Human-Computer Interaction

↳ back to the future and… forward to the past

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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

informatics mathematics
Inria
↳Lille - Nord Europe
CRIStAL
Centre de Recherche en Informatique, Signal et Automatique de Lille

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

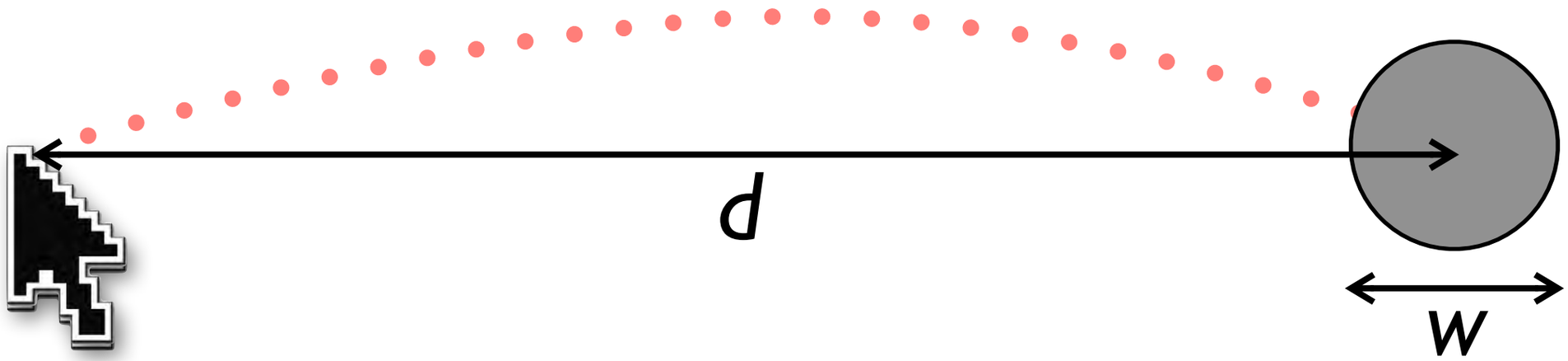
↳ technologies, modalities, contexts

integrate knowledge and expertise

↳ theories, methods, tools

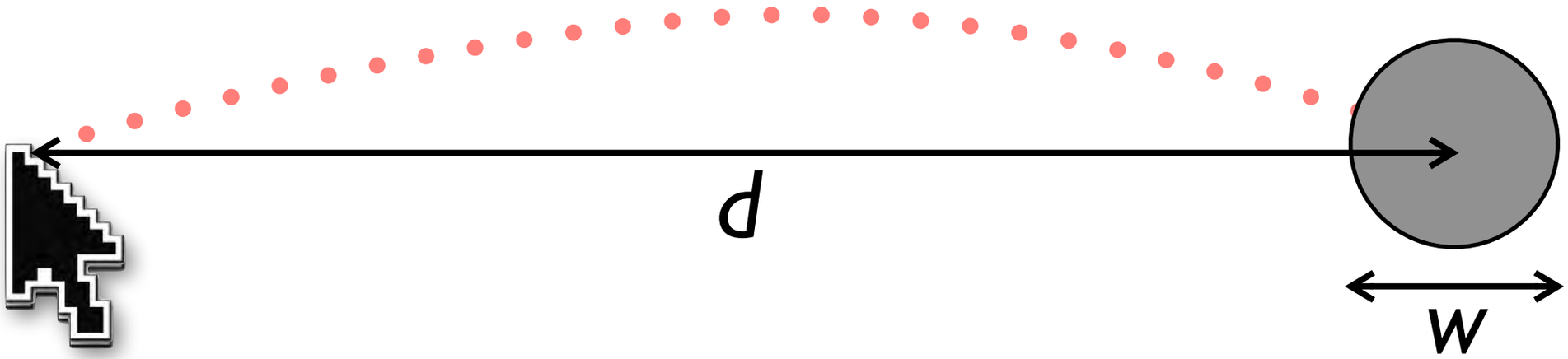
pointing with a mouse

pointing with a mouse



$$\mathrm{Movement\ Time} = ?$$

Fitts' Law (1954)



$$MT = a + bLog_2(1 + d/w)$$

ease pointing with expanding targets

why is HCI important?

always **at least one user**

↳ interactive systems

systems should be **accessibles and usable**

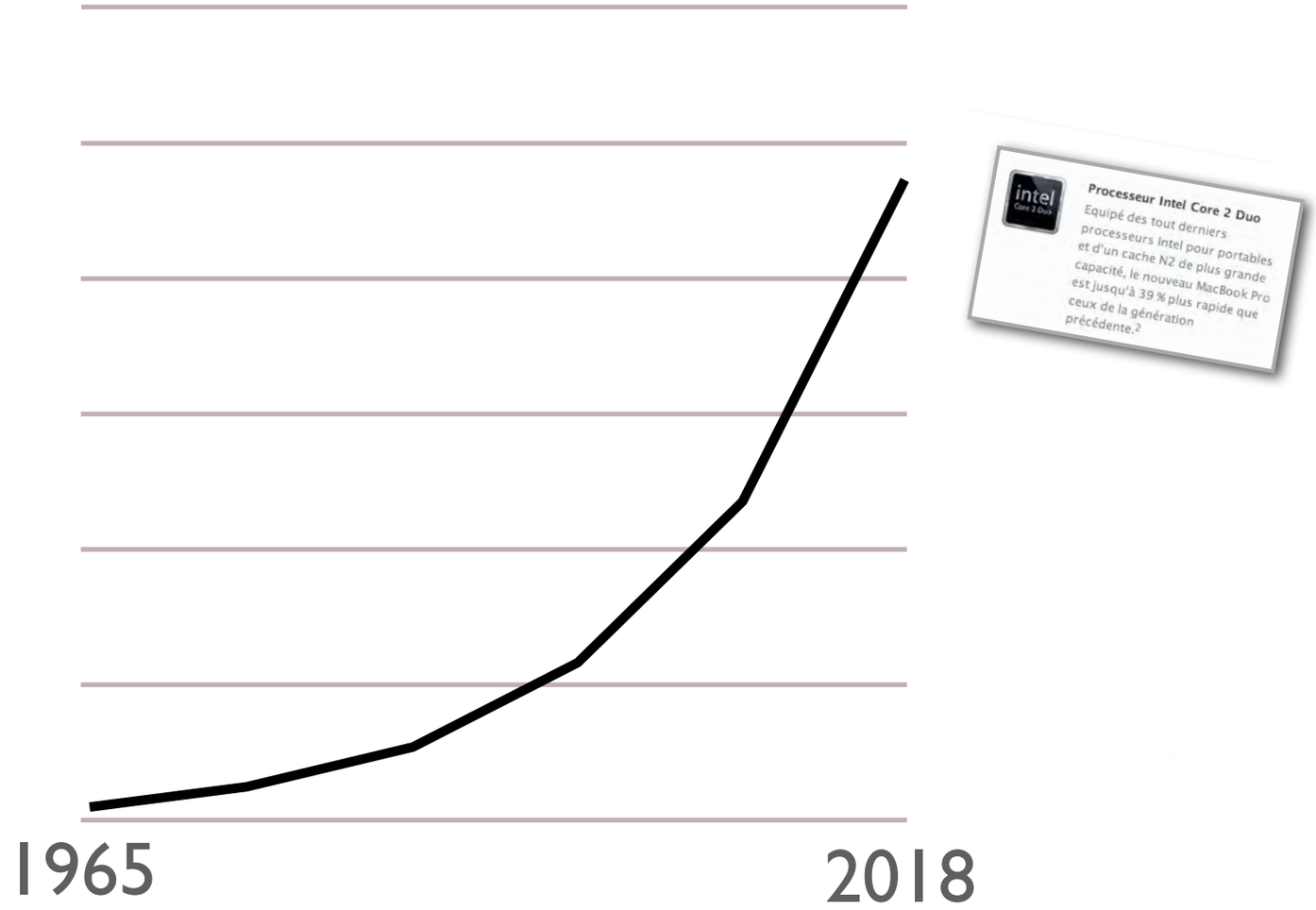
↳ the promises of the digital world

interaction should be **transparent** (figuratively)

↳ technology is a mean, a tool

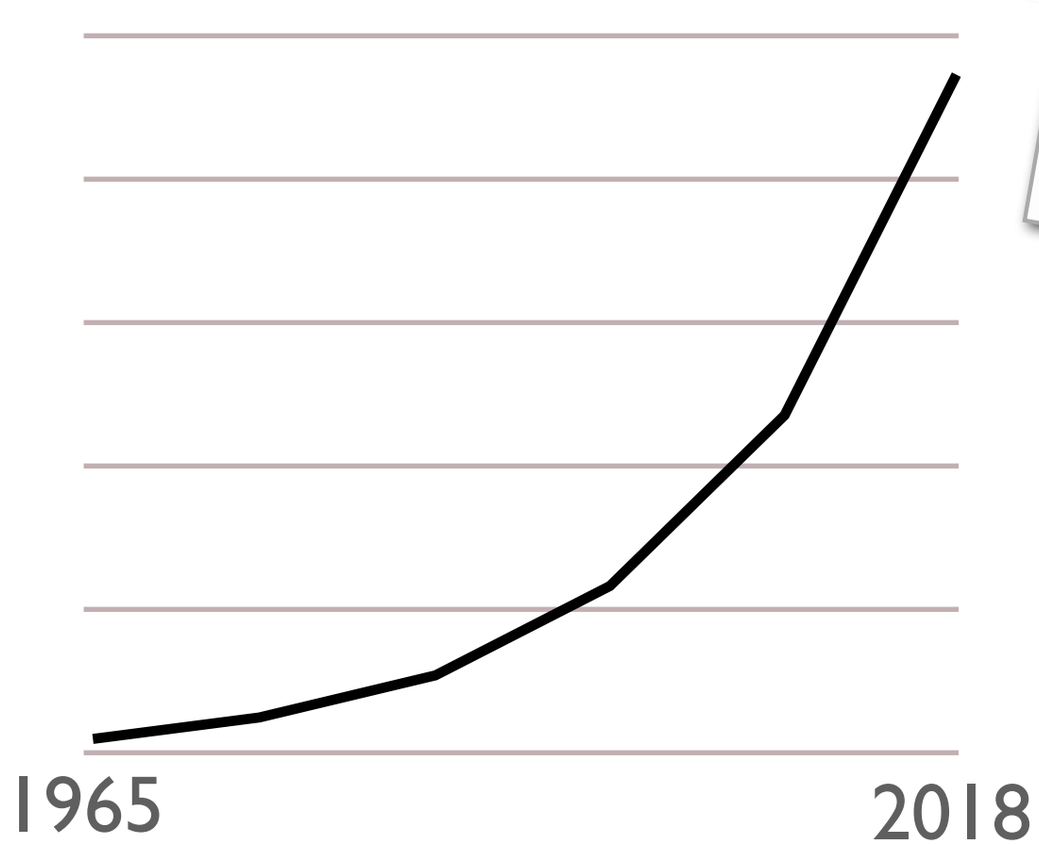
ina.f

the hard fact



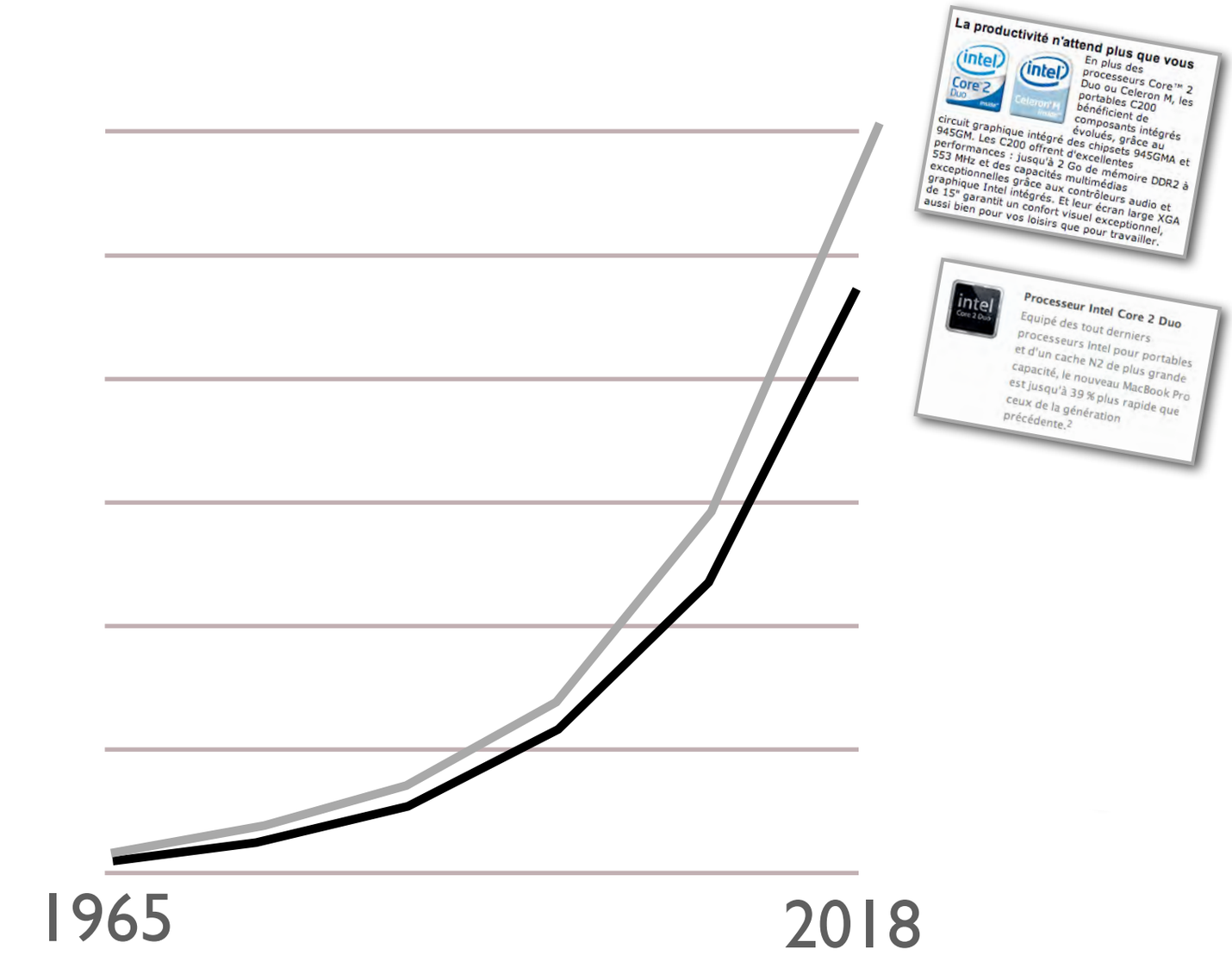
‘less is more (more or less)’
[W. Buxton]

Moore's law



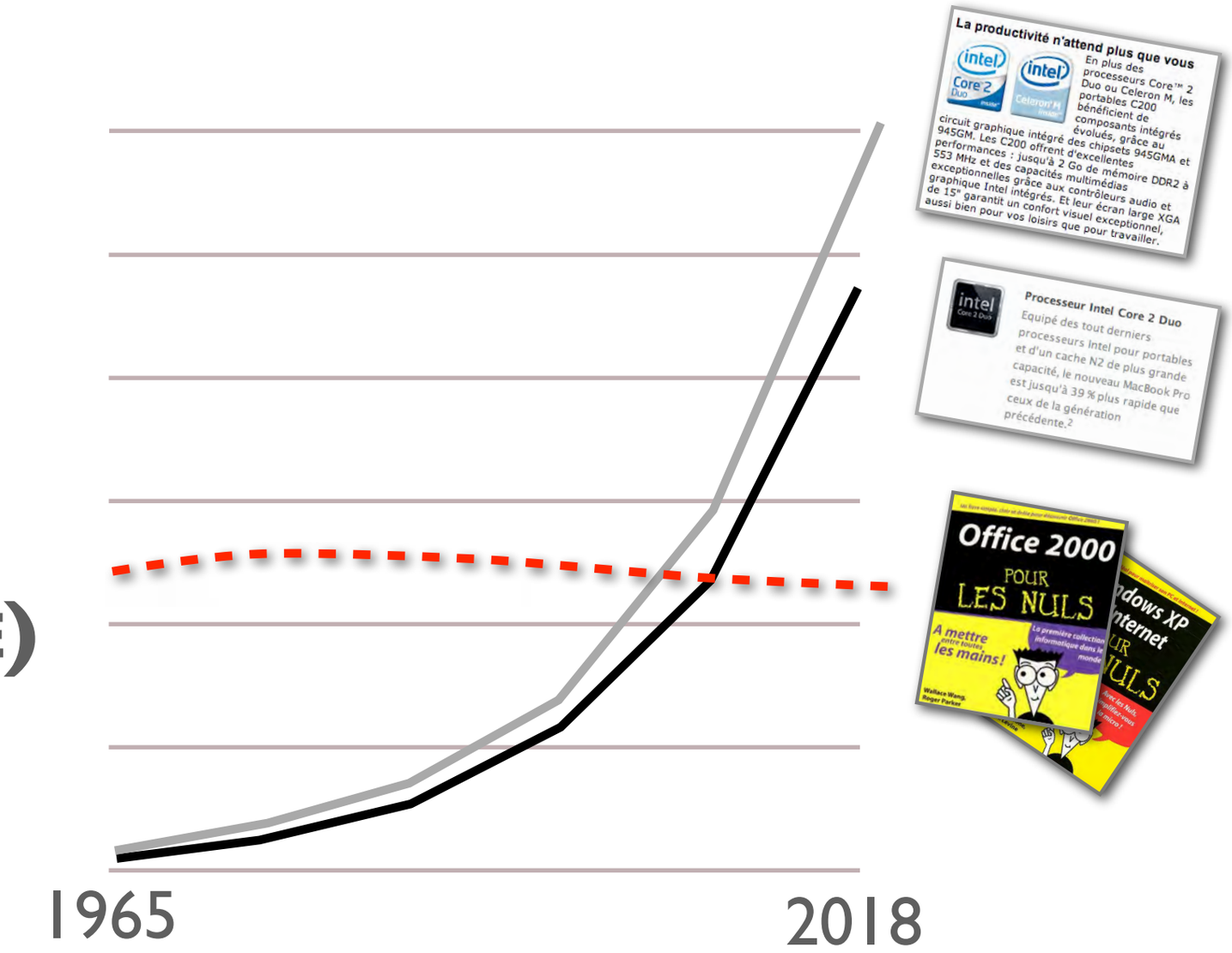
'less is more (more or less)'
[W. Buxton]

Moore's law
Buxton's law



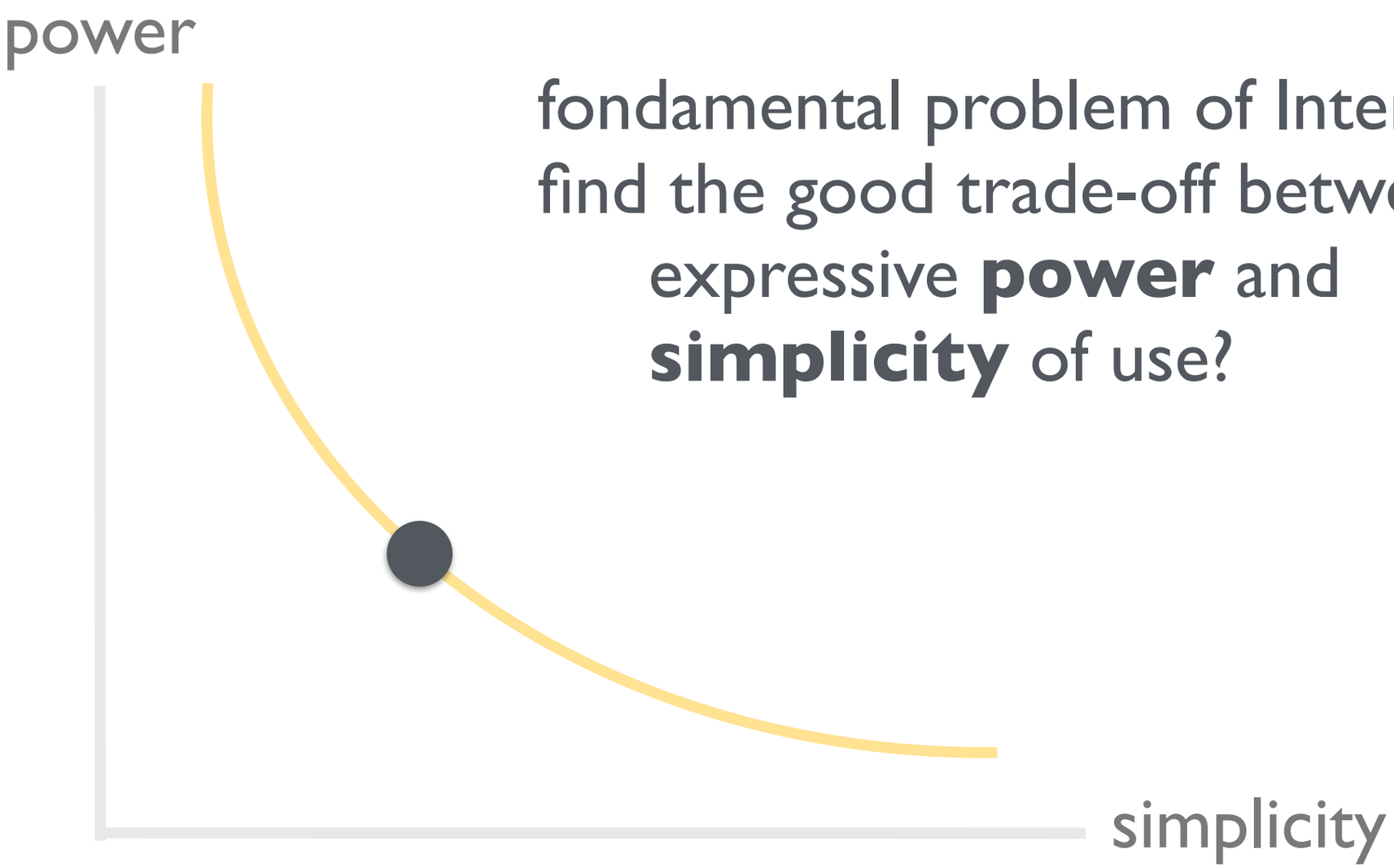
'less is more (more or less)'
[W. Buxton]

Moore's law
Buxton's law
and ...
God's Law (nature)



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

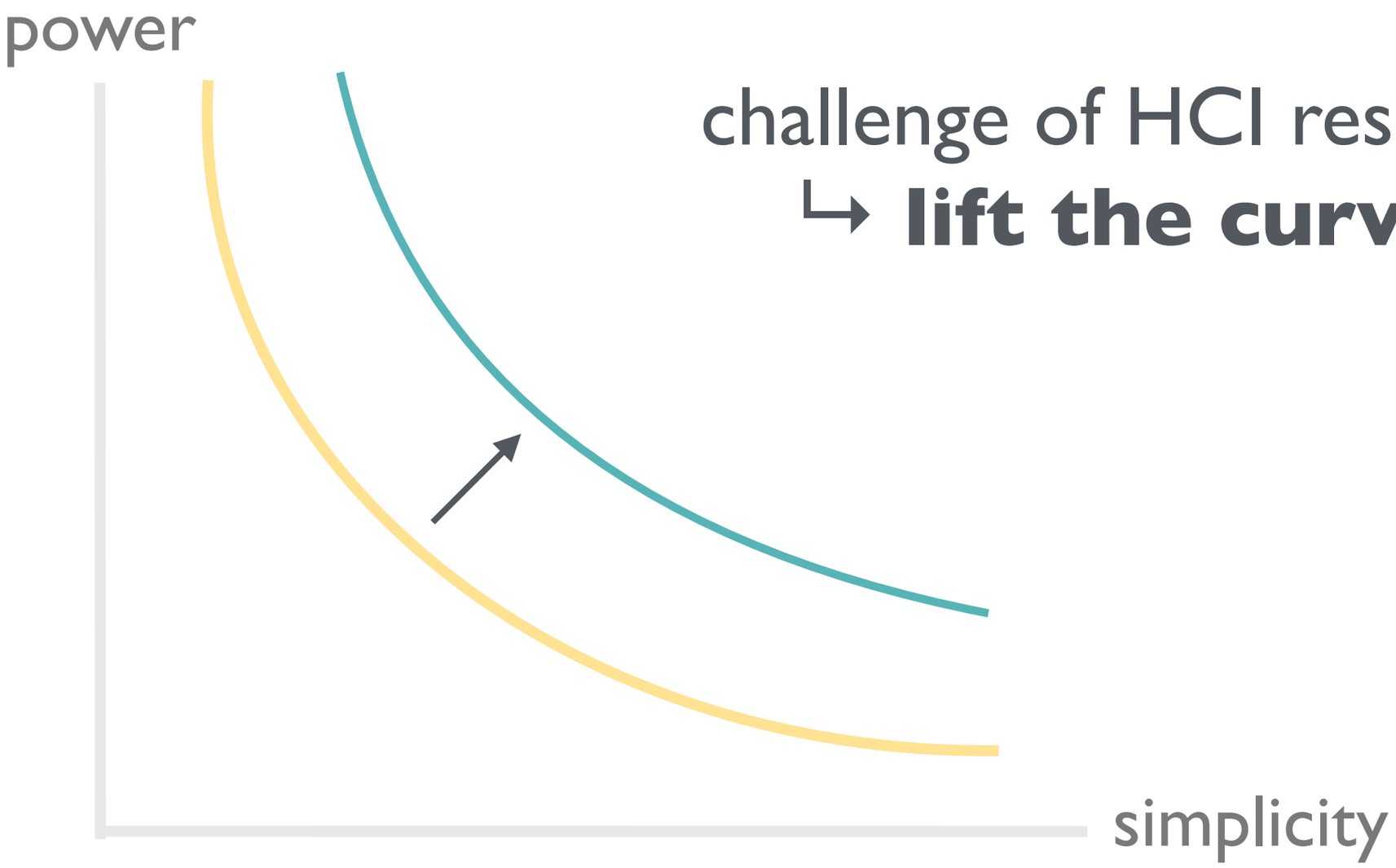
a matter of compromise...



fondamental problem of Interaction design:
find the good trade-off between
expressive **power** and
simplicity of use?

"*simple things should be simple, complex things should be possible*"
[A. Kay]

a matter of compromise...



challenge of HCI research

↳ **lift the curve**

[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**

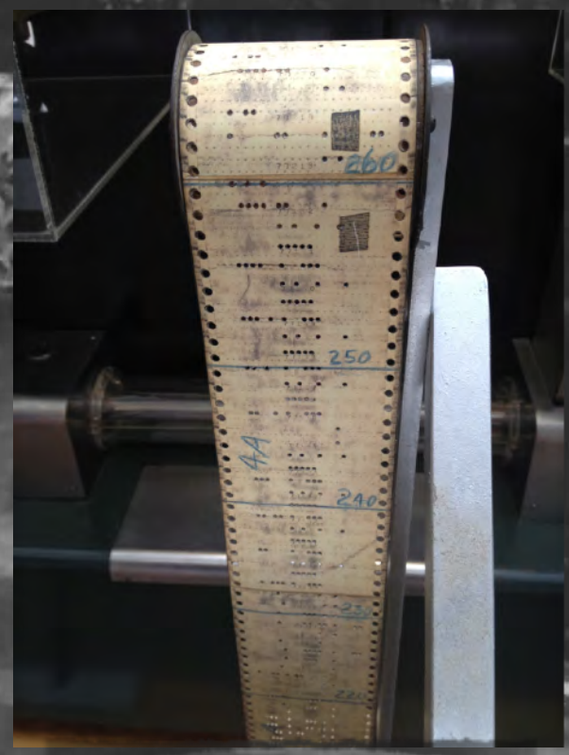
- design
- human factors
- computer science
- engineering

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

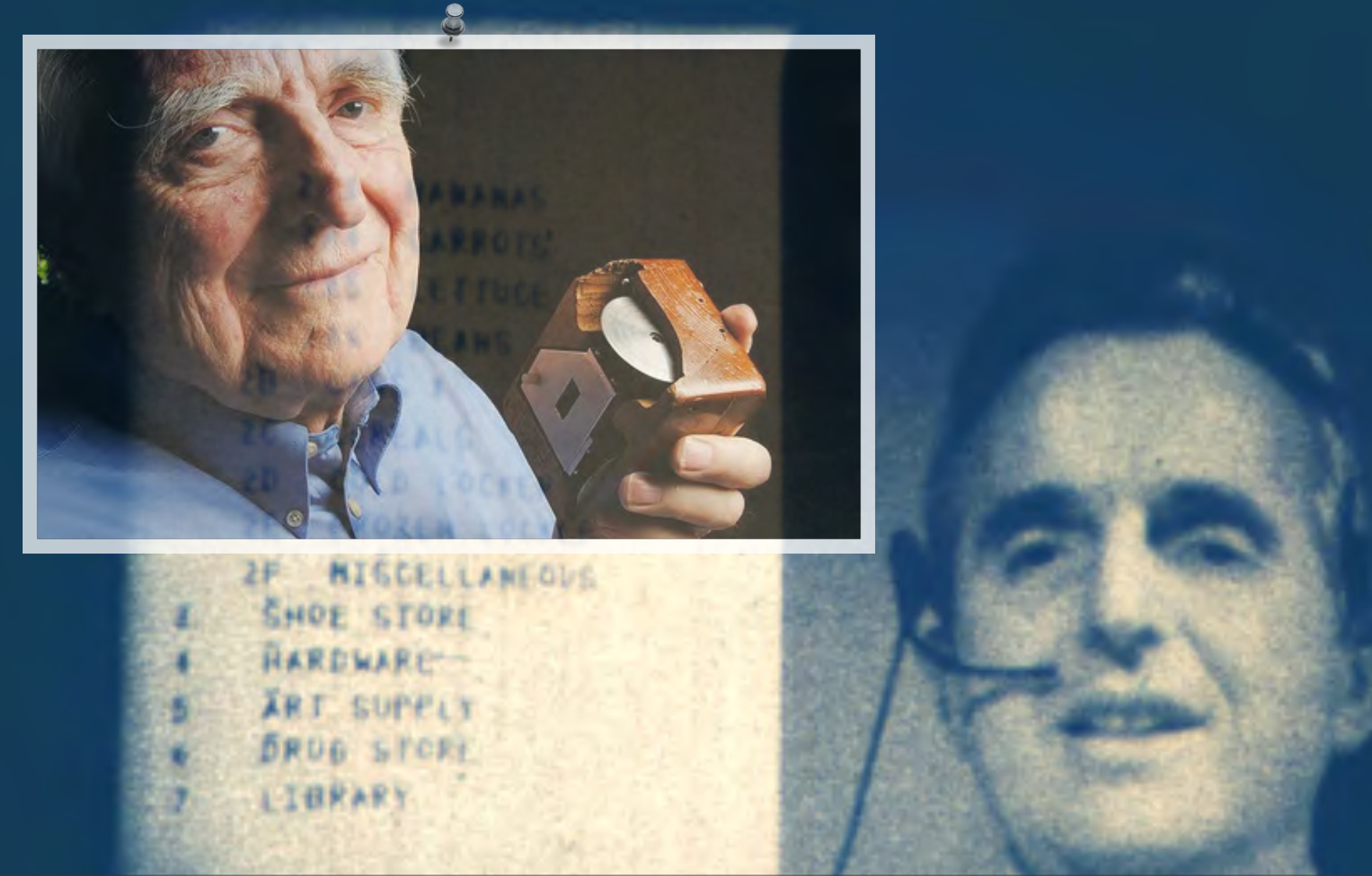
↳ text

SketchPad - [I. Sutherland, 63]

↳ **1st CAD system**

SketchPad - [I. Sutherland, 63]

↳ **1st CAD system**



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

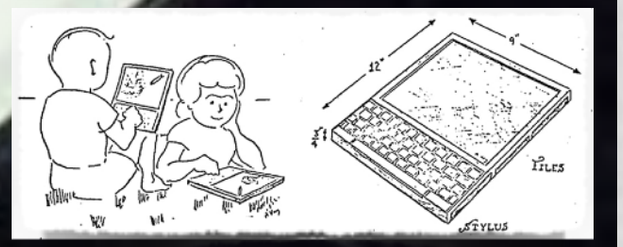
"*he sat on stage for an hour and a half dealing lightning with both hands*"

Chuck Thacker

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

Xerox Alto - 1973

↳ **graphical user interface (GUI)**

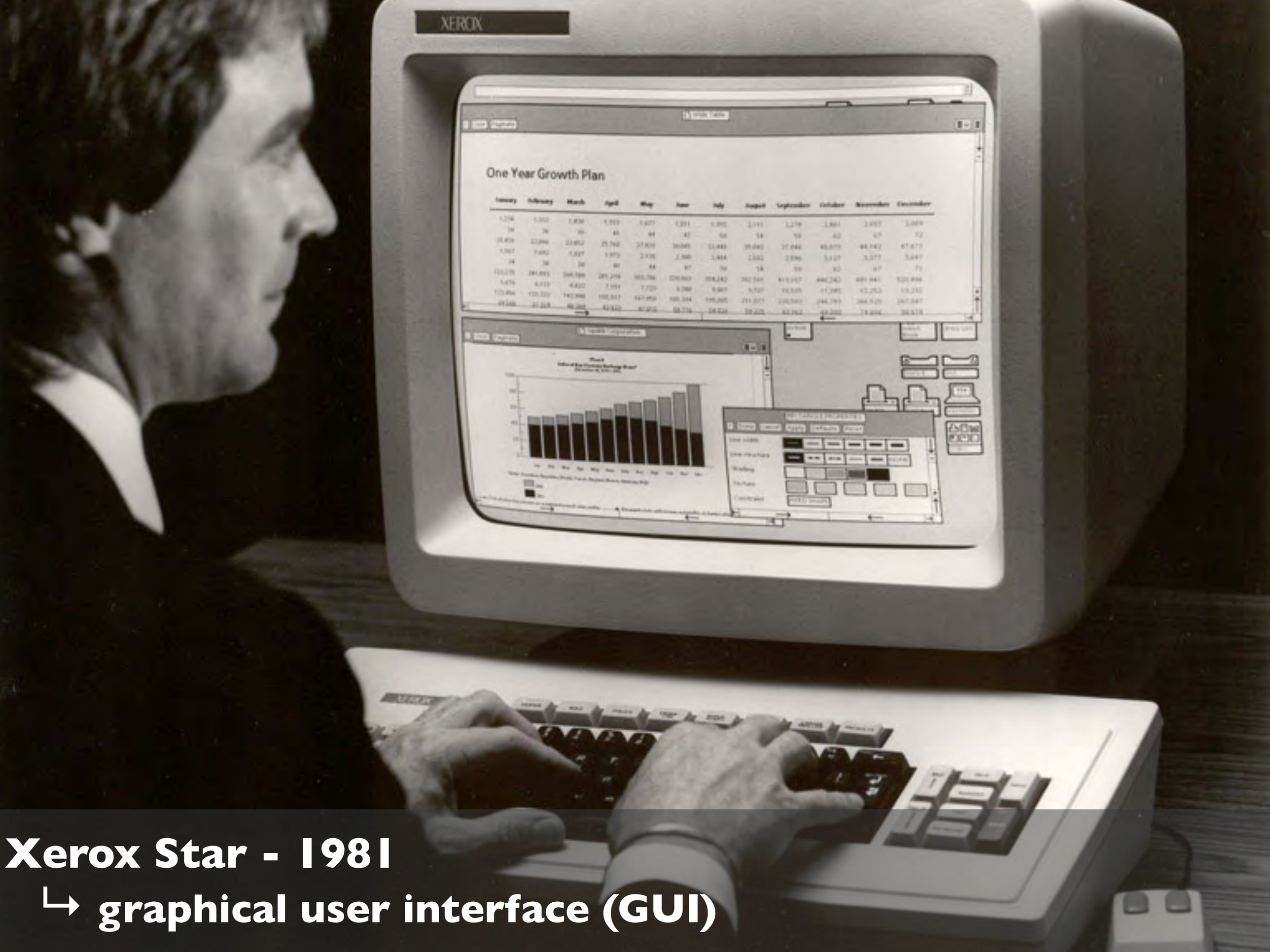


Dynabook

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

Alan C. Kay

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

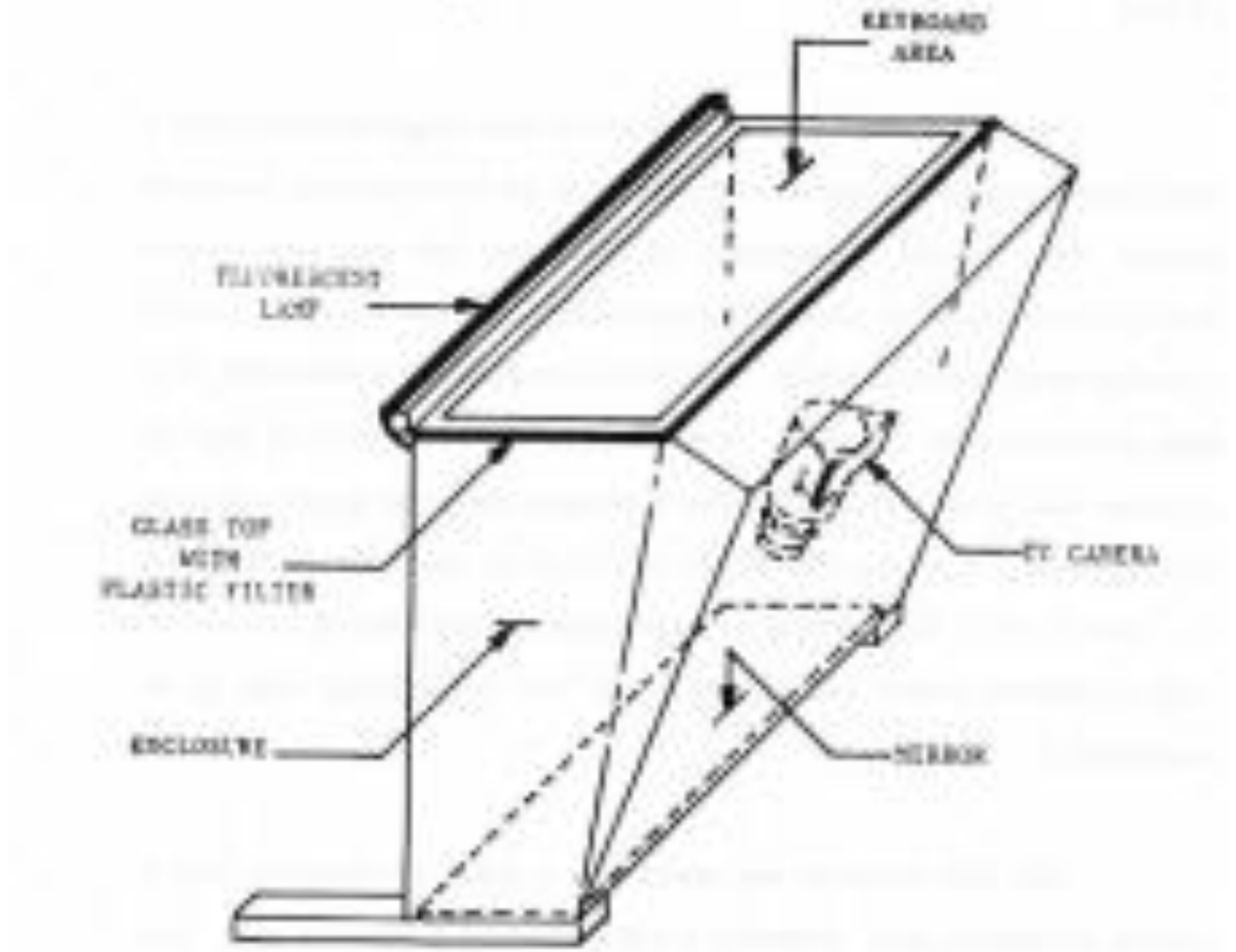


Xerox Star - 1981

↳ **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

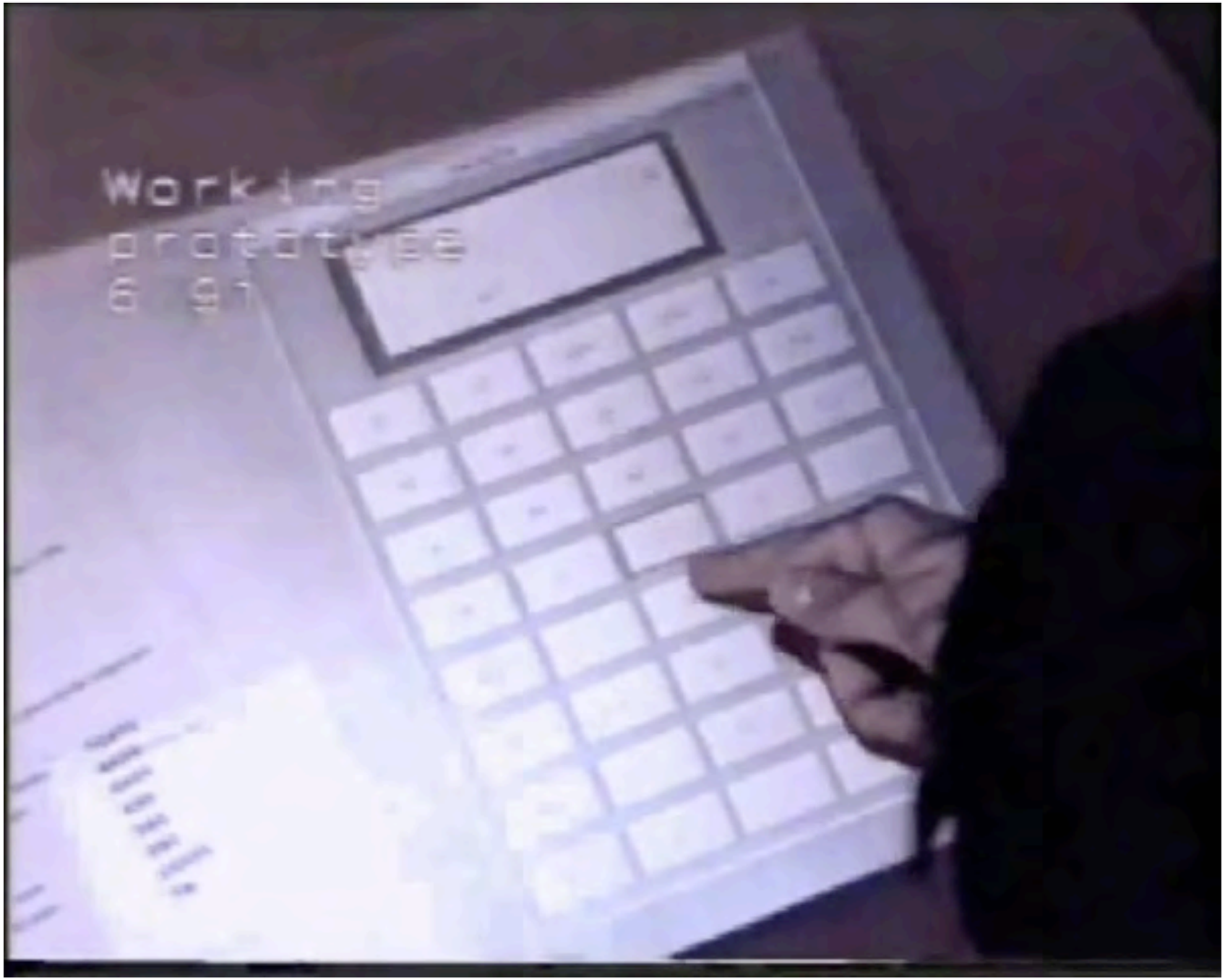
↳ **begins the era of popular multi-touch smartphones**

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

↳ **gestural interaction**

Kinect - Microsoft, 2010

↳ gestural interaction

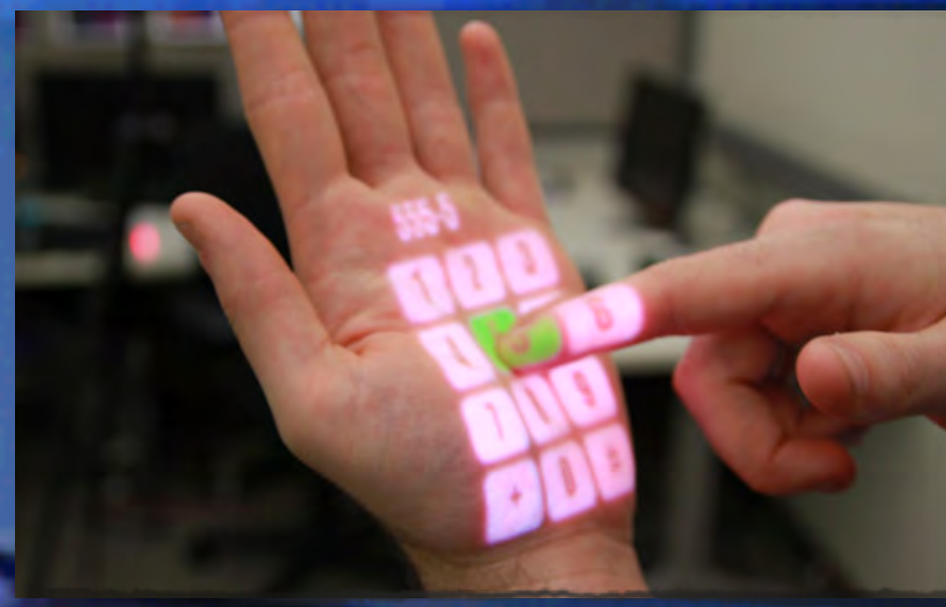


Digital Desk - [P. Wellner, 1991]

↳ **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

Auto Answer/ Space

Speed Dial/ Group Dial/ Backspace

Start

Redial/Pause

View Auto Correct

Menu

Back

WorkForce 600

xD/MS/SD PRO

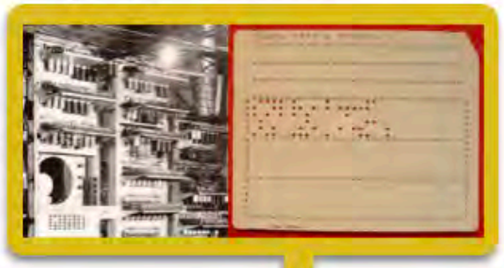
CF

WiFi Ethernet

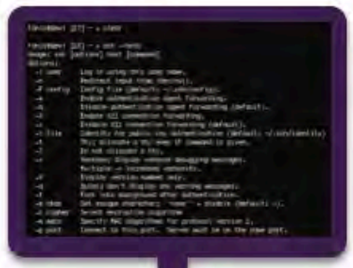
DURABrite Ultra INK

REGIONAL SALES

switches
punch cards

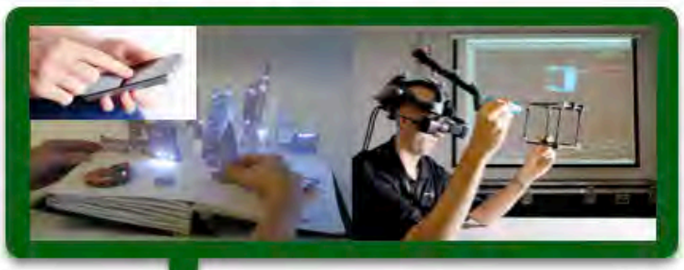


text



graphical

'embodied'
& pervasive



n:1

1:1

1:n

n:n

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

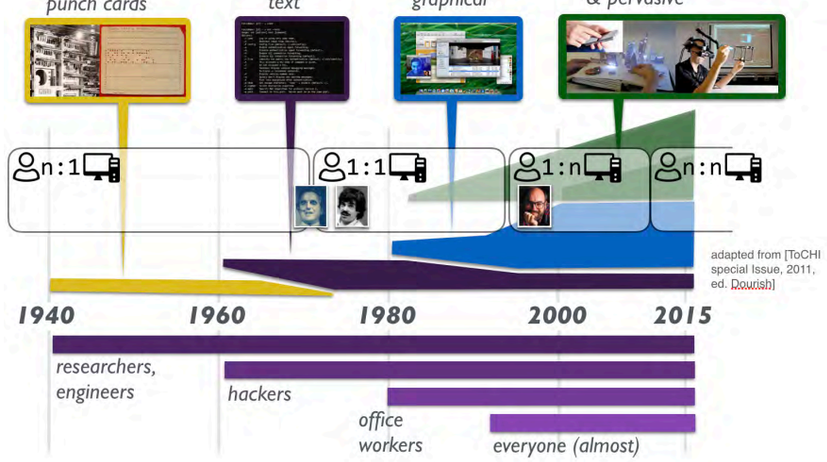
1940 **1960** **1980** **2000** **2015**

researchers, engineers

hackers

office workers

everyone (almost)



back to the future...

↳ a short (subjective and disordered) history of interfaces

... forward to the past?

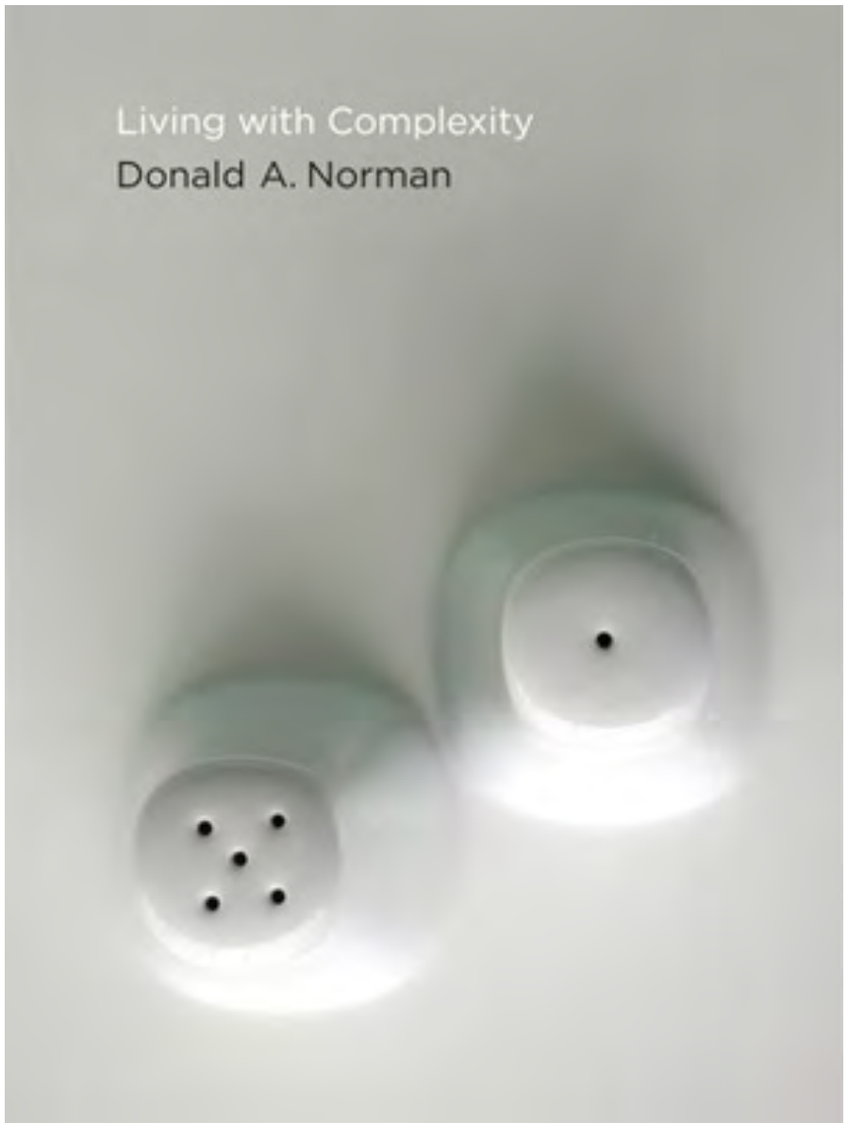
↳ challenges for research in HCI (and Computer Science ?)

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]



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."

Bulk Rename Utility

File Actions Display Options Renaming Options Special Help

Bulk Rename Utility

C:\Temp\BRUTEST\new

Temp
- [Folder Retire
- bru forum
- BRUTEST
  - [Folder F
  - new
    - images

Name	New Name	Size	Modified
images	images		11/01/2016 12:24:35 PM
Buy.php	Buy.php	3.61 KB	11/01/2016 2:21:25 PM
buynownew.gif	buynownew.gif	771 B	24/01/2014 3:08:54 PM
ccss.gif	ccss.gif	438 B	24/01/2014 3:57:26 PM
Common.php	Common.php	1.21 KB	11/01/2016 12:58:28 PM
Donate.php	Donate.php	2.09 KB	11/01/2016 1:42:43 PM

RegEx (1) R
Match
Replace
Include Ext.

Replace (3) R
Replace
With
Match Case

Remove (5) R
First n 0 Last n 0
From 0 to 0
Chars Words
Crop Before
Digits High Trim
D/S Accents Chars
Sym. Lead Dots Non

Add (7) R
Prefix
Insert
at pos. 0
Suffix
Word Space

Auto Date (8) R
Mode None
Type Creation (Cur
Fmt DMY
Sep. Seg.
Custom
Cent. Off. 0

Numbering (10) R
Mode None at 0
Start 1 Incr. 1
Pad 0 Sep.
Break 0 Folder
Type Base 10 (Decimal)
Roman Numerals None

Name (2) R
Name Keep

Case (4) R
Same
Excep.

Move/Copy Parts (6) R
None 1 None 1 Sep.

Append Folder Name (9) R
Name None Sep. Levels 1

Extension (11) R
Same

Filters (12) R
Mask *
Match Case RegEx
Folders Hidden Name Len Min 0 Max 0
Files Subfolders Path Len Min 0 Max 0
Condition

Copy/Move to Location (13) R
Path
Copy not Move

Special (14)
Change File Attributes — Status: Not Set
Change File Timestamps — Status: Not Set
Character Translations — Status: Not Set
Javascript Renaming — Status: Not Set

Reset
Revert
Rename

Bulk Rename Utility is **free for personal, non-commercial, home use**. For use in a commercial environment, a commercial license is required. **More Info**

18 Objects (1 Selected)

Advanced Renamer 3.78

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

Renaming method list

Add method | Clear

Presets:

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

Tag documentation

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

Batch mode: Rename

Start batch

Rename Files | Rename Folders

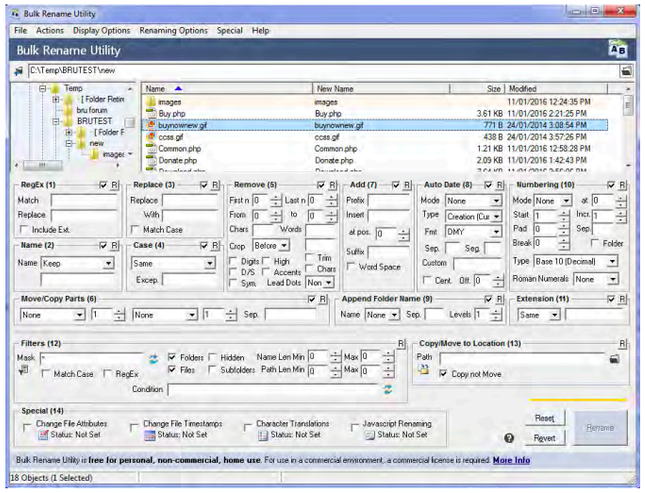
Add | List | Customize columns | Thumbnails | GPS Values | Name collision rule: Append number | Separator:

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	Dimensions:	3264x2448
Directory:	C:\Users\kj\Pictures\...\Downloads	Date Taken:	21-03-2016 15:46:05
Filetype:	JPG File	Author:	
Size:	1,8 mb	Copyright:	
Date Created:	26-03-2016 19:50:48	GPS Location:	52.5167, 13.3890
Date Modified:	26-03-2016 19:51:16	GPS Accuracy:	Unknown
Date Accessed:	26-03-2016 19:51:08		
Attributes:	A---		

ExifTool...

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



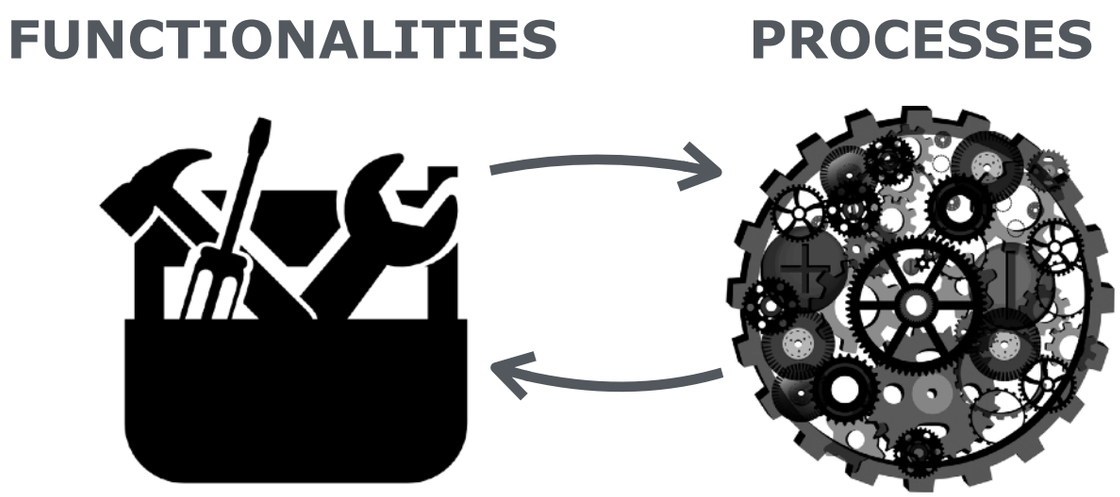
[© Francisco Inchauste from http://uxmag.com/articles/the-dirtiest-word-in-ux-complexity]

where does complexity come from?

where does complexity come from?

FUNCTIONALITIES

where does complexity come from?



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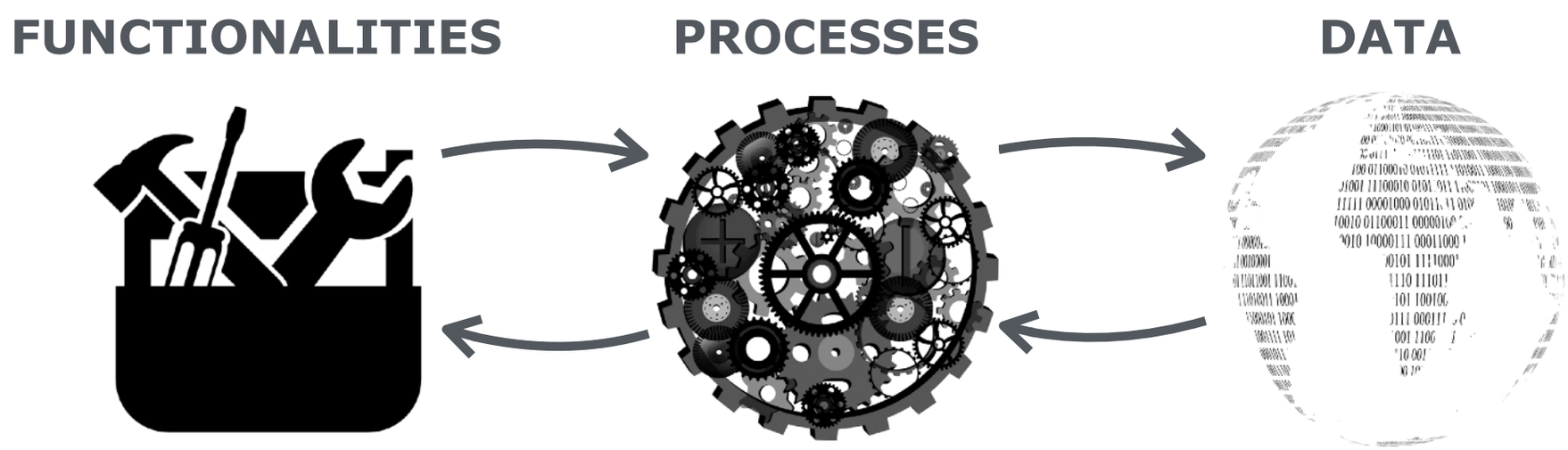

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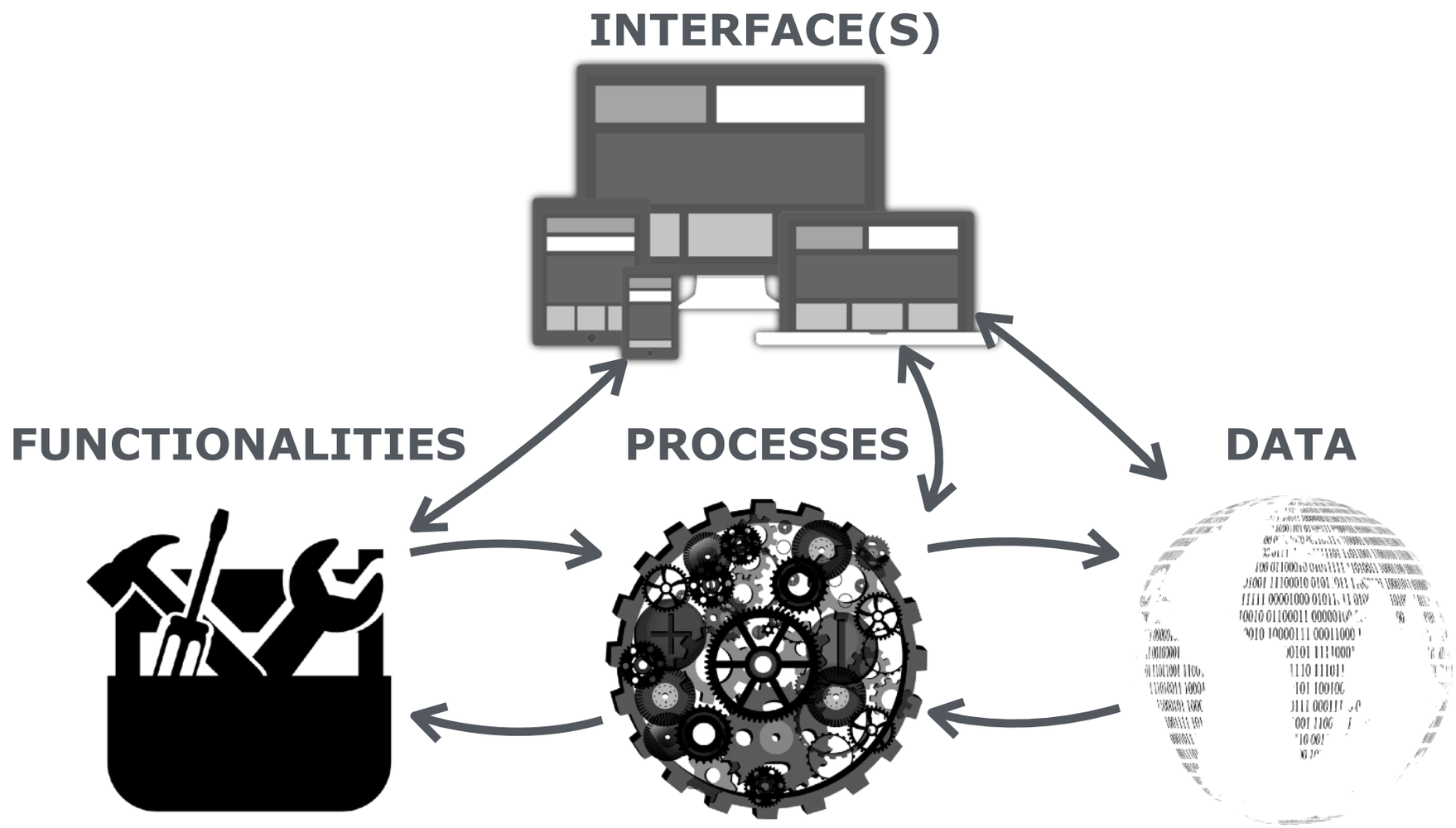

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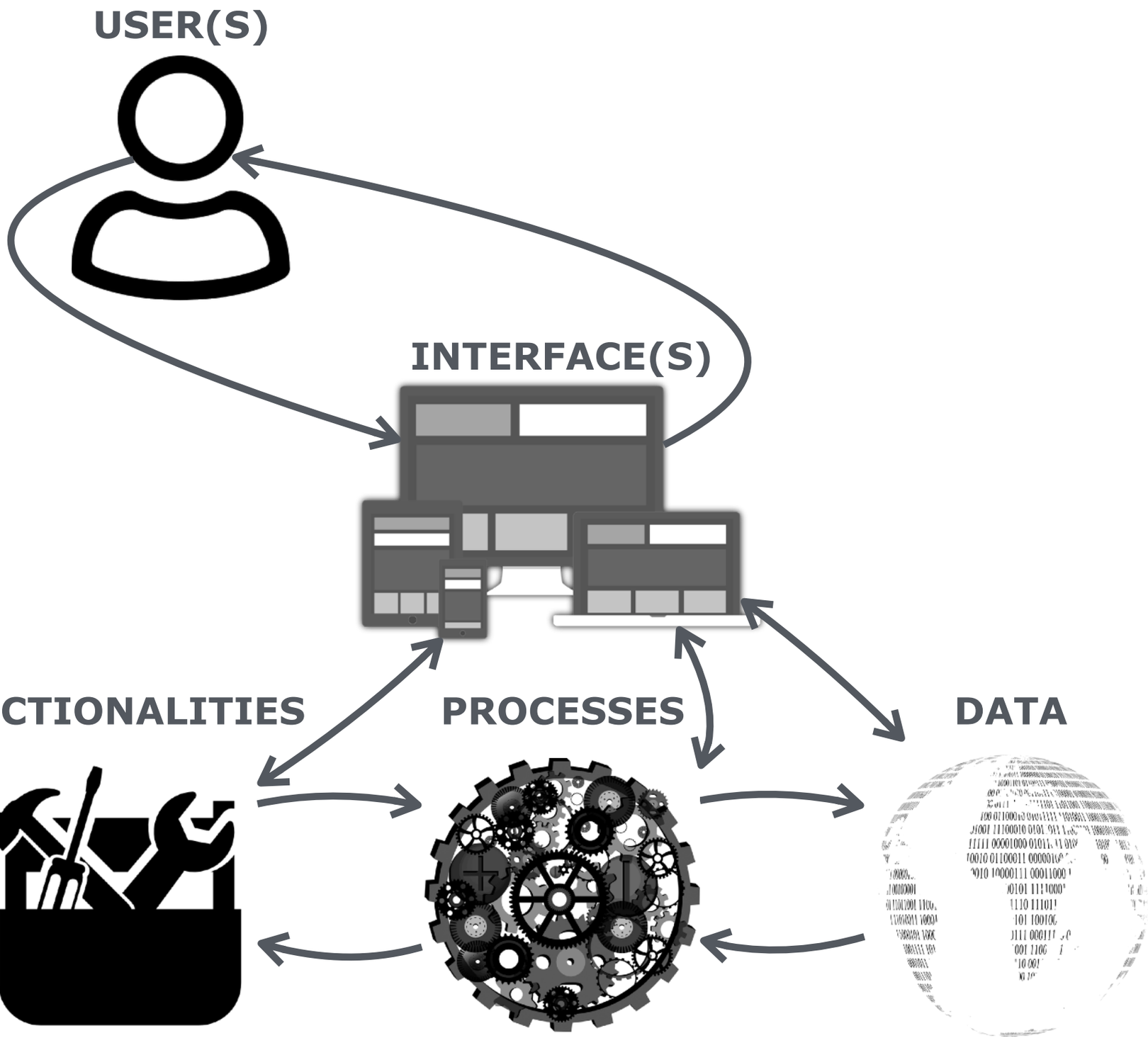

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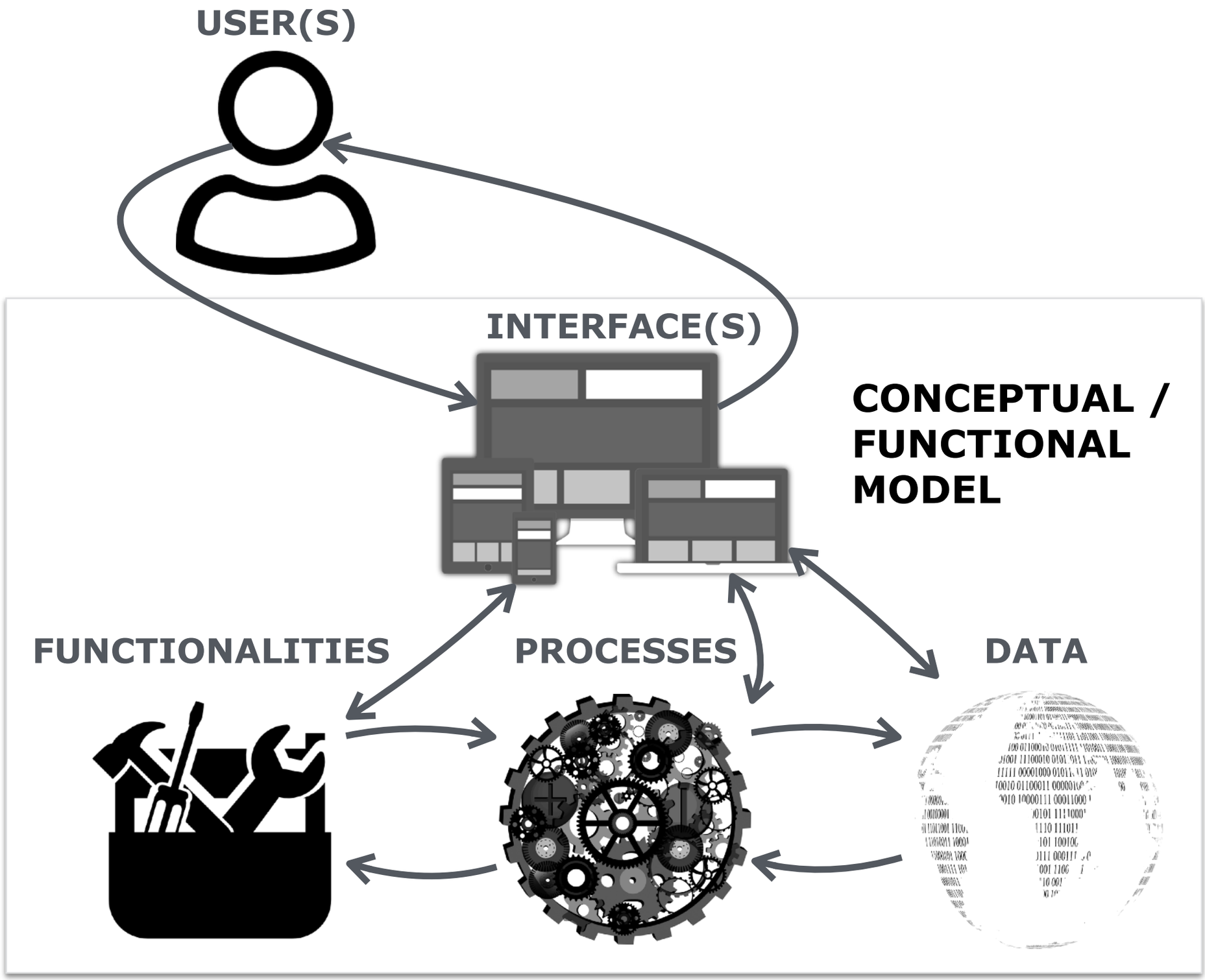

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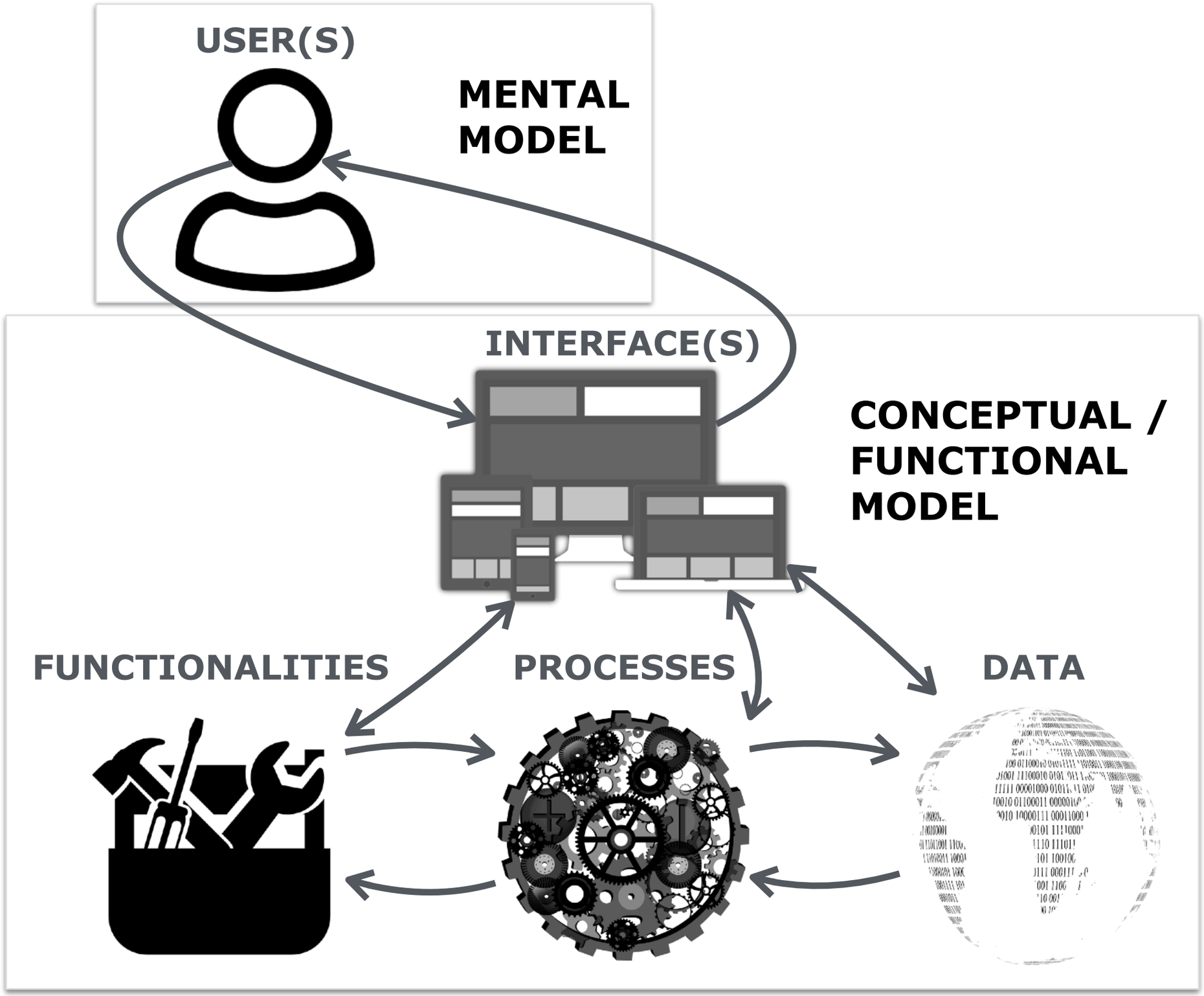
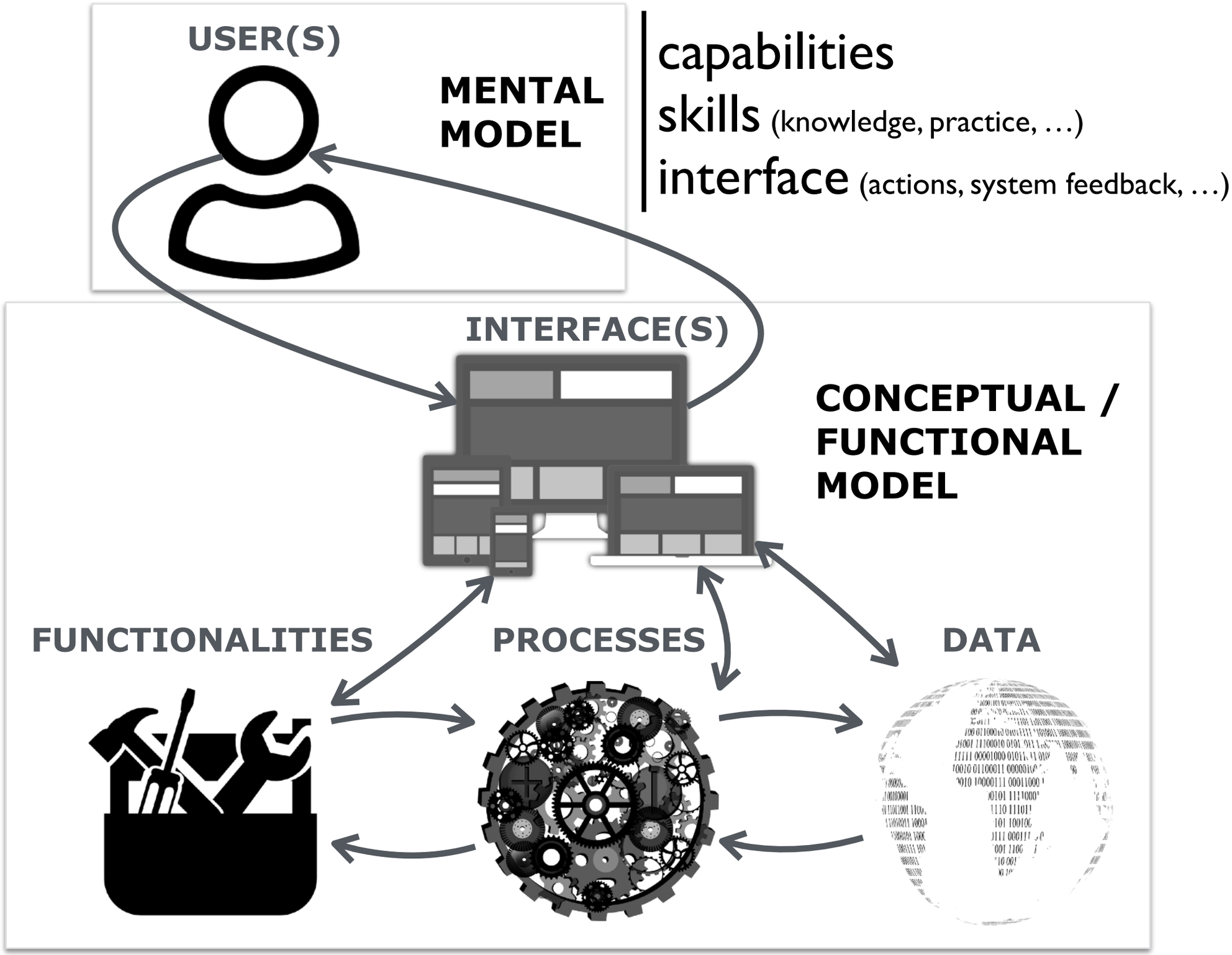
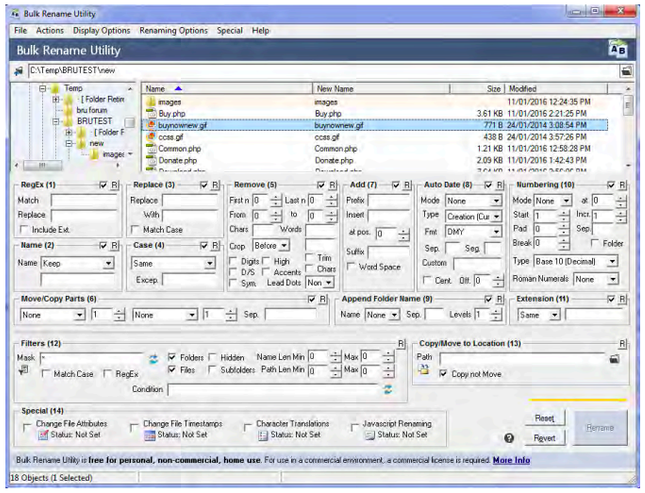


where does complexity come from?





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

master 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

Octopocus [Bau & Mackay, 08]

Skillometers:

Reflective Widgets that Motivate and Help Users to Improve Performance

S. Malacria[1], J. Scarr[1], A. Cockburn[1], C. Gutwin[2], T. Grossman[3]

[1]*University of Canterbury, Christchurch, New Zealand*
[2]*University of Saskatchewan, Saskatoon, Canada*
[3]*Autodesk Research, Toronto, Canada*

Skillometers [Malacria et al., 13]

Using Rhythmic patterns as an Input Method

CHI 2012

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

Univ. Paris-Sud (LRI)
CNRS
INRIA

presentation of the design

Rhythmic Interaction [Ghomi et al., 12]

“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)

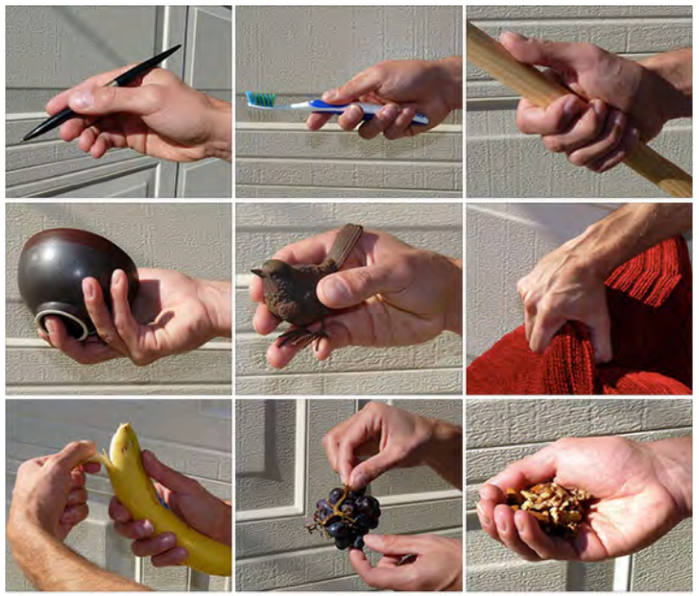
↳ some physicality in interaction

CHANNELS
16:00
15:00
14:00
13:00
CARTOON HOUR
TOTAL RUSH
RUSH HOUR
SAFARI
ELEPHANT WATCH
TIGER MOUNTAIN
SAFARI
SILVERSTONE
SPORTS
SAFARI
RUSH HD
BIG BUCK BUNNY
HD
PLAYLIST
ERICSSON

HANDS
FEEL THINGS

HANDS
MANIPULATE
THINGS

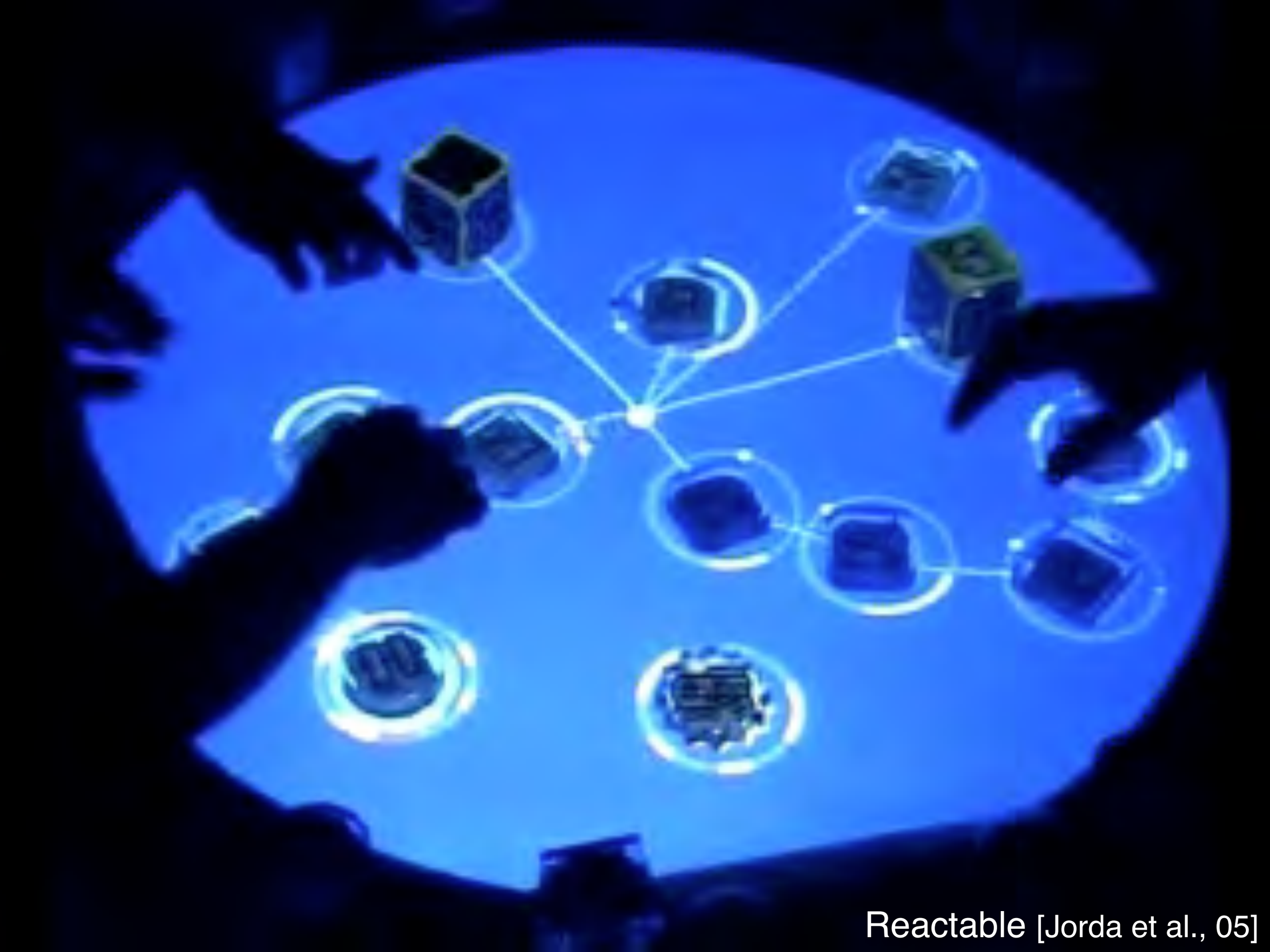
from [B. Victor, 11]
http://worrydream.com/ABriefRantOnTheFutureOfInteractionDesign/



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/



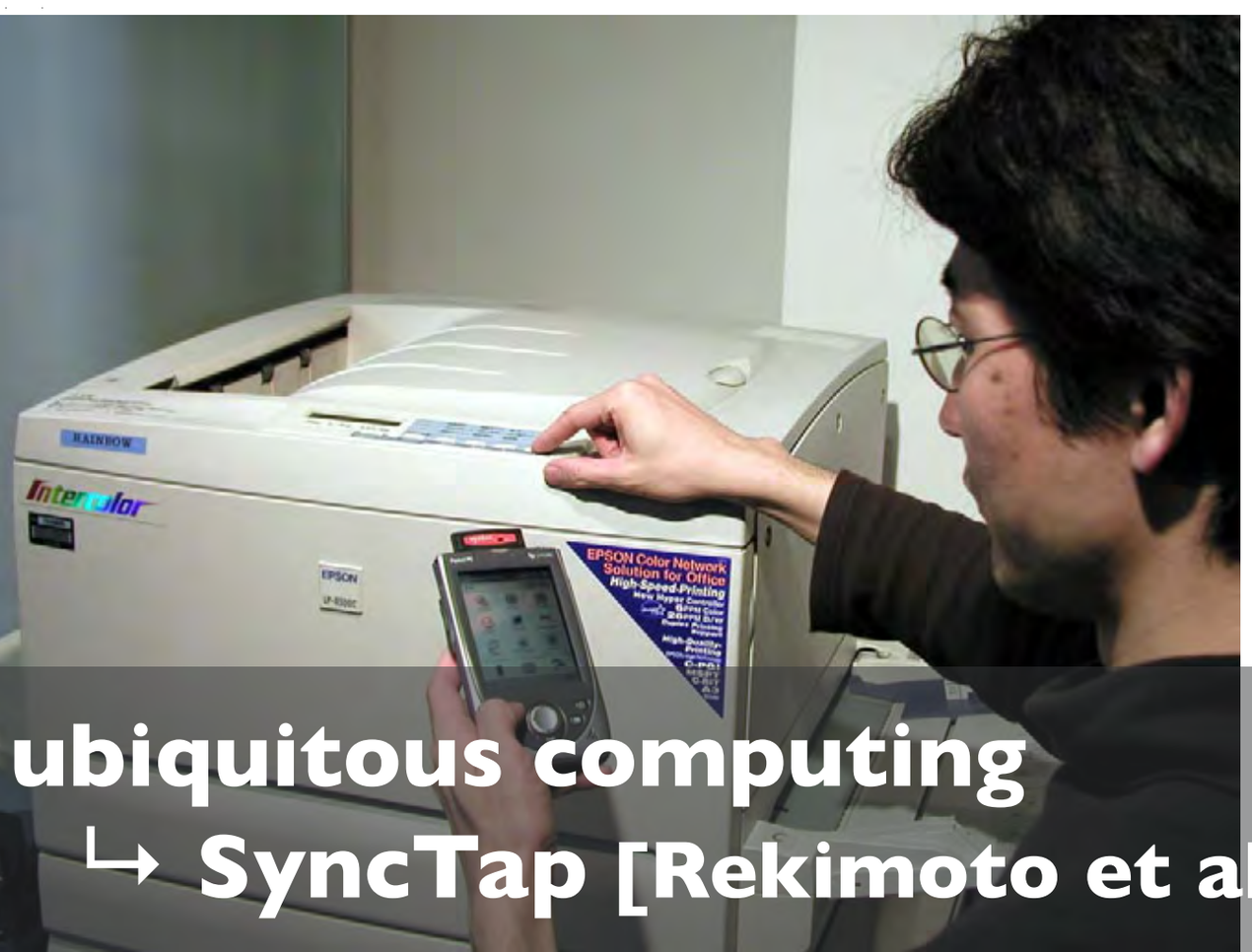
Reactable [Jorda et al., 05]

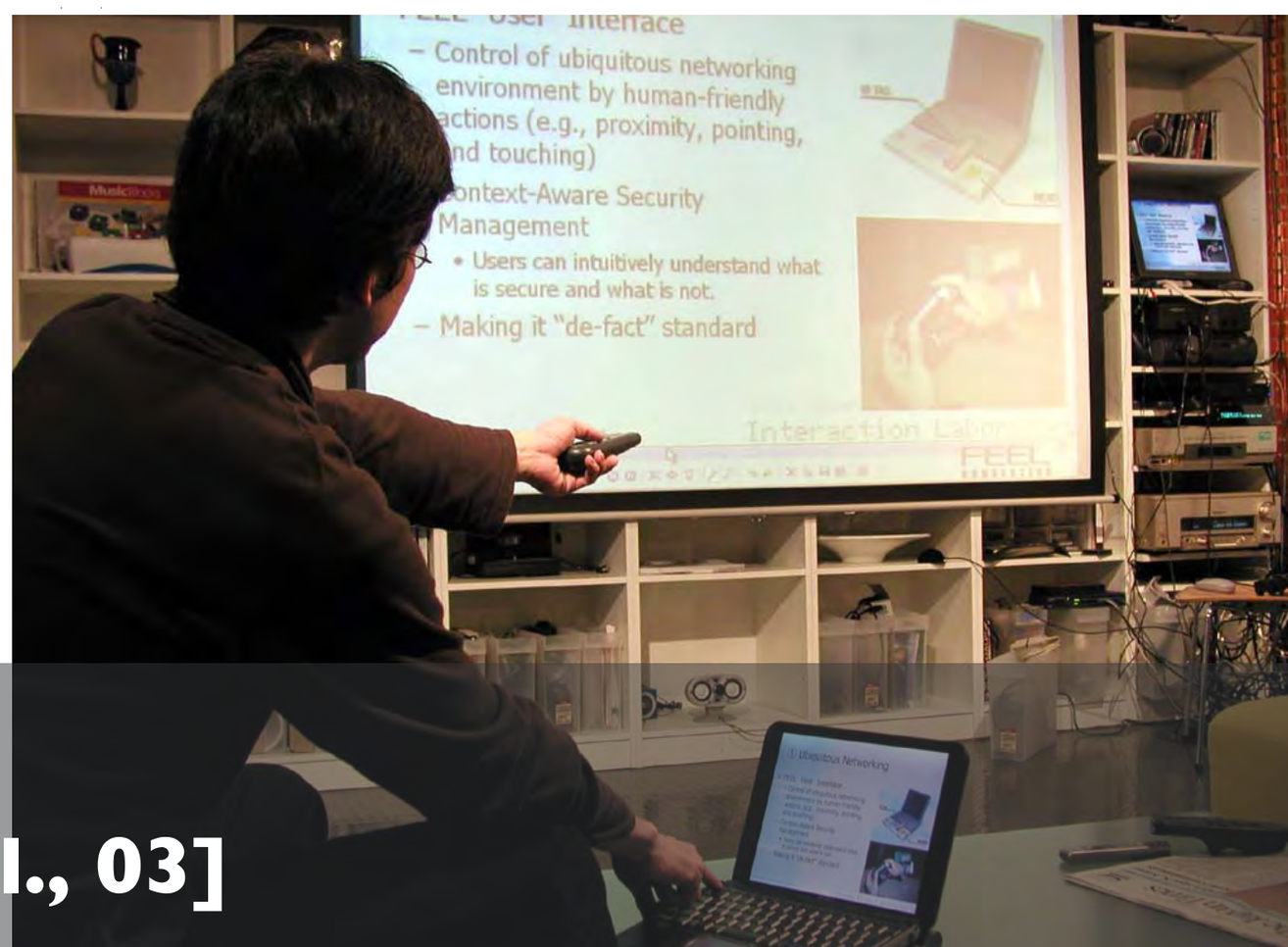
REVEL

Programming the sense of touch

Revel [Bau & Poupyrev, 12]

inFORM [Leithinger et al., 13]





ubiquitous computing

↳ SyncTap [Rekimoto et al., 03]

dws4.me

“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’

Soft
Benjamin
TX 100, (GZ) CHAR# 01333
UNO 0SO 5123US 8U9E3X

le monde n'est pas figé

↳ faire des systèmes interactifs de vrais 'outils'

S. Huot
↳ Gif - 01|2015

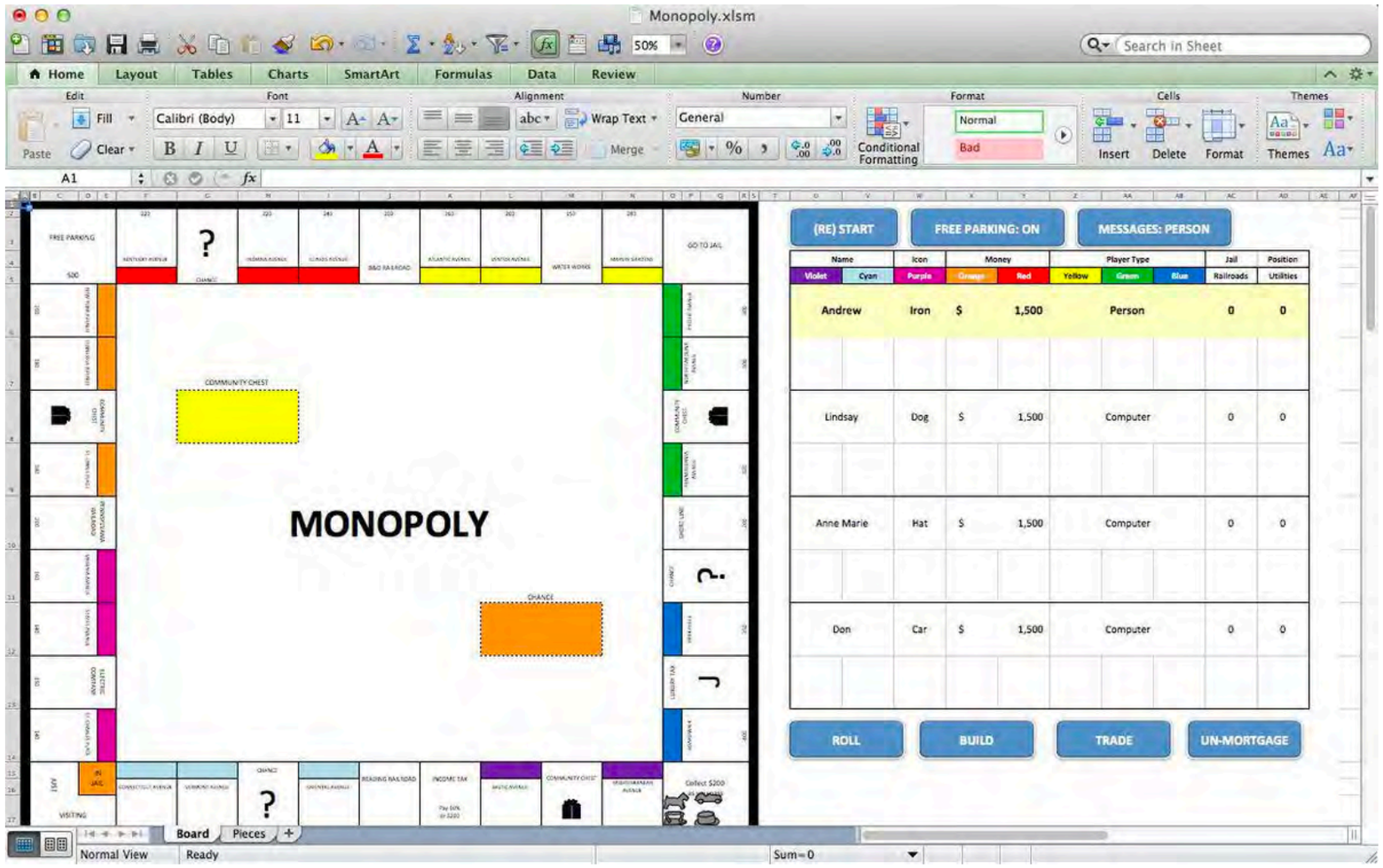
↳ 84

1 (L) TOTAL

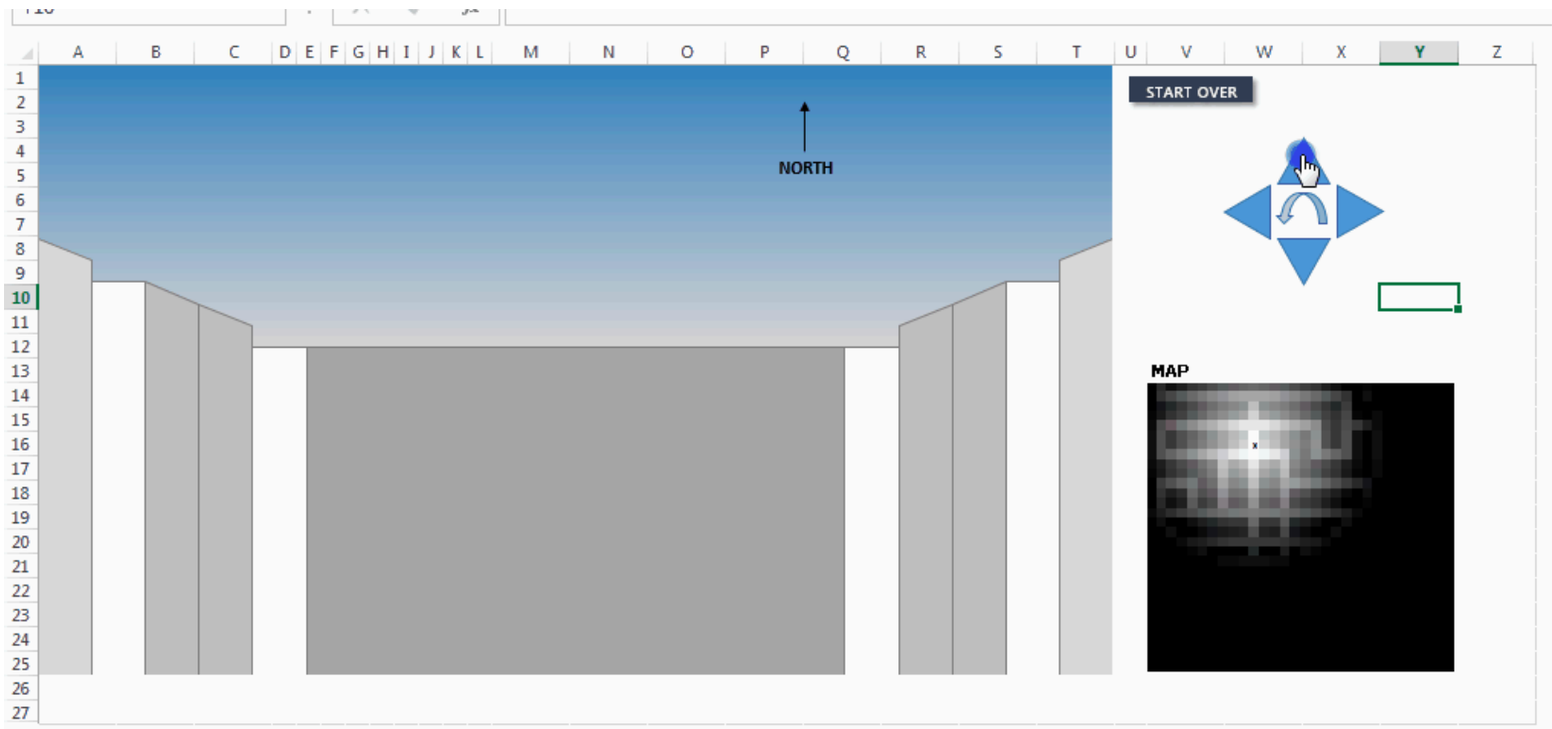
	A	B	C	D
1	ITEM	NO.	UNIT	COST
	----	---	----	----
	MUCK RAKE	43	12.95	556.85
	BUZZ CUT	15	6.75	101.25
	TOE TONER	250	49.95	12487.50
	EYE SNUFF	2	4.95	9.90

			SUBTOTAL	13155.50
			9.75% TAX	1282.60

			TOTAL	14438.10



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



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

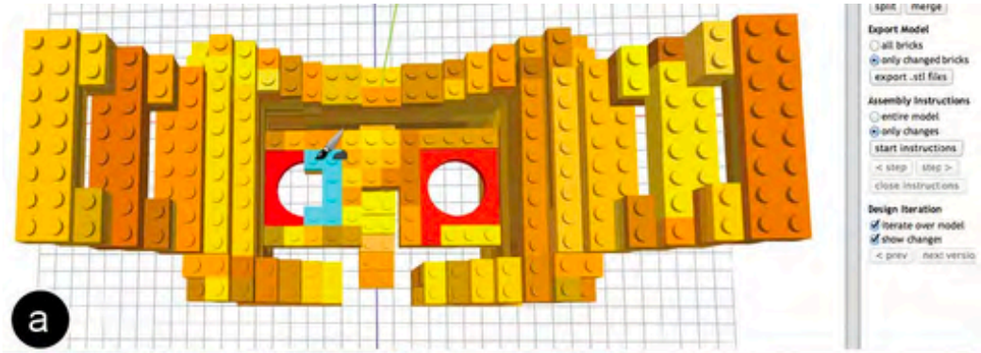
User Interface Façades:
Towards fully adaptable user interfaces

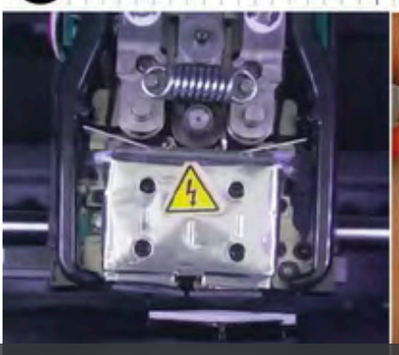
W. Stuerzlinger[*], O. Chapuis[**], D. Philipps[*] & N. Roussel[**]

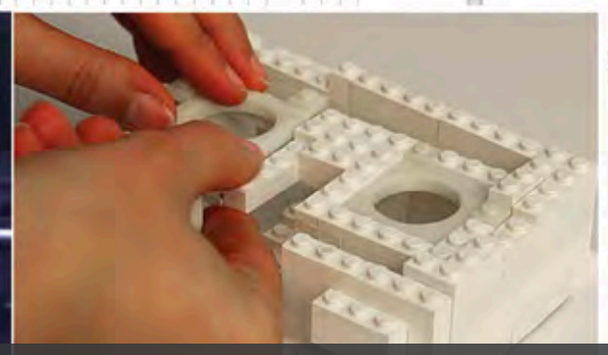
* Interactive Systems Research Group, York University, Canada
** Projet In Situ, CNRS - Université Paris-Sud - INRIA Futurs, France

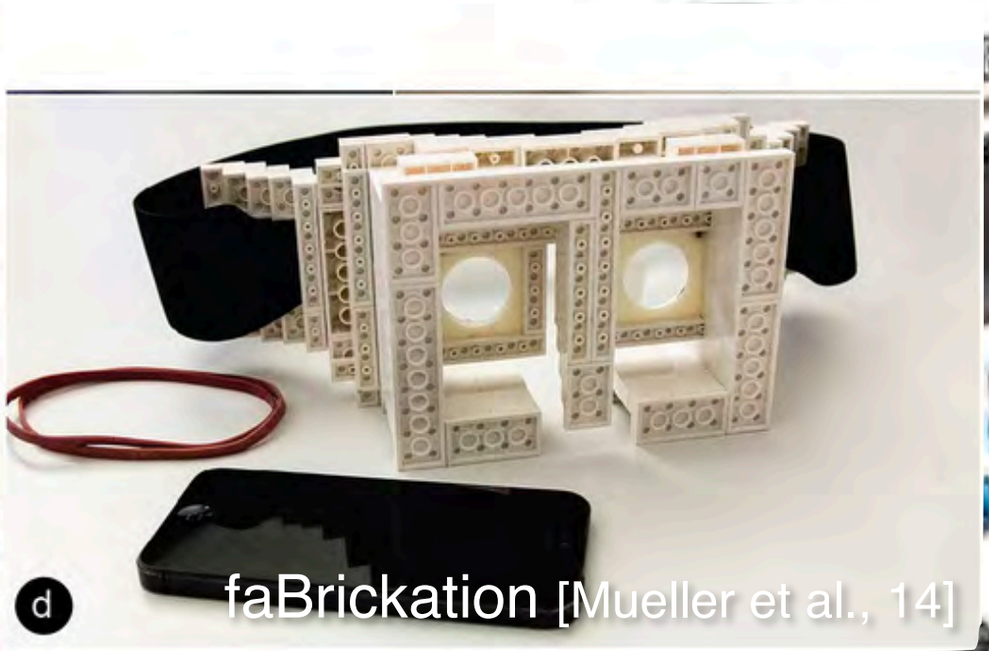
Façades [Stuerzlinger et al., 06]

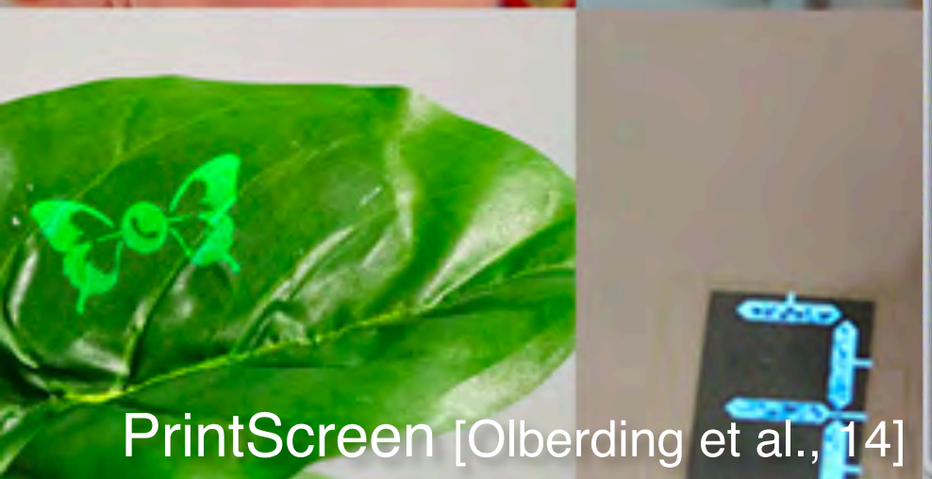
Digital Fabrication

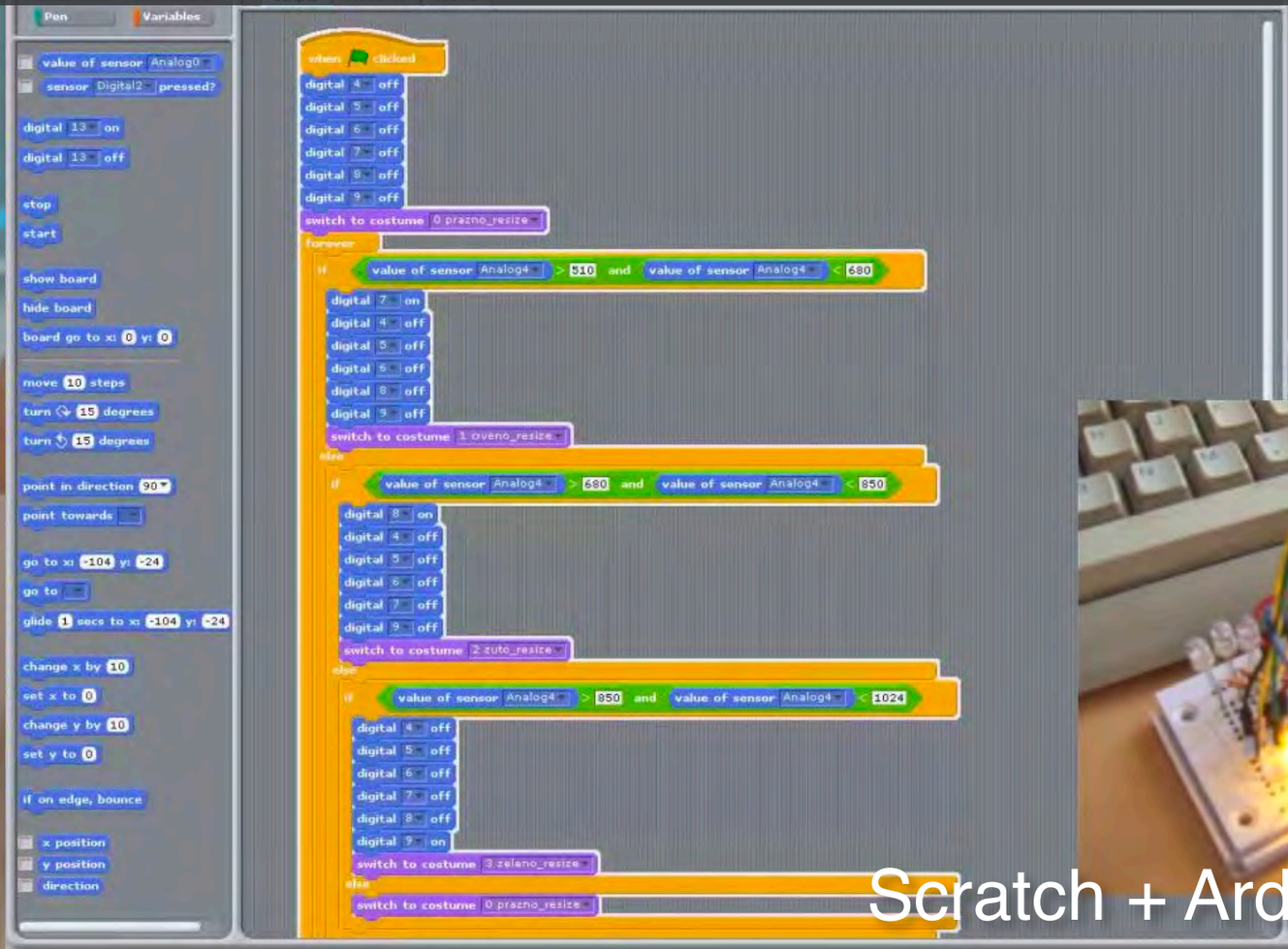






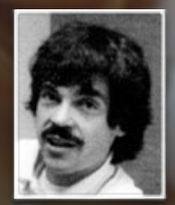






“One can imagine one of the first programs an owner will write is a filter to eliminate advertising!”

↳ **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

facegle
RechercheFacegle
J'ai de la chance
Facegle disponible en : English

facegle

gerard berry shad

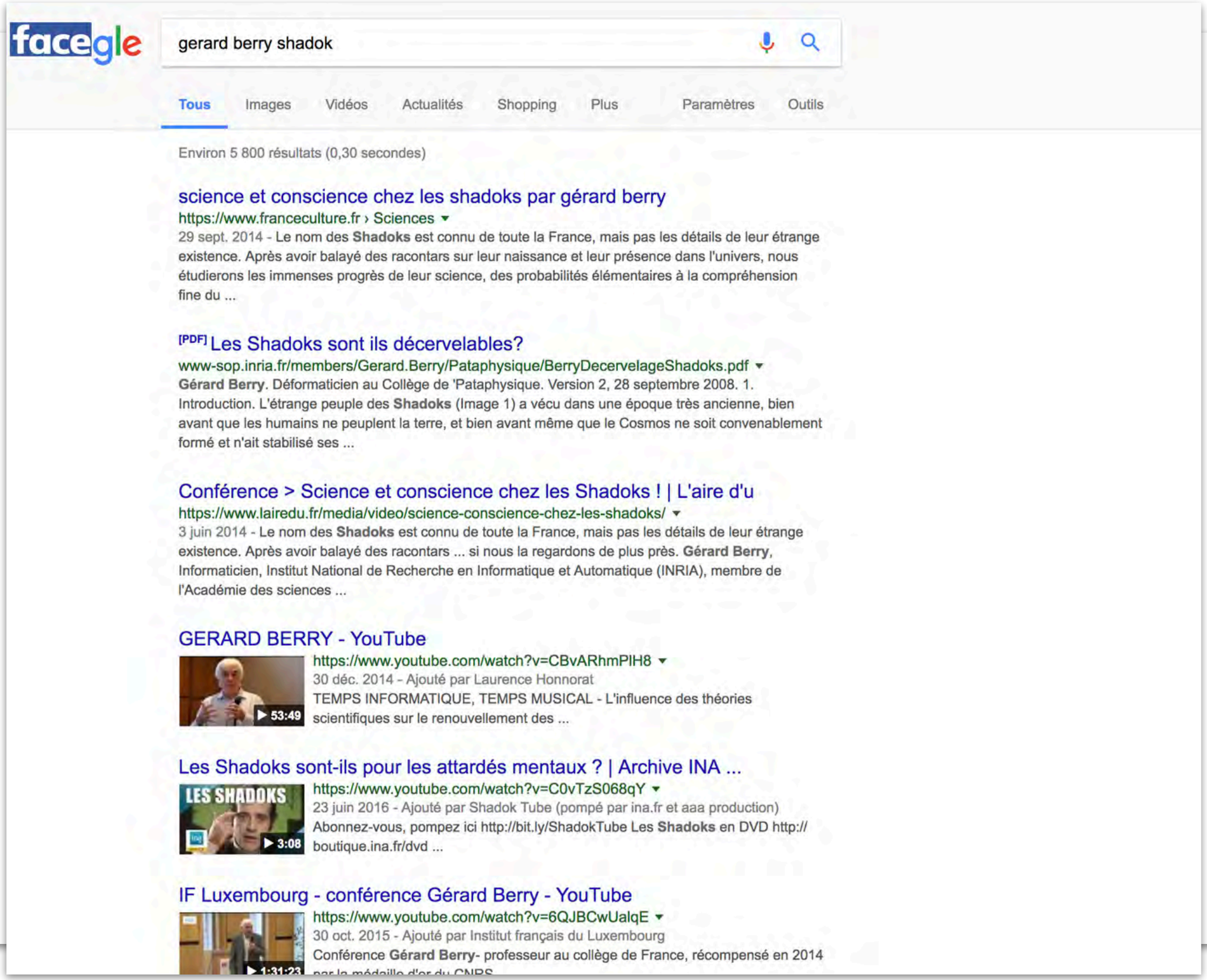
gerard berry shad**ok**

RechercheFacegle J'ai de la chance

En savoir plus

Signaler des prédictions inappropriées

transparency



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

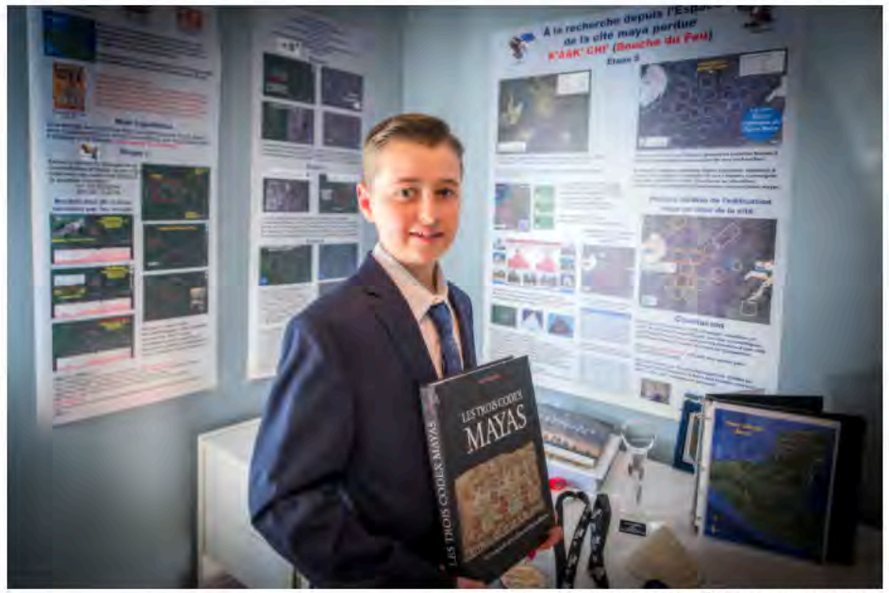


PHOTO LE JOURNAL DE MONTRÉAL, MARTIN CHEVALIER

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.

LES PLUS POPULAIRES

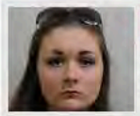
SANTÉ
66$ pour chaque patient en isolement

RICHARD MARTINEAU
Vingt-deux semaines avant l'apocalypse

ENVIRONNEMENT
De plus en plus extrêmes

VIE DE QUARTIER
Près de 45 000 clients privés d'électricité

ESSAIS
Ford F-150: la question à 100 piastres


FAITS DIVERS
Une adolescente de 15 ans en fugue à Sherbrooke

FAITS DIVERS
Opération policière liée aux Hells Angels en cours

EN 5 MINUTES
Les camions électriques du futur

FAITS DIVERS
Un parachutiste québécois perd la vie

FAITS DIVERS
La famille de la victime est sous le choc

CANADIEN

1 SHARES

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

Donner de la viande crue à votre chien ou chat est une mauvaise idée

Première cartographie d'un microcircuit cérébral

Nanoparticules non signalées : l'UFC-Que-Choisir porte plainte

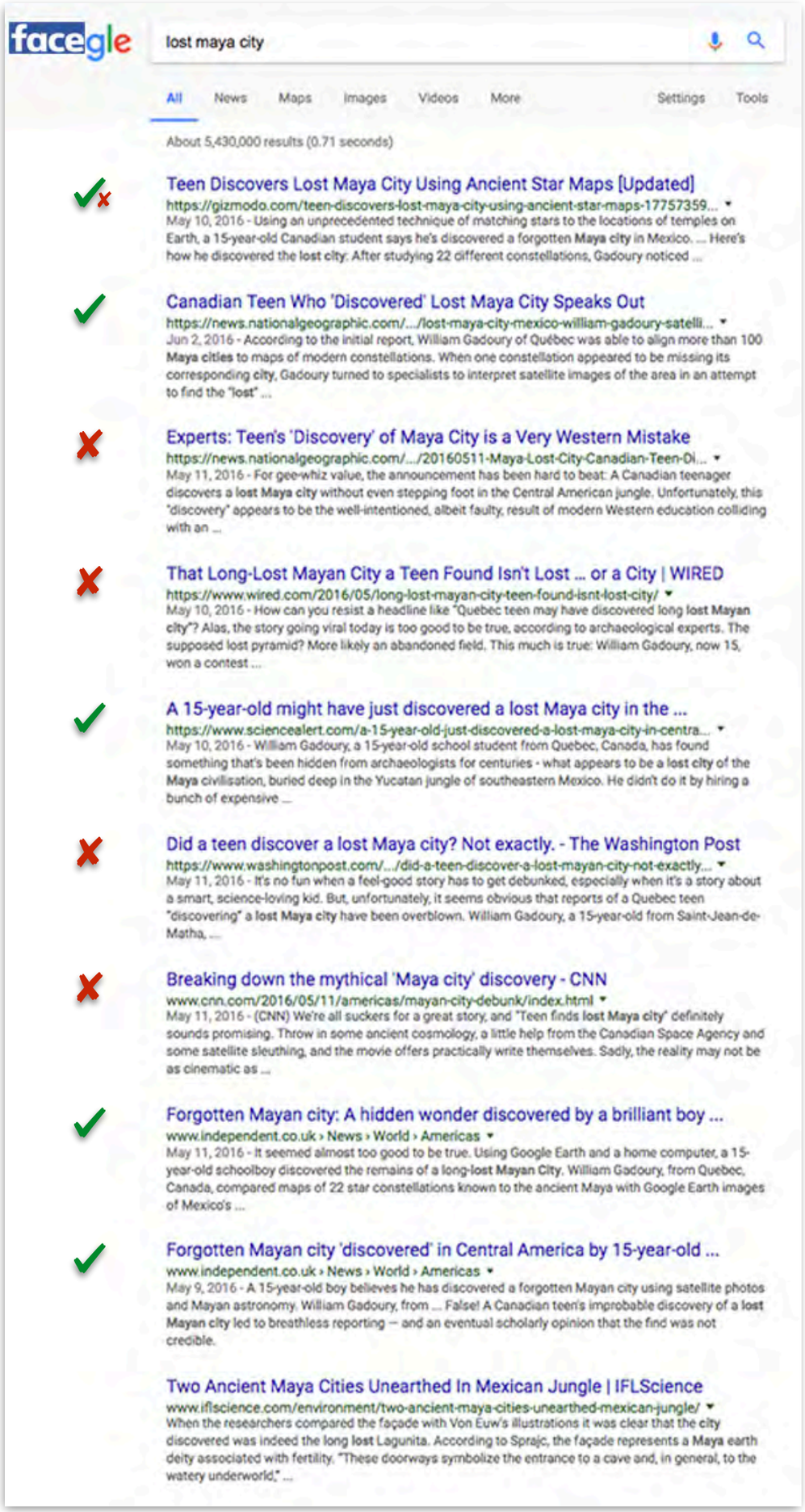
Les nouveaux télescopes chasseurs de planètes mis en service à l'observatoire de La Silla

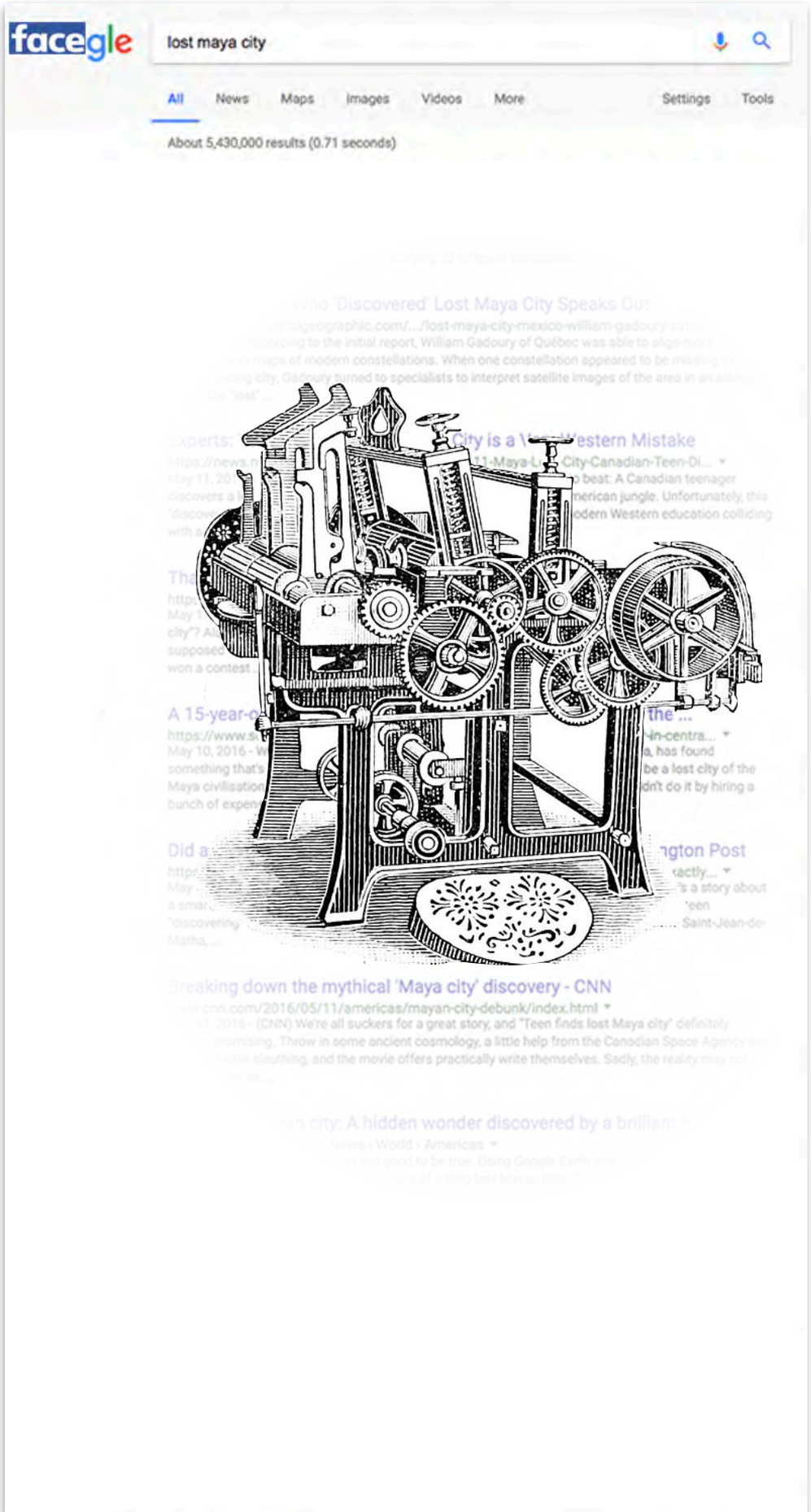
Les prix du bitcoin ont-ils été manipulés en 2013 ?

NEWSLETTER SCIENCES ET AVENIR

Entrez votre E-mail

JE M'ABONNE


facegle
lost maya city
All
News
Maps
Images
Videos
More
Settings
Tools
About 5,430,000 results (0.71 seconds)
Teen Discovers Lost Maya City Using Ancient Star Maps [Updated]
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
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 › 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 › 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/
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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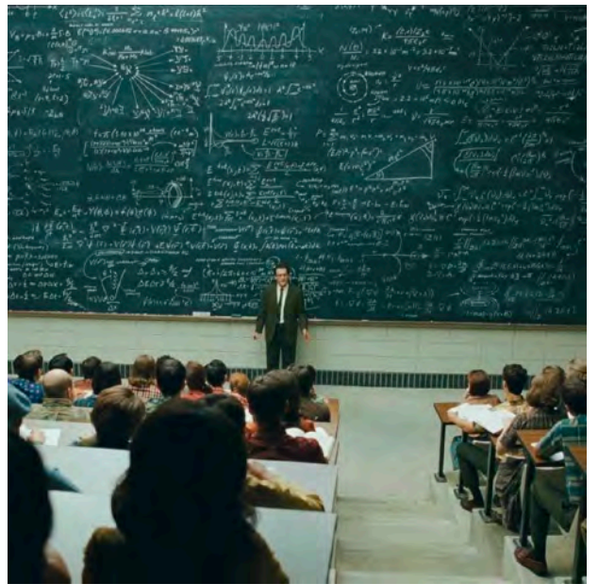
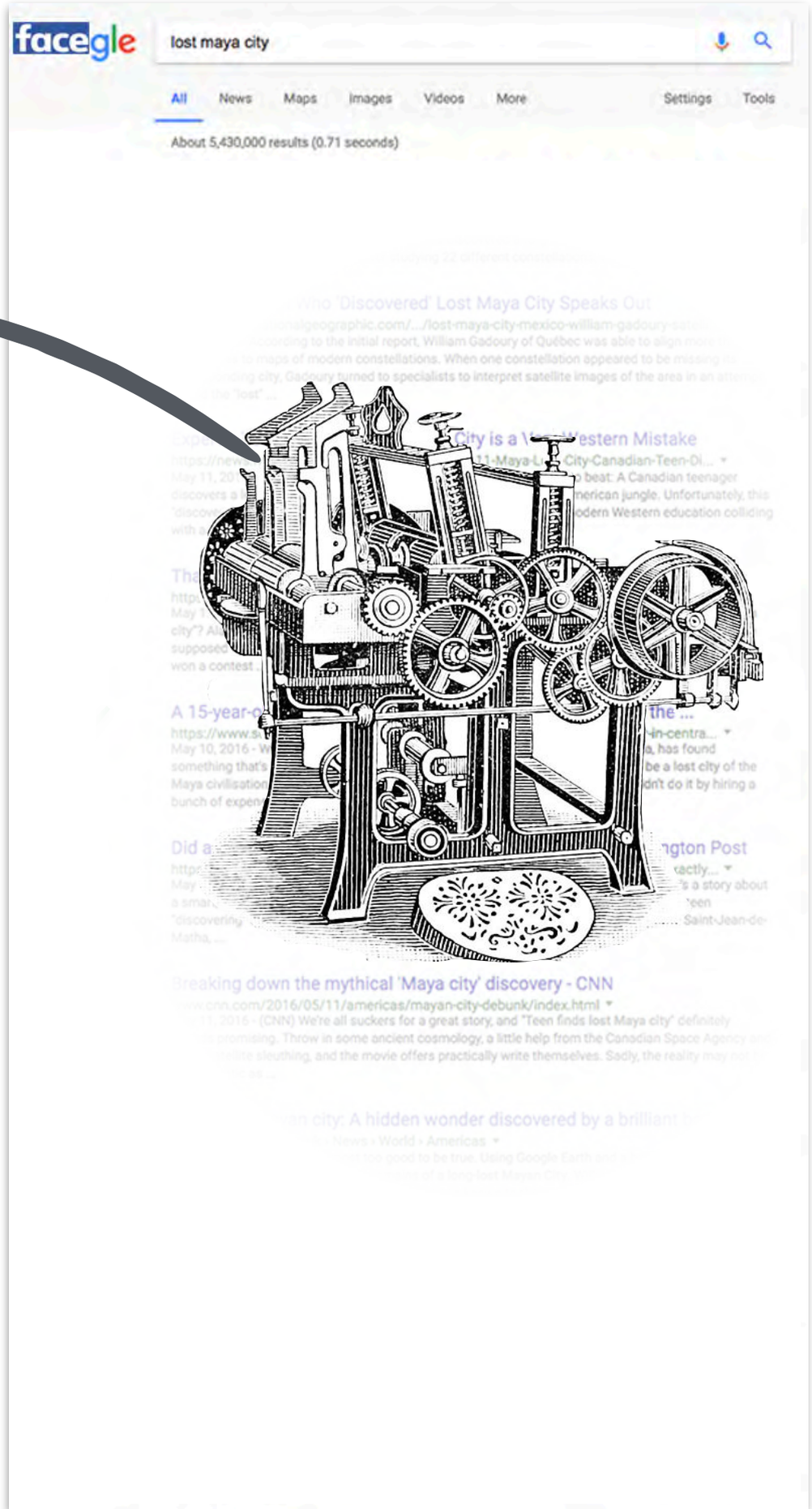
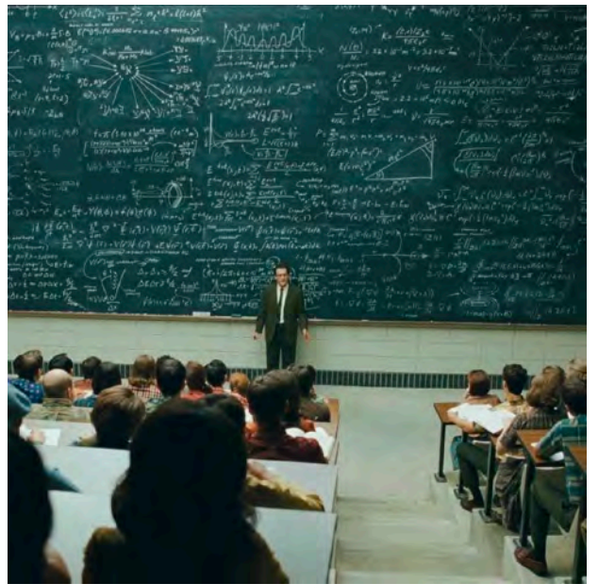
About 5,430,000 results (0.71 seconds)
Who 'Discovered' Lost Maya City Speaks Out
Breaking down the mythical 'Maya city' discovery - CNN

explanations

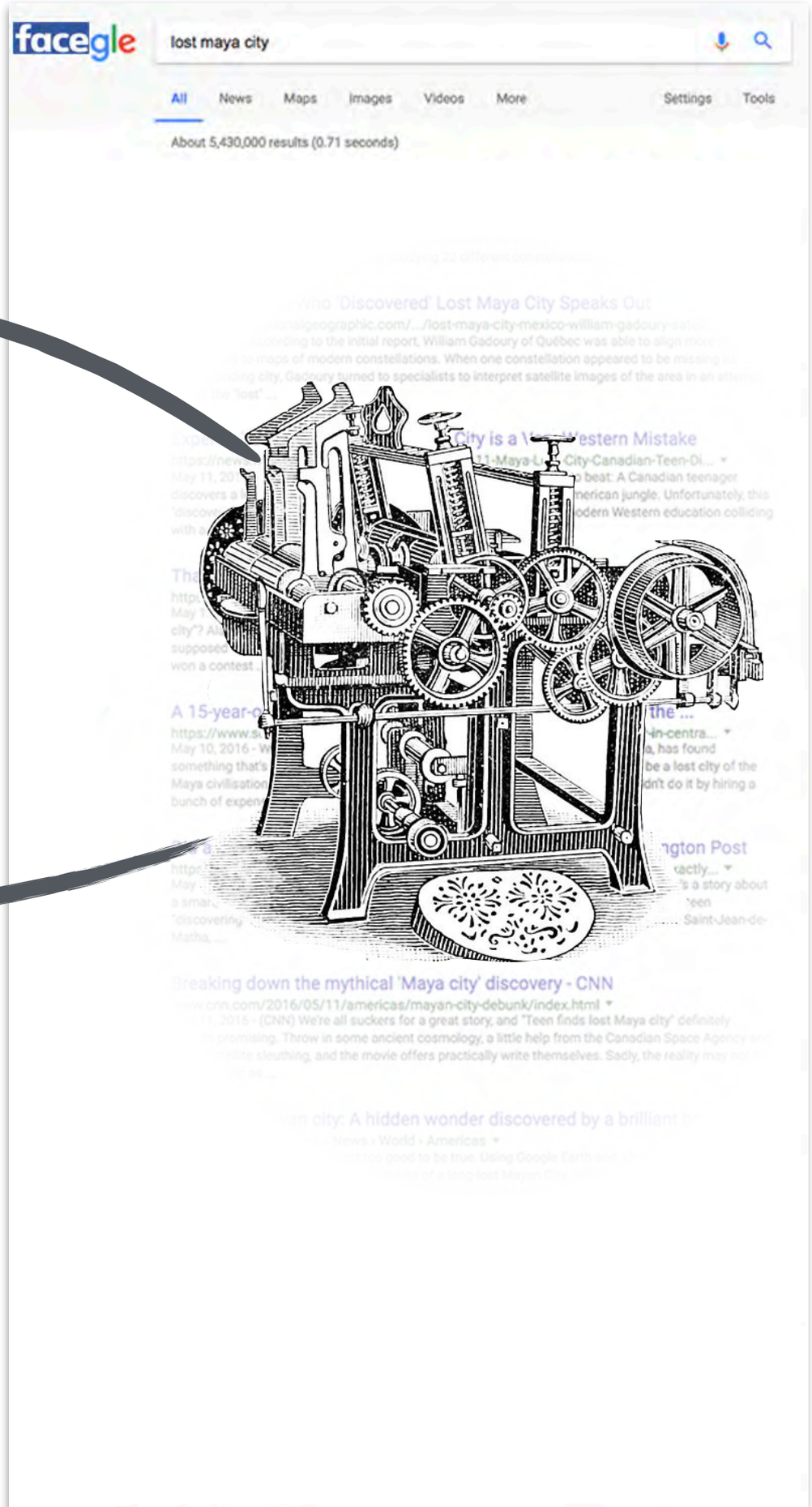


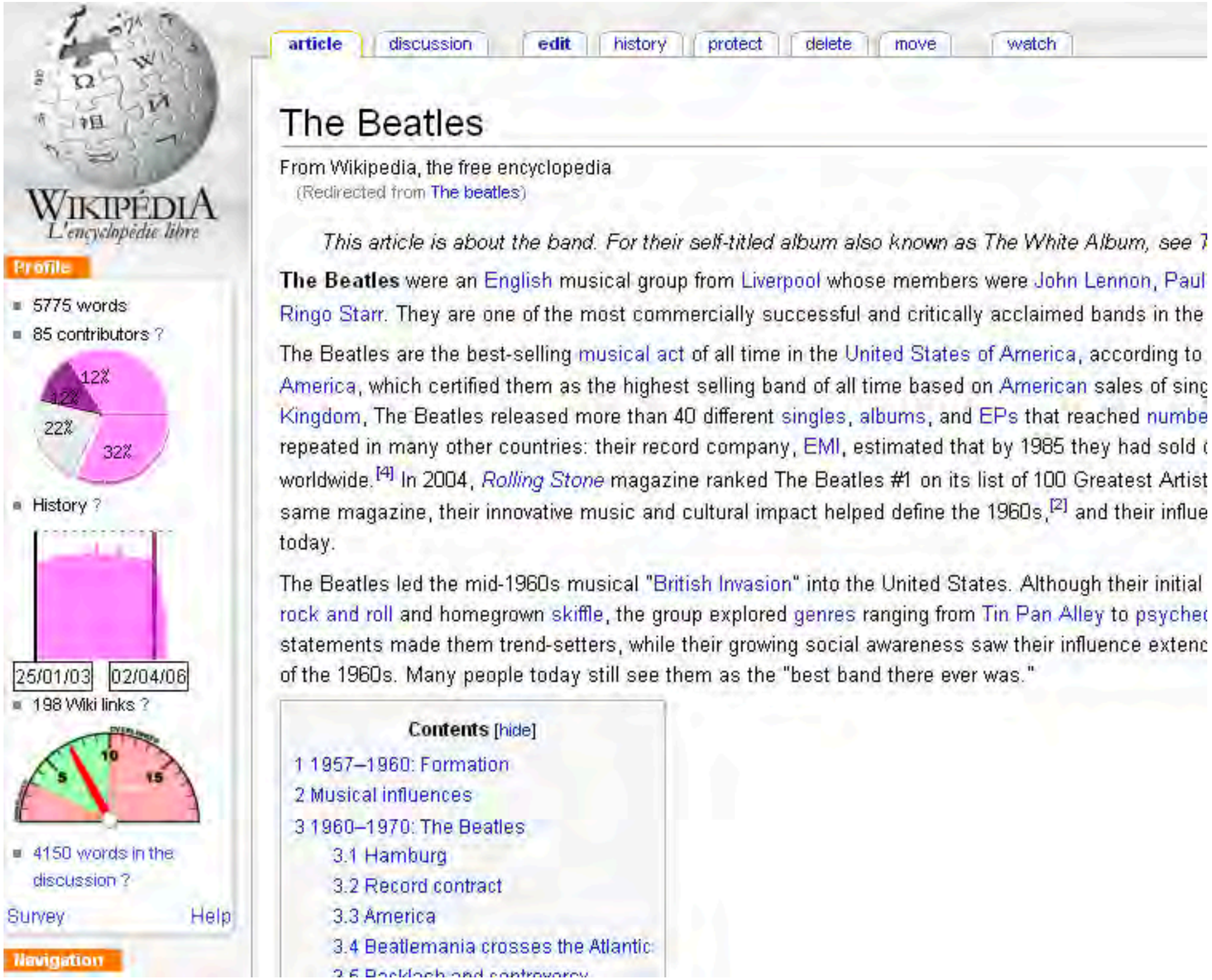


explanations

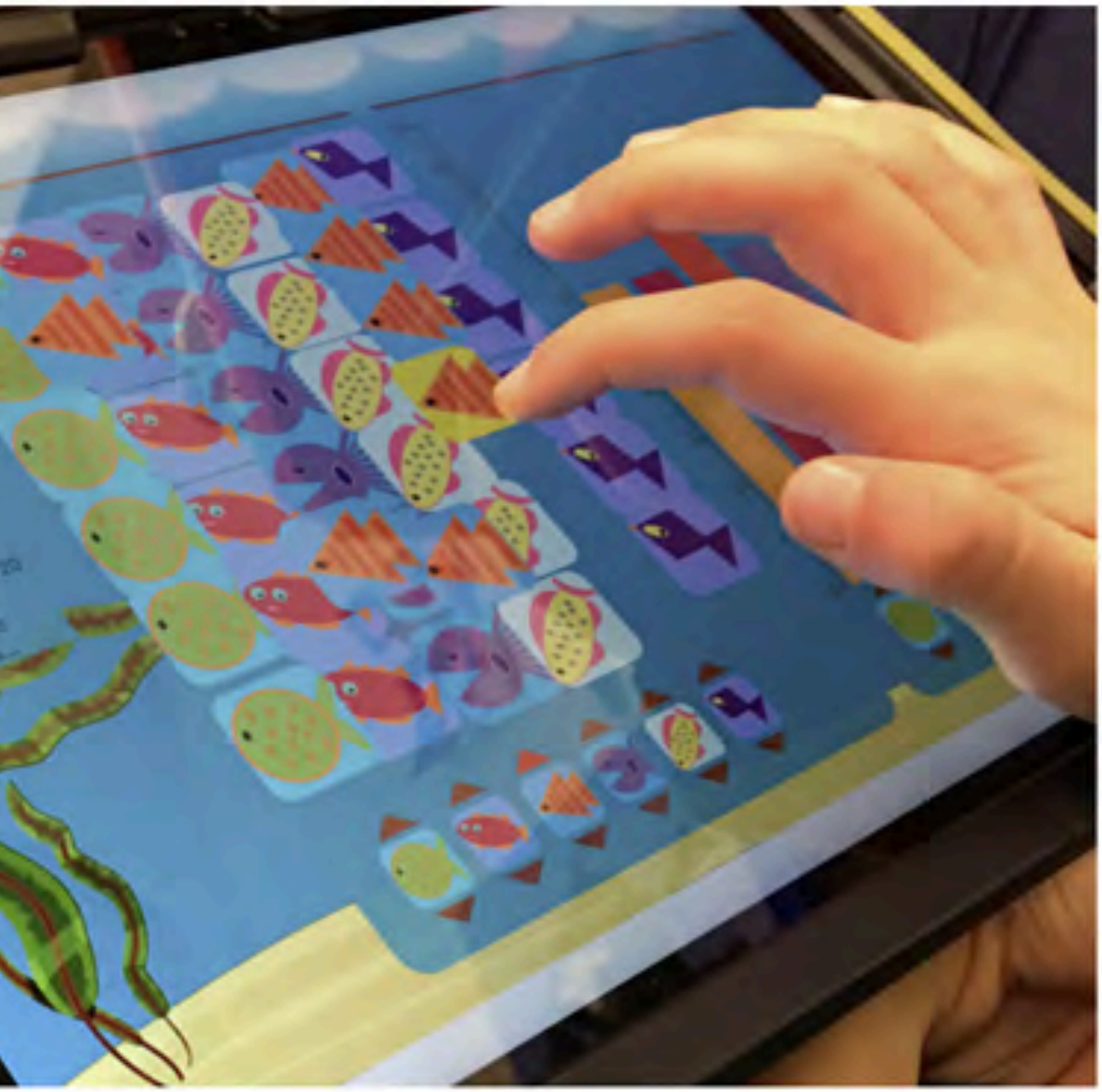


comprehension





WikipediaViz [Chevalier et al., 10]



C’est la Vis [Alper et al., 17]

control

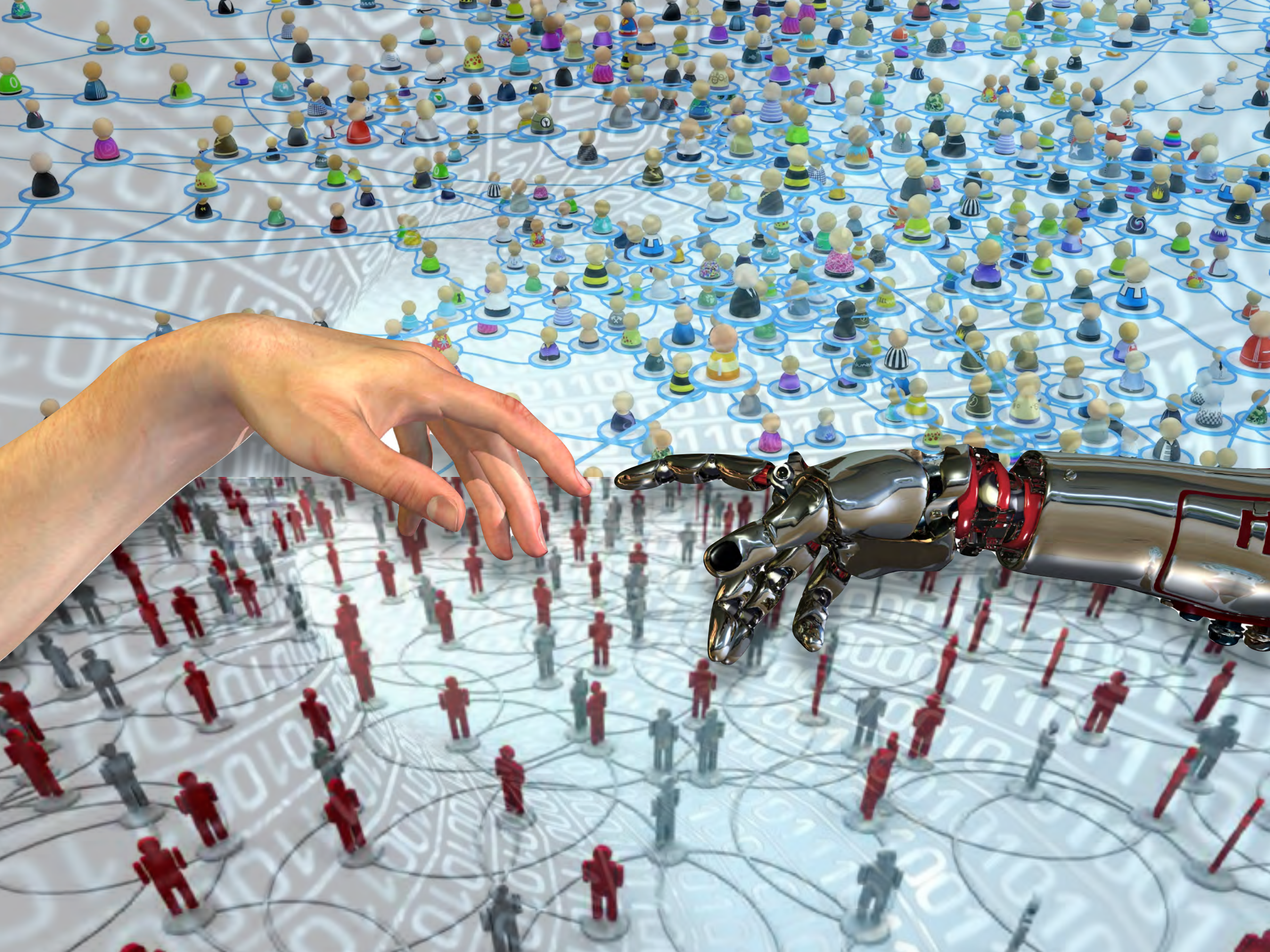
(semi-)autonomy vs (semi-)control

COMPREHENSION **TAKING OF CONTROL** **ACTION**

CONTROL

ASSISTANT **TOOL**

PERCEPTION OF CONTROL (AGENCY)



remerciements

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

quelques slides et idées inspirés par

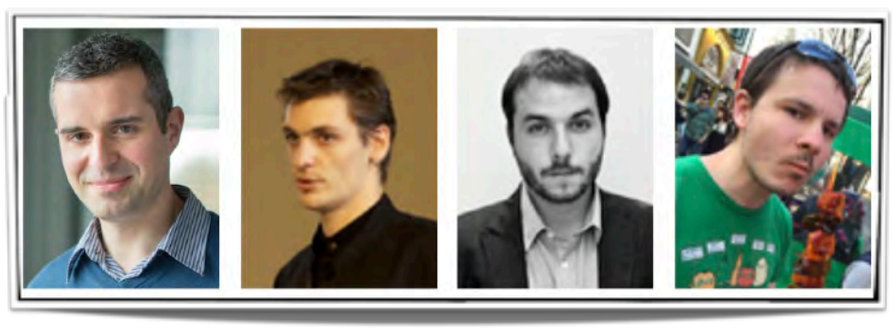
Nicolas ROUSSEL
Inria Bordeaux

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

les membres de l'équipe Loki technology & knowledge for interaction @Inria Lille Nord-Europe
http://loki.lille.inria.fr/