

# TIW 8

## Technologies Web synchrones et multi-dispositifs

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UbiComp Web

<https://aurelient.github.io/tiw8/>

# Plan

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- ▶ Introduction au cours
- ▶ **L'informatique Ubiquitaire**
- ▶ Rappels Stack Javascript

# L'informatique Ubiquitaire

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Un peu d'histoire:

- ▶ Mark Weiser et le Xerox PARC
- ▶ En Europe :
  - ▶ i-LAND
  - ▶ Phillips
- ▶ Aujourd'hui

# L'Ubicomp : 3<sup>e</sup> ère de l'informatique

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Fin des années 1980 - début 90 :

- ▶ L'informatique personnelle s'impose (Mac: 84, Windows 3: 90)
- ▶ Miniaturisation de l'informatique
- ▶ Informatique embarquée, premier téléphone mobile, Palm...
- ▶ Développement d'interfaces utilisateurs grand public
- ▶ Salles interactives, réalité augmentée...

De nombreux termes:

- ▶ Ubiquitous computing (Xerox)
- ▶ Pervasive computing (IBM)
- ▶ Intelligence ambiante (UE)

# Mark Weiser — Le père de l'Ubicomp

## The Computer for the 21st Century

*Specialized elements of hardware and software, connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence*

by Mark Weiser

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

Consider writing, perhaps the first information technology. The ability to represent spoken language symbolically for long-term storage freed information from the limits of individual memory. Today this technology is ubiquitous in industrialized countries. Not only do books, magazines and newspapers convey written information, but so do street signs, billboards, shop signs and even graffiti. Candy wrappers are covered in writing. The constant background presence of these products of "literacy technology" does not require active attention, but the information to be transmitted is ready for use at a glance. It is difficult to imagine modern life otherwise.

Screen-based information technology, in contrast, is far from having become part of the environment. More than 50 million personal computers have been sold, and the computer nonetheless remains largely in a world of its own. It

is approachable only through complex jargon that has nothing to do with the tasks for which people use computers. The state of the art is perhaps analogous to the period when scribes had to know as much about making ink or baking clay as they did about writing.

The arcane aura that surrounds personal computers is not just a "user interface" problem. My colleagues and I at the Xerox Palo Alto Research Center think that the idea of a "personal" computer itself is misplaced and that the vision of laptop machines, dynabooks and "knowledge navigators" is only a transitional step toward achieving the real potential of information technology. Such machines cannot truly make computing an integral, invisible part of people's lives. We are therefore trying to conceive a new way of thinking about computers, one that takes into account the human world and allows the computers themselves to vanish into the background.

Such a disappearance is a fundamental consequence not of technology but of human psychology. Whenever people learn something sufficiently well, they cease to be aware of it. When you look at a street sign, for example, you absorb its information without consciously performing the act of reading. Computer scientist, economist and Nobelist Herbert A. Simon calls this phenomenon "compiling"; philosopher Michael Polanyi calls it the "tacit dimension"; psychologist J. J. Gibson calls it "visual invariants"; philosophers Hans Georg Gadamer and Martin Heidegger call it the "horizon" and the "ready-to-hand"; John Seely Brown of PARC calls it the "periphery." All say, in essence, that only when things disappear in this way are we freed to use them without thinking and so to focus beyond them on new goals.

The idea of integrating computers seamlessly into the world at large runs counter to a number of present-day trends. "Ubiquitous computing" in this context does not mean just computers that can be carried to the beach, jungle or airport. Even the most powerful notebook computer, with access to a worldwide information network, still focuses attention on a single box. By analogy with writing, carrying a superlaptop is like owning just one very important book. Customizing this book, even writing millions of other books, does not begin to capture the real power of literacy.

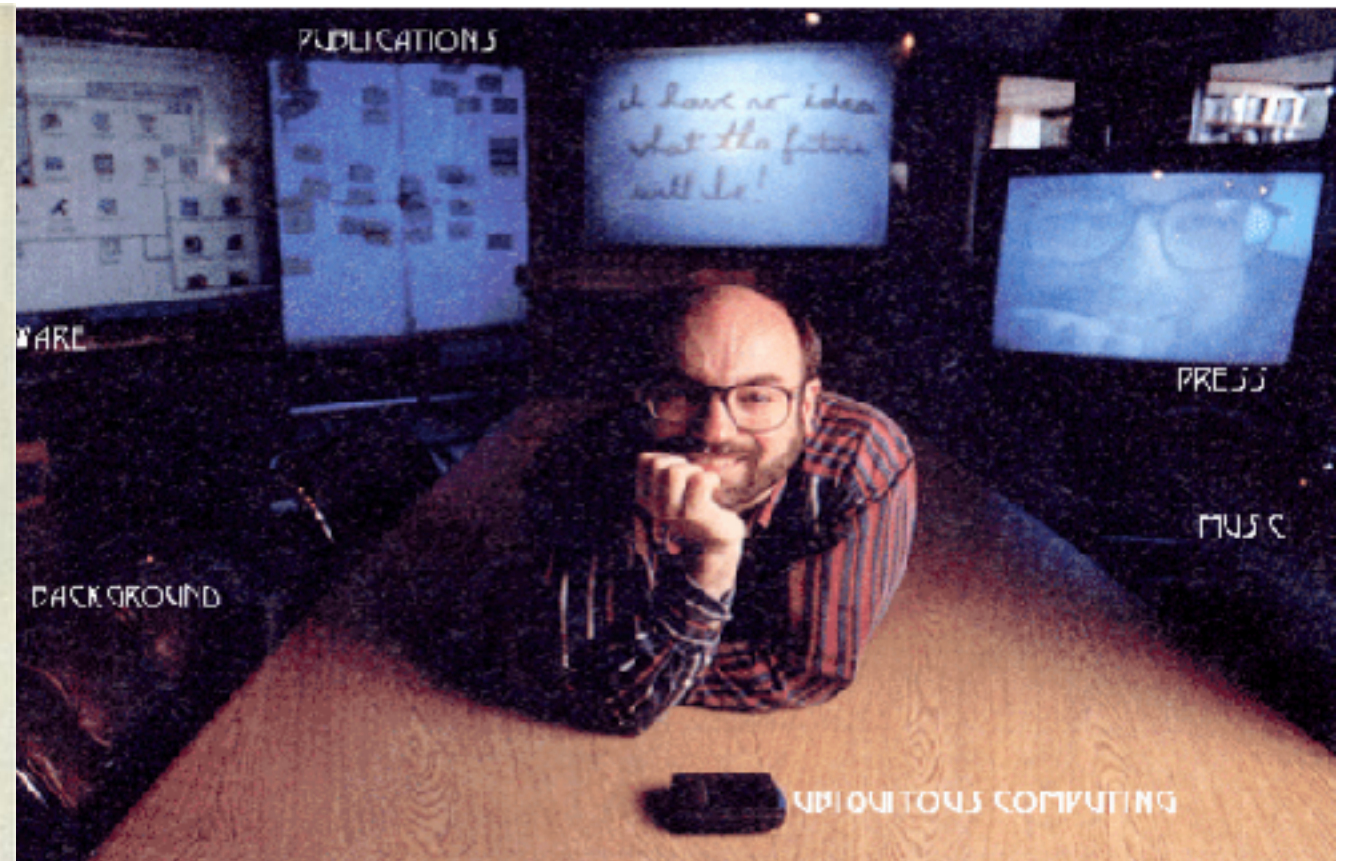
Furthermore, although ubiquitous computers may use sound and video in addition to text and graphics, that does not make them "multimedia computers." Today's multimedia machine makes the computer screen into a demanding focus of attention rather than allowing it to fade into the background.

Perhaps most diametrically opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. Users don special goggles that project an artificial scene onto their eyes; they wear gloves or even bodysuits that sense their motions and gestures so that they can move about and manipulate virtual objects. Although it may have its purpose in allowing people to explore realms otherwise inaccessible—the insides of cells, the surfaces of distant planets, the information web of data bases—virtual reality is only a map, not a territory. It excludes desks, offices, other people not wearing goggles and bodysuits, weather, trees, walks, chance encounters and, in general, the infinite richness of the universe. Virtual reality focuses an enormous apparatus on simulating the world rather than on invisibly enhancing the world that already exists.

Indeed, the opposition between the

MARK WEISER is head of the Computer Science Laboratory at the Xerox Palo Alto Research Center. He is working on the next revolution of computing after workstations, variously known as ubiquitous computing or embodied virtuality. Before working at PARC, he was a professor of computer science at the University of Maryland; he received his Ph.D. from the University of Michigan in 1979. Weiser also helped found an electronic publishing company and a video arts company and claims to enjoy computer programming "for the fun of it." His most recent technical work involved the implementation of new theories of automatic computer memory reclamation, known in the field as garbage collection.

94 SCIENTIFIC AMERICAN September 1991

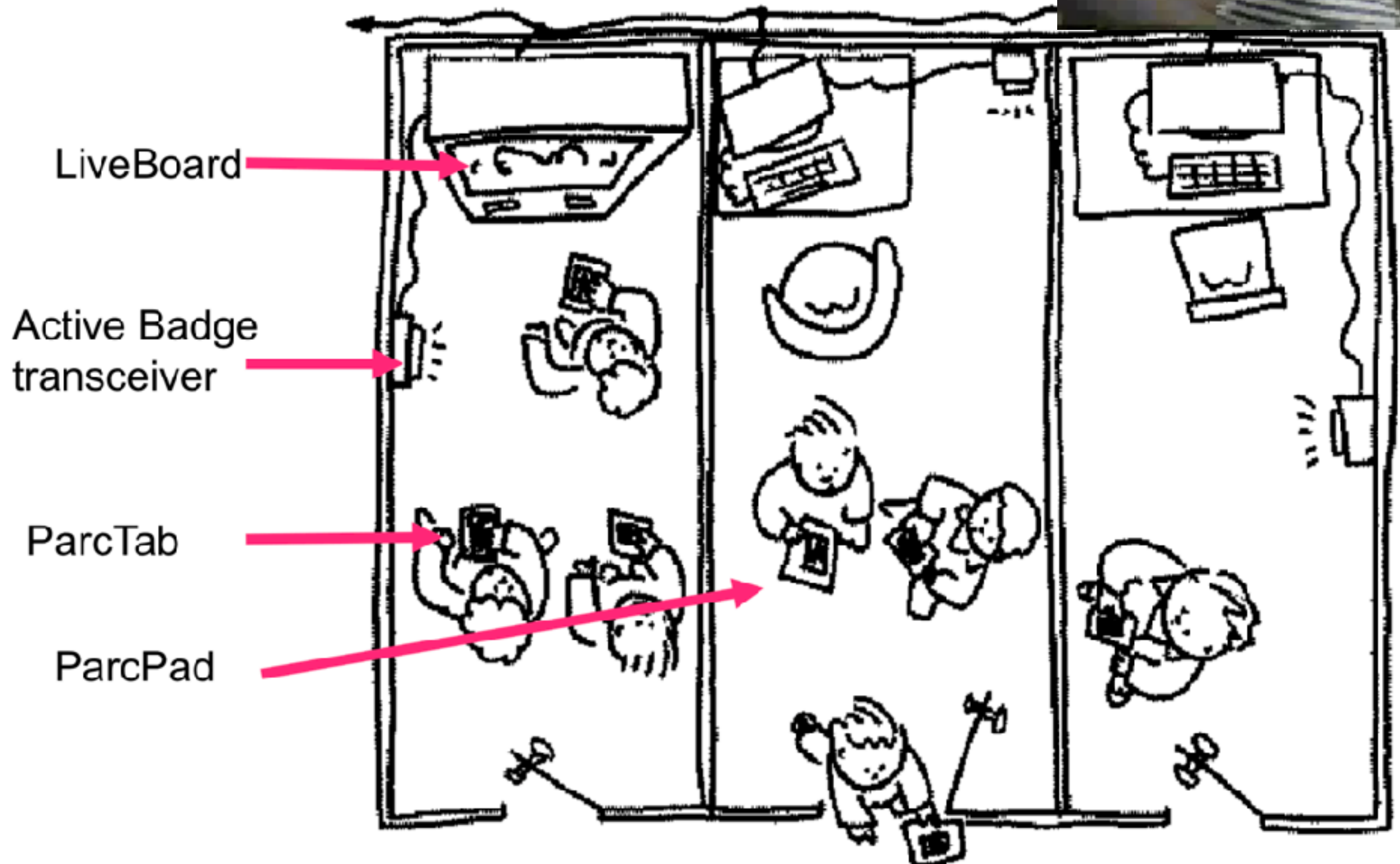


Formule une vision de l'informatique diffuse, dans l'environnement et les objets de tous les jours.

<https://www.lri.fr/~mbl/Stanford/CS477/papers/Weiser-SciAm.pdf>



# À Xerox Parc



# Computing by the inch, foot, & yard

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## Ubiquitous computing @ Xerox PARC, 1988 - 1995

Devices according to model size approach:

PARCtab

*Inch-sized*



PARCpad

*Foot-sized*



Liveboard

*Yard-sized*



# Échelle, continuité



<b>tiny</b> Every pixel counts Context Aware Pervasive	<b>~ book size</b> Action at point of input Error handling & disambiguation Disposable or personal	<b>&gt; meter</b> Fluid interaction Freeform input Shared collaborative
<b>PARC Tabs</b> hundreds/person	<b>PARC Pads</b> tens/person	<b>Liveboard</b> one/person



# Tabs

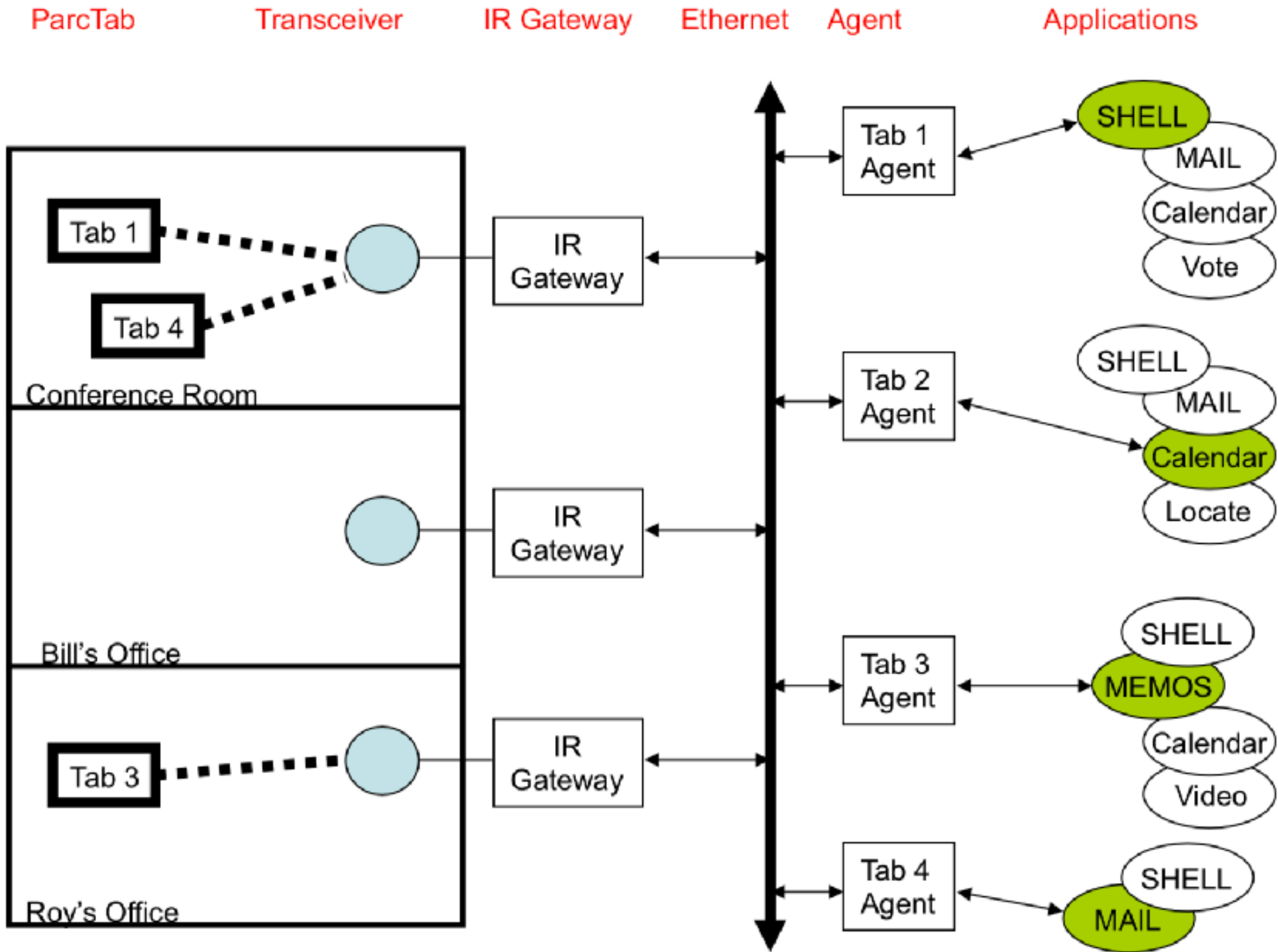
*“Tabs are the smallest components of embodied virtuality. Because they are interconnected, tabs will expand on the usefulness of existing inch-scale computers such as the pocket calculator and the pocket organizer. Tabs will also take on functions that no computer performs today.”*

*M. Weiser*

- ▶ Petits
- ▶ Interconnectés
- ▶ Applications embarquées

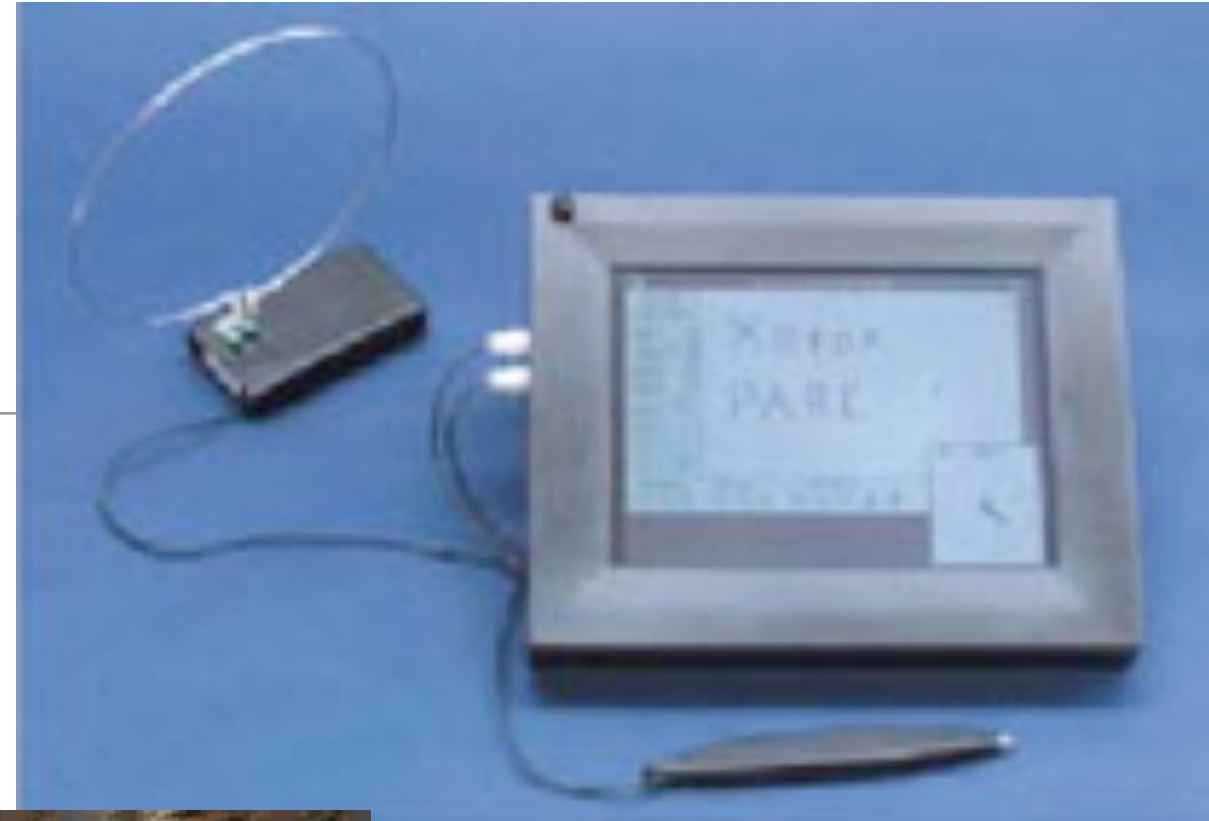






# Pads

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*“Pads differ from conventional portable computers in one crucial way. Whereas portable computers go everywhere with their owners, the pad that must be carried from place to place is a failure. Pads are intended to be ‘scrap computers’ (analogous to scrap paper) that can be grabbed and used any-where; they have no individualized identity or importance.”*

*M. Weiser*





# Boards

*“We have built enough Liveboards to permit casual use: they have been placed in ordinary conference rooms and open areas, and no one need sign up or give advance notice before using them. By building and using these boards, researchers start to experience and so understand a world in which computer interaction casually enhances every room.”*

*M. Weiser*



Xerox's Liveboard with Tivoli application



# *The Computer for the 21st Century*

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*“The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.”*

- ▶ l'écriture, l'eau, l'électricité...
- ▶ Embarqué, invisible, tacite, ambient, périphérique.
- ▶ Conscient de l'environnement



# Dangling Wire de Natalie Jeremijenko

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Un exemple de Calm Technology

<https://people.csail.mit.edu/rudolph/Teaching/weiser.pdf>  
<https://calmtech.com/index.html>



Good Night Lamp  
A. Deschamps-Sonsino

# L'informatique Ubiquitaire

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# En Europe

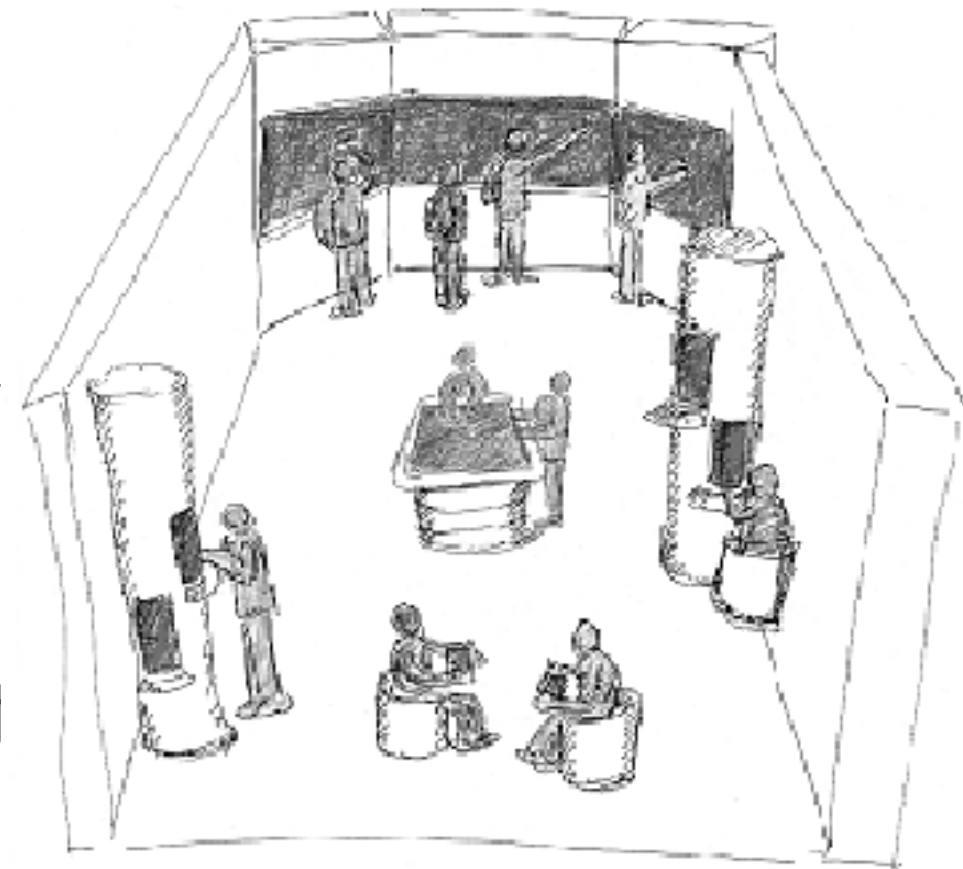
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## i-Land: “RoomWare” pour la créativité et Concepts

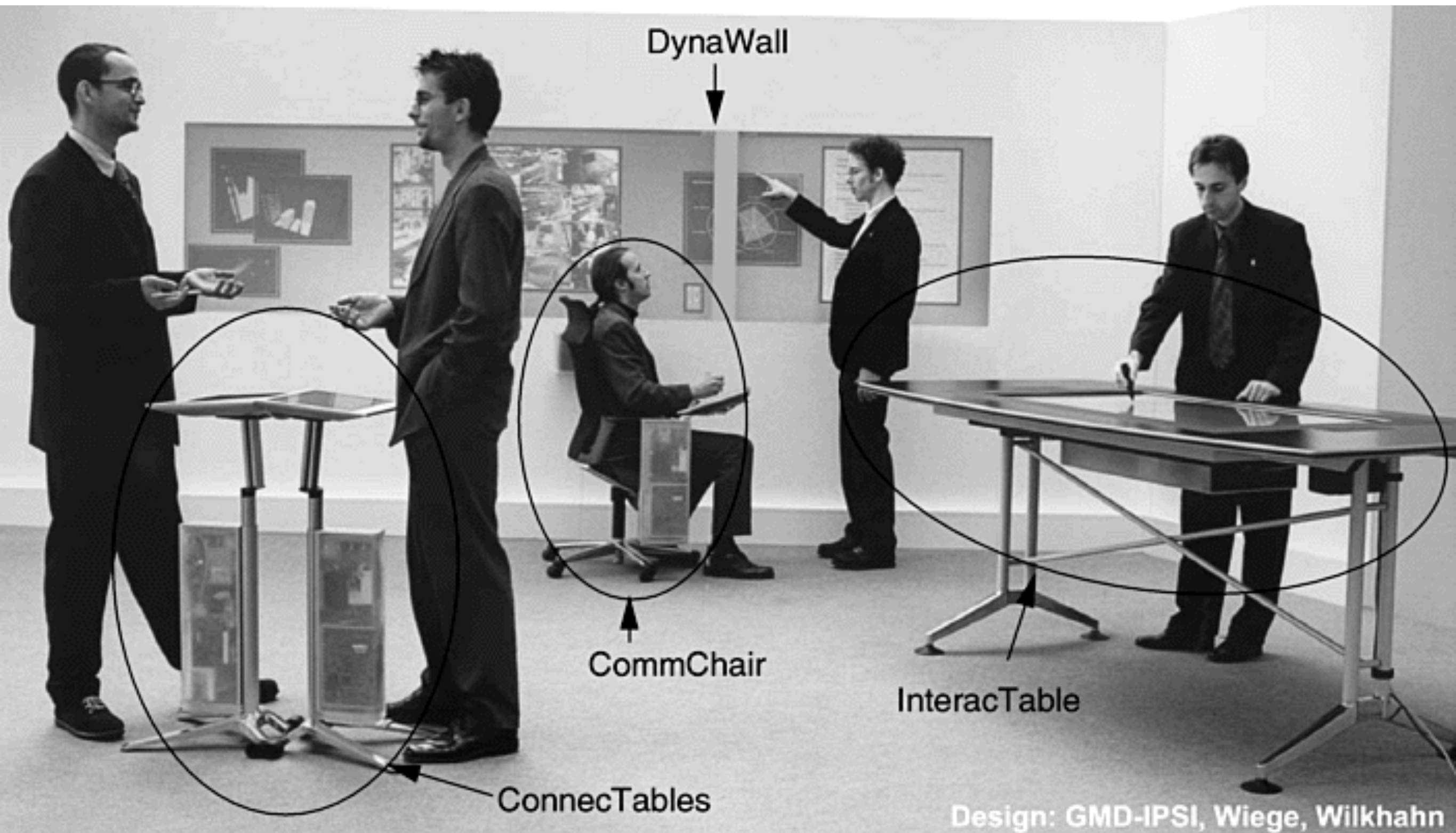
- ▶ Intégration de l’espace architectural et informationnel.
- ▶ Nouvelles pratiques de travail.

## Scénarios

- ▶ Rencontre dans le couloir, dessin sur le mur
- ▶ Travail collaboratif en sous-groupe —> session de discussion







DynaWall



CommChair

InteracTable

ConnecTables

Design: GMD-IPSI, Wiege, Wilkhahn



# i-Land

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## DynaWall

- ▶ Mur interactif tactile : 4,5m x 1,1m

## CommChair

- ▶ Chaises avec ordinateur et station de docking intégrées pour portables

## InteracTable

- ▶ Table interactive tactile : 65x85cm

## Passage

- ▶ Mécanisme de passage d'information et d'association entre objets physiques et numériques.

# Infrastructure

## Integration

- ▶ De tous les composants hardware
- ▶ Réseau + infrastructure logicielle
- ▶ “OS for RoomWare”

## Software Infrastructure ~ BEACH

- ▶ Partage d'information
- ▶ Gestion d'interfaces distribuées
- ▶ Distribution, réplication, gestion d'objet informationnels

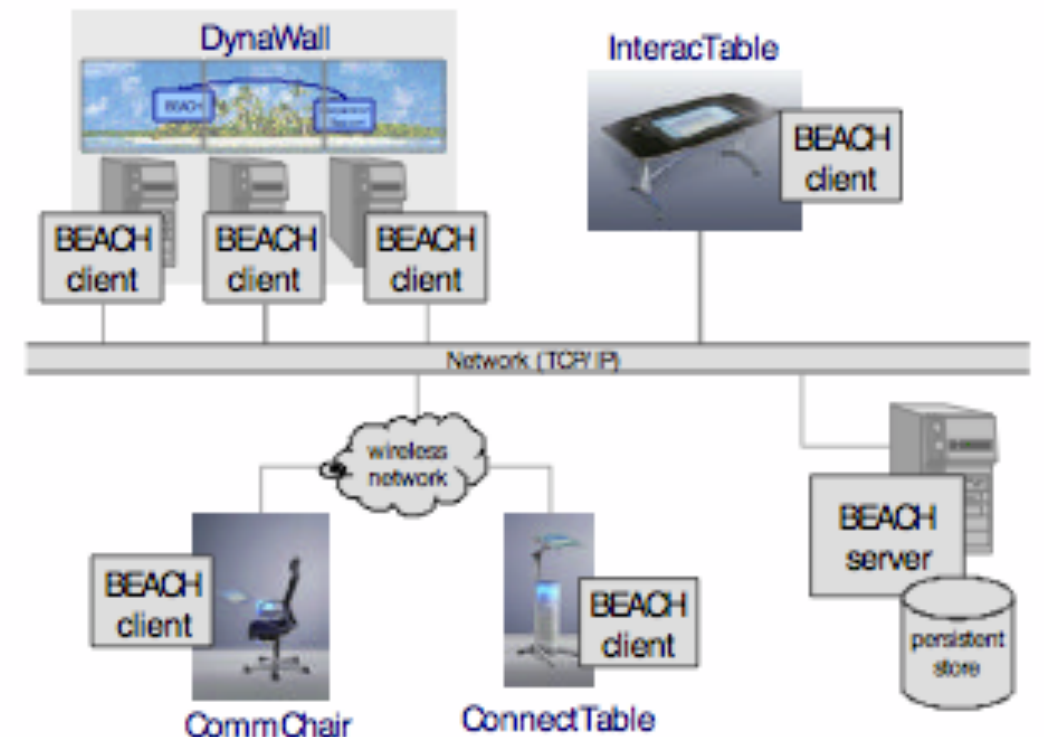
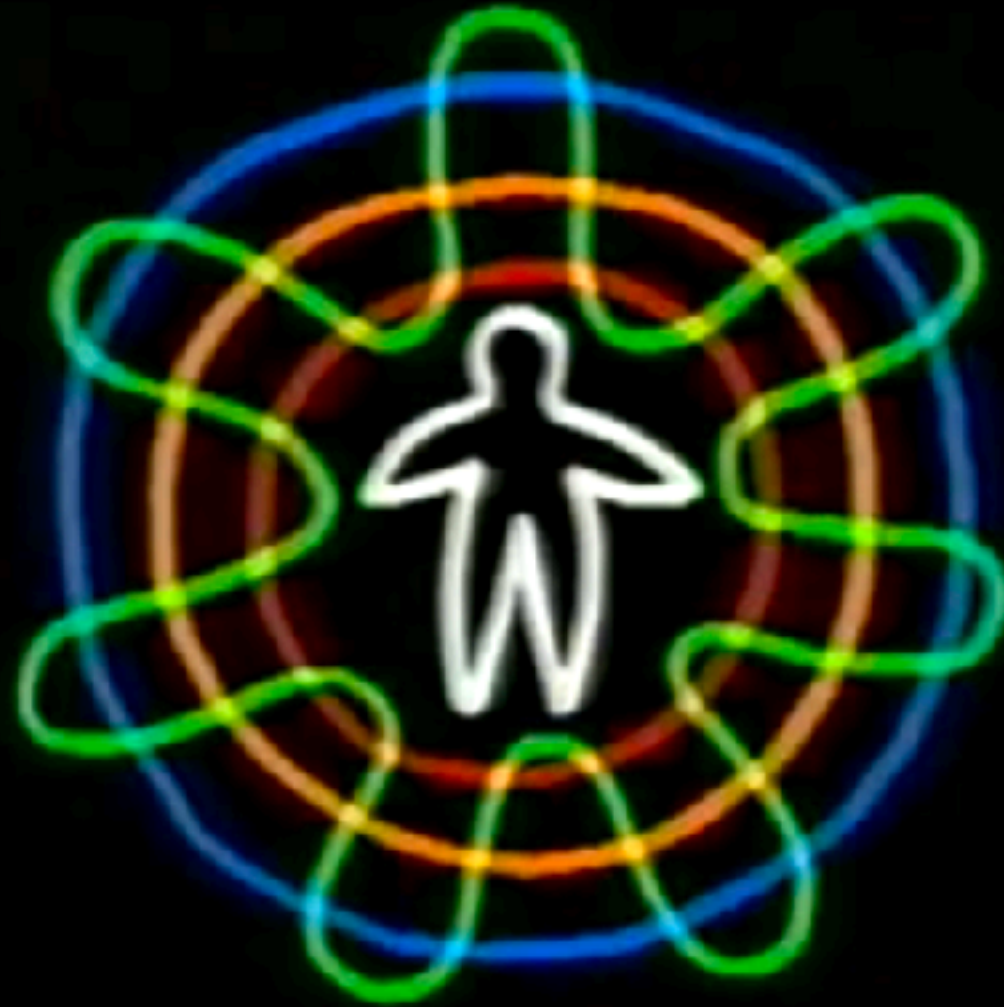


Fig. 4. BEACH clients running on different roomware component are synchronised by a server

# Vision of the future (Philips, 1996)

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VISION OF THE FUTURE

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# Principes et exemples

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## Décentralisation

- ▶ Nombreux dispositifs
- ▶ Distribués, mobiles, p2p

## Diversifiés

- ▶ Universel -> dédié
- ▶ Grand nombre de clients

## Connectivité

- ▶ Toujours actif
- ▶ Sans fil

## Simple

- ▶ “Information appliances”, dédiées avec fonctionnalité limitées
- ▶ “Intelligent”
  - Context-awareness
  - Activity-awareness



# Une personne, de nombreux dispositifs

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# Un dispositif, de nombreux utilisateurs

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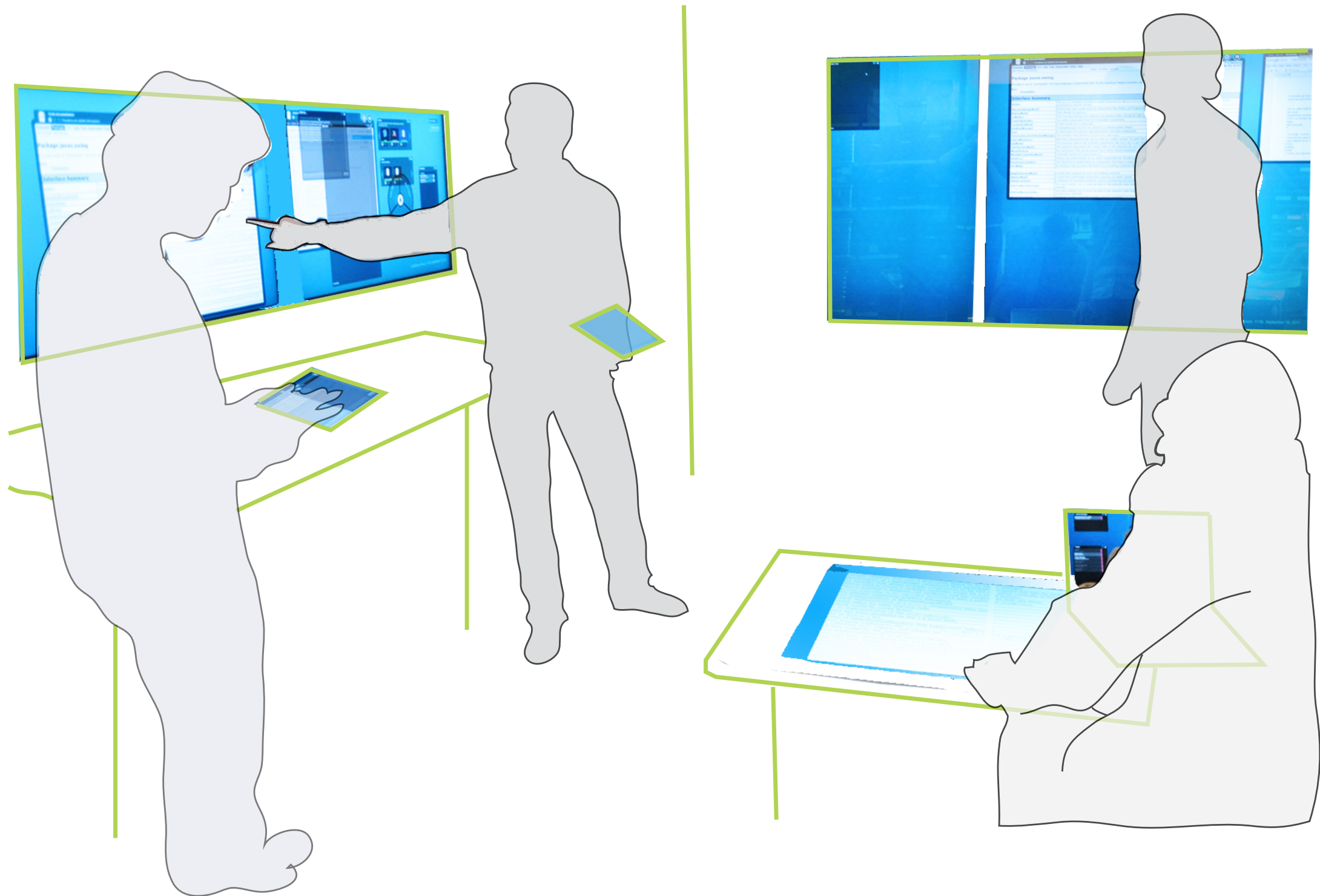
# Smart-home

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# Smart spaces

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# Mobilité





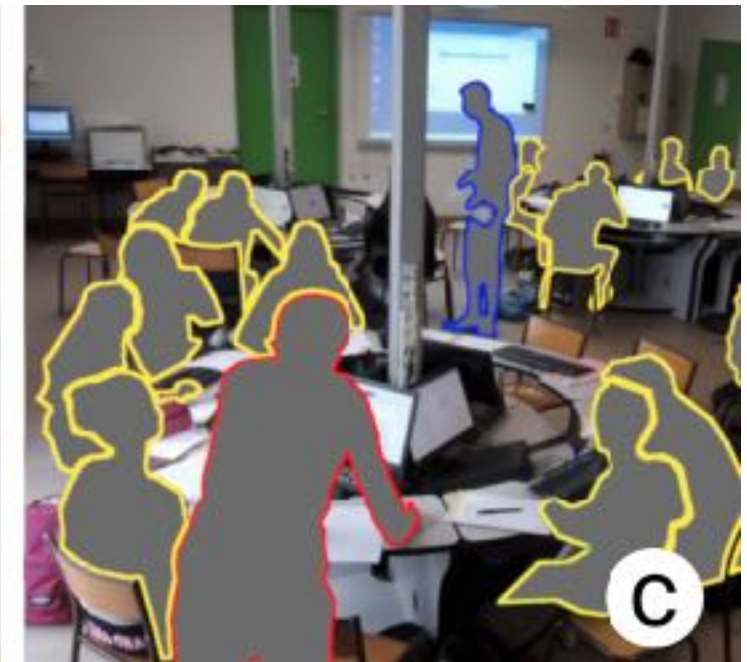
# Santé et soins

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# Education

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# Wearables

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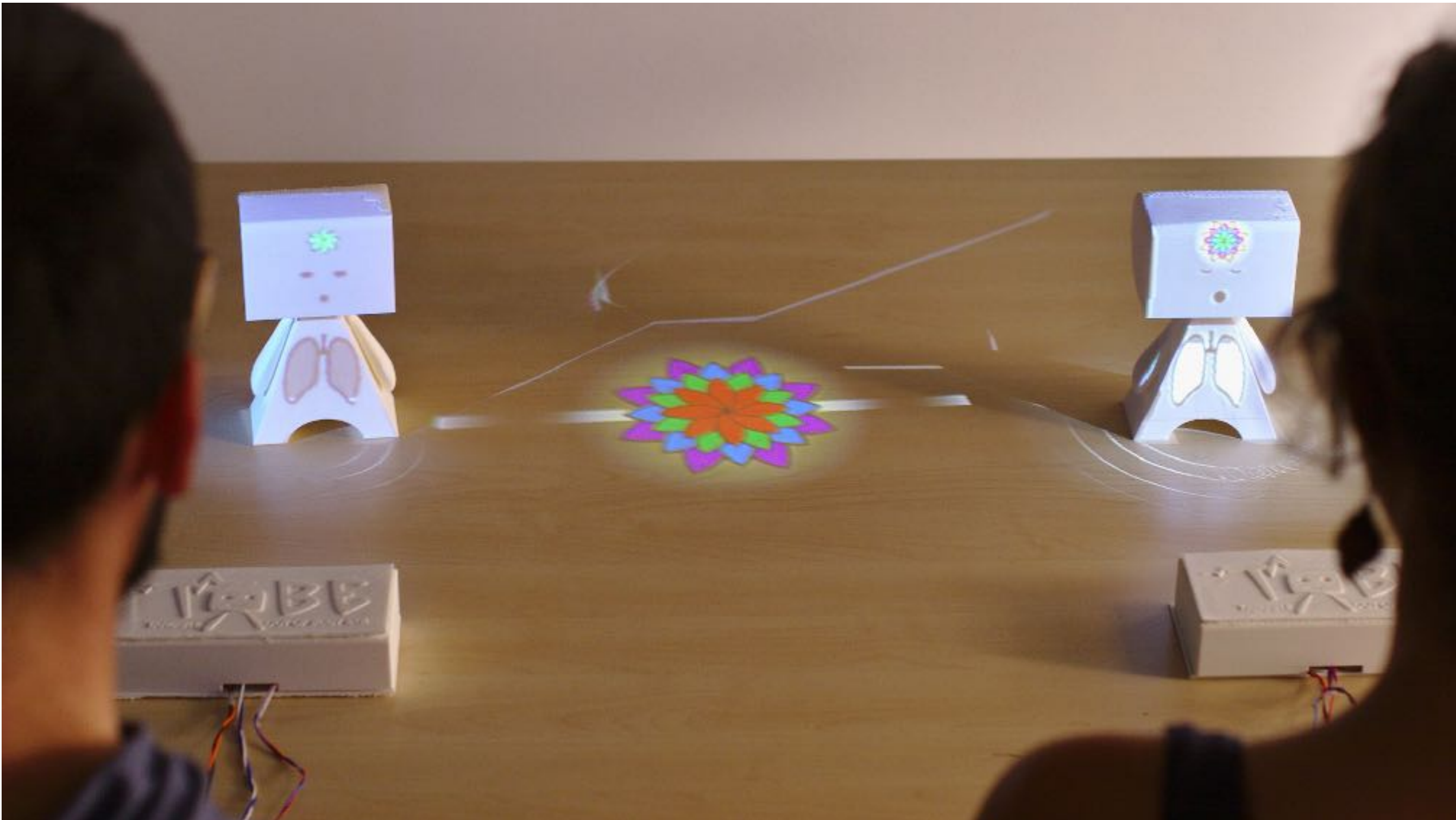
# Informatique tangible

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# Réalité mixte

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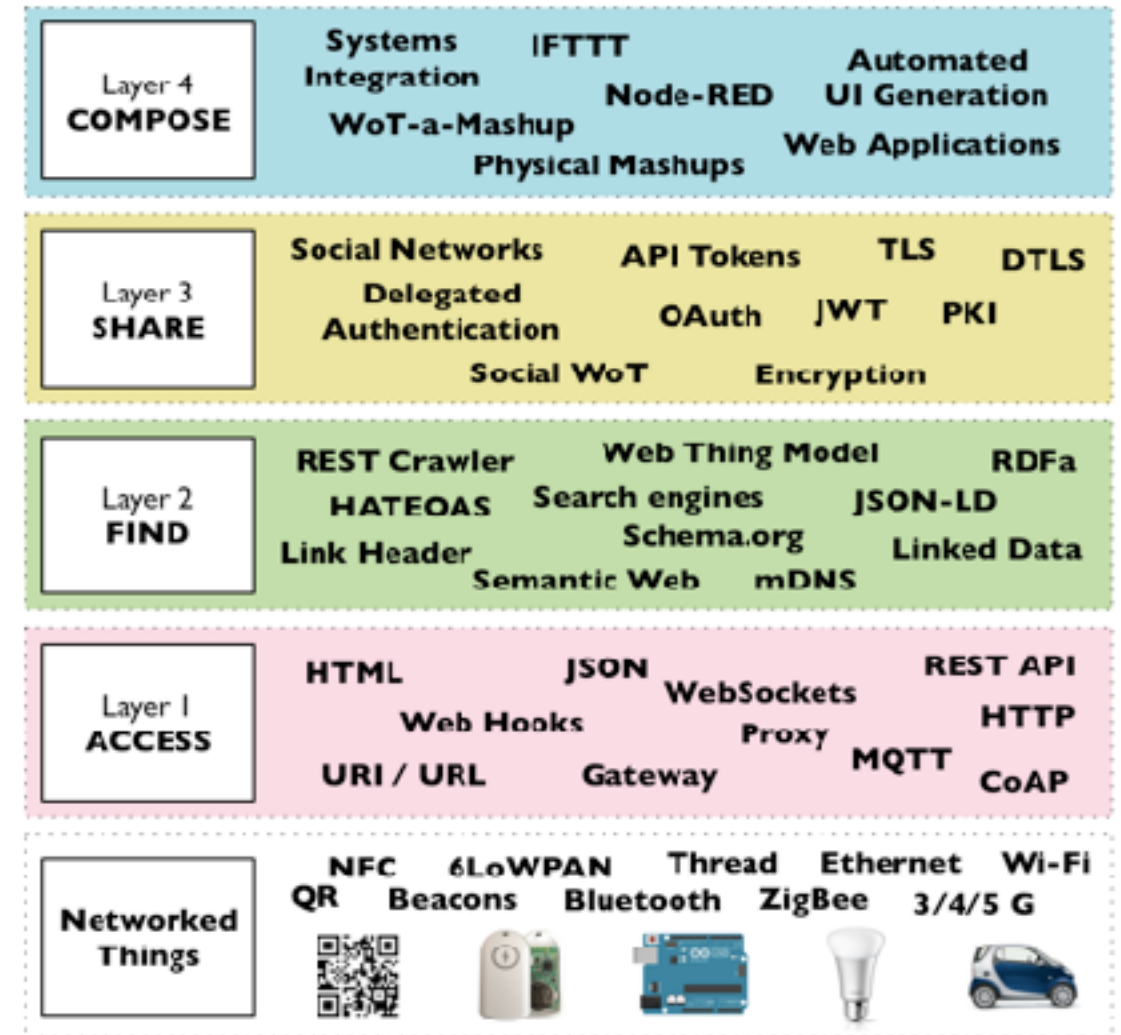
# Web of Things

<https://www.w3.org/WoT/>



## Couche Web sur l'Internet of Things

- ▶ Un GT du W3C  
2 Candidate Recommendations
- ▶ Réutiliser les standards
- ▶ Simplifier la création de services
- ▶ Des bases anciennes  
Projet Cooltown de HP en 2002
- ▶ Des entreprises actives:  
xively, evrythng, ...



Source: Building the Web of Things: [book.webofthings.io](http://book.webofthings.io)  
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# Bilan

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1. Concevoir pour la présence quasi-continue du numérique
2. Présenter l'information en respectant l'attention des utilisateurs -> de la périphérie vers le focus
3. Lier mondes physique et numérique
4. Transformer nos méthodes de conception, pour imaginer répondre à des besoins diffus et difficilement formalisables
5. Enjeux en termes de vie privée et environnemental