

# Human-Computer Interaction

↳ back to the future and... forward to the past

Stéphane HUOT | **Loki**

-technology & knowledge for interaction

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journée “Regards sur le FUTUR de l’Informatique”

Laboratoire d’Informatique de Grenoble

*Grenoble - 5 avril 2018*



# What is Human-Computer **Interaction?**

# *interaction paradigms*

## **computer as tool**

'first person' interface

↳ augmenting the capabilities of users

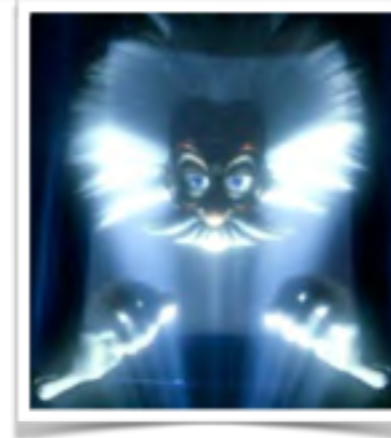


**Human-  
Computer  
Interaction**

## **computer as servant**

'second person' interface

↳ delegate tasks



**Artificial  
Intelligence**

## **computer as media**

'third person' interface

↳ communication, entertainment



**Mediated  
Communication  
& Multimedia**

[Verplank & Moggridge], [Beaudouin-Lafon & Mackay]

**understand** the phenomenon

↳ describe, explain, evaluate

**propose** new forms of interaction

↳ technologies, modalities, contexts

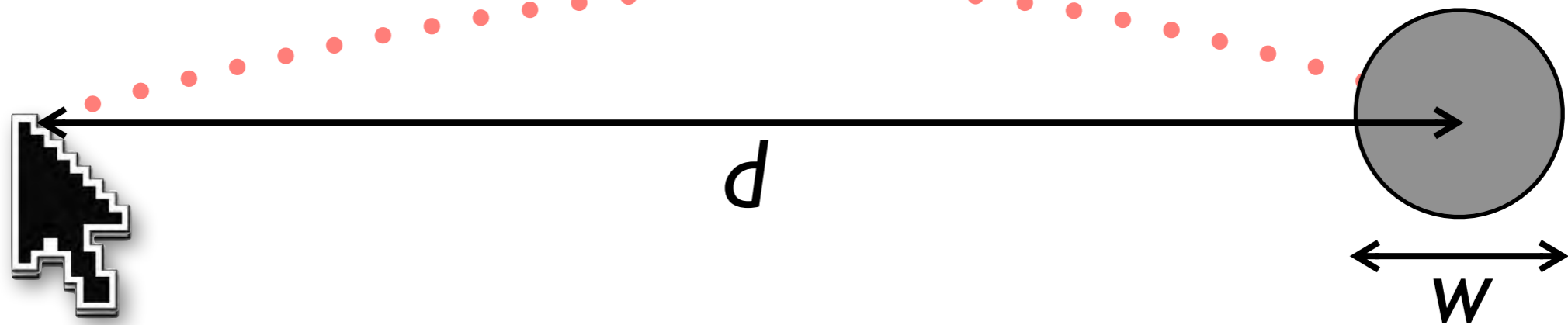
**integrate** knowledge and expertise

↳ theories, methods, tools

# *pointing with a mouse*

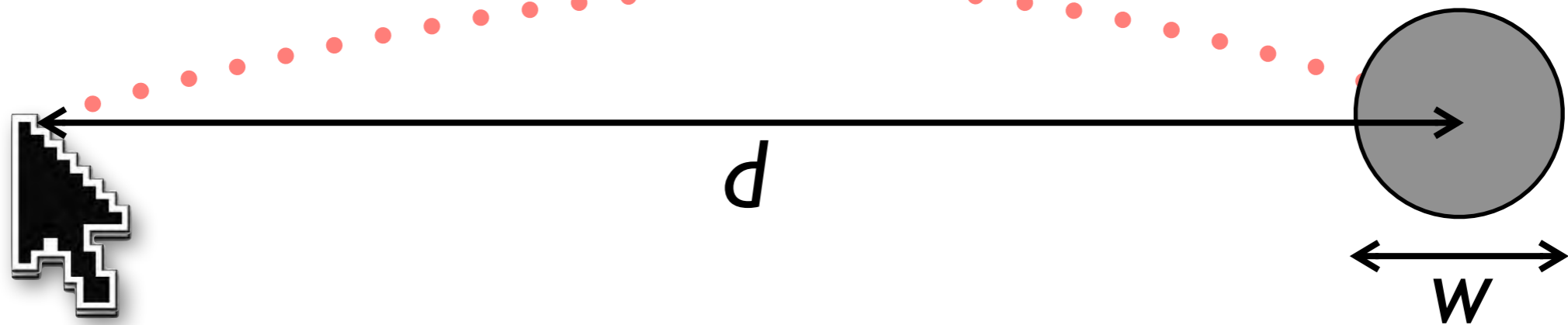


# *pointing with a mouse*



**M**<sub>ovement</sub> **T**<sub>ime</sub> = ?

# Fitts' Law (1954)



$$MT = a + b \text{Log}_2(1 + d/w)$$

# *ease pointing with expanding targets*





# *why is HCI important?*

---

always **at least one user**

↳ interactive systems

systems should be **accessibles and usable**

↳ the promises of the digital world

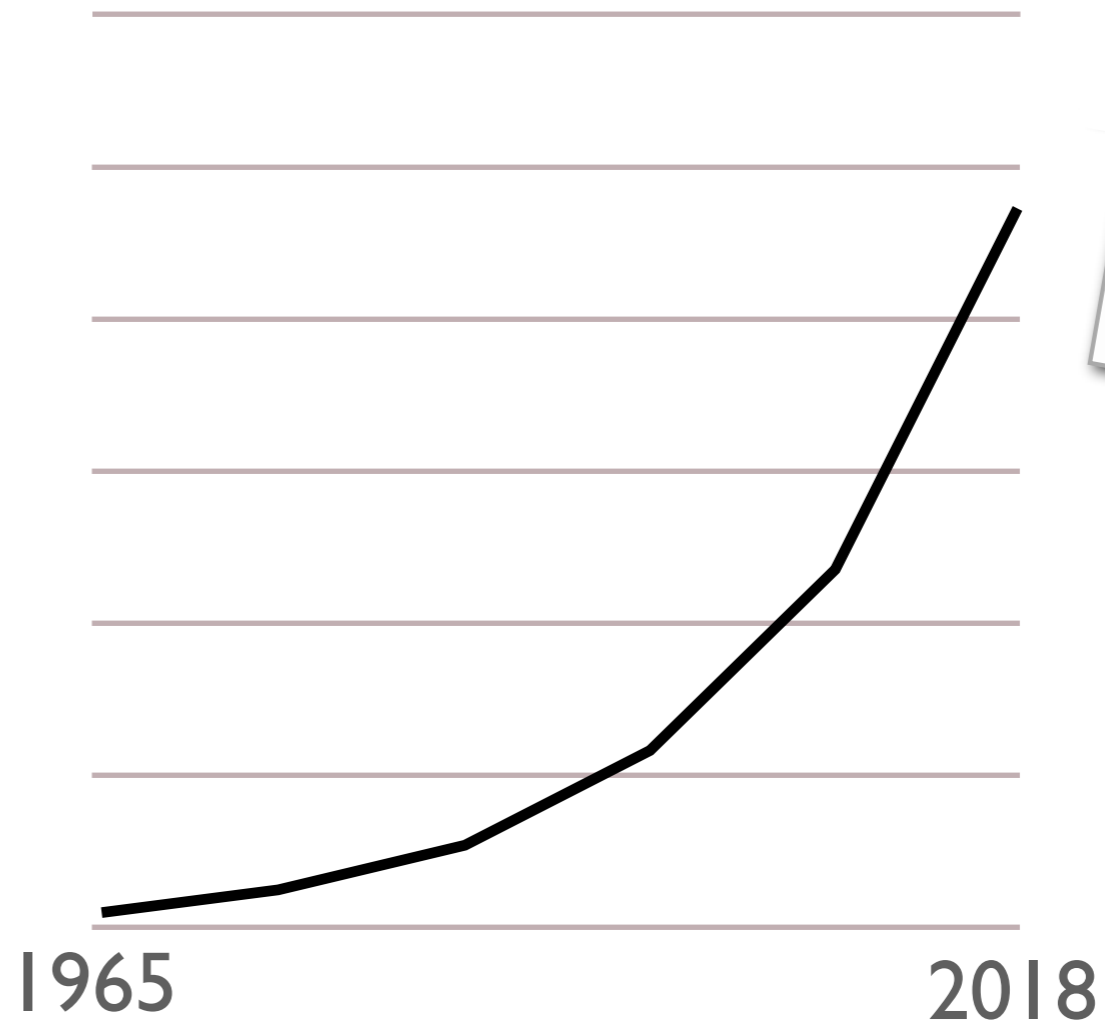
interaction should be **transparent** (figuratively)

↳ technology is a mean, a tool



ina.f

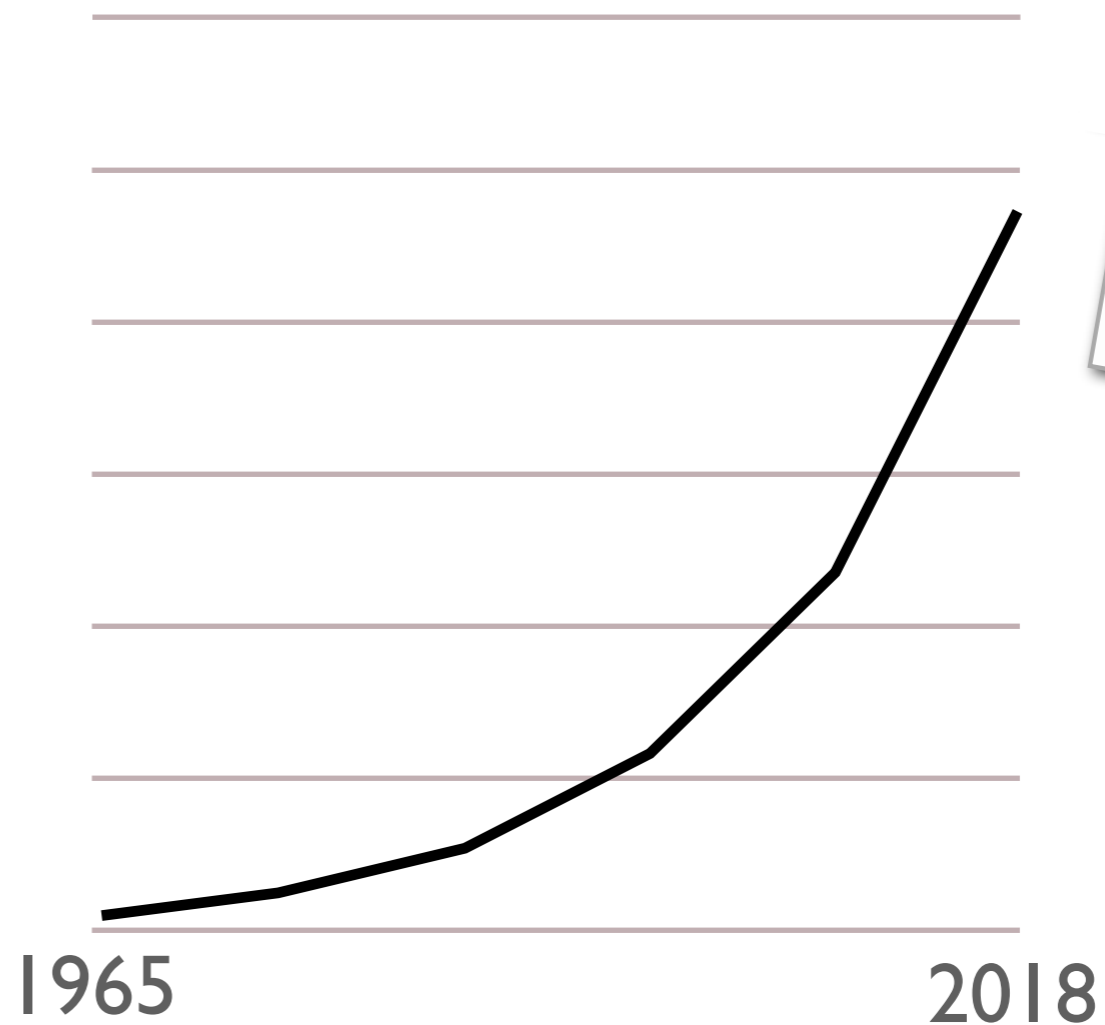
# the hard fact



'less is more (more or less)'  
[W. Buxton]

*the hard fact*

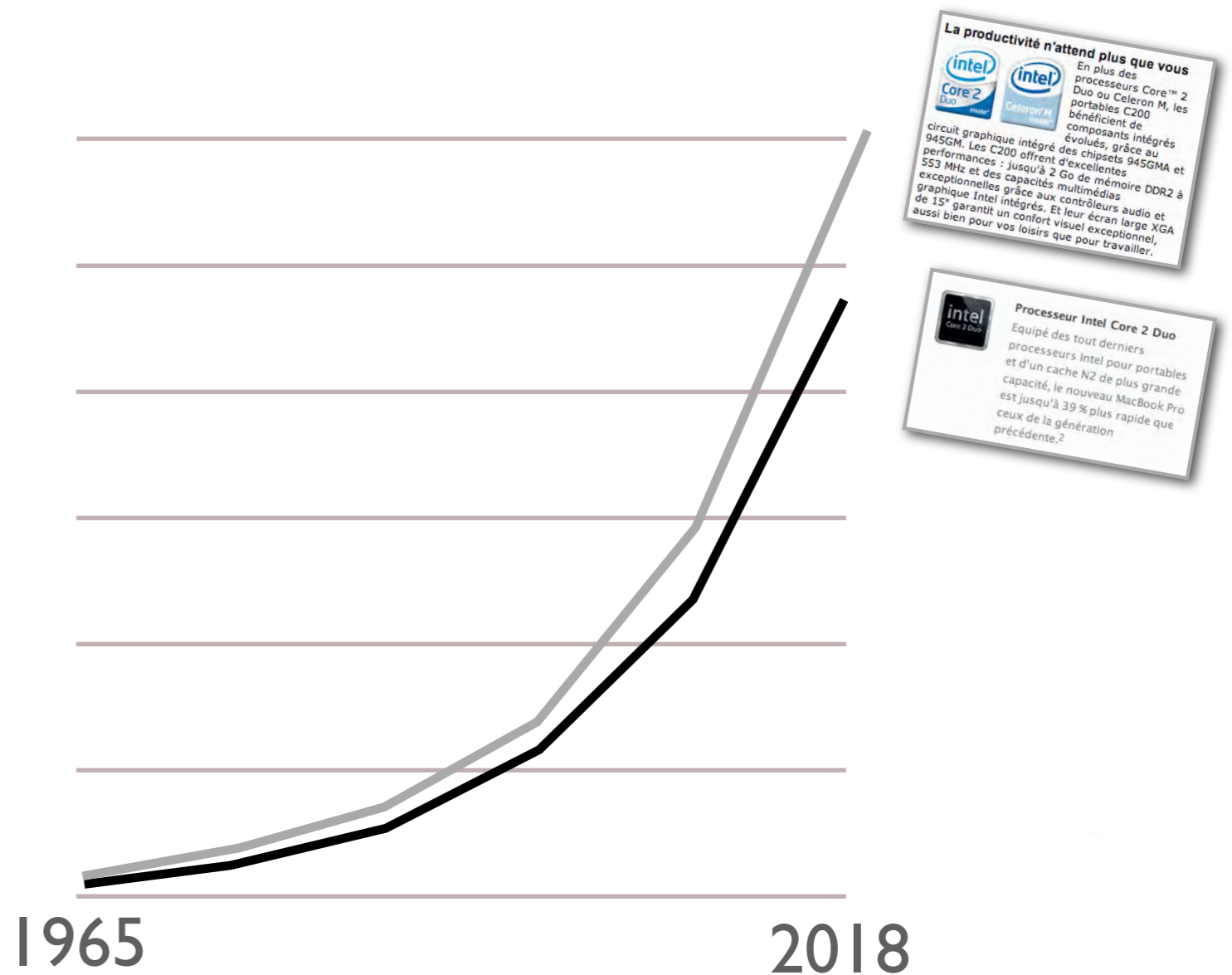
# MOORE'S LAW



'less is more (more or less)'  
[W. Buxton]

*the hard fact*

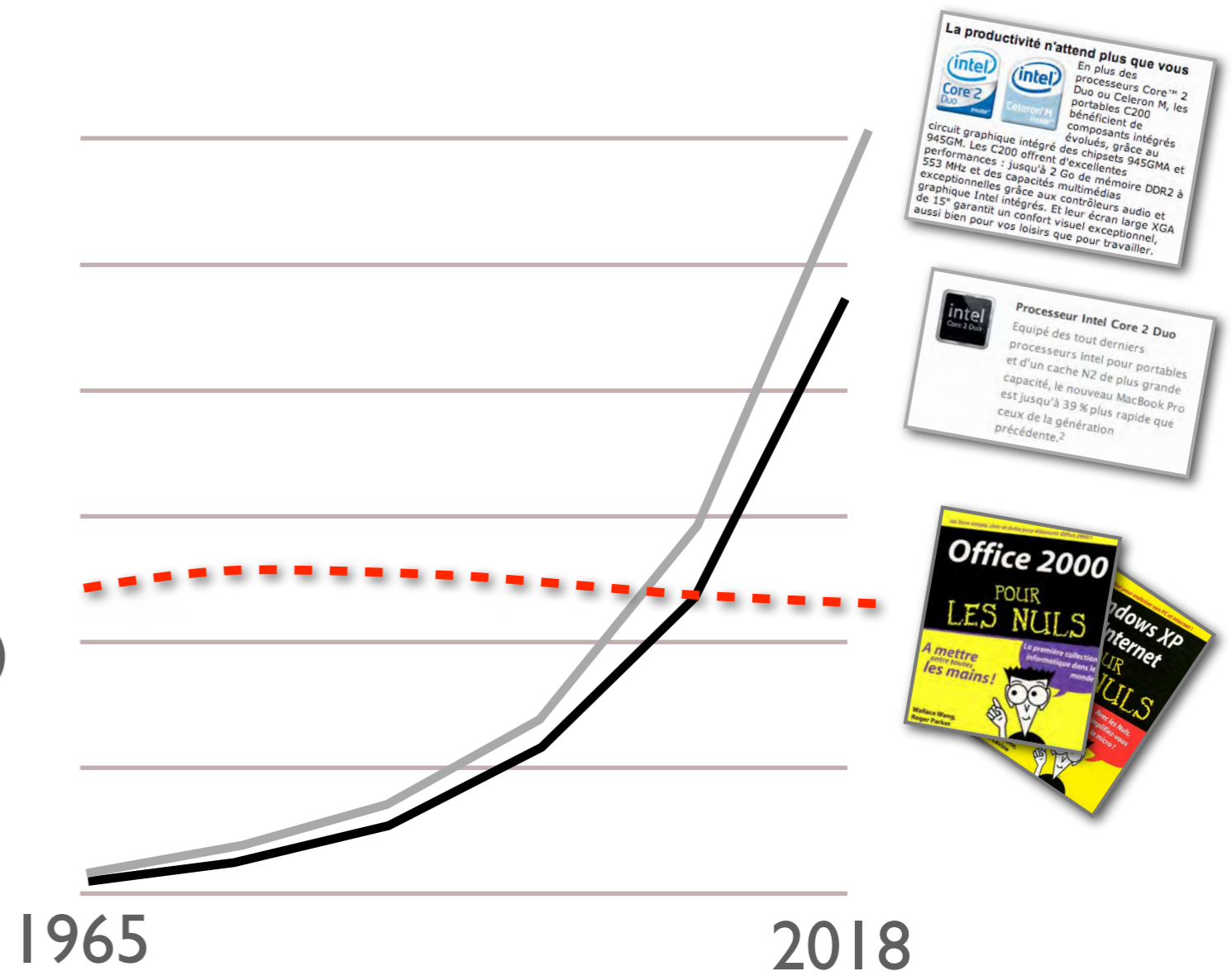
# MOORE'S LAW BUXTON'S LAW



'less is more (more or less)'  
[W. Buxton]

*the hard fact*

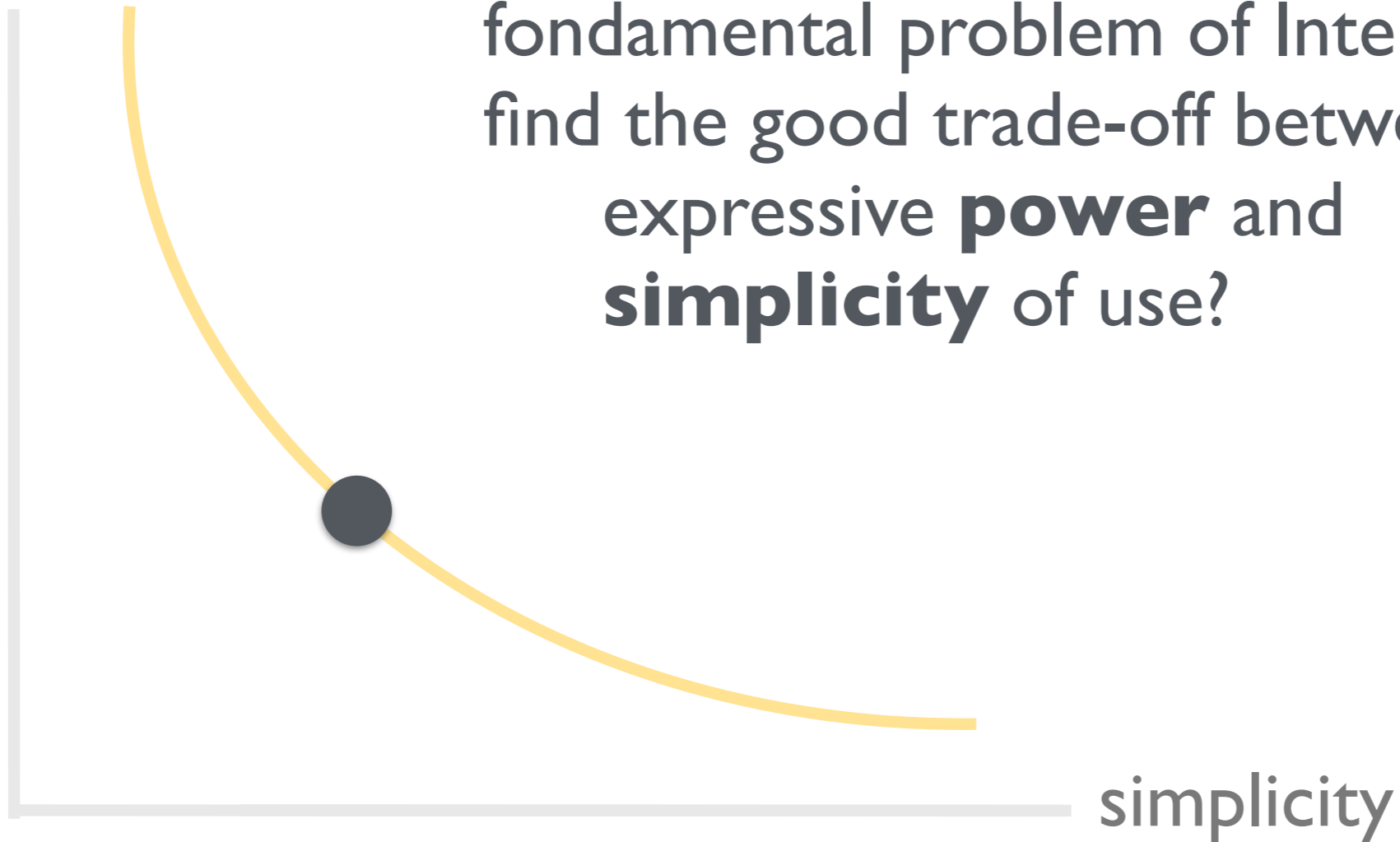
# MOORE'S LAW BUXTON'S LAW AND ... GOD'S LAW (NATURE)



'less is more (more or less)'  
[W. Buxton]

# *a matter of compromise...*

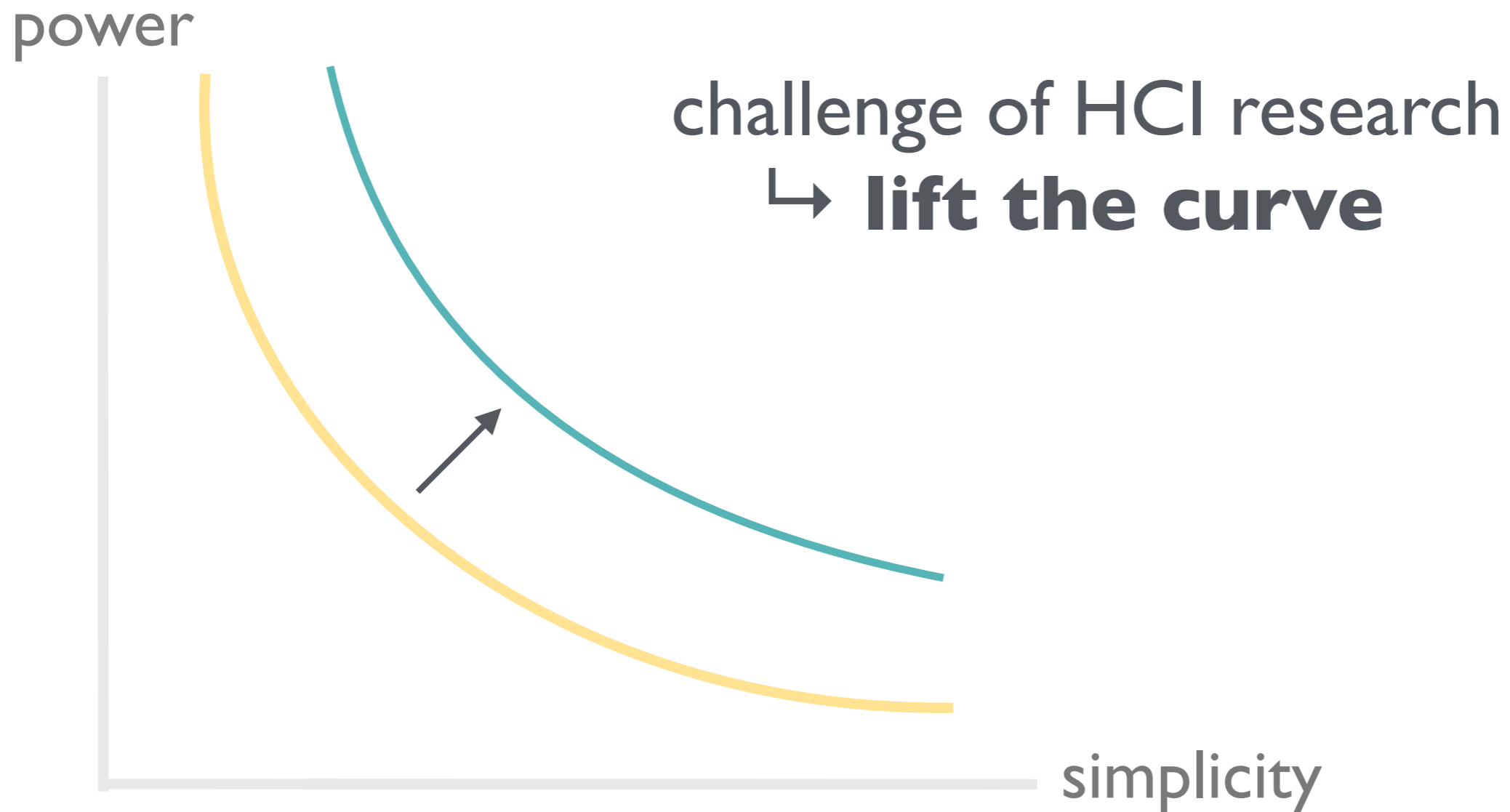
power



*“simple things should be simple, complex things should be possible”*

[A. Kay]

*a matter of compromise...*



[W. E. Mackay]



*why is it difficult?*

model the **user**

↳ motivations, behaviors, expectations

some **theories, models** and empirical **laws**

↳ but no unified framework for Interaction in general (yet)

to study a phenomenon, it has first **to happen**

↳ significant implementation efforts

↳ ecological approach vs reduction

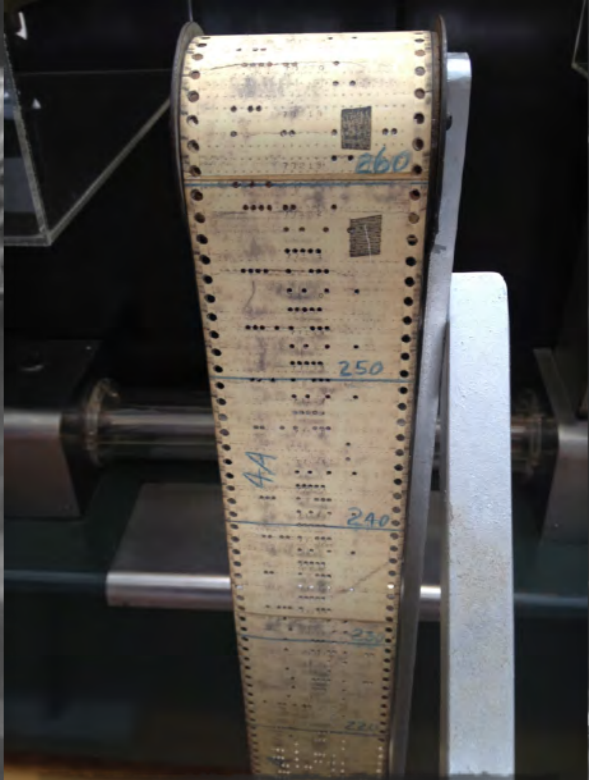
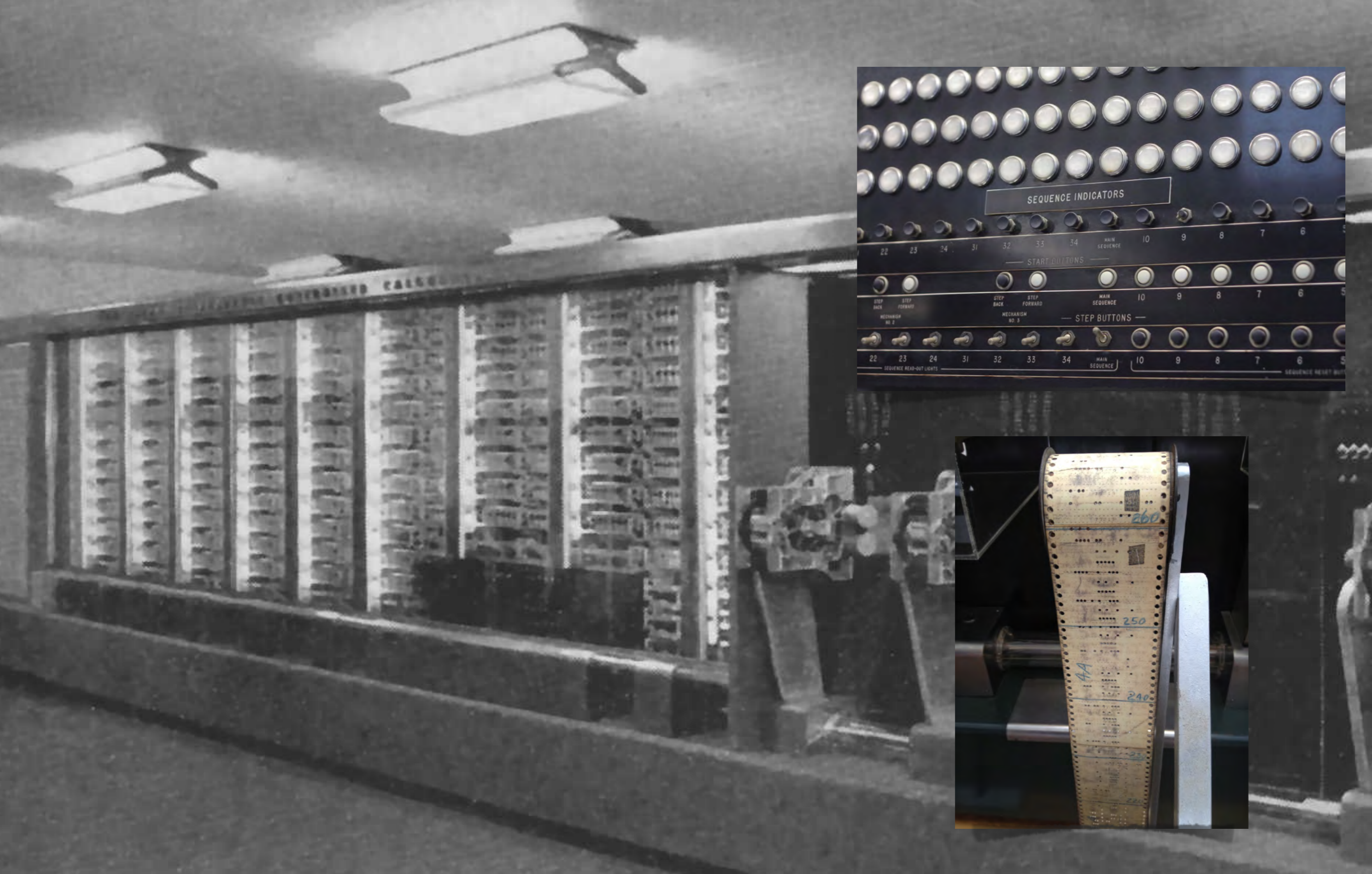
HCI requires **multidisciplinary skills**

design  
human factors  
computer science  
engineering

**once the goal is reached,  
these difficulties are often invisible**

# back to the future...

↳ a short (subjective and disordered) history of interfaces



**Harvard MARK I - 1944**  
↳ switches and punch cards



terminals - ~60

↳ text



**SketchPad - [I. Sutherland, 63]**

↳ **1st CAD system**



**SketchPad - [I. Sutherland, 63]**  
↳ **1st CAD system**



2F MISCELLANEOUS  
2 SHOE STORE  
4 HARDWARE  
5 ART SUPPLY  
6 DRUG STORE  
7 LIBRARY



**Douglas C. Engelbart**

↳ **augmenting human intellect - 60s**



# *oN-Line System (NLS)*

1968, December 9

↳ The Mother of All Demos

among other “new technologies”

↳ mouse

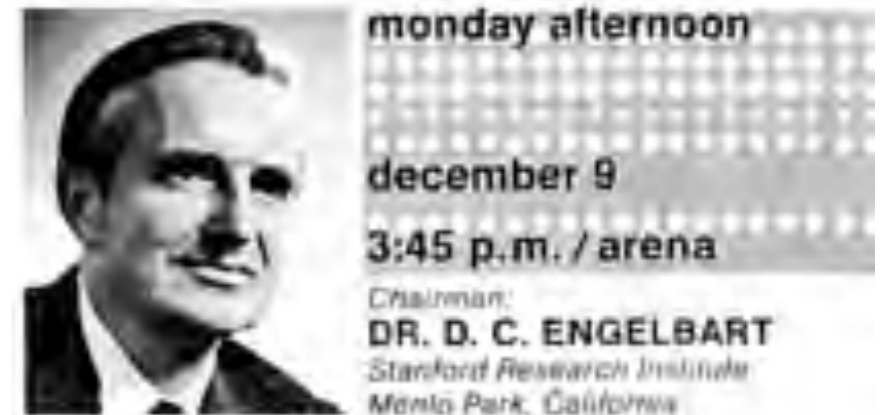
↳ teleconference

↳ distant collaboration

↳ ‘windows’

↳ hypertext

do **better** what we already do,  
make **possible** what we do not do **yet**  
even if it requires **training**

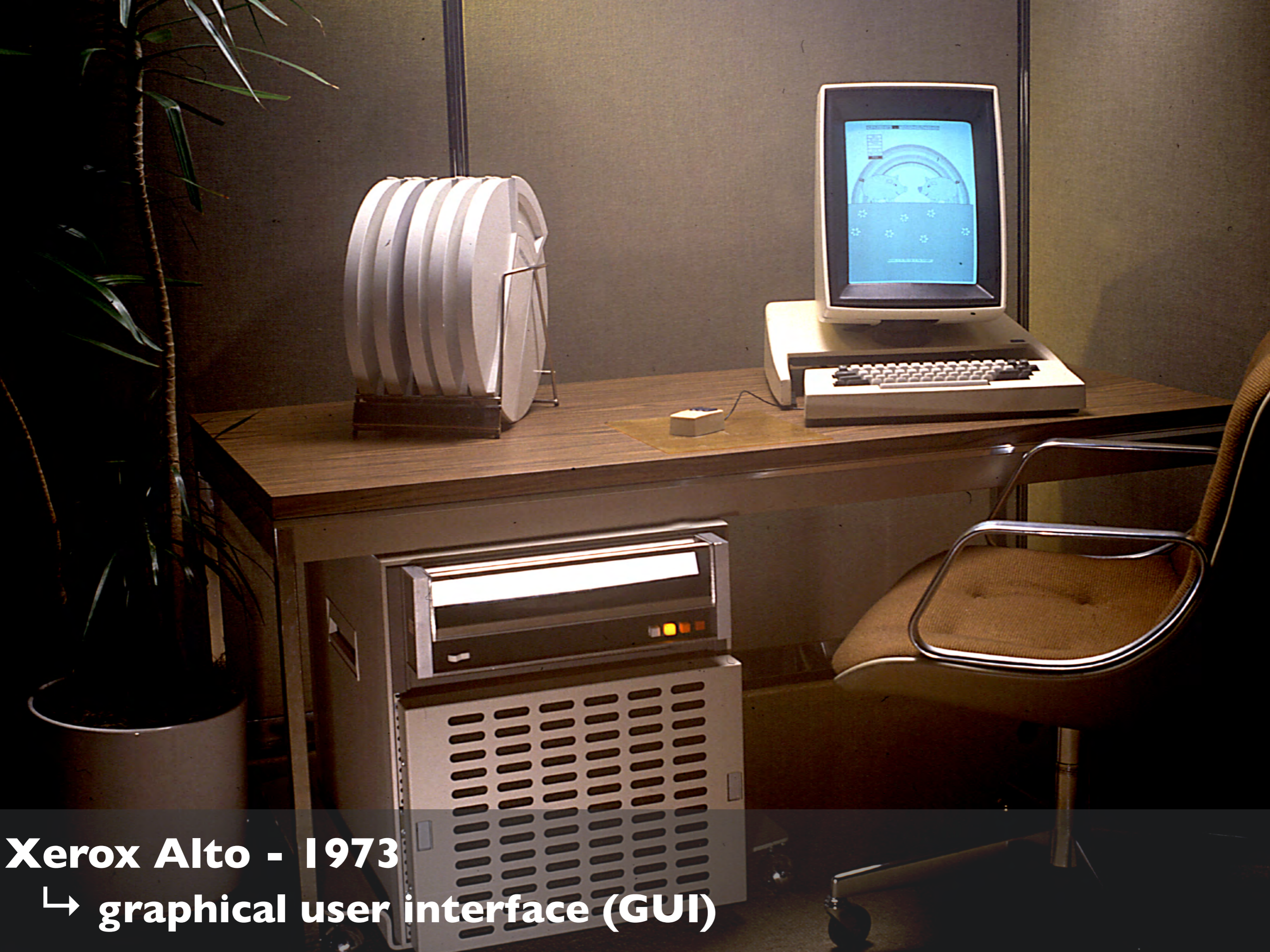


a research center  
for augmenting human  
intellect

This session is entirely devoted to a presentation by Dr. Engelbart on a computer-based, interactive, multi-console display system which is being developed at Stanford Research Institute under the sponsorship of ARPA, NASA and RADG. The system is being used as an experimental laboratory for investigating principles by which interactive computer aids can augment intellectual capability. The techniques which are being described will, themselves

“he sat on stage for an hour  
and a half dealing lightning  
with both hands”

Chuck Thacker



**Xerox Alto - 1973**

↳ **graphical user interface (GUI)**

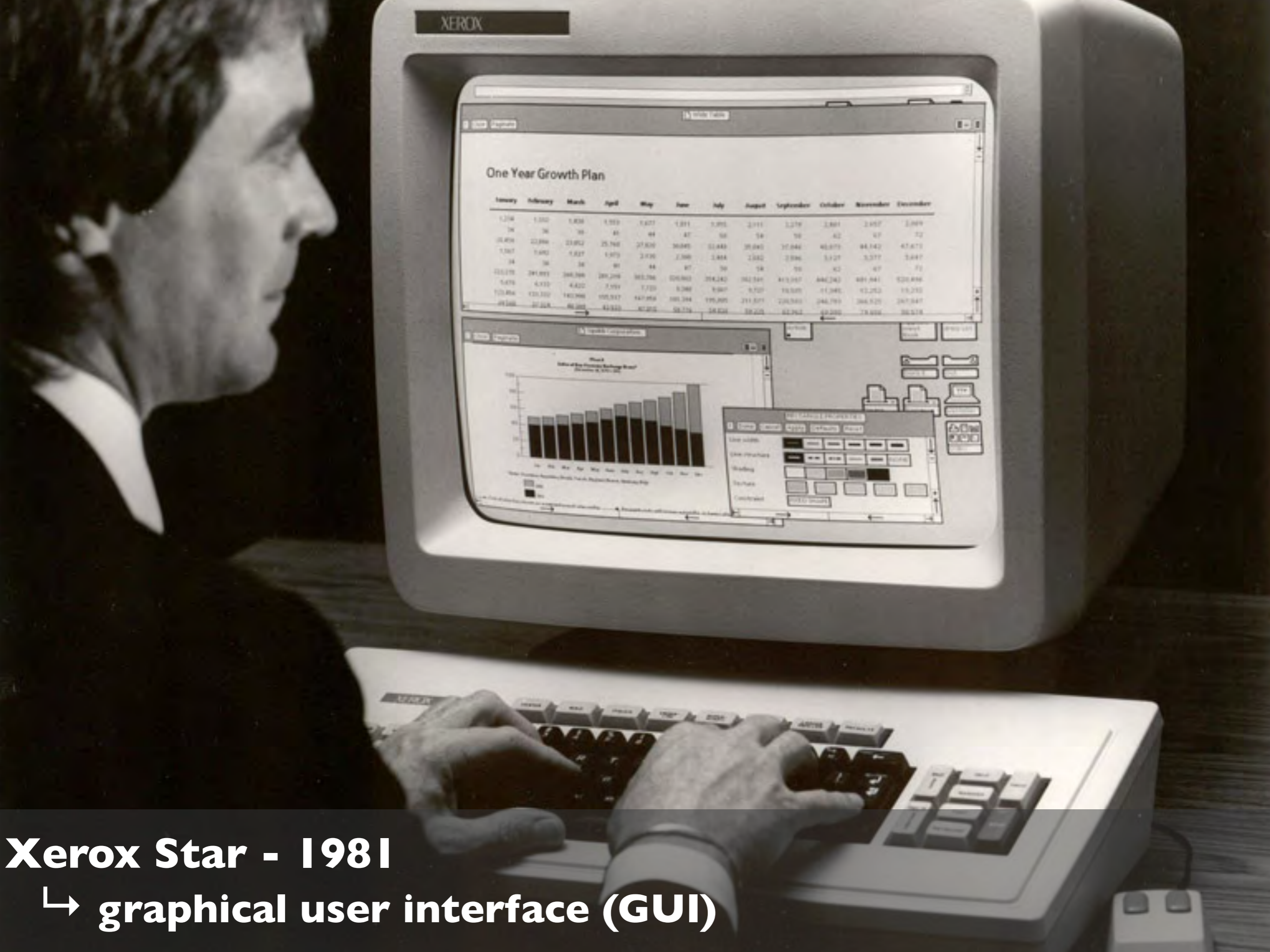


## Dynabook

↳ a personal computer for children of all ages - [Kay, 1972]

## Alan C. Kay

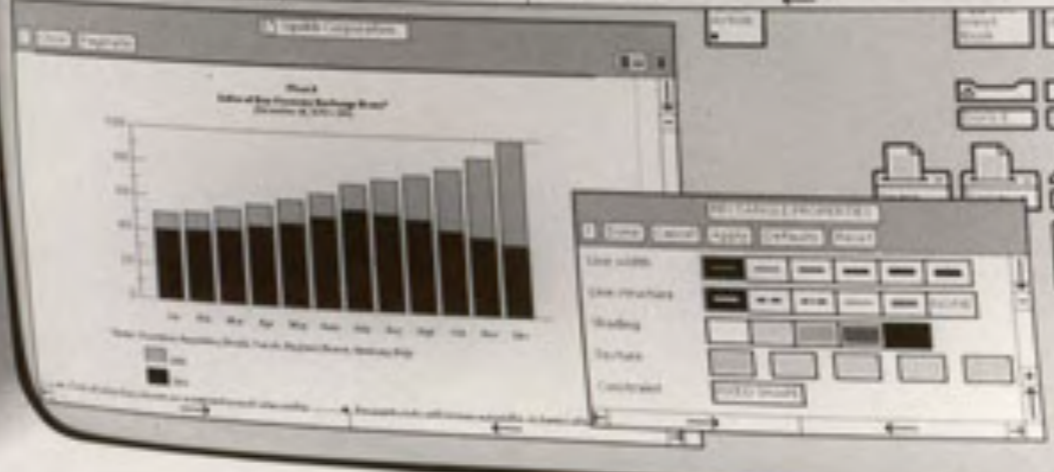
↳ a personal computer for children of all ages - 70s



XEROX

### One Year Growth Plan

January	February	March	April	May	June	July	August	September	October	November	December
1,204	1,350	1,500	1,650	1,800	1,950	2,100	2,250	2,400	2,550	2,700	2,850
34	36	38	40	42	44	46	48	50	52	54	56
24,804	25,800	26,800	27,800	28,800	29,800	30,800	31,800	32,800	33,800	34,800	35,800
1,567	1,680	1,800	1,920	2,040	2,160	2,280	2,400	2,520	2,640	2,760	2,880
34	36	38	40	42	44	46	48	50	52	54	56
255,170	261,800	268,500	275,200	281,900	288,600	295,300	302,000	308,700	315,400	322,100	328,800
1,670	1,780	1,890	2,000	2,110	2,220	2,330	2,440	2,550	2,660	2,770	2,880
103,804	105,300	106,800	108,300	109,800	111,300	112,800	114,300	115,800	117,300	118,800	120,300
48,500	49,500	50,500	51,500	52,500	53,500	54,500	55,500	56,500	57,500	58,500	59,500



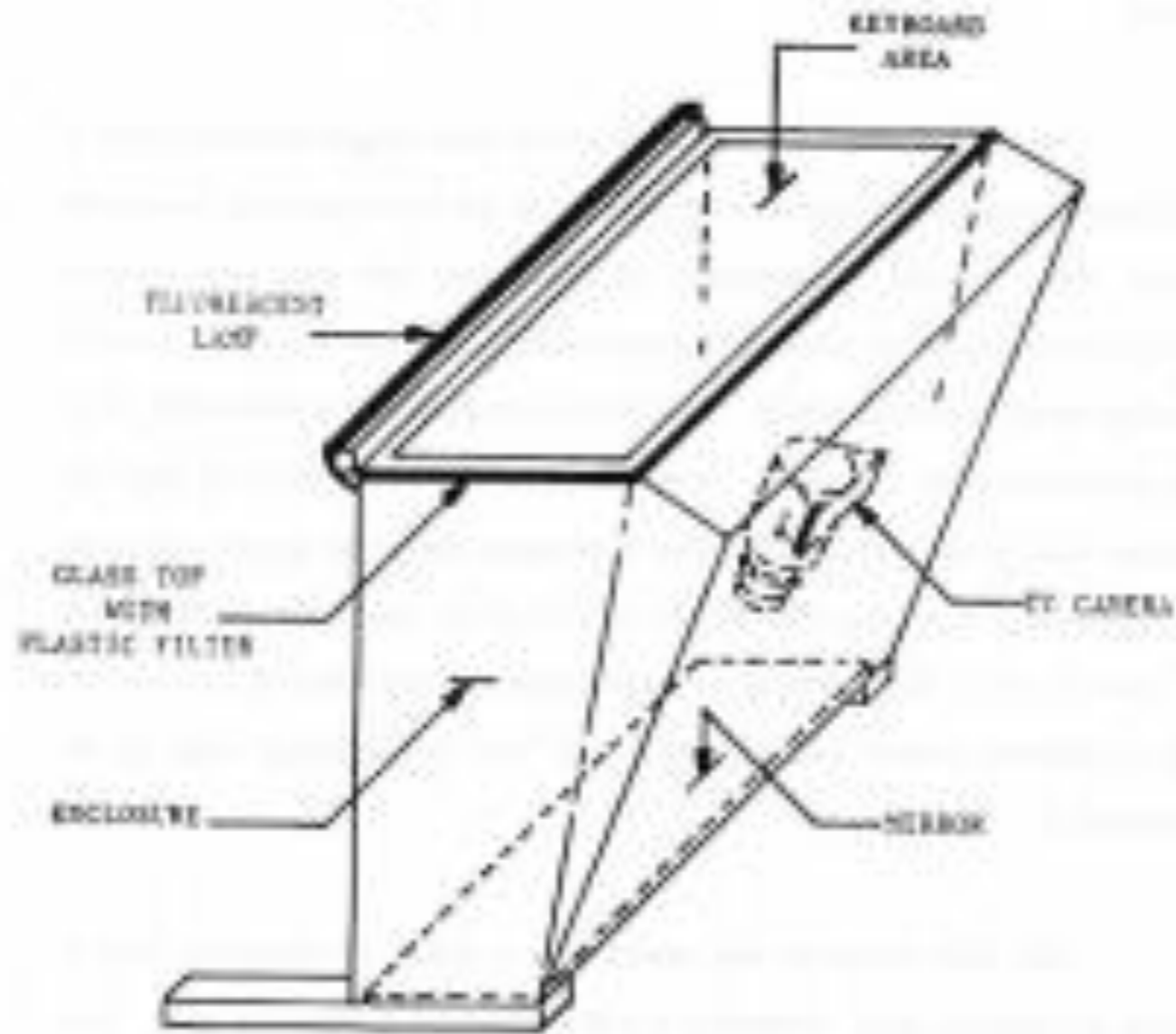
**Xerox Star - 1981**

↳ graphical user interface (GUI)



**Apple iMac - 2012**

↳ **(the same) graphical user interface (GUI)**



**‘multi-touch’ - [N. Mehta] 1982**  
↳ **A Flexible Machine Interface**



**Simon - IBM & Bell South, 1992**

↳ **1st touch 'smartphone'**



**interactive tables - ~2000**

↳ **MERL Diamond Touch, Microsoft Surface 1st Gen.**





**iPhone - Apple, 2007**

↳ **begins the era of popular multi-touch smartphones**



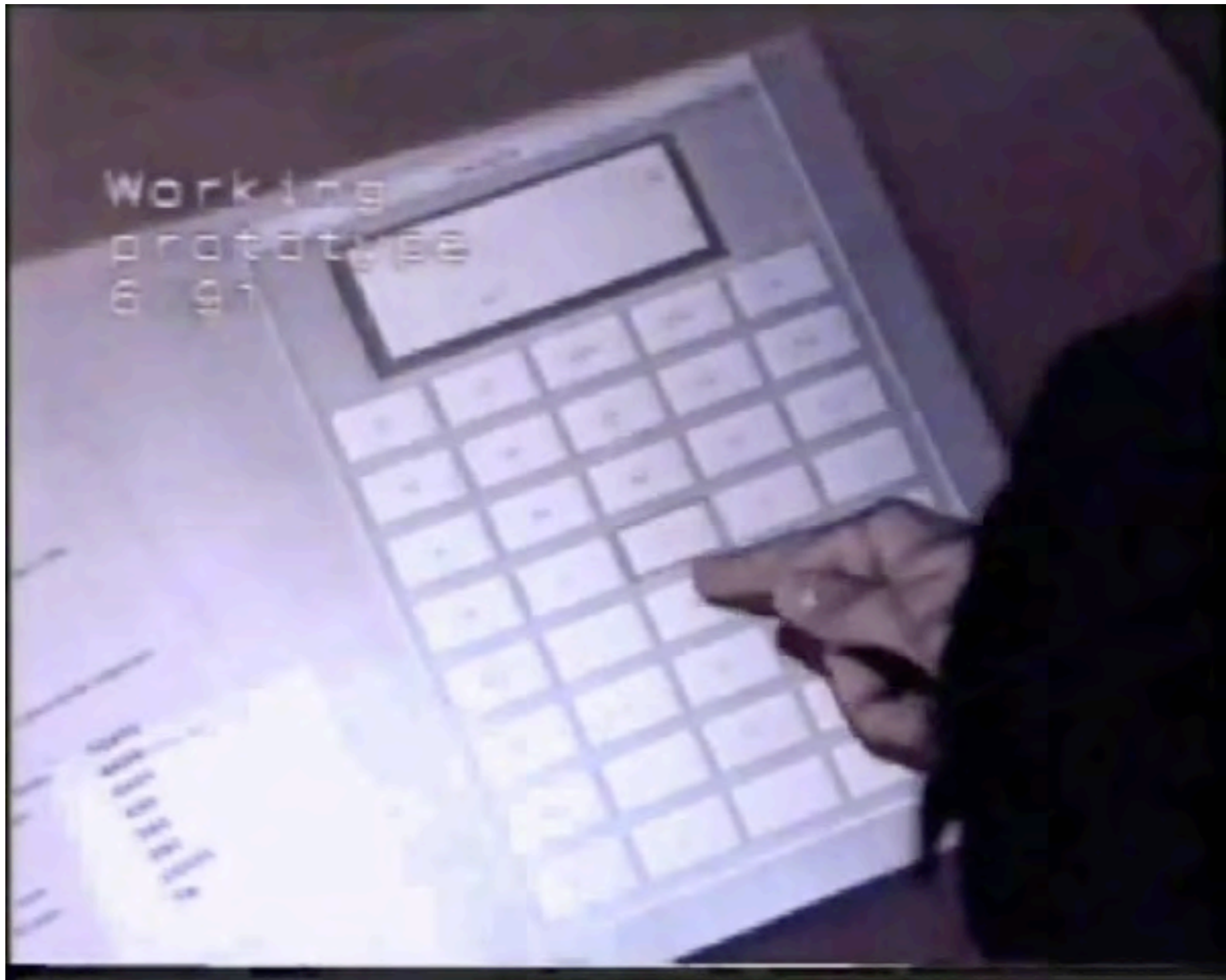
**Video Place / Video Desk - [M. Krueger, 1983]**

↳ **gestural interaction**



**Kinect - Microsoft, 2010**

↳ gestural interaction



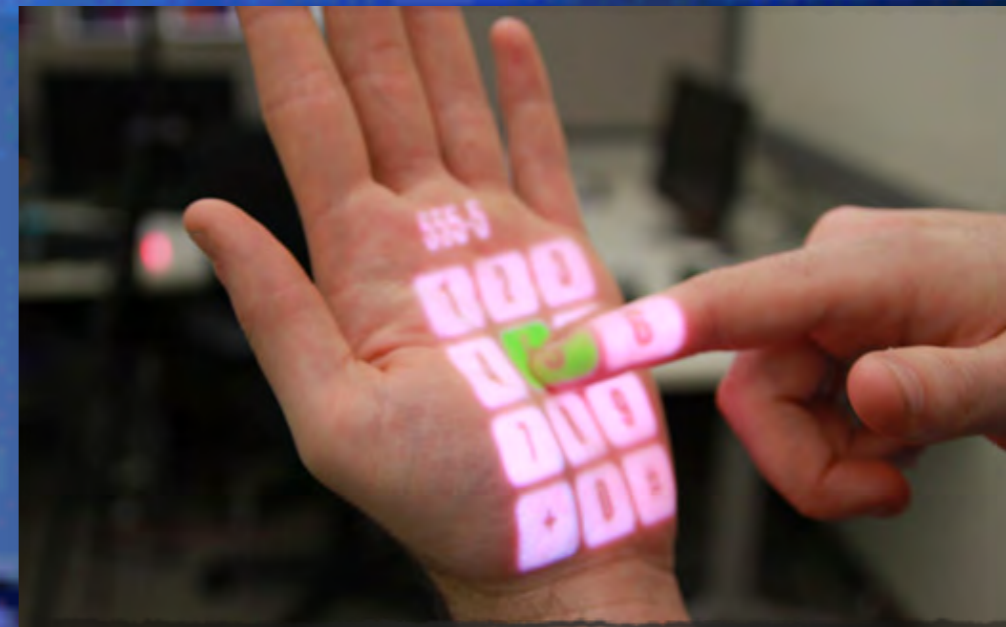
## Digital Desk - [P. Wellner, 1991]

↳ augmented reality and tactile/tangible interaction



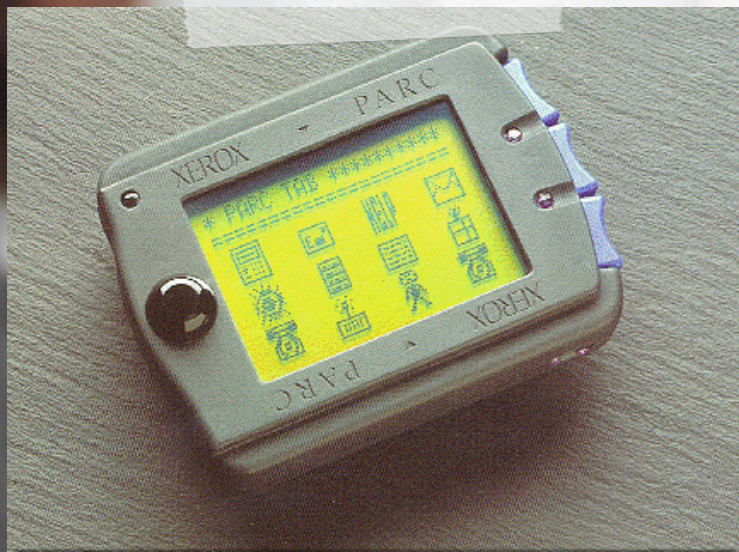
**Augmented Surfaces - [J. Rekimoto, 1999]**

↳ **mixed reality and tactile/tangible interaction**



**‘Embodied Interaction’ - ~2000**

↳ **tactile, gestural, tangible, ... interaction**



**'Ubiquitous Interaction' - ~2000**

↳ **tactile, gestural, tangible, ... interaction**



**Mark D. Weiser**

↳ **integrating computers seamlessly into the world - ~90s**



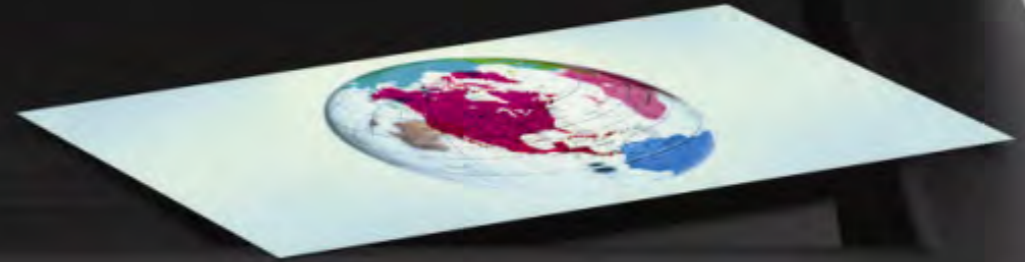
**“Ubiquitous** computing names the third wave in computing, just now beginning. First were mainframes, each shared by lots of people. Now we are in the personal computing era, person and machine staring uneasily at each other across the desktop. Next comes ubiquitous computing, or the age of calm technology, when technology recedes into the background of our lives.”



**Mark D. Weiser**

↳ **integrating computers seamlessly into the world - ~90s**

EPSON



On Display/Crop Copies Stop/Clear Settings

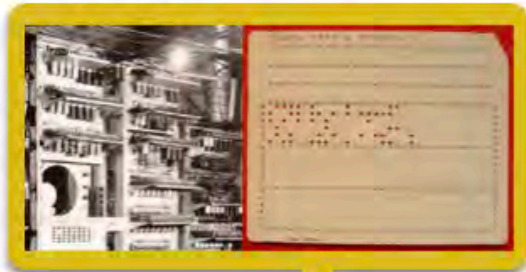
Home View Auto Correct Menu Back

1 symb	2 ABC	3 DEF	Auto	Auto Answer/ Space
4 GHI	5 JKL	6 MNO	Speed Dial/ Group Dial/ Backspace	Start
7 PQRS	8 TUV	9 WXYZ	Redial/Pause	
* 0 #				

WorkForce 600



switches  
punch cards



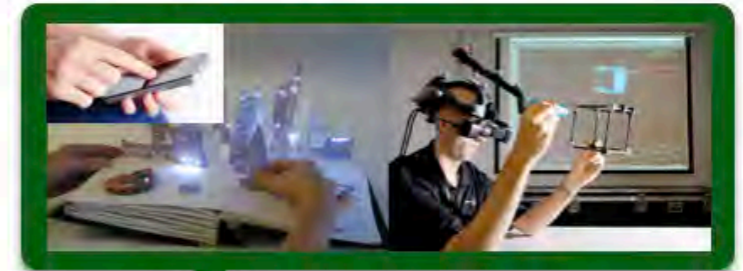
text



graphical



'embodied'  
& pervasive



n:1

1:1

1:n

n:n



adapted from [ToCHI special Issue, 2011, ed. Dourish]

1940

1960

1980

2000

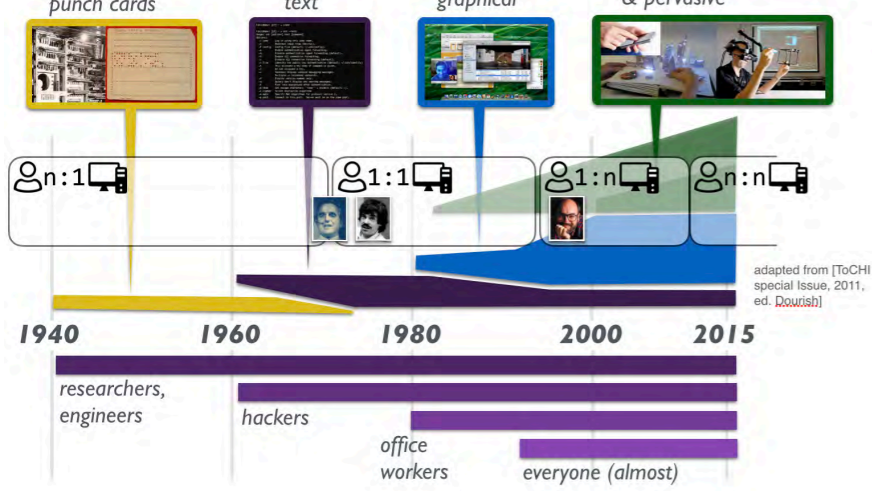
2015

researchers,  
engineers

hackers

office  
workers

everyone (almost)



# back to the future...

↳ a short (subjective and disordered) history of interfaces

# ... forward to the past?

↳ challenges for research in HCI (and Computer Science ?)



# the world is complex

↳ get rid of the myth of “walk-up and use”

# *what is complexity?*

**COMPLEX**, *Adj.* - Involving a lot of different but related parts: a complex molecule; a complex procedure. Difficult to understand or find an answer to because of having many different parts: a very complex issue; the film's plot was so complex that I couldn't follow it. [Cambridge Dictionary]

Living with Complexity  
Donald A. Norman

**COMPLEX** : state of the world

**COMPLICATED** : mental / psychological state  
leading to confusion

*“Modern technology can be complex, but complexity by itself is neither good nor bad: it is confusion that is bad.”*

*“The major cause of complicated, confusing, frustrating systems is not complexity: It is poor design.”*





Advanced Renamer 3.78

Refresh Test Batch Auto Test Import Program Folder Panel Help Metadata Undo Previous Batch

Renaming method list

Batch mode: Rename

Start batch

Presets: [dropdown]

1 : New Name

New Name: Auto show <Img Year>-<Img Month> - <GPS City> - <GPS>

Default Tags

- <Inc Nr> - Incrementing numbers
- <Inc NrDir> - Incrementing numbers per dir
- <Inc Alpha> - Incrementing letters
- <Name> - File name without extension
- <Ext> - Extension
- <DirName> - Name of the directory
- <Num Files> - Total number of files in the dir
- <Num Dirs> - Total number of subdirs in the dir
- <Num Items> - Total number of items in this list
- <Word> Indexed word of the file name

Apply to: Name

Add batch method

New Name New Case Move Remove Remove pattern  
 ReNUMBER Replace Add List List replace Swap Trim  
 Attributes Timestamp Script

10 Items 0 Errors Status: OK Registered to Kim Jensen (Personal use)

Rename Files Rename Folders

Batch mode: Rename

Start batch

Presets: [dropdown]

1 : New Name

New Name: Auto show <Img Year>-<Img Month> - <GPS City> - <GPS>

Default Tags

- <Inc Nr> - Incrementing numbers
- <Inc NrDir> - Incrementing numbers per dir
- <Inc Alpha> - Incrementing letters
- <Name> - File name without extension
- <Ext> - Extension
- <DirName> - Name of the directory
- <Num Files> - Total number of files in the dir
- <Num Dirs> - Total number of subdirs in the dir
- <Num Items> - Total number of items in this list
- <Word> Indexed word of the file name

Apply to: Name

Add batch method


New Name New Case Move Remove Remove pattern  
 ReNUMBER Replace Add List List replace Swap Trim  
 Attributes Timestamp Script

10 Items 0 Errors Status: OK Registered to Kim Jensen (Personal use)

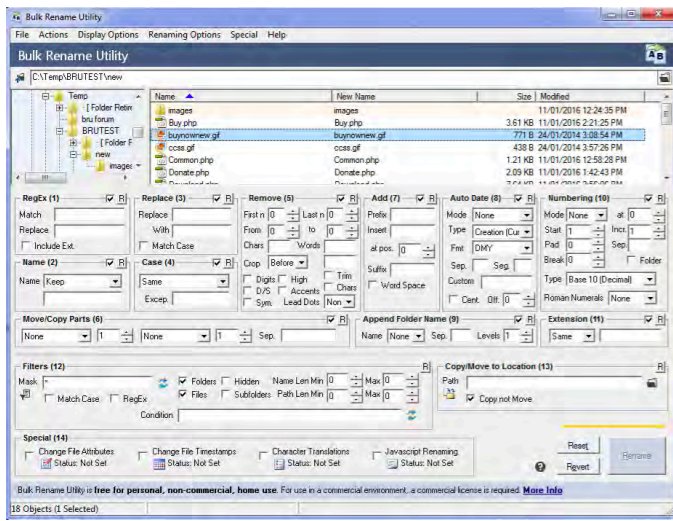
Filename	New Filename	Error	Path	Dimensions	Date Taken
IMG_0278.JPG	Auto show 2015-12 - Copenhagen - Denmark 001.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	29-12-2015 12
IMG_0279.JPG	Auto show 2015-12 - Copenhagen - Denmark 002.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	29-12-2015 12
IMG_0280.JPG	Auto show 2015-12 - Copenhagen - Denmark 003.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	29-12-2015 12
IMG_0281.JPG	Auto show 2015-12 - Copenhagen - Denmark 004.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	29-12-2015 12
IMG_0282.JPG	Auto show 2015-12 - Copenhagen - Denmark 005.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	29-12-2015 12
IMG_0296.JPG	Auto show 2016-03 - Berlin - Germany 001.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	21-03-2016 15
IMG_0297.JPG	Auto show 2016-03 - Berlin - Germany 002.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	21-03-2016 15
IMG_0643.JPG	Auto show 2017-03 - Geneva - Switzerland 001.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	15-03-2017 12
IMG_0644.JPG	Auto show 2017-03 - Geneva - Switzerland 002.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	15-03-2017 12
IMG_0645.JPG	Auto show 2017-03 - Geneva - Switzerland 003.JPG	OK	C:\Users\kj\Pictures\iCloud Photos\Downloads\	3264x2448	15-03-2017 12

Filename: IMG\_0297.JPG  
 Directory: C:\Users\kj\Pictures\...\Downloads  
 Filetype: JPG File  
 Size: 1,8 mb  
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 Date Modified: 26-03-2016 19:51:16  
 Date Accessed: 26-03-2016 19:51:08  
 Attributes: A---

Dimensions: 3264x2448  
 Date Taken: 21-03-2016 15:46:05  
 Author:  
 Copyright:  
 GPS Location: 52.5167, 13.3890  
 GPS Accuracy: Unknown



ExifTool...



[© Francisco Inchauste from <http://uxmag.com/articles/the-dirtiest-word-in-ux-complexity>]

*where does complexity come from?*

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*where does complexity come from?*

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## FUNCTIONALITIES



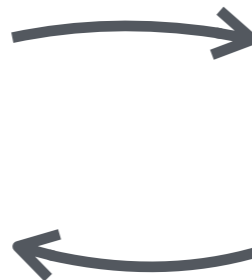
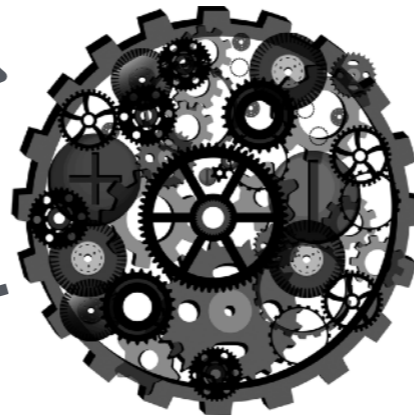
# *where does complexity come from?*

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**FUNCTIONALITIES**



**PROCESSES**

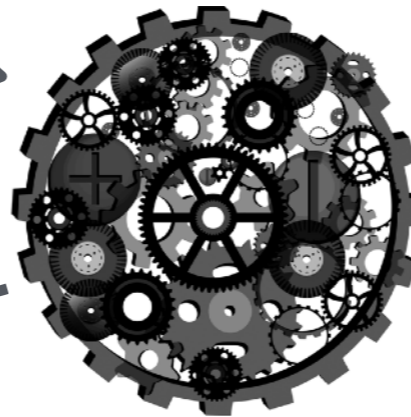


# *where does complexity come from?*

**FUNCTIONALITIES**



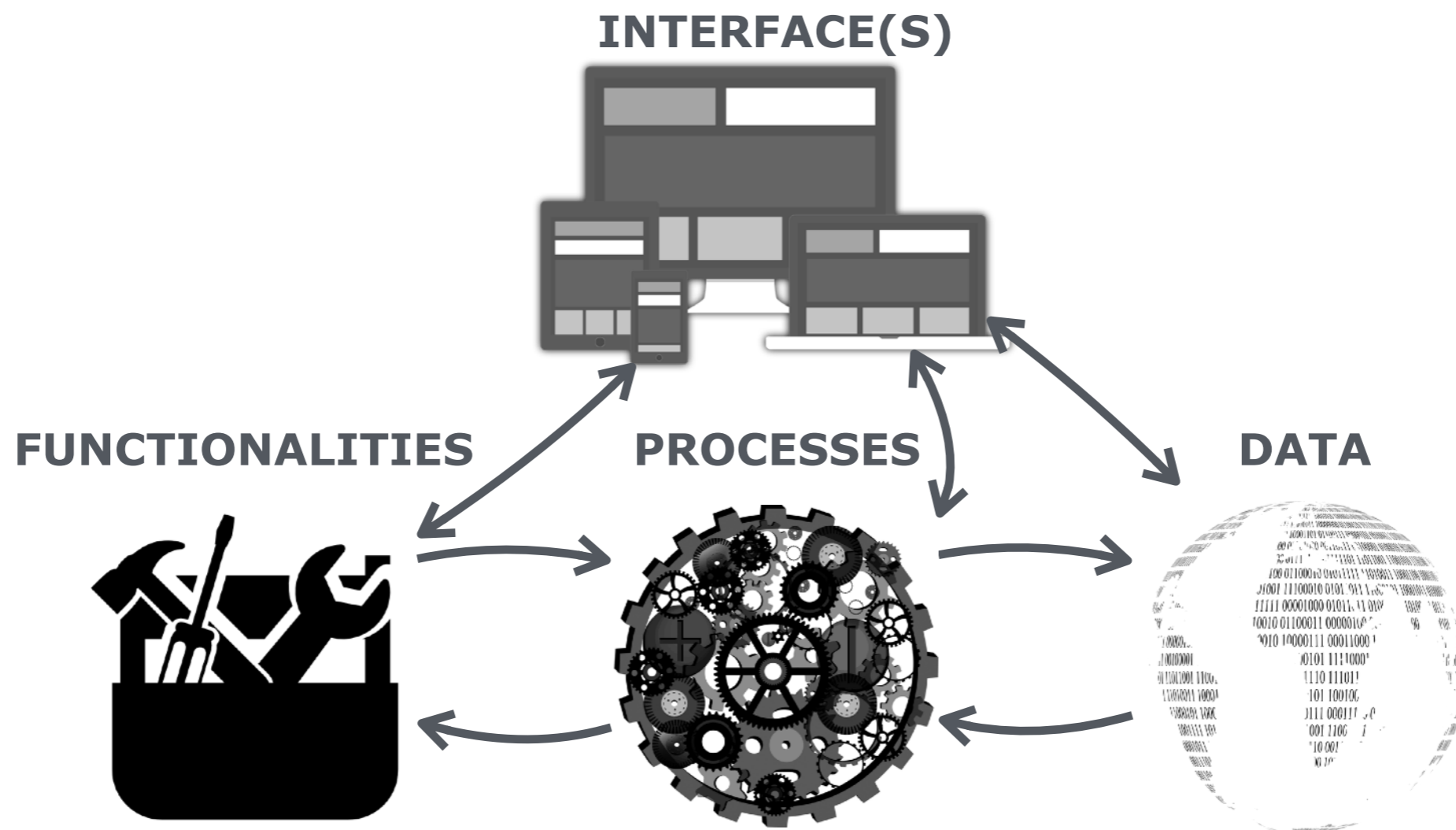
**PROCESSES**



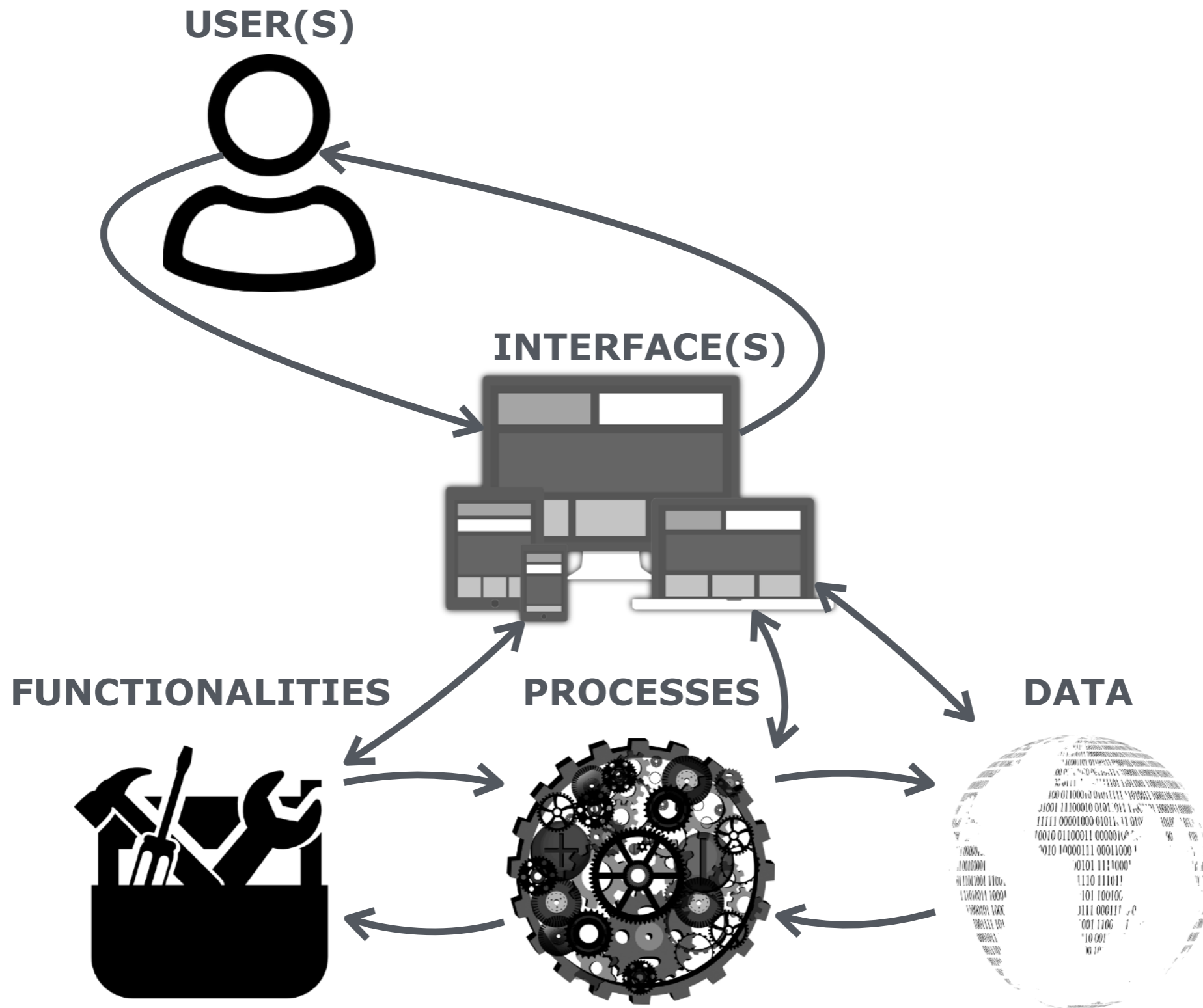
**DATA**



# *where does complexity come from?*

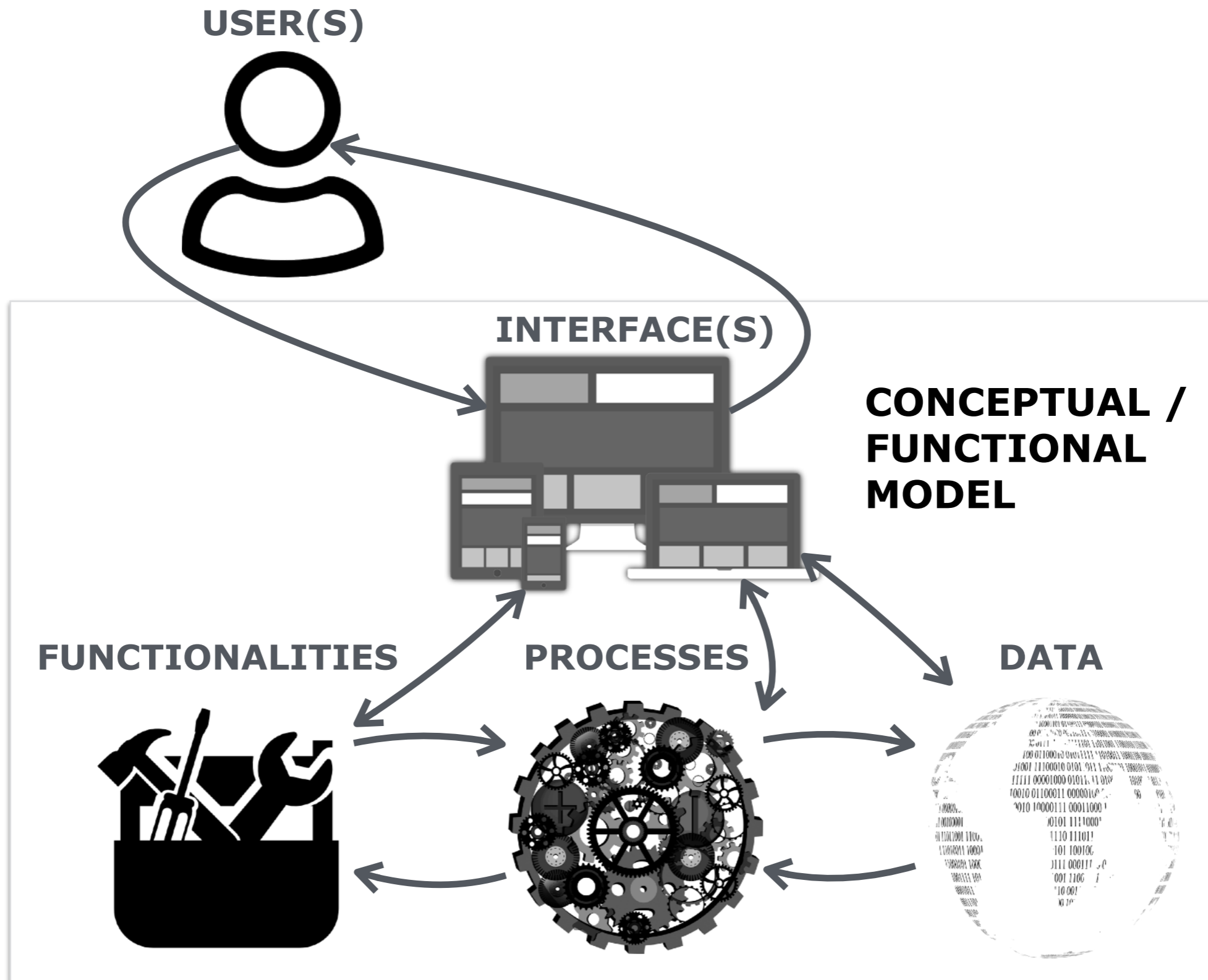


# *where does complexity come from?*

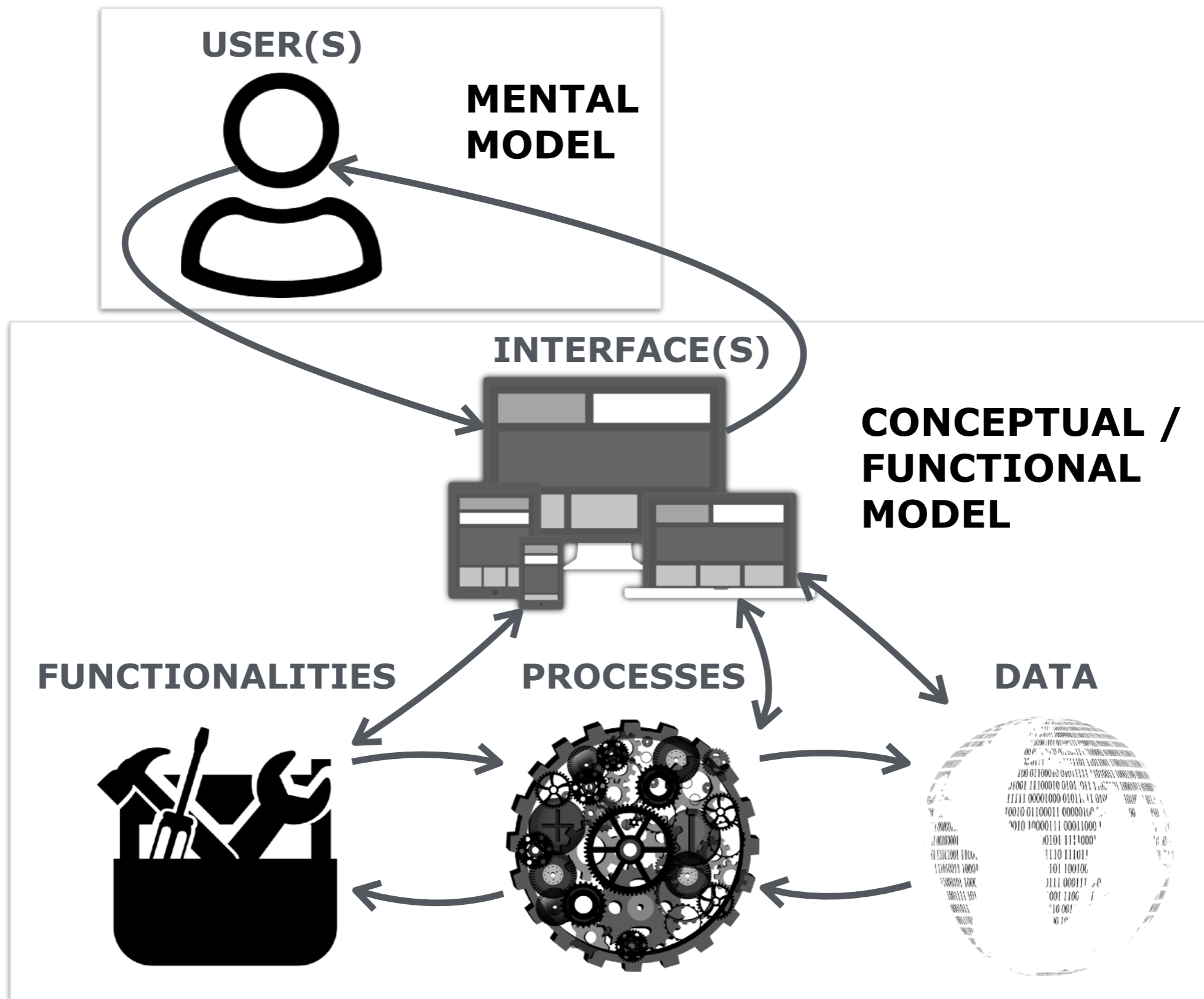




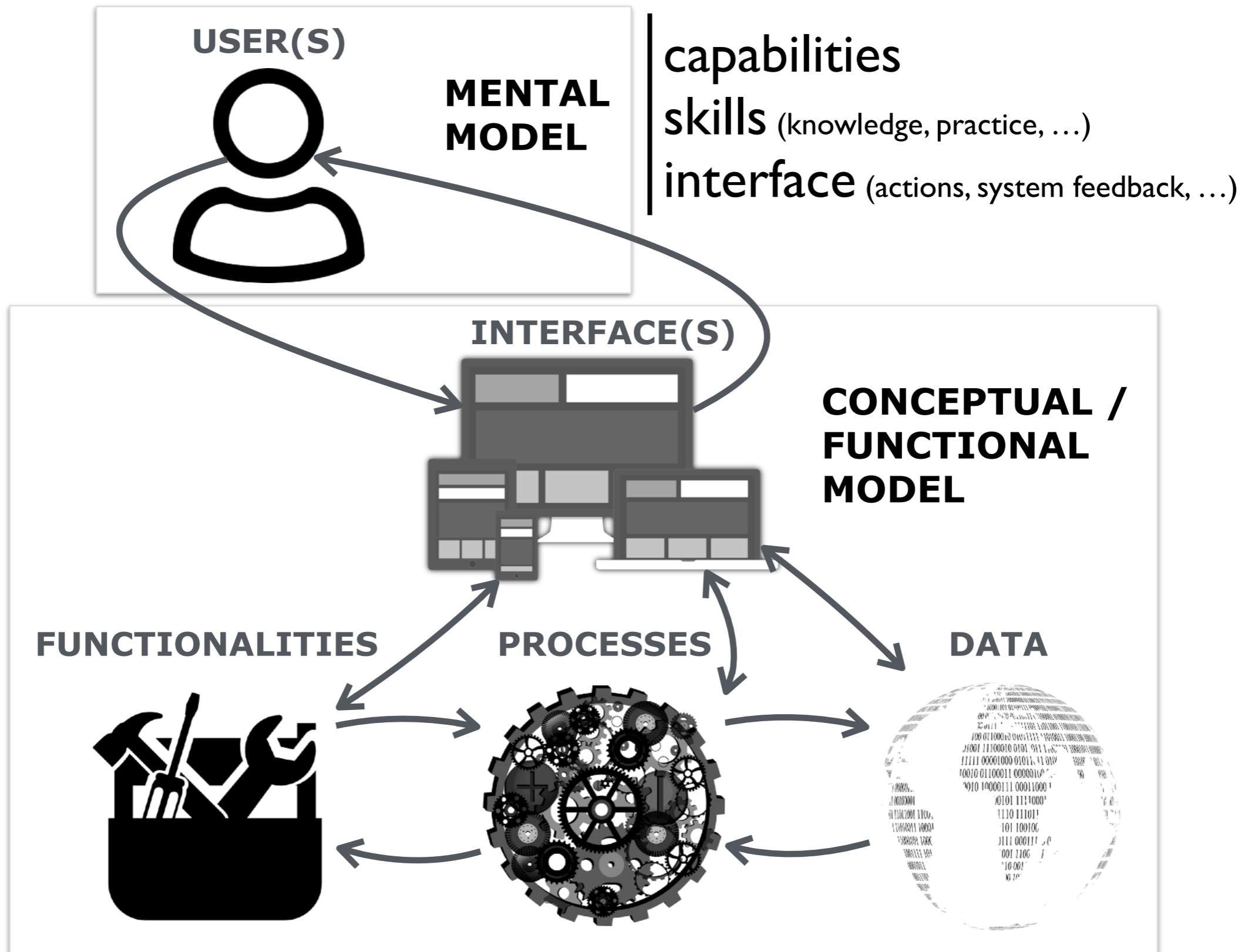
# where does complexity come from?

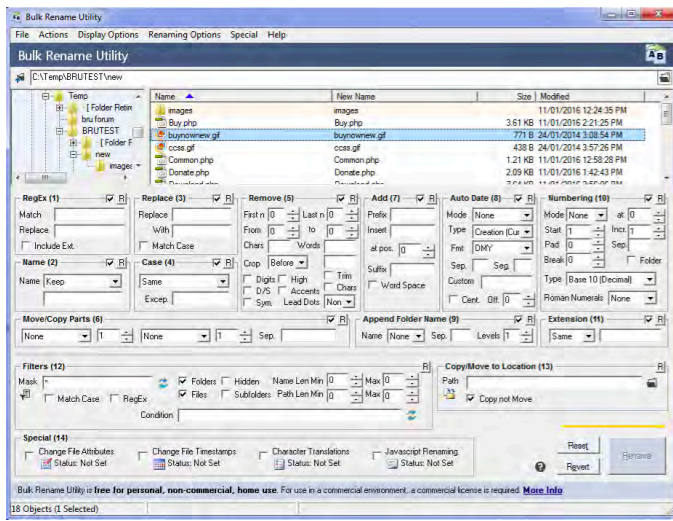


# where does complexity come from?



# where does complexity come from?





for renaming files



[© Francisco Inchauste from <http://uxmag.com/articles/the-dirtiest-word-in-ux-complexity>]

*reduce the complexity*

by **design**

↳ avoid Swiss army knives



otherwise, focus on what is needed when it is needed

↳ known and proven design rules & guidelines

*reduce the complexity*









discovery and mastery of **functionalities**

↳ *what do I want to do? what can I do?*

discovery and mastery of **interactions**

↳ *how can I do it?*

improving **skills**

↳ *would it be profitable to do it another way?*

# OctoPocus

A Dynamic Guide for Learning  
Gesture-Based Command Sets

Olivier Bau & Wendy E. Mackay  
In Situ, INRIA Saclay - LRI

UIST 2008

# **Skillometers:**

## **Reflective Widgets that Motivate and Help Users to Improve Performance**

S. Malacria<sup>1</sup>, J. Scarr<sup>1</sup>, A. Cockburn<sup>1</sup>, C. Gutwin<sup>2</sup>, T. Grossman<sup>3</sup>

<sup>1</sup>*University of Canterbury, Christchurch, New Zealand*

<sup>2</sup>*University of Saskatchewan, Saskatoon, Canada*

<sup>3</sup>*Autodesk Research, Toronto, Canada*

# Using Rhythmic patterns as an Input Method

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CHI 2012

Emilien Ghomi  
Guillaume Faure  
Stéphane Huot  
Olivier Chapuis  
Michel Beaudouin-Lafon

Univ. Paris-Sud (LRI)  
CNRS  
INRIA

presentation of the design



**“If ease of use was the only valid criterion, people would stick to tricycles and never try bicycles.”**

**↳ D. C. Engelbart**





**the world is not flat** (I hope)

↳ some physicality in interaction



HANDS  
FEEL THINGS



HANDS  
MANIPULATE  
THINGS



from [B. Victor, 11]

<http://worrydream.com/ABriefRantOnTheFutureOfInteractionDesign/>





Power grip, fingers vs palm



Precision grip, fingers vs thumb



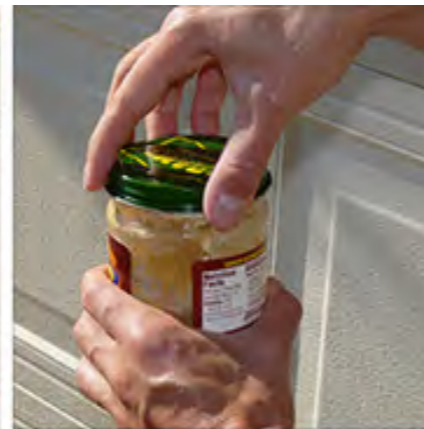
Hook grip, between phalanges



Scissor grip, between fingers



Power grip to loosen the lid



Precision grip to unscrew it

from [B. Victor, 11]

<http://worrydream.com/ABriefRantOnTheFutureOfInteractionDesign/>

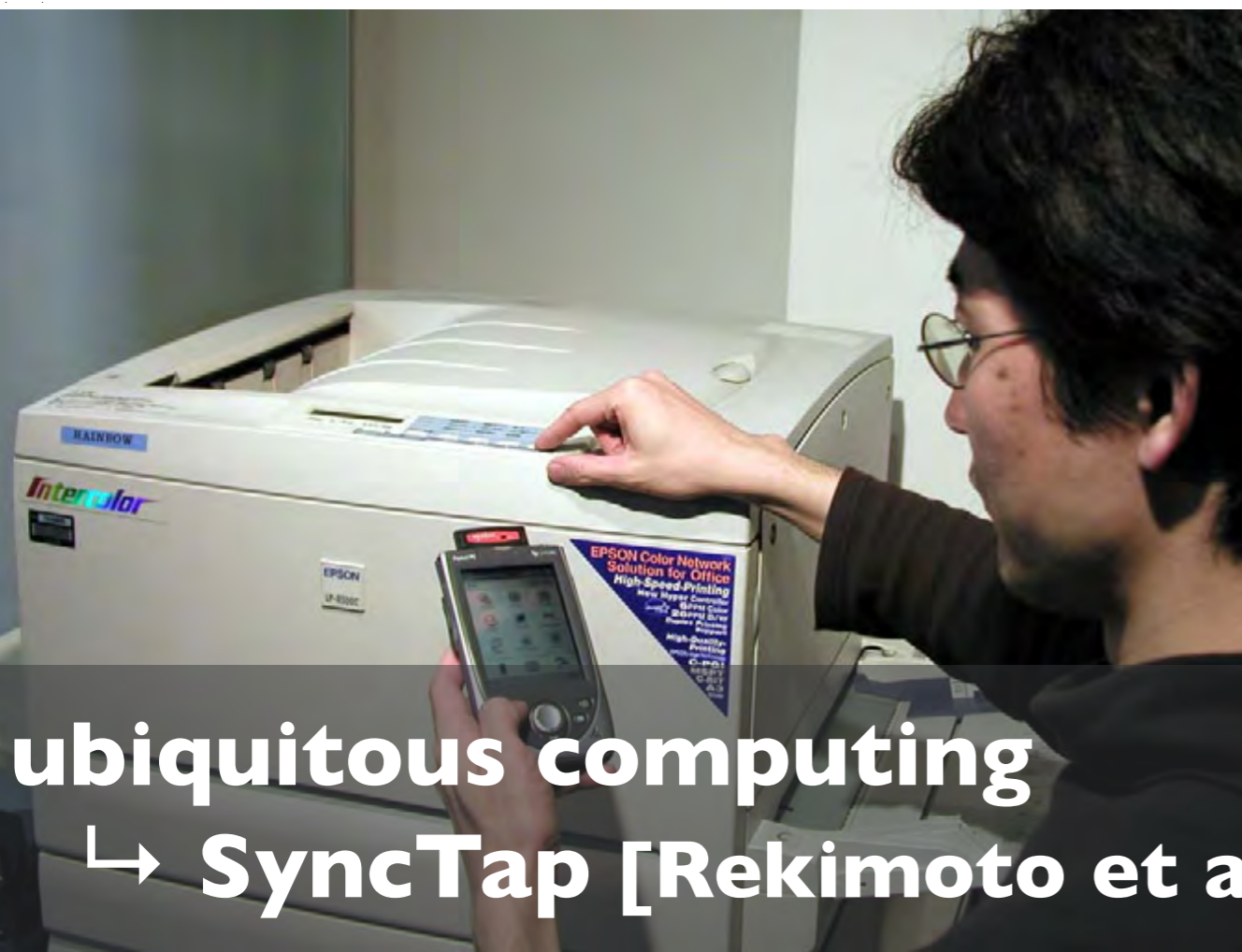


*REVEL*


Programming the sense of touch

# inFORM

Interacting with a dynamic shape display



**ubiquitous computing**  
↳ **SyncTap [Rekimoto et al., 03]**



**“There is more information available at our fingertips during a walk in the woods than in any computer system, yet people find a walk among trees relaxing and computers frustrating. Machines that fit the human environment, instead of forcing humans to enter theirs, will make using a computer as refreshing as taking a walk in the woods.”**

**↳ M. D. Weiser**





**the world is not frozen** (yet)

↳ make interactive system truly adaptable 'tools'

TR 1002 (G/L) CAN# 013333  
512008  
K2967M UN962K

Benjamin

REG

Soft



Des ordinateurs et des Hommes - 2015.key — Edited

View 85% Zoom Add Slide Play Table Chart Text Shape Media Comment Share Tips Format Animate Document

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Devices  
Z

le monde n'est pas figé



# le monde n'est pas figé

↳ faire des systèmes interactifs de vrais 'outils'

*Invited* S. HUOT  
↳ Gif - 01|2015

↳ 84

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	A	B	C	D
	ITEM	NO.	UNIT	COS
	---	---	---	---
MTBUC	RAKE	4	12.95	51.80
YOUNK	CUT	25	1.95	48.75
MTBUC	TONER	4	12.95	51.80
YOUNK	TR	2	9.95	19.90
				---
			SUBTOTAL	13155.50
		9.75%	TAX	1282.60
			<b>TOTAL</b>	<b>14438.10</b>

Name	Icon	Money	Player Type	Jail	Position
Andrew	Iron	\$ 1,500	Person	0	0
Lindsay	Dog	\$ 1,500	Computer	0	0
Anne Marie	Hat	\$ 1,500	Computer	0	0
Don	Car	\$ 1,500	Computer	0	0

<http://okayandrew.tumblr.com/post/8740017278>

<https://carywalkin.ca/2013/09/17/vba4play-making-a-maze-part-1-your-first-maze/>

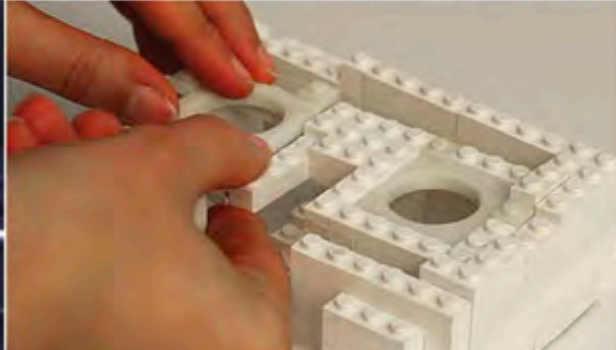
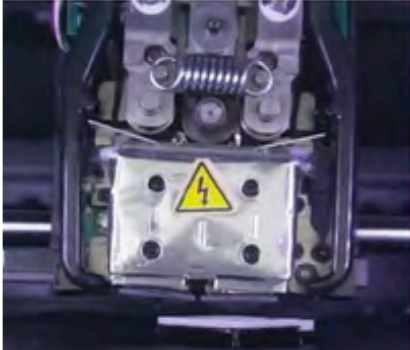
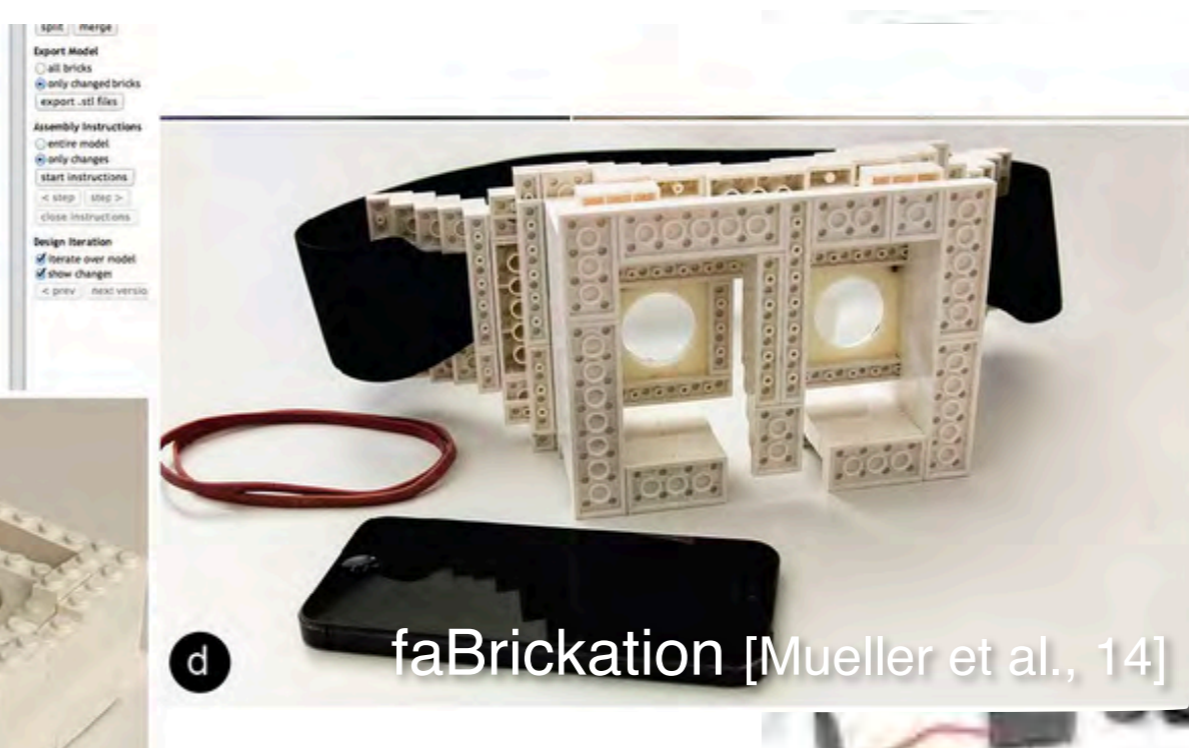
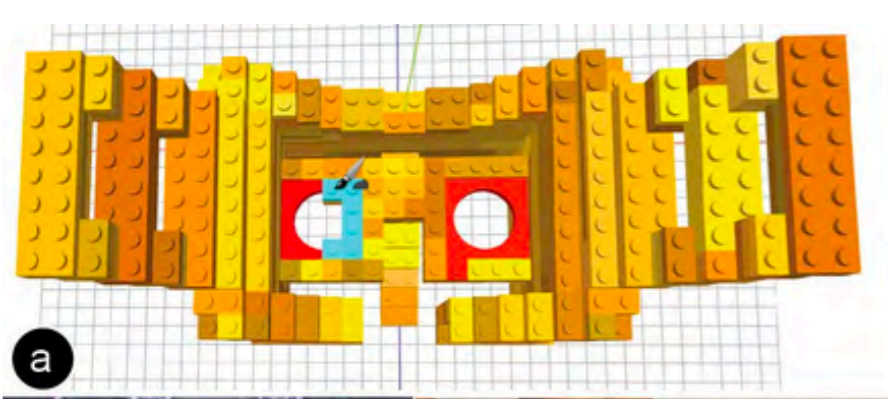
# **User Interface Façades:**

## **Towards fully adaptable user interfaces**

**W. Stuerzlinger<sup>\*</sup>, O. Chapuis<sup>\*\*</sup>, D. Philipps<sup>\*</sup> & N. Roussel<sup>\*\*</sup>**

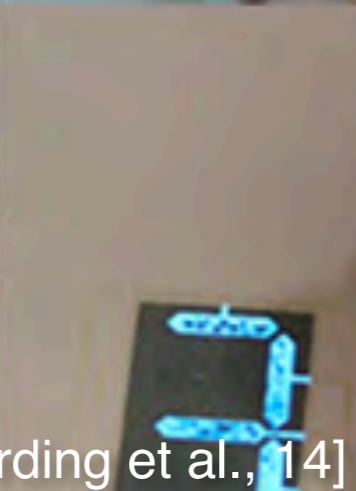
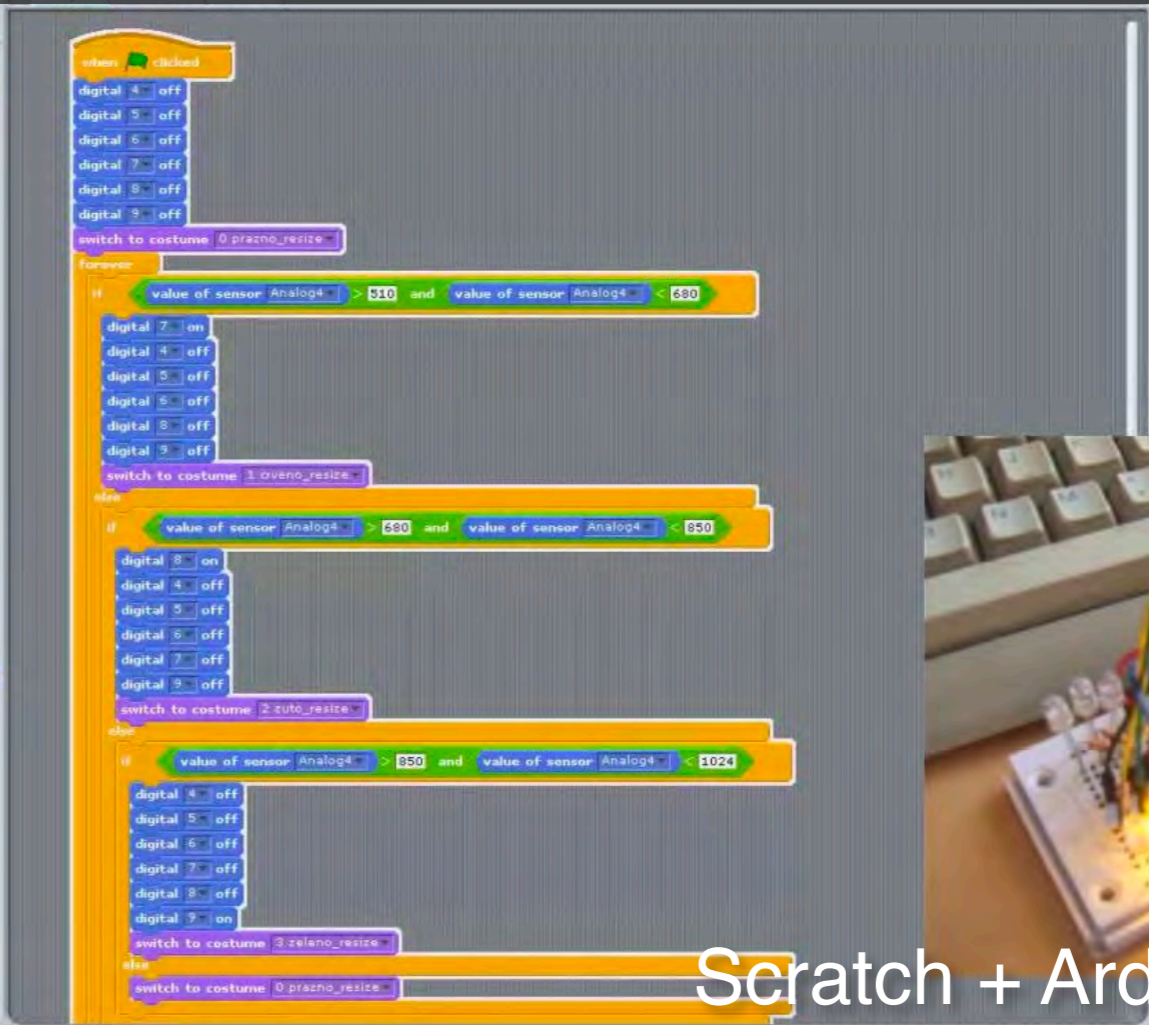
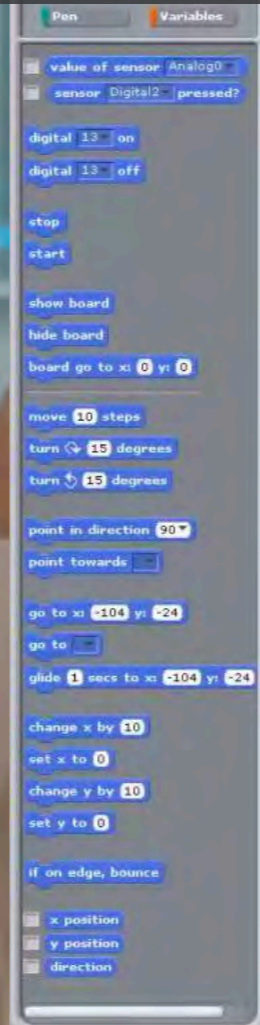
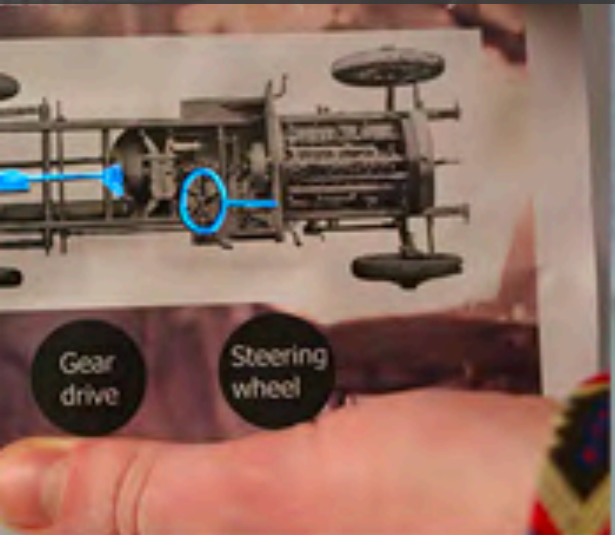
<sup>\*</sup> Interactive Systems Research Group, York University, Canada

<sup>\*\*</sup> Projet In Situ, CNRS - Université Paris-Sud - INRIA Futurs, France



faBrickation [Mueller et al., 14]

# Digital Fabrication



PrintScreen [Olberding et al., 14]

Scratch + Arduino [S4A]



**“One can imagine one of the first programs  
an owner will write is a filter to eliminate advertising!”**

**↳ A. C. Kay**



# **the future is not so simple...**

↳ transparency and control

# *transparency and control*

*“If people don’t understand what these systems are doing, how do we expect people to challenge them?” [dana boyd, 15]*  
<http://www.danah.org/papers/talks/2015/ParkerLecture.html>

## **mastering complexity**

↳ better understanding and control

## **physicality**

↳ digital objects in the physical world

## **adaptability**

↳ mastering and improving the system



*transparency*

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Environ 5 800 résultats (0,30 secondes)

**science et conscience chez les shadoks par gérard berry**  
<https://www.franceculture.fr/sciences>  
29 sept. 2014 - Le nom des **Shadoks** est connu de toute la France, mais pas les détails de leur étrange existence. Après avoir balayé des racontars sur leur naissance et leur présence dans l'univers, nous étudierons les immenses progrès de leur science, des probabilités élémentaires à la compréhension fine du ...

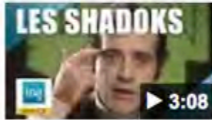
**[PDF] Les Shadoks sont ils décervelables?**  
[www-sop.inria.fr/members/Gerard.Berry/Pataphysique/BerryDecervelageShadoks.pdf](http://www-sop.inria.fr/members/Gerard.Berry/Pataphysique/BerryDecervelageShadoks.pdf)  
Gérard Berry. Déformaticien au Collège de 'Pataphysique. Version 2, 28 septembre 2008. 1. Introduction. L'étrange peuple des **Shadoks** (Image 1) a vécu dans une époque très ancienne, bien avant que les humains ne peuplent la terre, et bien avant même que le Cosmos ne soit convenablement formé et n'ait stabilisé ses ...

**Conférence > Science et conscience chez les Shadoks ! | L'aire d'u**  
<https://www.lairedu.fr/media/video/science-conscience-chez-les-shadoks/>  
3 juin 2014 - Le nom des **Shadoks** est connu de toute la France, mais pas les détails de leur étrange existence. Après avoir balayé des racontars ... si nous la regardons de plus près. **Gérard Berry**, Informaticien, Institut National de Recherche en Informatique et Automatique (INRIA), membre de l'Académie des sciences ...


**GERARD BERRY - YouTube**

 <https://www.youtube.com/watch?v=CBvARhmPIH8>  
30 déc. 2014 - Ajouté par Laurence Honnorat  
TEMPS INFORMATIQUE, TEMPS MUSICAL - L'influence des théories scientifiques sur le renouvellement des ...

**Les Shadoks sont-ils pour les attardés mentaux ? | Archive INA ...**

 <https://www.youtube.com/watch?v=C0vTzS068qY>  
23 juin 2016 - Ajouté par Shadok Tube (pompé par ina.fr et aaa production)  
Abonnez-vous, pompez ici <http://bit.ly/ShadokTube> Les **Shadoks** en DVD <http://boutique.ina.fr/dvd> ...

**IF Luxembourg - conférence Gérard Berry - YouTube**

 <https://www.youtube.com/watch?v=6QJBCwUalqE>  
30 oct. 2015 - Ajouté par Institut français du Luxembourg  
Conférence **Gérard Berry**- professeur au collège de France, récompensé en 2014 par la médaille d'or du CNRS.

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- OPINIONS
- BLOGUES
- 24 HEURES

**ACTUALITÉ SOCIÉTÉ**

# Un adolescent découvre une cité maya

**Le Québécois de 15 ans a fait le lien entre la forme des constellations et la position des villes mayas**

f 149,3K PARTAGEZ SUR FACEBOOK PARTAGEZ SUR TWITTER AUTRES



PHOTO LE JOURNAL DE MONTRÉAL, MARTIN CHEVALIER

William Gadoury étudie en 4e secondaire à l'académie Antoine-Manseau de Joliette. Il sera porte-parole de l'Expo-Science pancanadienne à l'Université McGill à Montréal le 18 mai.

**MICHEL HARNOIS**

Samedi, 7 mai 2016 07:30  
MISE à JOUR Samedi, 7 mai 2016 07:30

**SAINT-JEAN-DE-MATHA | Un Québécois de 15 ans a découvert une nouvelle cité maya jusque-là méconnue grâce à sa théorie selon laquelle cette civilisation choisissait l'emplacement de ses villes selon la forme des constellations d'étoiles.**

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- FAITS DIVERS**  
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- EN 5 MINUTES**  
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- FAITS DIVERS**  
Un parachutiste québécois perd la vie
- FAITS DIVERS**  
La famille de la victime est sous le choc
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Yves Coppens Notre-Dame-des-Landes Recherche pour le développement 70 ans du magazine  
Agriculture



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SCIENCES ET AVENIR > ARCHÉO & PALÉO > ARCHÉOLOGIE

🏠 ARCHÉOLOGIE

## Non, un adolescent n'a pas découvert une cité maya

Par Morgane Kergoat le 11.05.2016 à 19h09, mis à jour le 11.05.2016 à 19h09

Un adolescent canadien aurait découvert une nouvelle grande cité maya en établissant un lien avec les constellations. Une jolie histoire... pourtant totalement fausse selon les scientifiques.



Le temple du grand Jaguar à Tikal (cité maya située au Guatemala) est érigé sur un socle pyramidal de 47 m de hauteur. © SUPERSTOCK/SUPERSTOCK/SIPA

SUR LE MÊME SUJET

• **TEOTIHUACAN.**  
Le mystère du mercure sous la pyramide du

**CANULAR.** Un Québécois de 15 ans a découvert une cité maya après avoir élaboré une théorie selon laquelle l'emplacement géographique des cités de cette civilisation précolombienne correspond aux constellations. Il a ainsi

+ LUS + COMMENTÉS + PARTAGÉS



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<https://gizmodo.com/teen-discovers-lost-maya-city-using-ancient-star-maps-17757359...>  
 May 10, 2016 - Using an unprecedented technique of matching stars to the locations of temples on Earth, a 15-year-old Canadian student says he's discovered a forgotten Maya city in Mexico. ... Here's how he discovered the lost city: After studying 22 different constellations, Gadoury noticed ...
- ✓ **Canadian Teen Who 'Discovered' Lost Maya City Speaks Out**  
<https://news.nationalgeographic.com/.../lost-maya-city-mexico-william-gadoury-satelli...>  
 Jun 2, 2016 - According to the initial report, William Gadoury of Québec was able to align more than 100 Maya cities to maps of modern constellations. When one constellation appeared to be missing its corresponding city, Gadoury turned to specialists to interpret satellite images of the area in an attempt to find the "lost" ...
- ✗ **Experts: Teen's 'Discovery' of Maya City is a Very Western Mistake**  
<https://news.nationalgeographic.com/.../20160511-Maya-Lost-City-Canadian-Teen-Di...>  
 May 11, 2016 - For gee-whiz value, the announcement has been hard to beat: A Canadian teenager discovers a lost Maya city without even stepping foot in the Central American jungle. Unfortunately, this "discovery" appears to be the well-intentioned, albeit faulty, result of modern Western education colliding with an ...
- ✗ **That Long-Lost Mayan City a Teen Found Isn't Lost ... or a City | WIRED**  
<https://www.wired.com/2016/05/long-lost-mayan-city-teen-found-isnt-lost-city/>  
 May 10, 2016 - How can you resist a headline like "Quebec teen may have discovered long lost Mayan city"? Alas, the story going viral today is too good to be true, according to archaeological experts. The supposed lost pyramid? More likely an abandoned field. This much is true: William Gadoury, now 15, won a contest ...
- ✓ **A 15-year-old might have just discovered a lost Maya city in the ...**  
<https://www.sciencealert.com/a-15-year-old-just-discovered-a-lost-maya-city-in-centra...>  
 May 10, 2016 - William Gadoury, a 15-year-old school student from Quebec, Canada, has found something that's been hidden from archaeologists for centuries - what appears to be a lost city of the Maya civilisation, buried deep in the Yucatan jungle of southeastern Mexico. He didn't do it by hiring a bunch of expensive ...
- ✗ **Did a teen discover a lost Maya city? Not exactly. - The Washington Post**  
<https://www.washingtonpost.com/.../did-a-teen-discover-a-lost-mayan-city-not-exactly...>  
 May 11, 2016 - It's no fun when a feel-good story has to get debunked, especially when it's a story about a smart, science-loving kid. But, unfortunately, it seems obvious that reports of a Quebec teen "discovering" a lost Maya city have been overblown. William Gadoury, a 15-year-old from Saint-Jean-de-Matha, ...
- ✗ **Breaking down the mythical 'Maya city' discovery - CNN**  
[www.cnn.com/2016/05/11/americas/mayan-city-debunk/index.html](http://www.cnn.com/2016/05/11/americas/mayan-city-debunk/index.html)  
 May 11, 2016 - (CNN) We're all suckers for a great story, and "Teen finds lost Maya city" definitely sounds promising. Throw in some ancient cosmology, a little help from the Canadian Space Agency and some satellite sleuthing, and the movie offers practically write themselves. Sadly, the reality may not be as cinematic as ...
- ✓ **Forgotten Mayan city: A hidden wonder discovered by a brilliant boy ...**  
[www.independent.co.uk](http://www.independent.co.uk) > News > World > Americas  
 May 11, 2016 - It seemed almost too good to be true. Using Google Earth and a home computer, a 15-year-old schoolboy discovered the remains of a long-lost Mayan City. William Gadoury, from Quebec, Canada, compared maps of 22 star constellations known to the ancient Maya with Google Earth images of Mexico's ...
- ✓ **Forgotten Mayan city 'discovered' in Central America by 15-year-old ...**  
[www.independent.co.uk](http://www.independent.co.uk) > News > World > Americas  
 May 9, 2016 - A 15-year-old boy believes he has discovered a forgotten Mayan city using satellite photos and Mayan astronomy. William Gadoury, from ... False! A Canadian teen's improbable discovery of a lost Mayan city led to breathless reporting — and an eventual scholarly opinion that the find was not credible.
- Two Ancient Maya Cities Unearthed In Mexican Jungle | IFLScience**  
[www.iflscience.com/environment/two-ancient-maya-cities-unearthed-mexican-jungle/](http://www.iflscience.com/environment/two-ancient-maya-cities-unearthed-mexican-jungle/)  
 When the researchers compared the façade with Von Euw's illustrations it was clear that the city discovered was indeed the long lost Lagunita. According to Sprajc, the façade represents a Maya earth deity associated with fertility. "These doorways symbolize the entrance to a cave and, in general, to the watery underworld," ...

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**Who 'Discovered' Lost Maya City Speaks Out**  
<http://www.nationalgeographic.com/.../lost-maya-city-mexico-william-gadoury-satellite>  
 According to the initial report, William Gadoury of Québec was able to sign more than 100 new sites on maps of modern constellations. When one constellation appeared to be missing in the jungle, Gadoury turned to specialists to interpret satellite images of the area in an attempt to find the "lost" city.

**Experts: 'Lost Maya City' is a Western Mistake**  
<https://news.11-Maya-City-Canadian-Teen-Discovered>  
 May 11, 2016  
 A Canadian teenager discovered a lost Maya city in the Yucatan jungle. Unfortunately, this discovery is a modern Western education colliding with a

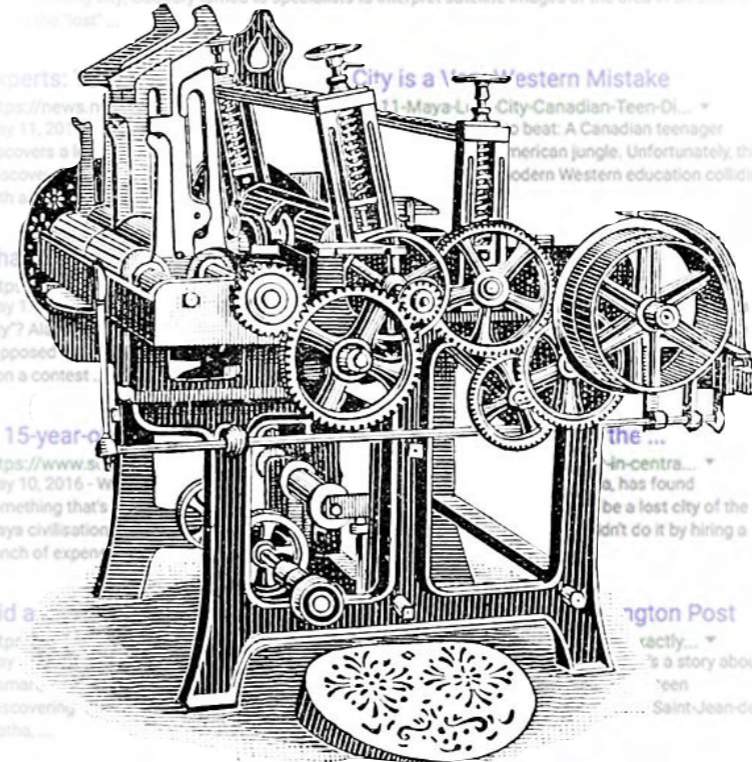
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 A Canadian teenager discovered a lost Maya city? All supposed to be a Western mistake won a contest

**A 15-year-old Canadian teen discovers a lost Maya city**  
<https://www.southcoasttoday.com/daily/16-05/160510-01n.htm>  
 May 10, 2016 - William Gadoury, a 15-year-old Canadian, has found something that's been lost for centuries. He discovered a lost Maya civilization in the Yucatan jungle. A bunch of experts are skeptical.

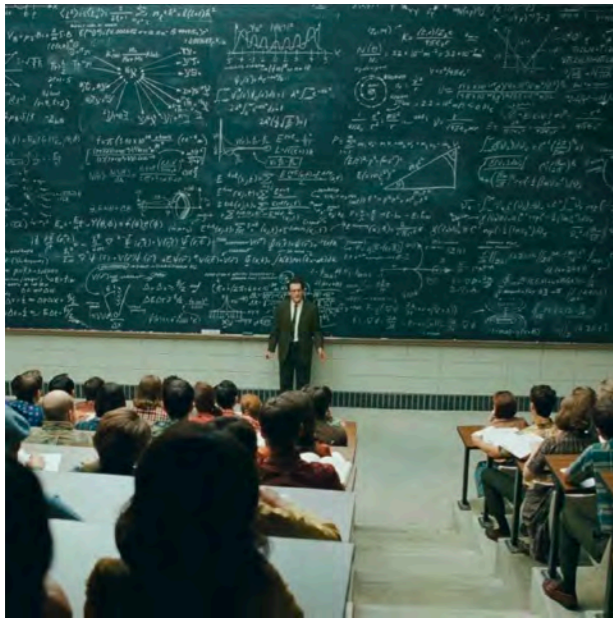
**Did a 15-year-old Canadian teen discover a lost Maya city?**  
<http://www.11-Maya-City-Canadian-Teen-Discovered>  
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**Maya city: A hidden wonder discovered by a brilliant teen**  
<http://www.11-Maya-City-Canadian-Teen-Discovered>  
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...the "leaf" ...

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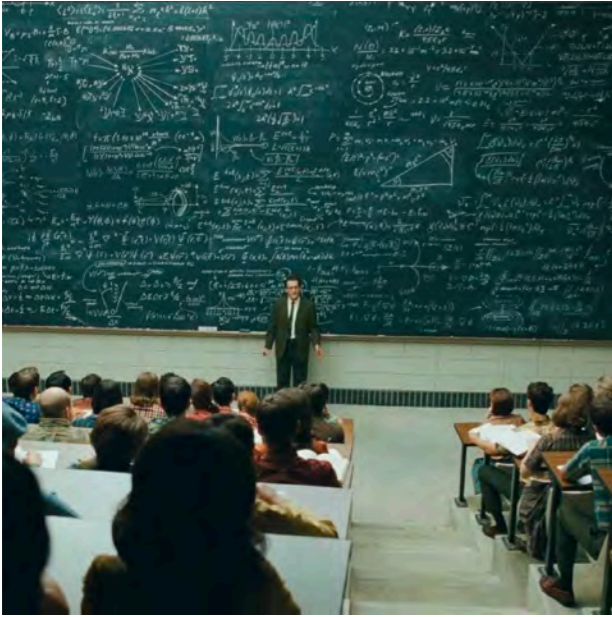
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# explanations



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# The Beatles

From Wikipedia, the free encyclopedia  
(Redirected from [The beatles](#))

*This article is about the band. For their self-titled album also known as [The White Album](#), see [The Beatles \(album\)](#).*

**The Beatles** were an [English](#) musical group from [Liverpool](#) whose members were [John Lennon](#), [Paul McCartney](#), [George Harrison](#), and [Ringo Starr](#). They are one of the most commercially successful and critically acclaimed bands in the world. The Beatles are the best-selling [musical act](#) of all time in the [United States of America](#), according to [RIAA](#), which certified them as the highest selling band of all time based on [American](#) sales of single and album. In the [United Kingdom](#), The Beatles released more than 40 different [singles](#), [albums](#), and [EPs](#) that reached number one. They were also repeated in many other countries: their record company, [EMI](#), estimated that by 1985 they had sold 1 billion records worldwide.<sup>[4]</sup> In 2004, *Rolling Stone* magazine ranked The Beatles #1 on its list of 100 Greatest Artists of All Time. The same magazine, their innovative music and cultural impact helped define the 1960s,<sup>[2]</sup> and their influence is still felt today.

The Beatles led the mid-1960s musical "[British Invasion](#)" into the United States. Although their initial [rock and roll](#) and homegrown [skiffle](#), the group explored [genres](#) ranging from [Tin Pan Alley](#) to [psychedelic rock](#). Their statements made them trend-setters, while their growing social awareness saw their influence extend beyond music throughout the 1960s. Many people today still see them as the "best band there ever was."

### Contents [hide]

- 1957–1960: Formation
- Musical influences
- 1960–1970: The Beatles
  - 1 Hamburg
  - 2 Record contract
  - 3 America
  - 4 Beatlemania crosses the Atlantic
  - 5 Backlash and controversy

WikipediaViz [Chevalier et al., 10]



C'est la Vis [Alper et al., 17]

*control*

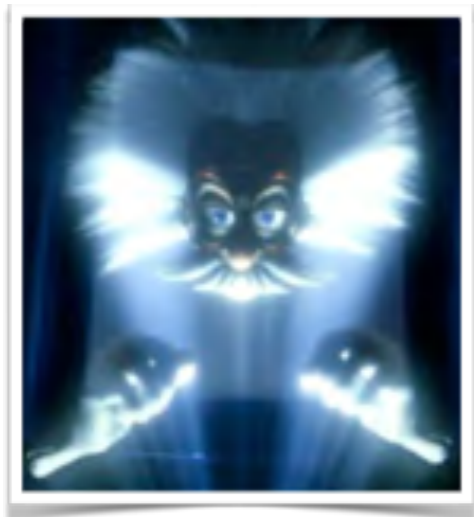


# *(semi-)autonomy vs (semi-)control*

COMPREHENSION

TAKING OF CONTROL

ACTION

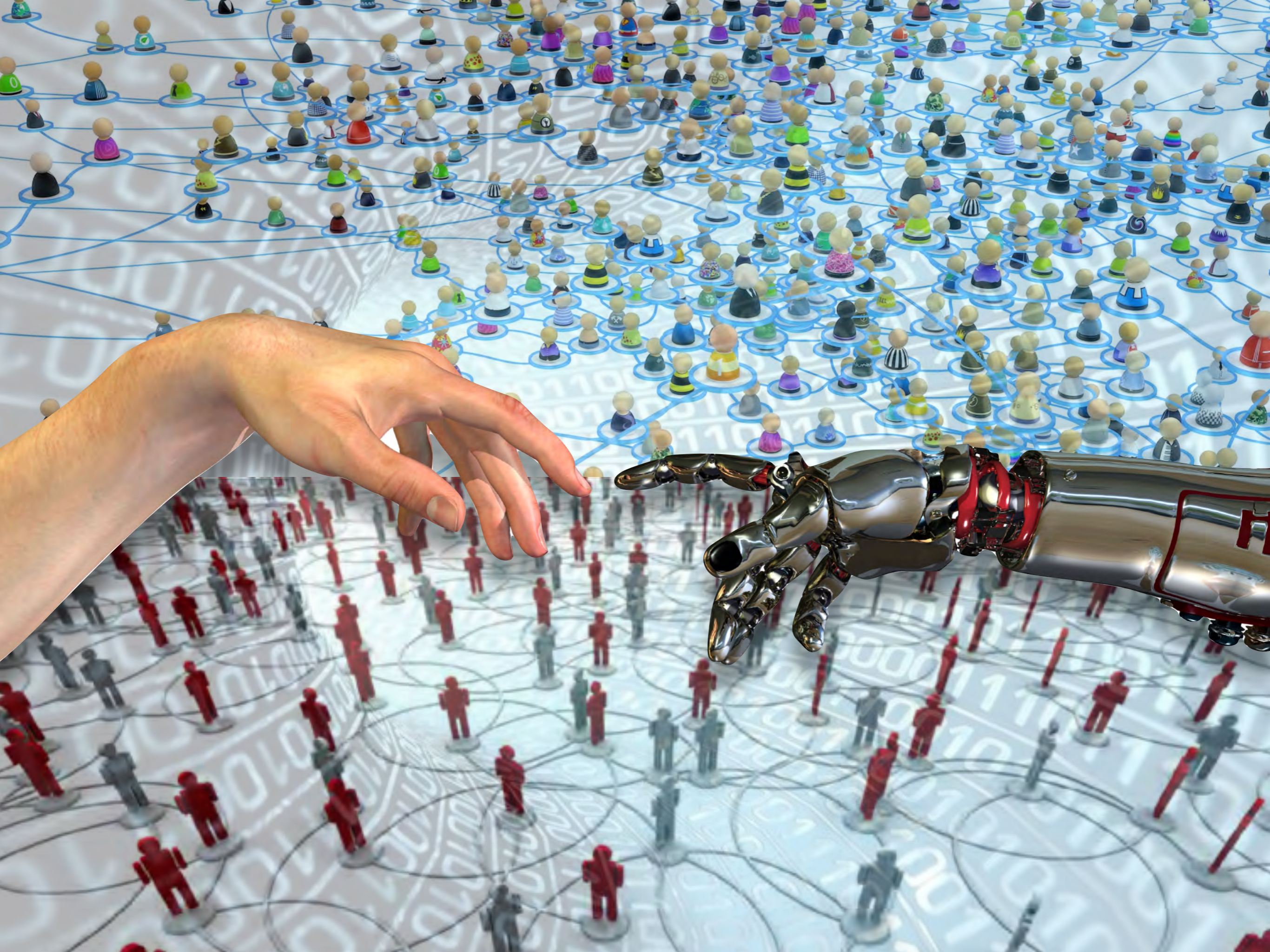


**ASSISTANT**



**TOOL**

**PERCEPTION OF CONTROL  
(AGENCY)**



# remerciements

LIG - E. Gaussier, S.Amer-Yahia, J. David, R. Lachaize

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**Wendy MACKAY**

Inria Saclay

**Michel BEAUDOUIN-LAFON**

Université Paris-Sud

l'article

*'Douglas ENGELBART, inventeur et visionnaire'*

[Jonathan ACEITUNO et Nicolas ROUSSEL, Interstices, 2013]

[https://interstices.info/jcms/ni\\_76304/douglas-engelbart-inventeur-et-visionnaire](https://interstices.info/jcms/ni_76304/douglas-engelbart-inventeur-et-visionnaire)

les membres de l'équipe **Loki**@Inria Lille Nord-Europe

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