Smart Environments

Prof Dr Gerhard Schmitt

Singapore, April 6, 2009

iA
Chair for Information Architecture

Dr Kisho Kurokawa's Fusionopolis

Smart Environments

Overview

- Ubiquitous Computing
- Technologies pervading Space - Examples
- Quality Characteristica
- The changing Relationship with the Environment

Smart Environments

Overview

- Ubiquitous Computing
- Technologies pervading Space - Examples
- Quality Characteristica
- The changing Relationships with the Environment

Ubiquitous Computing

This paradigm is also described as pervasive computing, ambient intelligence, or more recently, everyware.

When primarily concentrating on the objects involved, it is also physical computing, the Internet of things, haptic computing, and things that think.

Definitions and Principles

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

Marc Weiser, 1991

	ENGLISCH		DEUTSCH	
Speichern	der ausgewählten Wörter im Trainer		**9 Treffer**	
Unmittelbare Treffer				
	ubiquitous *adj.*		allgegenwärtig	
	ubiquitous *adj.* [biol.]		ubiquitär	
	ubiquitous *adj.*		universell	
Zusammengesetzte Einträge				
	ubiquitous application		universelle Anwendung	
	ubiquitous computing		allgegenwärtige Datenverarbeitung	
	ubiquitous computing		pervasives Computing	
	ubiquitous computing		ubiquitäres Computing	
	area of **ubiquitous** operation [telecom.]		Bereich mit hoher Netzkapazität	
Beispiele				
	ubiquitous sun, sea and sand		allgegenwärtige Sonne, See und Sand	

Definitions and Principles

Ubiquitous Computing is...

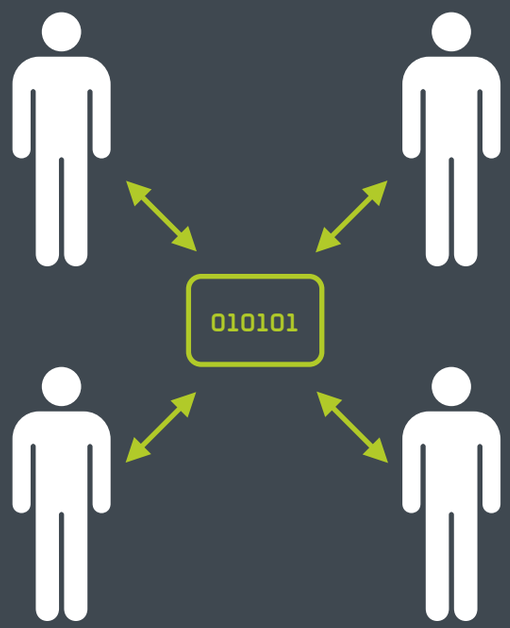
– numerous, casually accessible, often invisible computing devices

– mobile or imbedded in the environment

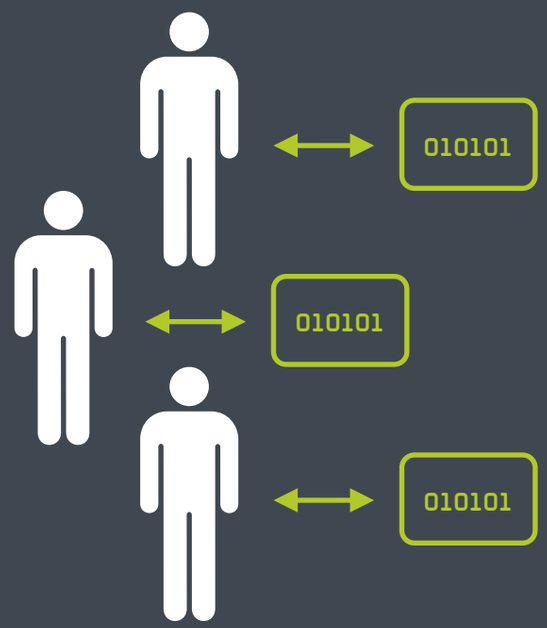
– connected to an increasingly ubiquitous network structure

Development Stages

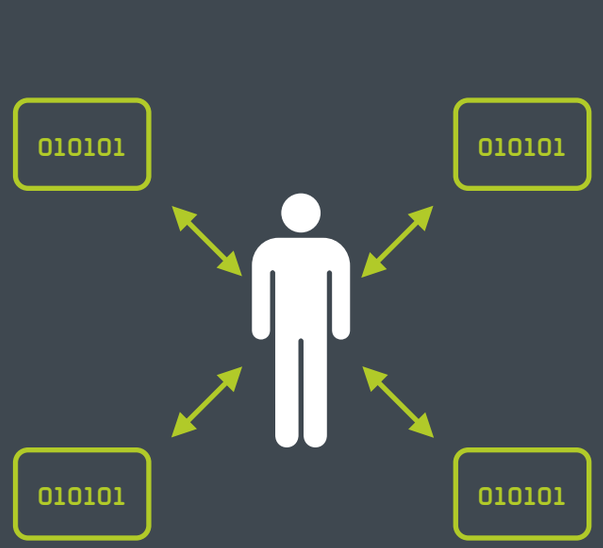
Mainframe-Era:
one computer,
many users



PC-Era:
one computer,
one user



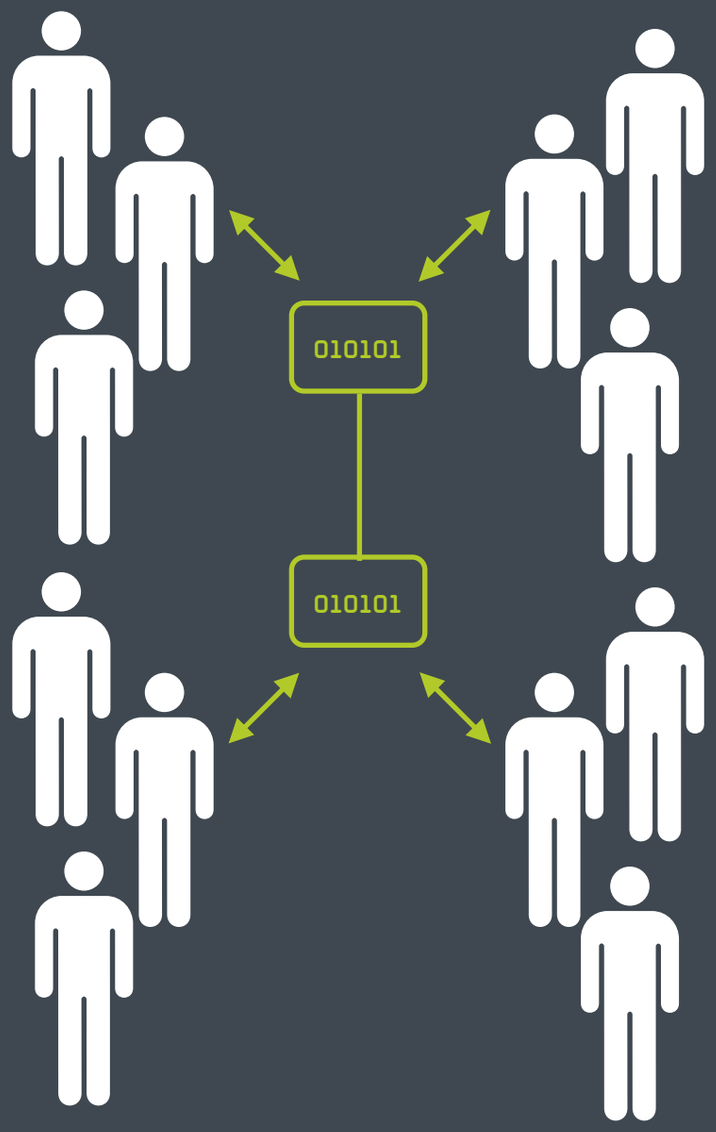
Ubiquitous- Computing:
many computers,
one user



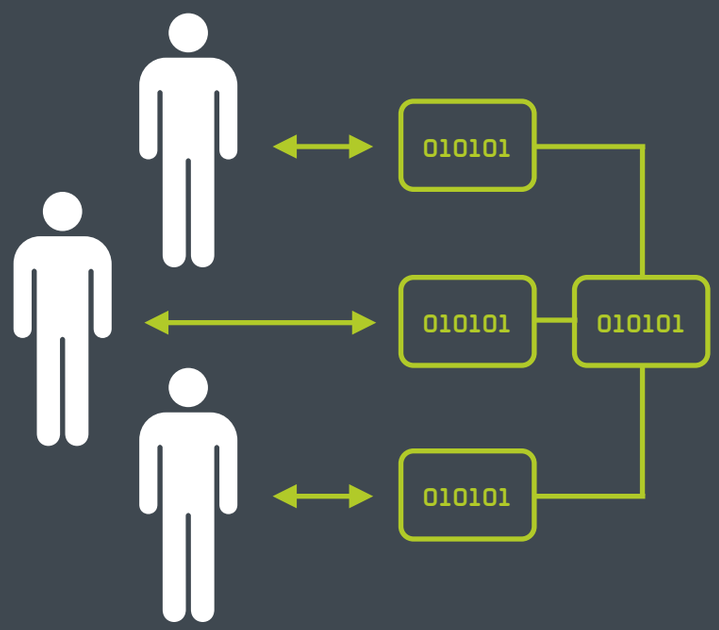
Ubiquitous Computing

Ubiquitous Connectivity

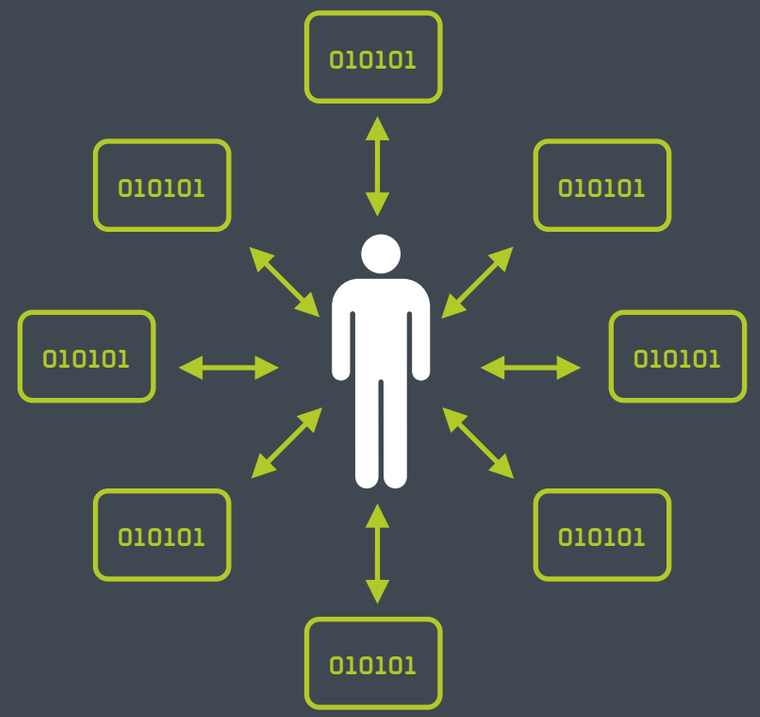
Mainframe-Era:
beginning
connections



PC-Era:
Internet



Ubiquitous- Computing:
Web of objects



Smart Environments

Overview

- Ubiquitous Computing
- Technologies pervading Space - Examples
- Quality Characteristica
- The changing Relationships with the Environment

Technologies are pervading Space

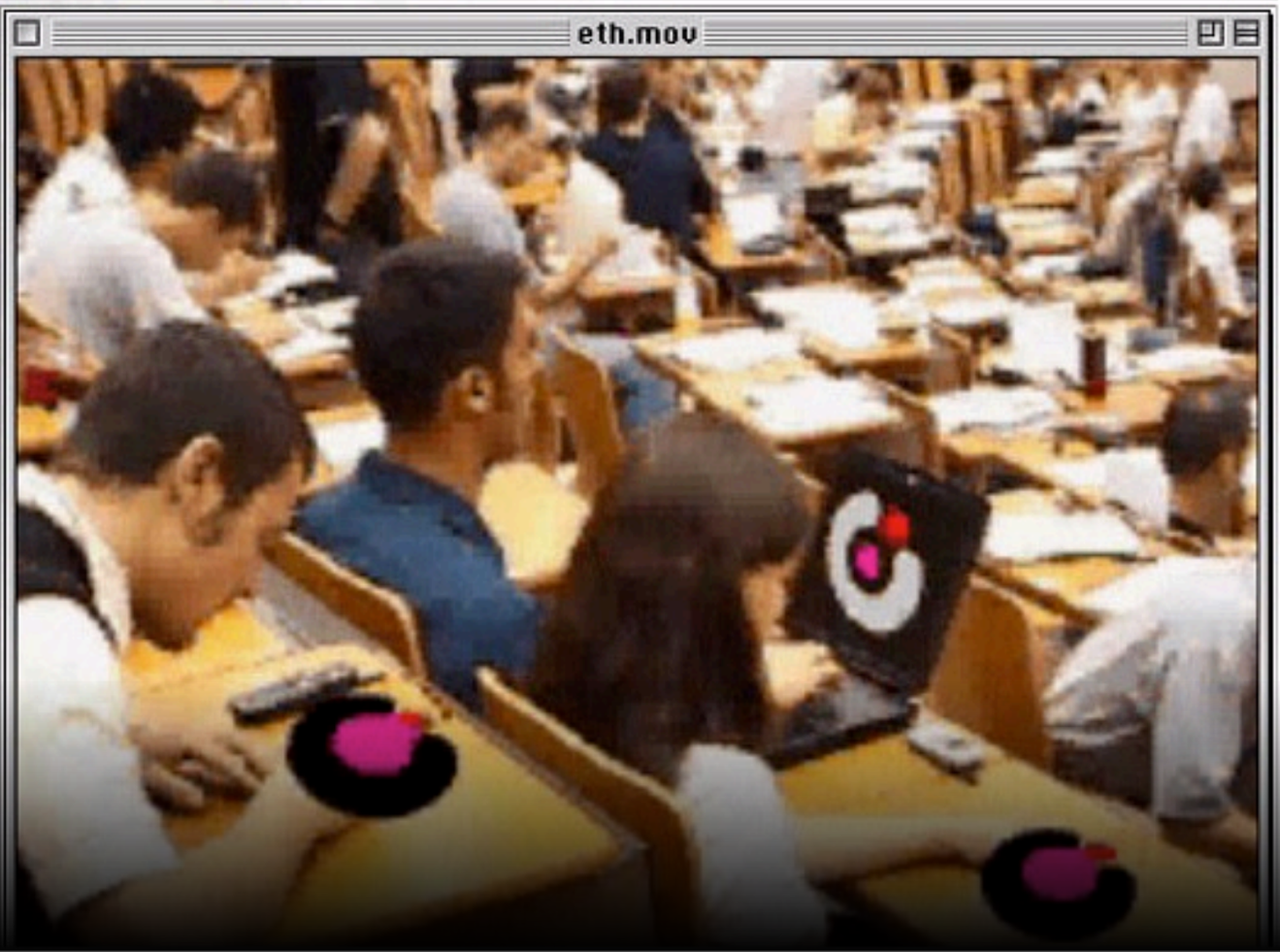
Example: ETH World - 2000 - Predecessor to Interactive Cities

05	07	06	02	04	01	03
28	17	49	08	13	11	18
42	01	03	05	10	12	15
21	23	24	25	26	29	31
32	36	38	48	33	34	40
41	04	06	07	20	22	27
30	43	37	09	14	16	39
44	46	47	50	02		

PROJECT 3005
1. Prize

Mitlinks AG
Alexandra Papadopoulos
Urs Suter
Rafael Garcia
L'Altro
Cyril Brunner
Jakob Schiratzki
HLS Architeckten
Matthias Hauenstein
ETH Zürich, D-ELEK
Daniel Erni

LQ
HQ



Facts:

28.04.2000
Competition Started
300 parties,30 countries

phase 1
51 contributions submitted

07.2000
phase2
7 contributions selected

08.11.2000
Jury decision

13.11.2000
Public Presentation
of the Winner

Organization:
ETH Zuerich
[Phase 1] Berlin

Invitation to tender:
.pdf, text(0.4 MB)
.pdf low res. (1.5 MB)
.pdf high res. (9.0 MB)

Map Legend:

1. Prize	1
2. Prize	1
3. Prize	1
4. Prize	1
Separate Prize	1
3. Rundgang (2.Ph)	9
3. Rundgang (1.Ph)	1
2. Rundgang (1.Ph)	24
1. Rundgang (1.Ph)	17
Nachrücker	1

Example: Proposed ETH World - Worlds in the year 2000

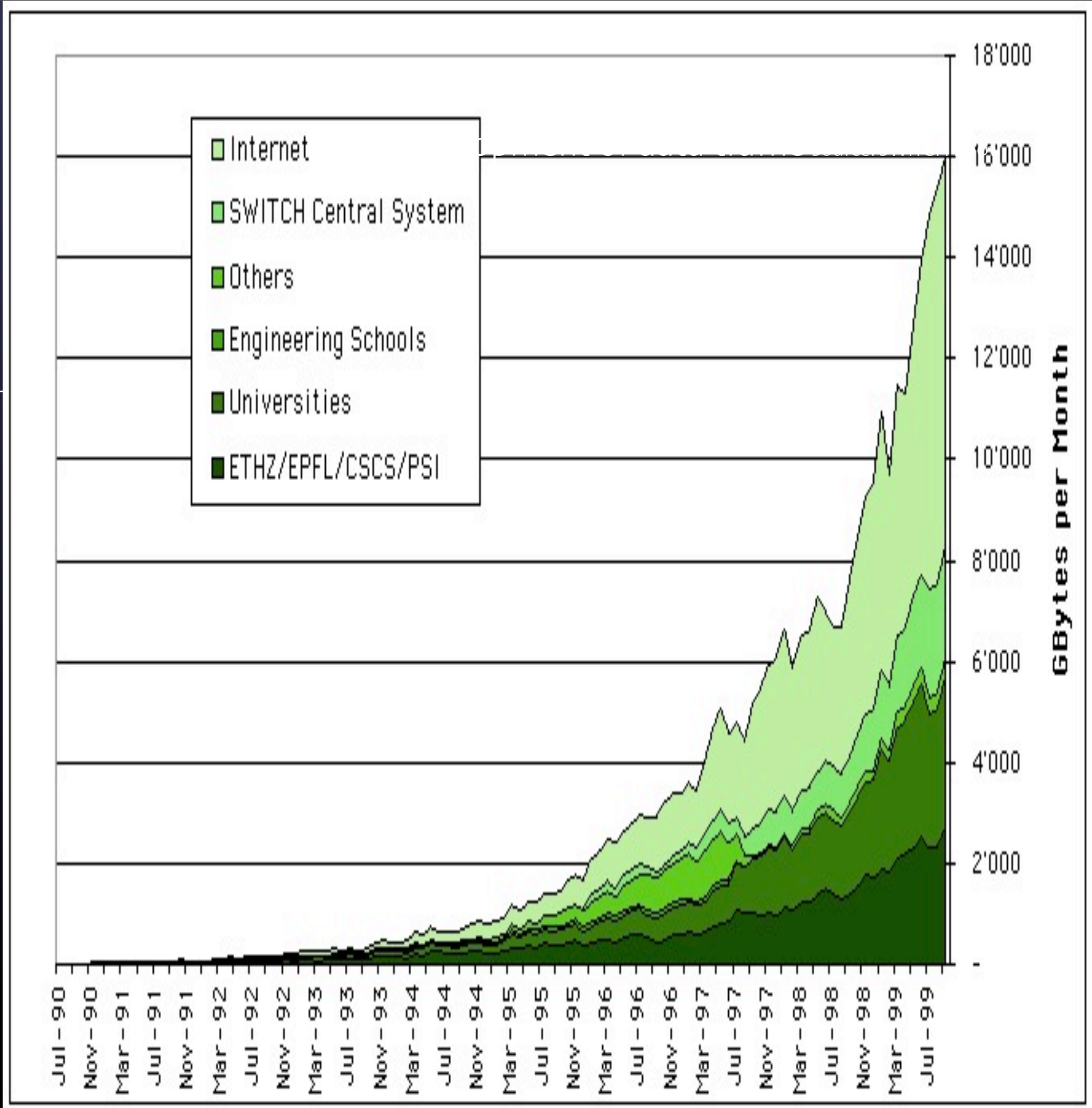
ETH World:

- ETH Learning, Teaching, Research, Service World
- ETH Student World
- ETH Assistant World
- ETH Professor World
- ETH Department Head World
- ETH Administration World
- ETH Alumni World

ETH World

Reasons for ETH World: Development of data transfer

Source:
SWITCH 2001 http://www.switch.ch



ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Information Technology

"the use of electronic means to facilitate the execution and coordination of tasks"

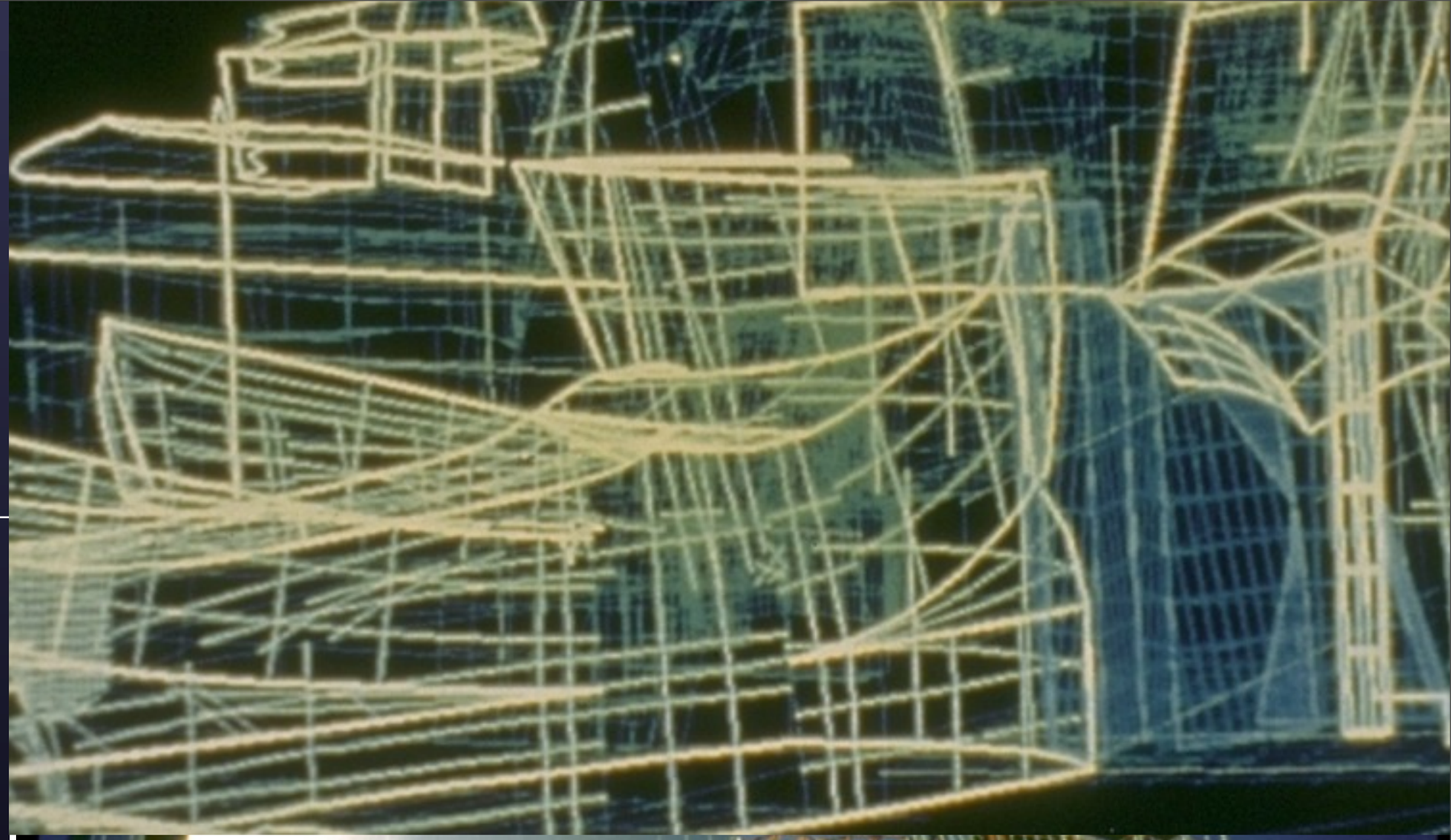
Examples in ETHWorld

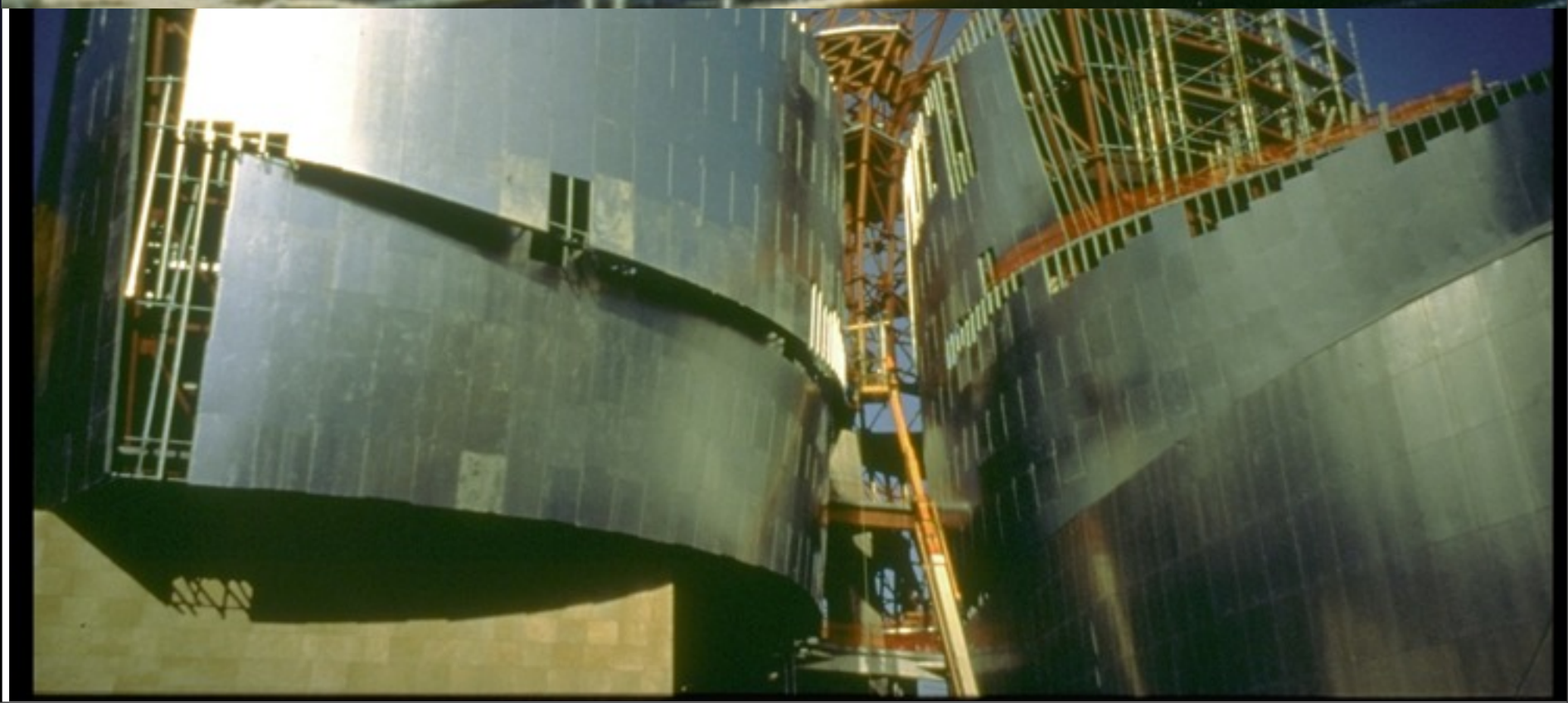
Tasks: attending lectures, access documents, access spaces, etc.

Coordination of tasks: group discussions, research collaboration, etc.

ETH World

All Digital: Advanced use of IT at any stage implies that all tasks in all linked stages are executed in digital media





ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Mobile, wireless components

They are central to ETHWorld

Access beyond the desktop

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Swatch watches (Swisshouse)

Swissair e>card

Others...

Industry applications

Swisshouse: registration of visitors using Swatch watches

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

From “carry-on” towards “wearable”

From big to small…

- Wireless laptop computer
- PDA
- Smart card
- Watch
- Pin
- Textiles
- etc

ETH World

Levels of Input

Human: active interfaces (keyboard, stylus, voice, etc.)

Sensors: passive interfaces (temperature, time, external signals, etc.)

Constant signal, preprogrammed

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Challenges...

- Miniaturization
- Functionality
- Design
- Security
  - Stolen identity
  - Access to databases

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

communication and knowledge transfer

ETH World presence
a wearable device?

Each member of the ETH community will have the opportunity to receive a mobile device: *The ETHworld presence*

ETHworld presence will be a tool to access ETHworld and its global community. It will contain a personal Web server and will allow direct interaction with ETHworld's physical facilities.

A built-in radio interface like Bluetooth and UMTS will allow communication with ETHworld, all existing equipment (laptop, workstation, cellular telephone, or PDA), and the ETHworld accessories. Connected with the accessories, the ETHworld presence will become a complete mobile communication and collaboration device.

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Not everything will be miniaturized

Digital displays and interaction spaces will become part of the physical architecture

The middle will disappear

ETH World

Goals and Milestones in 2000

International competition for the design of ETH World infostructure

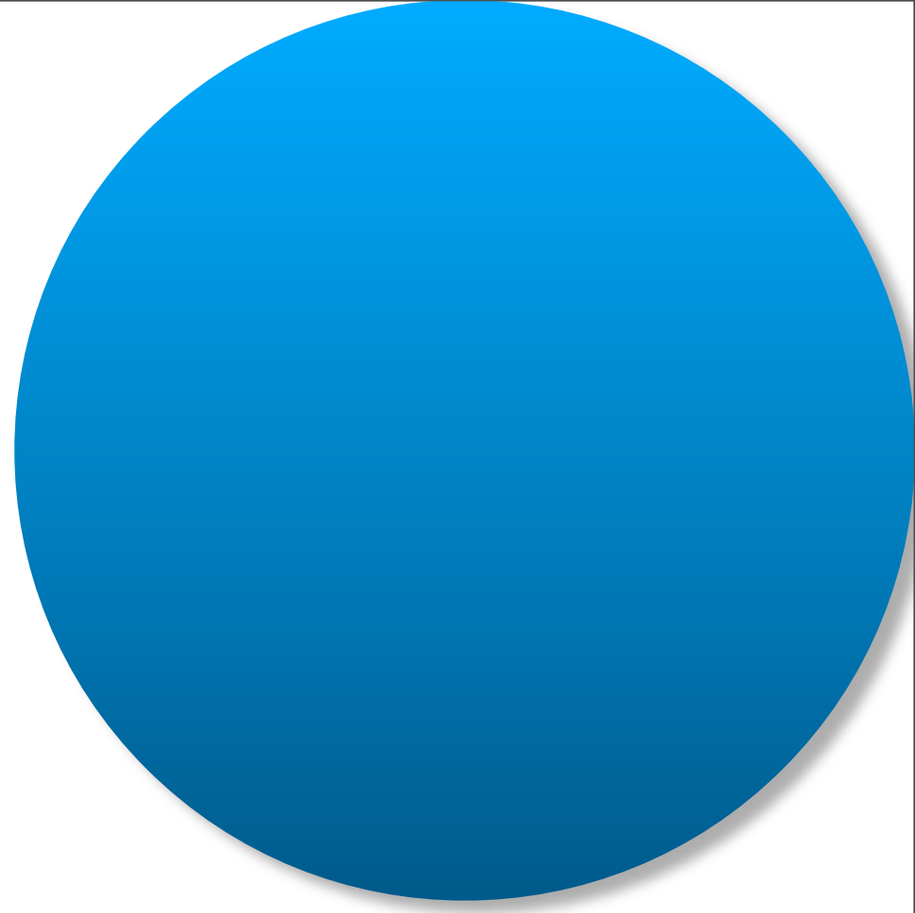
Begin of phase 1 ETH World pioneer projects

Planning of prototype wireless learning and working environment

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

The Projects in 2001



Neptun

Wireless LAN

Infostructure projects II: Focussed on the direct needs of ETH World as result of the competition

Implementation of competition results I

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Probable consequences

Re-definition of the status and need for research facilities

Re-definition of the status and need for teaching facilities

Changes in the role of the computing services

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Conclusion - 1

The university of the future will consist of a physical part and a rapidly growing virtual part. Together, they will form the new reality

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Conclusion - 2

Future infrastructure planning must consider the virtual part of the university as an integral part from the beginning

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Conclusion - 3

Probable consequences:

- Development of a new type of communication
- Long-term gains
- Short-term costs

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Conclusions - 4

Regionalism will grow

The importance of physical architecture and physical presence will increase as a result of de-materialization and virtualization

The human being will increasingly be the focus of the development

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH World

Conclusions - 5

ETH World's main goal:

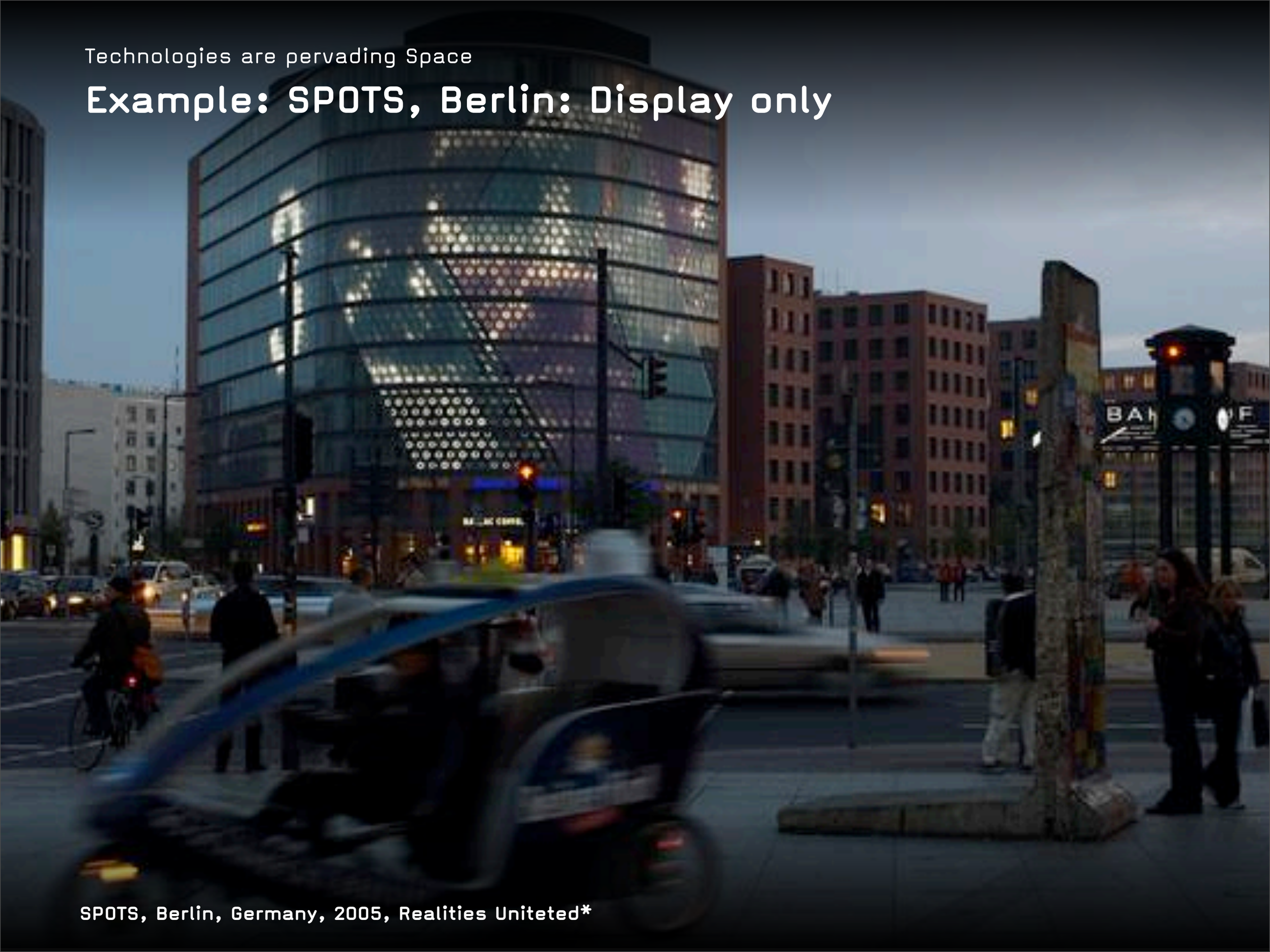
Make ETH the most attractive – physical and virtual - place to study and do research

www.ethworld.ch

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Technologies are pervading Space

Example: SPOTS, Berlin: Display only



SPOTS, Berlin, Germany, 2005, Realities Uniteted*

Technologies are pervading Space

Example: SPOTS, Berlin

SPOTS, Berlin, Germany, 2005, Realities United

Technologies are pervading Space

Example: under scan, Nottingham, UK

under scan, Relational Architecture, Nottingham, UK, 2006, Rafael Lozano-Hemmer

Smart Environments

Overview

- Ubiquitous Computing
- Technologies pervading Space - Examples
- Quality Characteristica
- The changing Relationships with the Environment

General Quality Characteristics

We identify five goals of ubiquity, with regards to a service. These goals may be satisfied to varying degrees based on user needs and operating conditions.

- Availability
- Transparency
- Seamlessness
- Awareness
- Trustworthiness

Quality Characteristics

Availability

Ideally, a ubiquitous service should be available context independent.

The service should be also available regardless of changes in user status, needs, and preferences.

Quality Characteristics

Transparency

A good tool is an invisible tool, meaning that the tool does not intrude on the user consciousness.

The user focuses on the task (not the tool)
so that she or he can achieve more intuitively and with ease without requiring constant attention and awareness of the underlying technology.


飲料表
Drink List


1 33 3

Quality Characteristics

Seamlessness

The capability of providing an uninterrupted service session under any connection with any device.

The system will recognize the user wherever she or he logs on, on any system, with any equipment, at any time, with the applications in a given state and have them adapt in the best possible way given these surrounding conditions.

Quality Characteristics

Seamlessness

Ubiquitous devices extend the human senses by providing greater awareness of the surrounding environment.

By blending into the physical world, ubiquitous computing bridges the gap between the end-user and her or his surrounding.


E|R|P

Quality Characteristics

Trustworthiness

Mutual trust must be established between different entities in an ubiquitous environment in the sense that each entity is assigned a trust value based on its behavior.

An entity can be a device, a service or a user.


6748 9911 (24-hr)


THE CATHAY

Smart Environments

Overview

- Ubiquitous Computing
- Technologies pervading Space - Examples
- Quality Characteristica
- The changing Relationships with the Environment

The changing Relationships to the Environment

From GUI to smart Space

	Virtual	Physical
Foreground	Graphical User Interface (GUI)	Haptic Interface
Background	Ambient Interface	Inhabitable Interface (smart space)

Why should we look at UbiComp?

There is a paradigm shift from cyberspace to pervasive or ubiquitous computing

Digital technology moves out of the screen into our daily life

Ubiquitous computing and total connectivity begin to have an impact on personal decisions

co2balance.com

Need help or advice? Please feel free to contact us on

Within the UK **0845 094 2620** or Internationally **+44 (0)1823 33 22 33**

Top Performing Retail Offset Provider
Clean Air - Cool Planet Report

Carbon Footprint Calculators

To calculate and offset your carbon emissions, simply select the relevent calculator from the list below.

FLIGHTS | HOUSEHOLD | CAR

RAIL | KNOWN EMISSIONS CO_2 | BUSINESS EMISSIONS

co2balance. Working with...

DEVONSHIRE MOTORS

Carbon Footprint Calculators

Co2balance have created a variety of carbon calculators that calculate the amount of CO2 (carbon dioxide) created by various activities.

Once your carbon footprint has been calculated, you can offset the calculated emission by investing through us in one of our many projects.

Air Travel Carbon Dioxide Emission Calculator

Please enter your flight details below to calculate the co2 emissions for your journey

Depart from:

Switzerland

Zurich

Arrive at:

Singapore

Singapore, Changi

Is your journey ○ one way, or ◉ return?

Number of persons travelling 1

Calculate

co2balance.com

Need help or advice? Please feel free to contact us on

Within the UK **0845 094 2620** or Internationally **+44 (0)1823 33 22 33**

Top Performing Retail Offset Provider
Clean Air - Cool Planet Report

Carbon Footprint Calculators

To calculate and offset your carbon emissions, simply select the relevent calculator from the list below.

FLIGHTS | HOUSEHOLD | CAR

RAIL | KNOWN EMISSIONS CO_2 | BUSINESS EMISSIONS

co2balance. Working with...

Group 4 Securicor

Carbon Dioxide Emission Calculators

Offset your Air Travel

Total CO2 Emissions : 4.72 tonnes

To offset this will cost : Price dependant on chosen Project

Choose Your Carbon Offset Project

Kenyan Energy Efficient Stoves - Wood Fuel

£42.48 at £9.00 per tonne

View Project | Select Project

Kenyan Energy Efficient Stoves - Charcoal Fuel

£47.20 at £10.00 per tonne

View Project | Select Project

Kenyan Energy Efficient Stoves - Wood Fuel

co2balance is working with local social groups in East Africa to replace the use of open fires for cooking with energy efficient cooking stoves. Our energy efficient stoves are made entirely in East Africa and utilise the 'Rocket stove' technology which offers a good balance between cost, life expectancy and efficiency. These stoves reduce firewood consumption by half and save in the region of 3 tonnes of greenhouse gas emissions a year, 15 tonnes over the 5 year life span, in comparison to traditional cooking methods.

In addition to the saving in greenhouse gas emissions, the reduced need for firewood and the burning of rubbish leads to a corresponding reduction in the amount of time spent collecting cooking fuel. The recipients of the energy efficient technology also gain considerable co-benefits such as reduced costs and a considerably improved environment from a health and safety perspective.

This is another example of co2balance seeking projects with a wide range of additional benefits to the receiving community, including health, financial, social and environmental. In this way, we can maximise the project's achievements beyond simple carbon saving.

Von Zürich, Switzerland Datum 27-03-2009 Wählen

Nach Tel Aviv-Yafo (TLV), Israel Zeit 08:00 − +

Suchen

Optionen
Flughafen wählen
Währungsauswahl
Pw-Fahrt anpassen
Transfer-Auswahl

Favoriten
Permalink

Feedback
Anregungen begrüsst!

Achtung

- Keine Informationen über Flughafentransfers in Tel Aviv-Yafo (TLV) gefunden. Bitte beachten Sie, dass diese Informationen nur für Flughäfen in Europa verfügbar sind.

Suche von Zürich, Switzerland nach Tel Aviv-Yafo (TLV), Israel am 27-03-2009 um 08:00

...	...	VIA	TRANS	ZEIT	CO2	PREIS	
23:07!	16:25	Munich (MUC)		15h18	469kg	EUR 430,15	Tickets kaufen
22:09!	16:30	Milan (MXP)		16h21	472kg	*EUR 419,65*	Tickets kaufen
8:01	15:30	Zürich (ZRH)		5h29	484kg	*EUR 1135,85*	Tickets kaufen
20:55	4:30!	Zürich (ZRH)		5h35	484kg	EUR 1584,30	Tickets kaufen
11:09	4:15!	Milan (MXP)		15h06	485kg	*EUR 285,76*	Tickets kaufen
11:09	2:55!	Munich (MUC)		13h46	487kg	EUR 742,85	Tickets kaufen
7:46	15:30	Zürich (ZRH)		5h43	487kg	*EUR 1136,70*	Tickets kaufen
20:46	4:30!	Zürich (ZRH)		5h43	487kg		Tickets kaufen

Think:

What would be the equivalent calculator for the design and construction of Architecture?

Could you program and compute this for design?

Could you offer equivalent CO2 offsetting projects?

Do you know the ETH North-South Center?

The changing Relationships to the Environment

Why we should look at UbiComp

Statement 1/5

Many developments in information and communication technology originally invented for industries have later become part of our daily lives - and will continue to do so.

The changing Relationships to the Environment

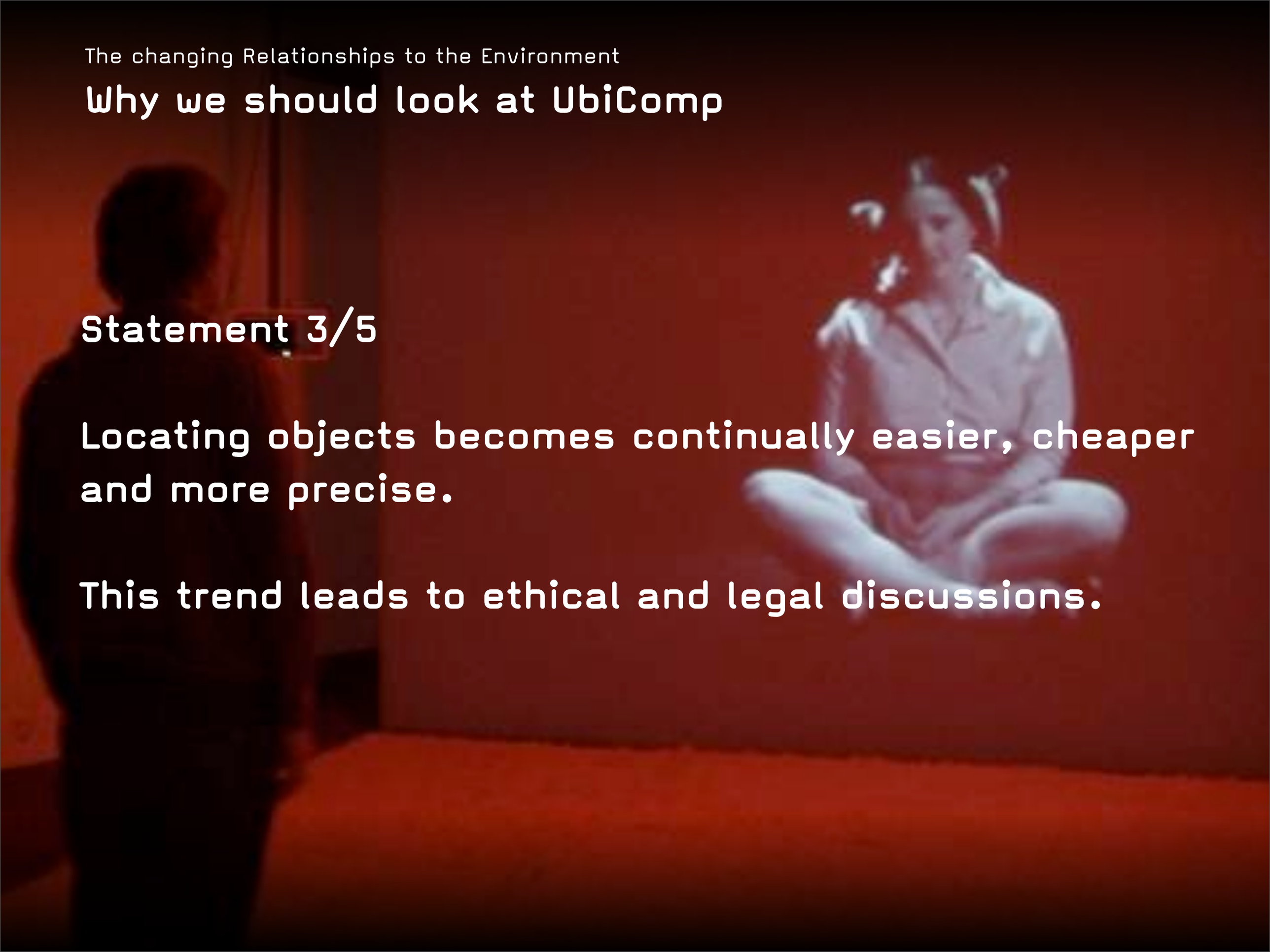
Why we should look at UbiComp

Statement 2/5

Many everyday objects become ‚smart‘ by adding information technology to collect, save, use and exchange data.

The changing Relationships to the Environment

Why we should look at UbiComp

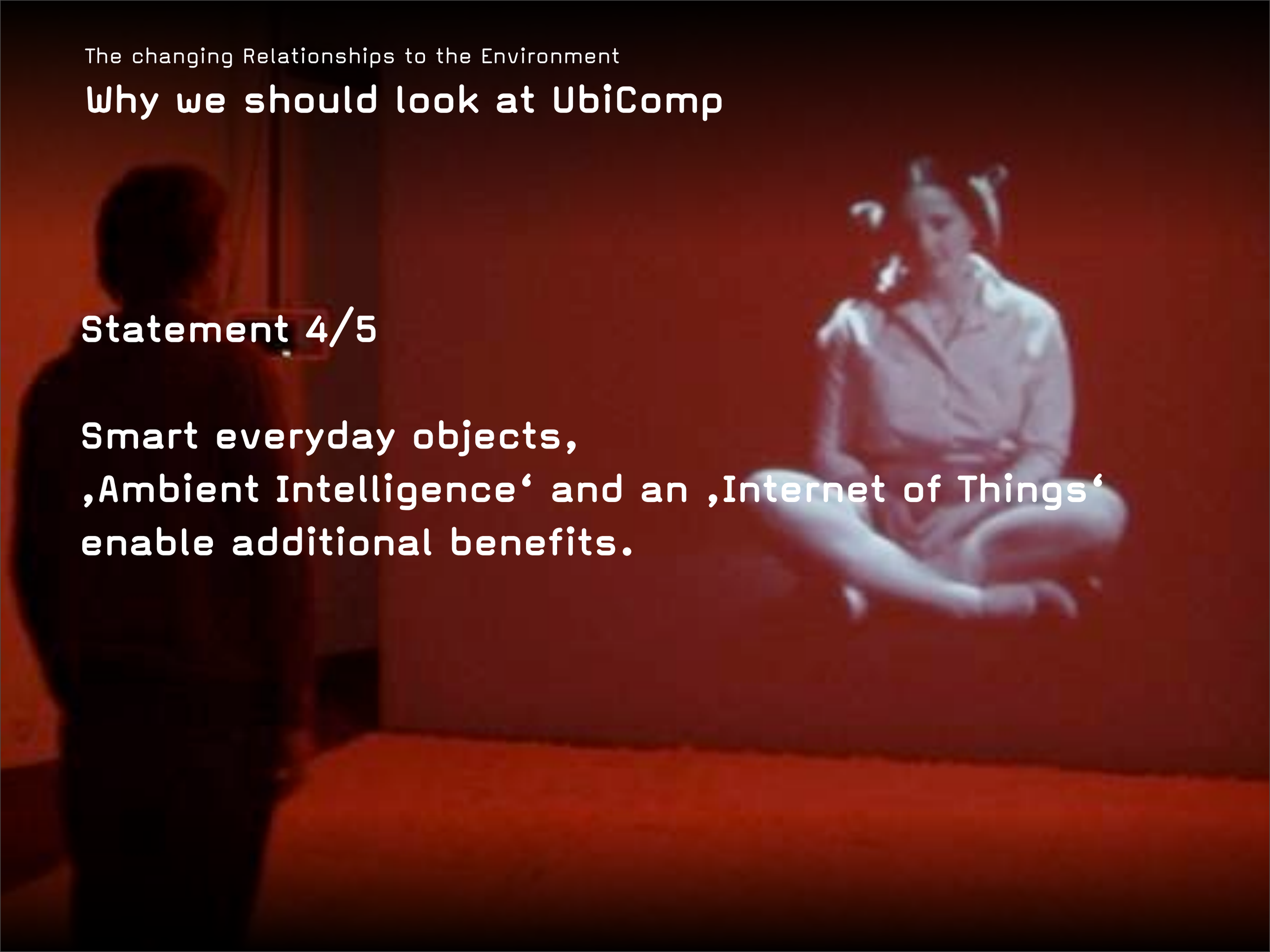


Statement 3/5

Locating objects becomes continually easier, cheaper and more precise.

This trend leads to ethical and legal discussions.

Why we should look at UbiComp



Statement 4/5

Smart everyday objects,
‚Ambient Intelligence‘ and an ‚Internet of Things‘
enable additional benefits.

The changing Relationships to the Environment

Why we should look at UbiComp

Statement 5/5

Collecting everyday life data results in huge challenges - for technology, economy and society.


eBay
PayPal
skype
89 Neil Road
Neil Rd

The changing Relationships to the Environment

Why we should look at UbiComp?

Eventually, ubiquitous computing will allow the re-creation of physical objects in real space and the interaction of humans with these objects - whether they are people, architecture, or information objects. In some areas of daily life, ubiquitous computing is already here.

Chair for Information Architecture | FS2009

Podcast Information Architecture

http://www.ia.arch.ethz.ch/teaching/fs2009-lecture/

Chair for Information Architecture

Sources

10: ETH Zurich
11: http://www.youtube.com/watch?v=4IbAQ1K8X94
12: http://www.spots-berlin.de/de/galerie/impressionen.php?col=0&expo=104
13: http://www.youtube.com/watch?v=047K74NOUQM
26: http://www.blinkenlights.net/
27: http://www.youtube.com/watch?v=_nIpyou3lvg
28: http://www.lozano-hemmer.com/imagrlh/rpics/uscan/1_girl_05_seq1.tif
29: http://www.youtube.com/watch?v=GQxLcxQAvOY
40: http://www.ubicomp.org/ubicomp2006/11.jpg
41-45: unknown source
46: http://www.flickr.com/photos/sveinhal/2676746354/
61: http://www.flickr.com/photos/sveinhal/2676746354/sizes/l/in/set-72157602397020671/