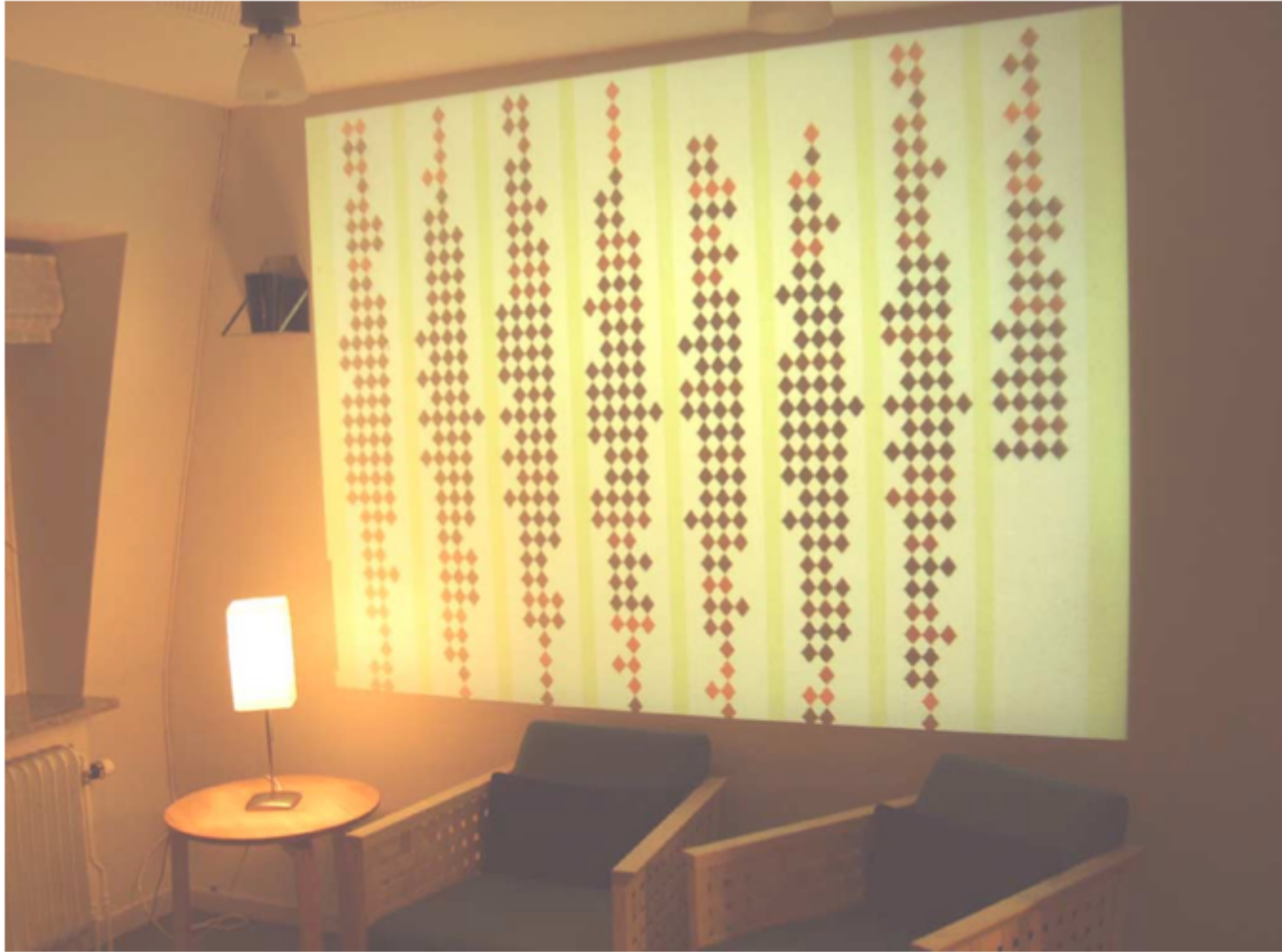
(eg. [Redström et al., 2000], [Skog et al., 2001])



Mondrianesque compositions based on email traffic

Informative art

[Skog, 2004], activity wallpaper)



Display of ambient noise in environment

ambient & public displays

ambient vis in (very) public settings

public setting, conveying dynamic info
sometimes museum exhibits or art installations
(focus or periphery?)



Poly by Digit showing
online poll data, 2014



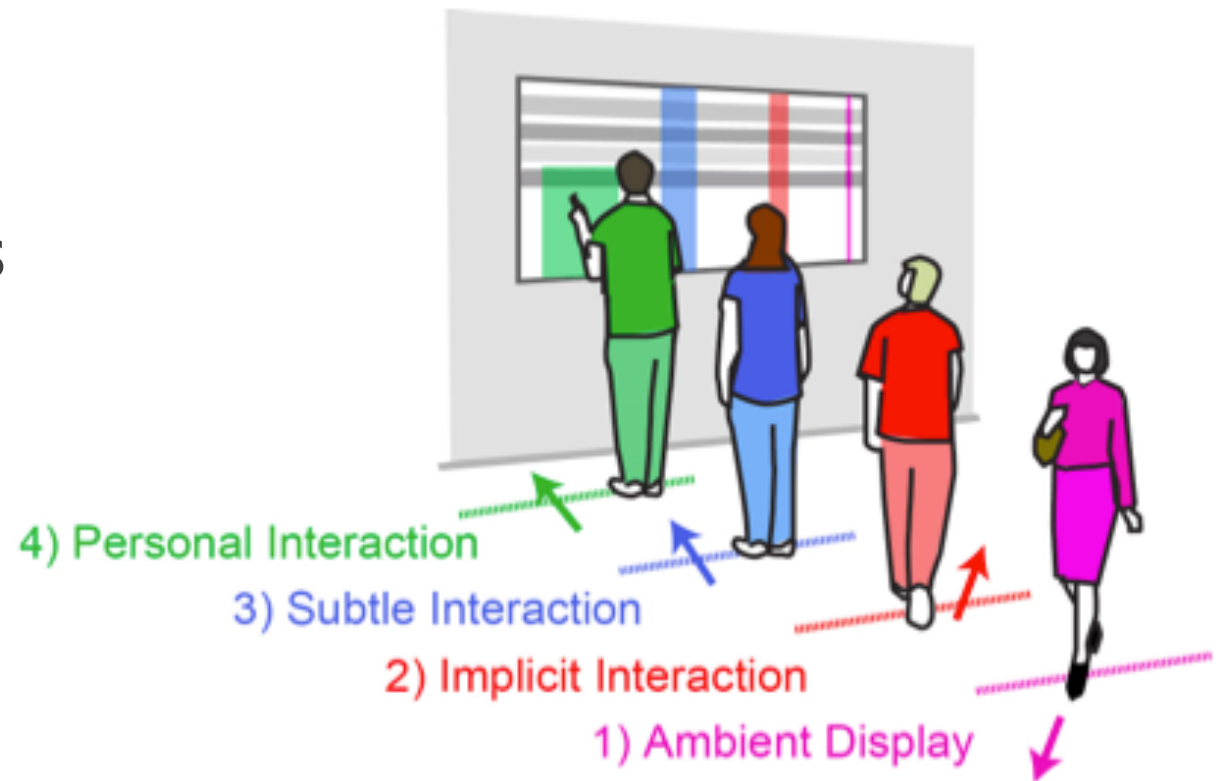
Bompas & Parr,
London Eye chart, 2015

diffs between ambient displays

- private, public or semi-public
- modality (sound, image, other?)
- periphery only, or periphery and focus
- human or system communication support
- information related to primary task or not
- information tied to the display location/nature or not
- interactive or not
- explicit or implicit interaction

ambient input methods

- presence and activity sensors
- gestural input
- touch
- tangible interfaces
- rarely traditional UIs



<http://youtu.be/aFI71SPeYto>

[Vogel & Balakrishnan, 2004]

design principles [Pousman & Stasko, 2006]

- display important but not critical information
- support moving from periphery to focus and back
- focus on physical representation in environment
- subtle changes to reflect updates (not distracting)
- aesthetically pleasing and appropriate for environment

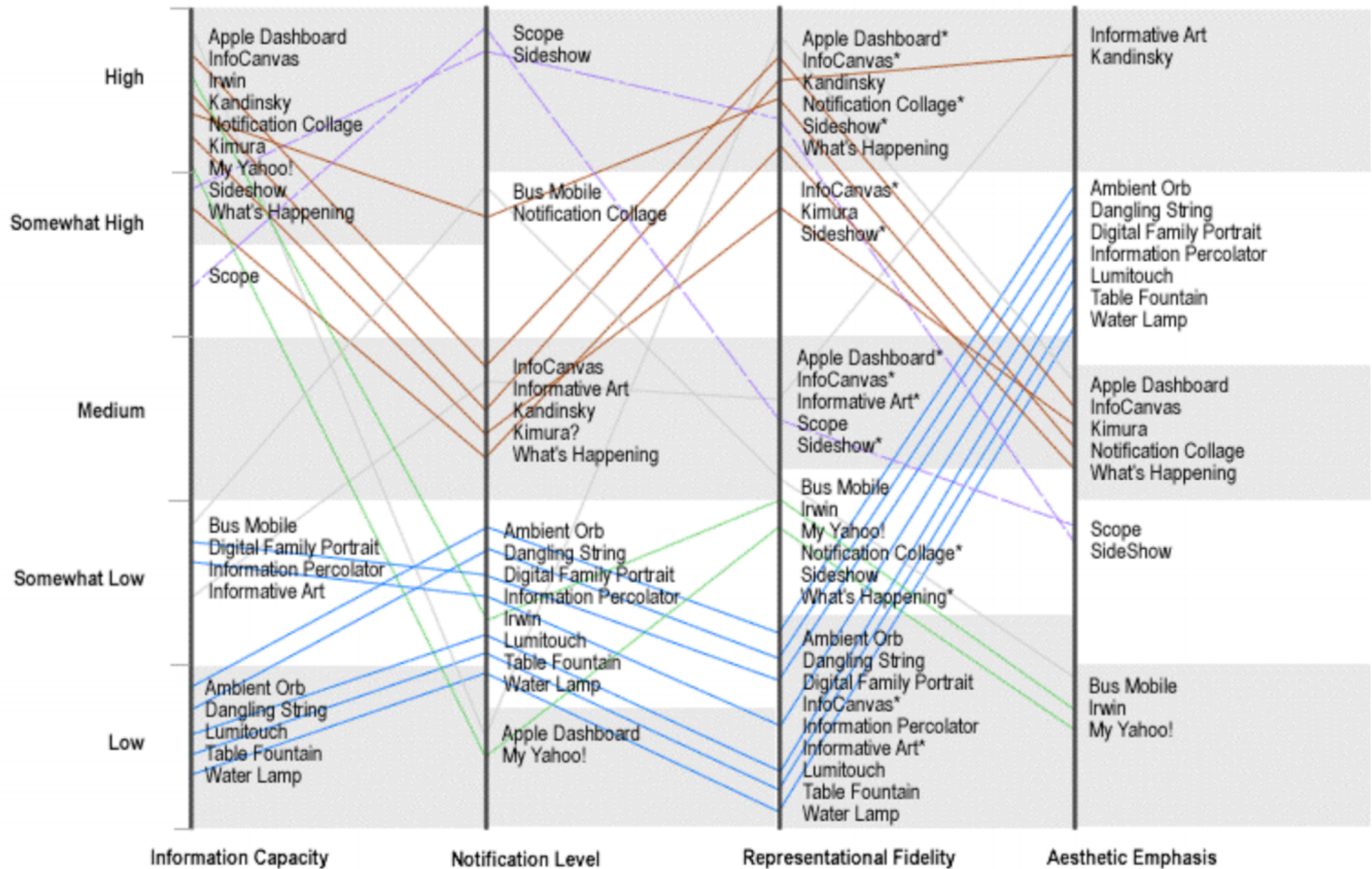
ambient display taxonomy

[Pousman & Stasko, 2006]

- information capacity
 - space & time trade-off, information necessity
- notification level
 - [Matthiews et al., 2006]: ignore, change blindness, make aware, interrupt, demand attention
- representation fidelity
 - use of **signs**, described by Semiotics (signified, signifier, sense)
 - symbolic, iconic, indexical
- aesthetic emphasis

ambient display taxonomy

[Beuerman & Stokes 2006]



ambient display evaluation

- what are the challenges?
- most common methods
 - formative ethnographies
 - interviews
 - diaries
 - iterative “living laboratories”