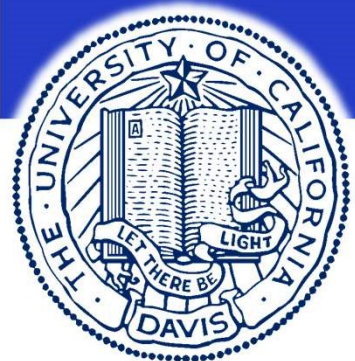


Computación social:

¿cómo conceptualizar la sociedad como un gigantesco sistema de procesamiento de información?



UC DAVIS
UNIVERSITY OF CALIFORNIA

Martin Hilbert (Prof; Dr; PhD)

Chair DE Computational Social Science

Dpt. Communication; DataLab;

GG Computer Science

www.MartinHilbert.net | hilbert@UCDavis.edu

1) El Poder de lo Artificial

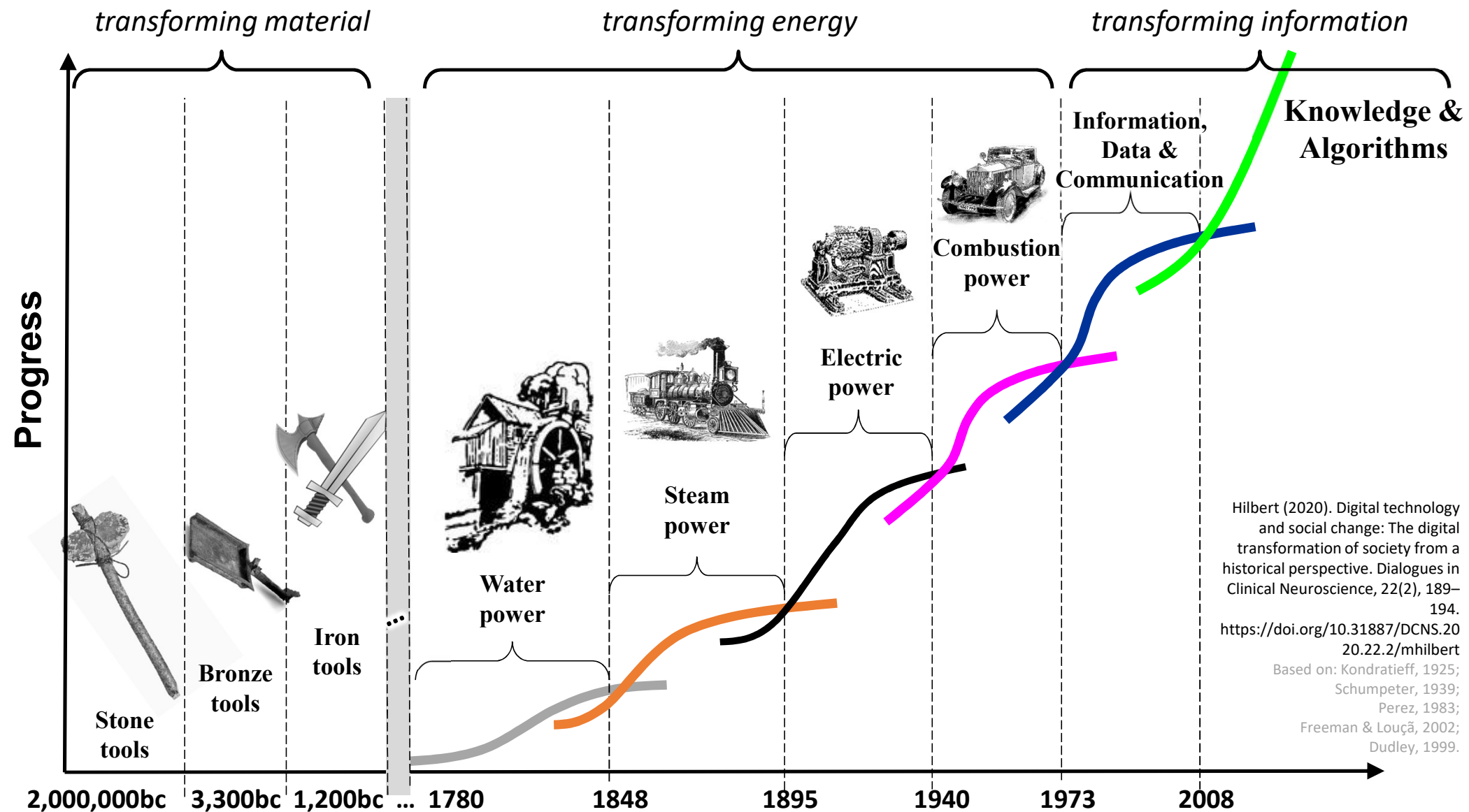
2) El Poder de lo Humano con lo Artificial

3) El Poder de lo Artificial sobre lo Humano

1) El Poder de lo Artificial

2) El Poder de lo Humano con lo Artificial



3) El Poder de lo Artificial sobre lo Humano








Hilbert (2020). Digital technology and social change: The digital transformation of society from a historical perspective. *Dialogues in Clinical Neuroscience*, 22(2), 189–194.
<https://doi.org/10.31887/DCNS.2020.22.2/mhilbert>
 Based on: Kondratieff, 1925; Schumpeter, 1939; Perez, 1983; Freeman & Louçã, 2002; Dudley, 1999.

Most valuable companies






2018

Rank	Brand
 #1	Apple
 #2	Google
 #3	Microsoft
 #4	Facebook
 #5	Amazon






2019

Rank	Brand
 #1	Apple
 #2	Google
 #3	Microsoft
 #4	Amazon
 #5	Facebook

2020

Rank	Brand
 #1	Apple
 #2	Google
 #3	Microsoft
 #4	Facebook
 #5	Amazon

2021

Rank	Brand
 #1	Apple
 #2	Google
 #3	Microsoft
 #4	Amazon
 #5	Facebook



#1 Jeff Bezos



#2 Bill Gates



#5 Carlos Slim Helu & family



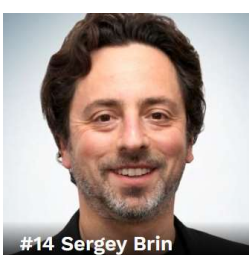
#7 Larry Ellison



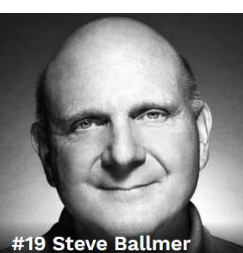
#8 Mark Zuckerberg



#10 Larry Page



#14 Sergey Brin



#19 Steve Ballmer



#20 Ma Huateng



#21 Jack Ma

Top 10 digital individuals net worth 2019 = \$634 billion

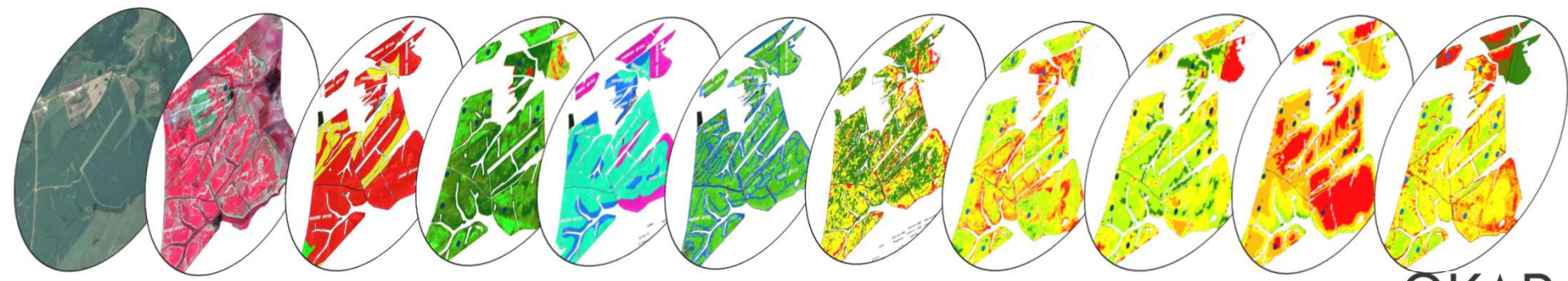
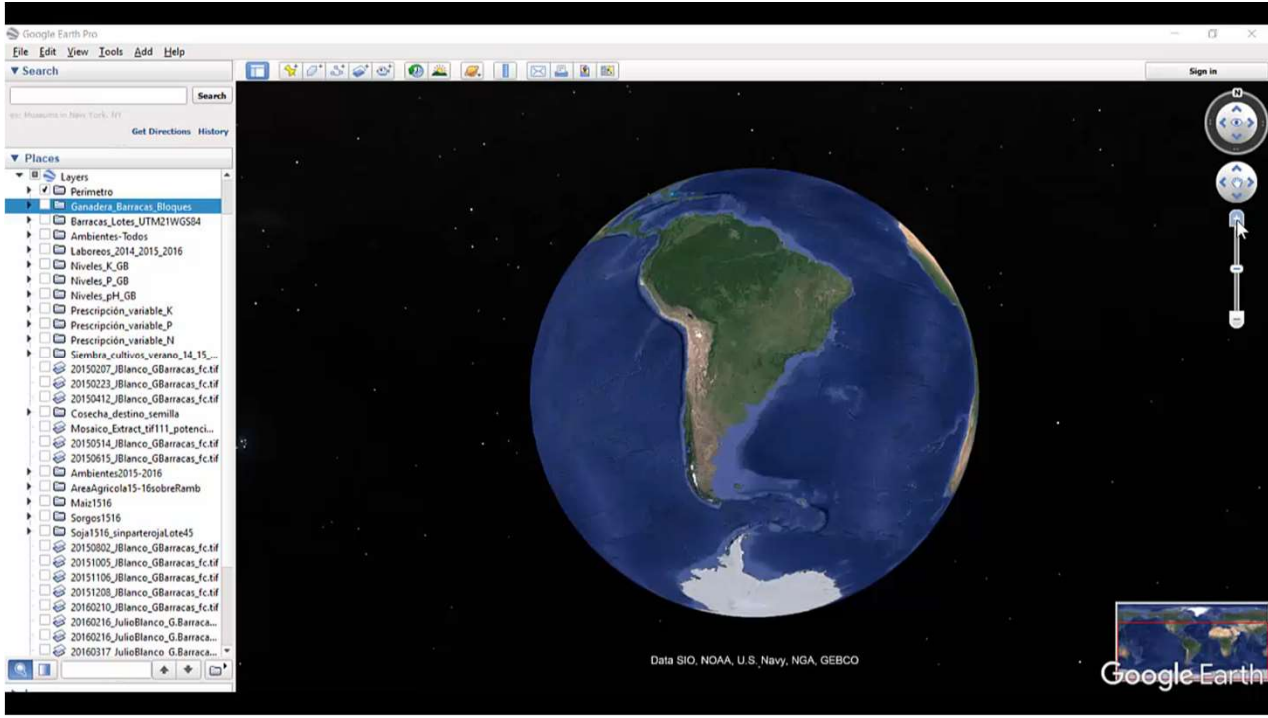
> GDP of 40% of all countries together (80 countries)

> GDP of 90% of each country (171 countries)



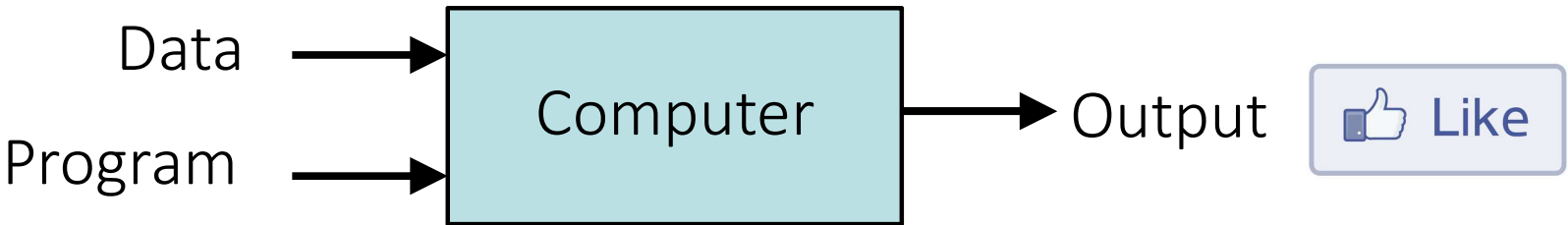
- | | | | |
|---------------------------------|------------------------|-----------------------------------|----------------------|
| Sierra Leone | Iceland | Ethiopia | Switzerland |
| Guyana | Papua New Guinea | Dominican Republic | Taiwan |
| Suriname | Trinidad and Tobago | Sri Lanka | Poland |
| South Sudan | Bosnia and Herzegovina | Guatemala | Thailand |
| Burundi | Laos | Oman | Sweden |
| Liberia | Afghanistan | Venezuela | Belgium |
| Djibouti | Botswana | Luxembourg | Iran |
| Timor-Leste | Mali | Panama | Austria |
| Aruba | Gabon | Ghana | Nigeria |
| Bhutan | Georgia | Bulgaria | Argentina |
| Lesotho | Jamaica | Myanmar | Norway |
| Central African Republic | Albania | Tanzania | United Arab Emirates |
| Eritrea | Mozambique | Belarus | Israel |
| Belize | Malta | Costa Rica | Ireland |
| St. Lucia | Burkina Faso | Croatia | Hong Kong |
| Gambia | Mauritius | Uzbekistan | Malaysia |
| Antigua and Barbuda | Mongolia | Syria ^(*) | Singapore |
| Seychelles | Benin | Uruguay | South Africa |
| San Marino | Namibia | Lebanon | Philippines |
| Solomon Islands | Guinea | Macau | Denmark |
| Grenada | Zimbabwe | Slovenia | Colombia |
| Comoros | North Macedonia | Lithuania | Bangladesh |
| St. Kitts and Nevis | Bahamas, The | Serbia | Egypt |
| Vanuatu | Madagascar | Congo, Democratic Republic of the | Chile |
| Samoa | Nicaragua | Azerbaijan | Pakistan |
| St. Vincent and the Grenadines | Brunei | Turkmenistan | Finland |
| Dominica | Equatorial Guinea | Côte d'Ivoire | Vietnam |
| Tonga | Moldova | Jordan | Czech Republic |
| São Tomé and Príncipe | Congo, Republic of the | Bolivia | Romania |
| Micronesia, Federated States of | Chad | Paraguay | Portugal |
| Palau | Rwanda | Tunisia | Peru |
| Marshall Islands | Niger | Cameroon | Iraq |
| Kiribati | Haiti | Bahrain | Greece |
| Tuvalu | Kyrgyzstan | Latvia | New Zealand |
| | Vanuatu | Libya | Qatar |
| | Tajikistan | Estonia | Algeria |
| | Kosovo | Sudan | Hungary |
| | Malawi | Uganda | Kazakhstan |
| | Maldives | Yemen | Ukraine |
| | Togo | Nepal | Kuwait |
| | Mauritania | El Salvador | Morocco |
| | Montenegro | Cambodia | Ecuador |
| | Fiji | Honduras | Slovakia |
| | Barbados | Cyprus | Puerto Rico |
| | Somalia | Zambia | Kenya |
| | Eswatini | Senegal | Angola |

Information & ...



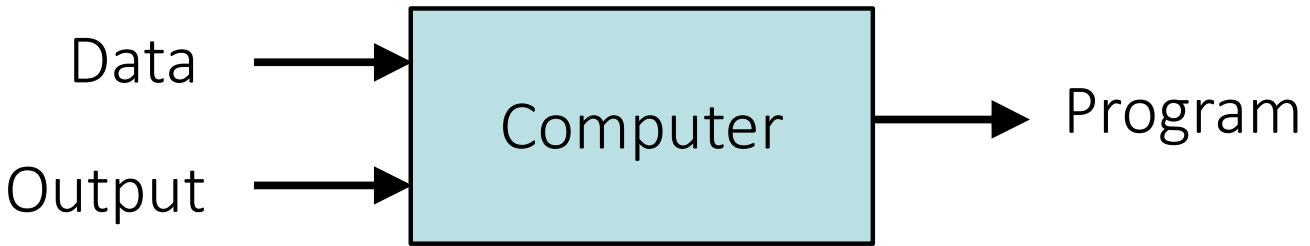
... & Knowledge

Machine Learning

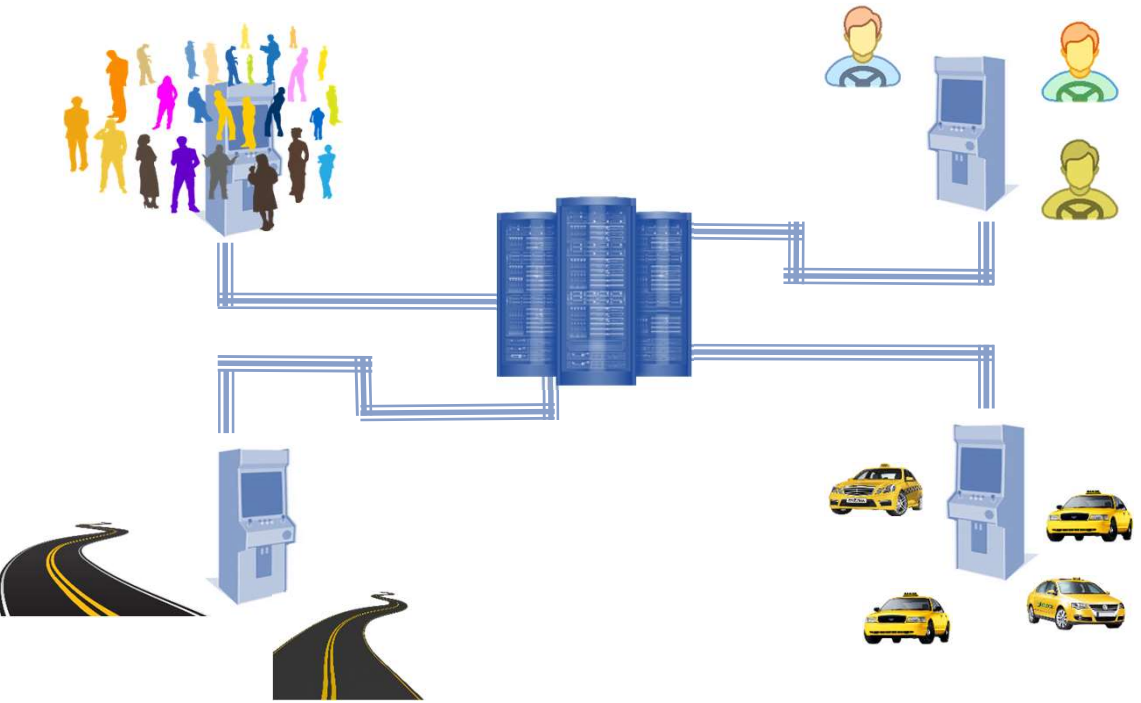


$$(2 + 3) * 4 = ?$$

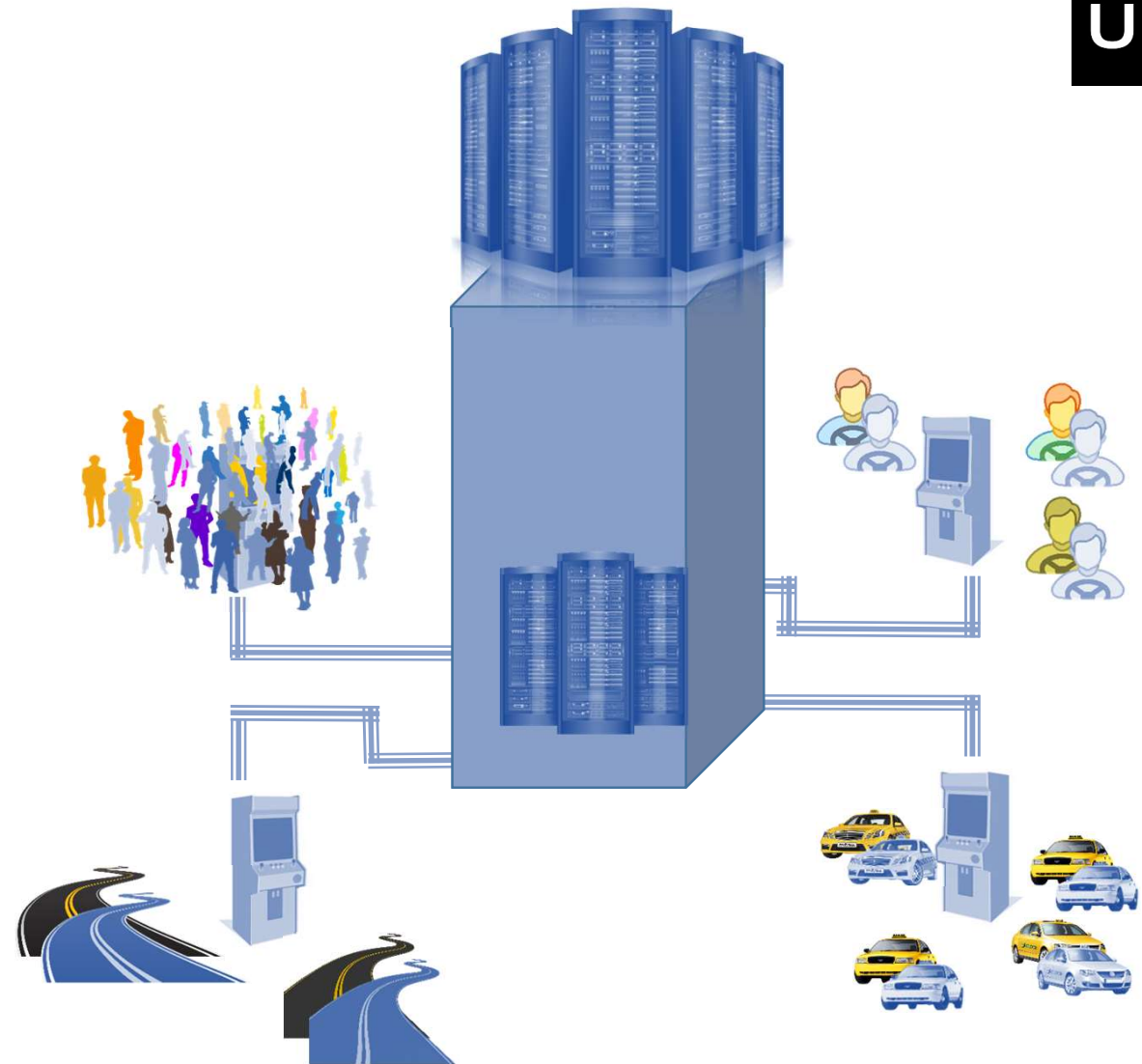
2 ? 3 ? 4 = 20



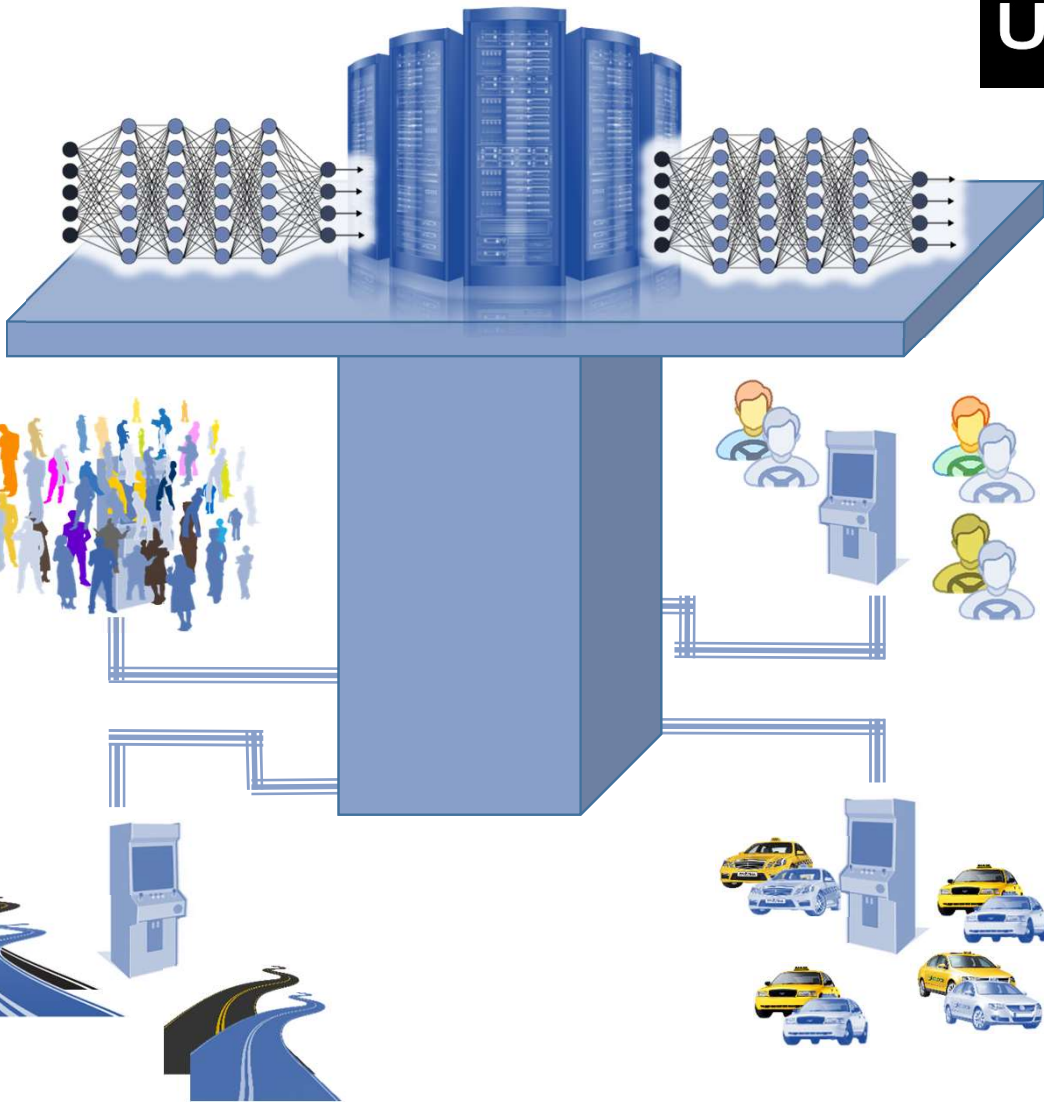
UBER



UBER



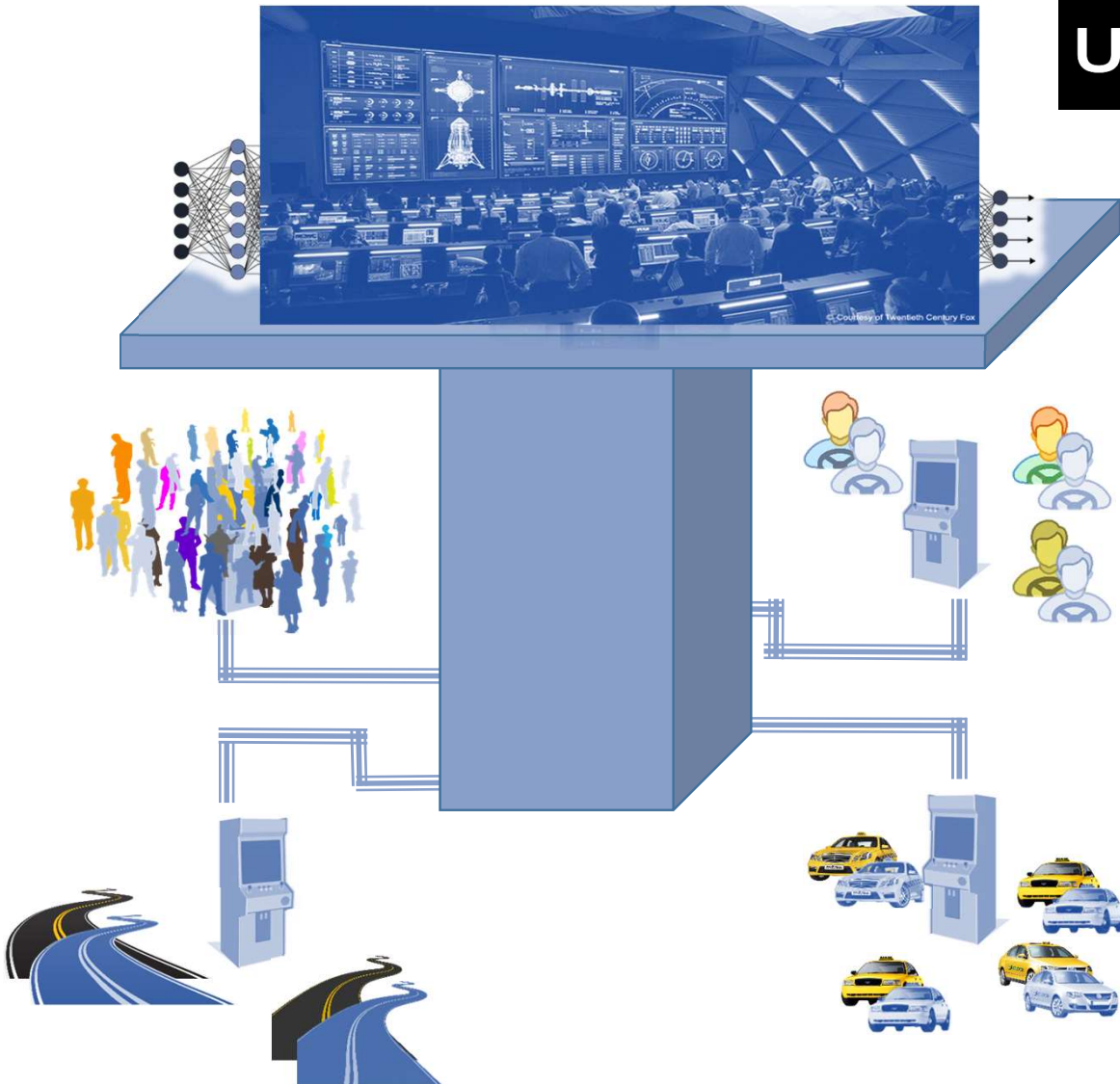
UBER

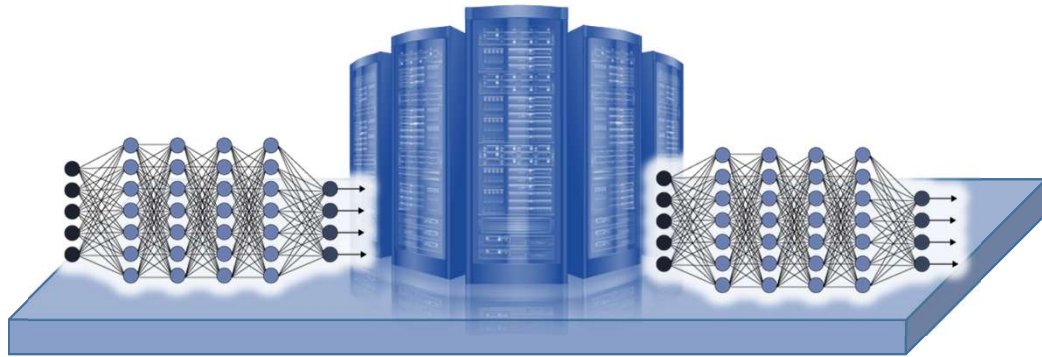


UBER

algoritmo
maestro de control

El algoritmo maestro





amazon®

El algoritmo maestro



SONY MUSIC

El algoritmo maestro



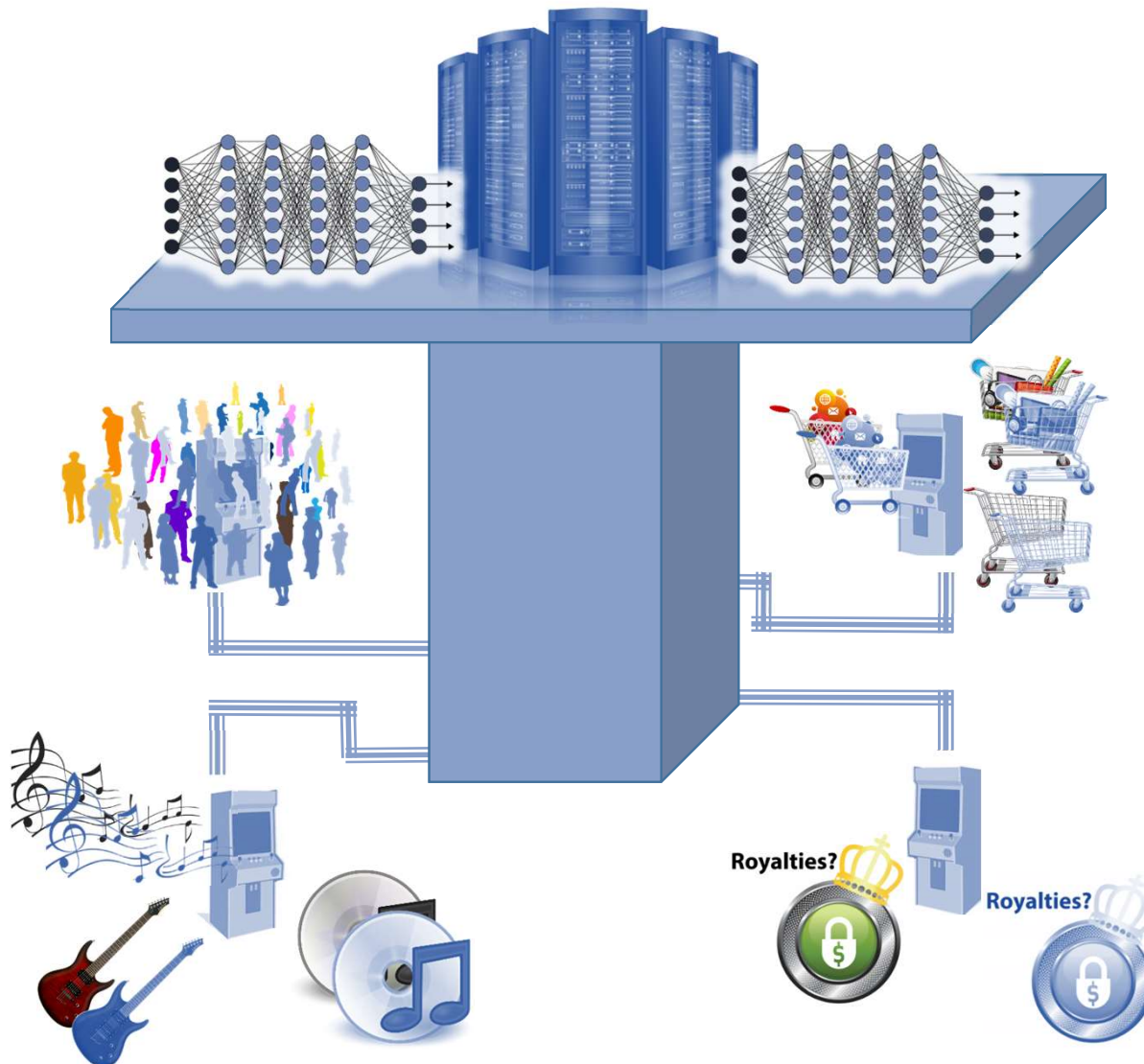
Revenue (2019): US\$9 billion

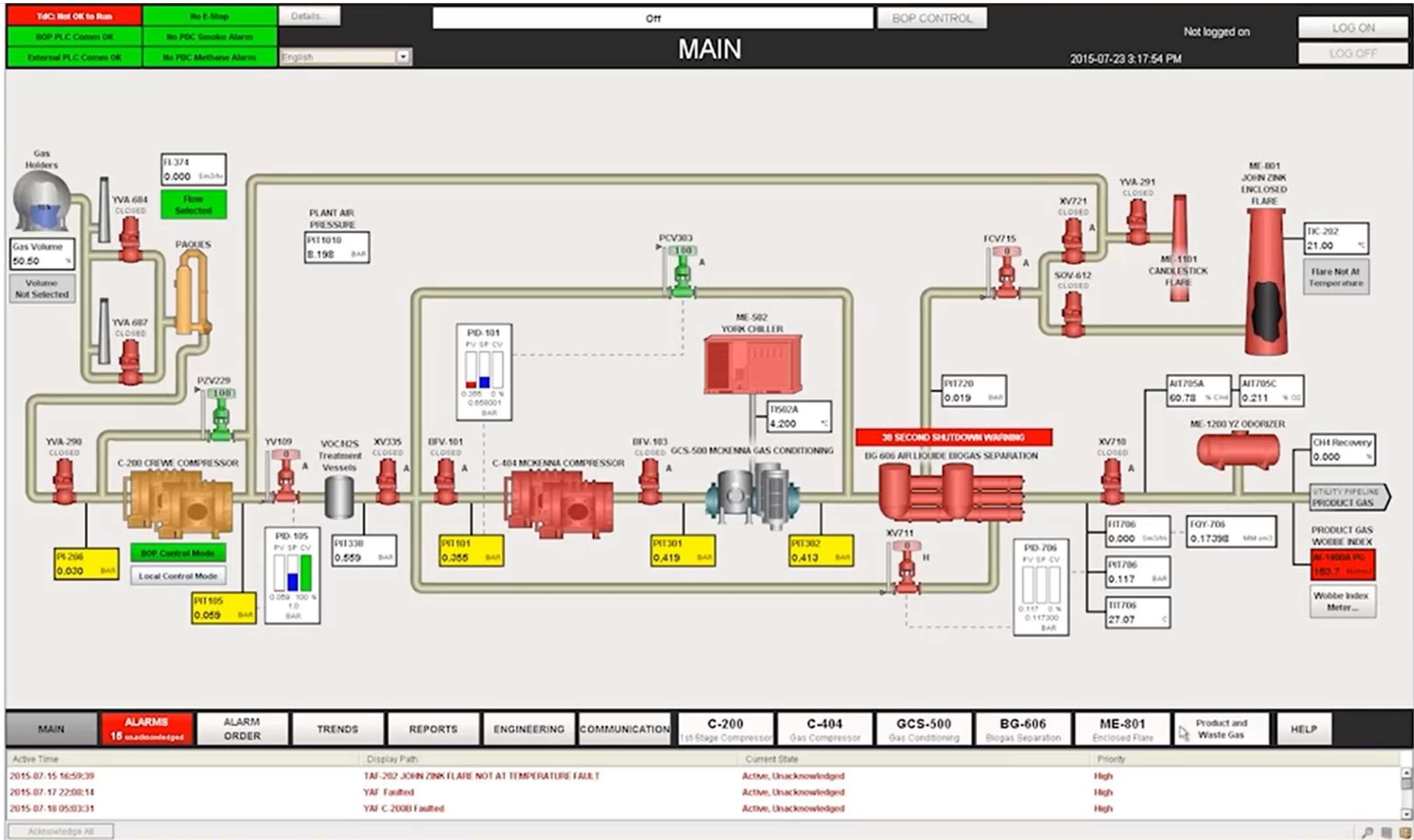
Revenue (2019): US\$8 billion



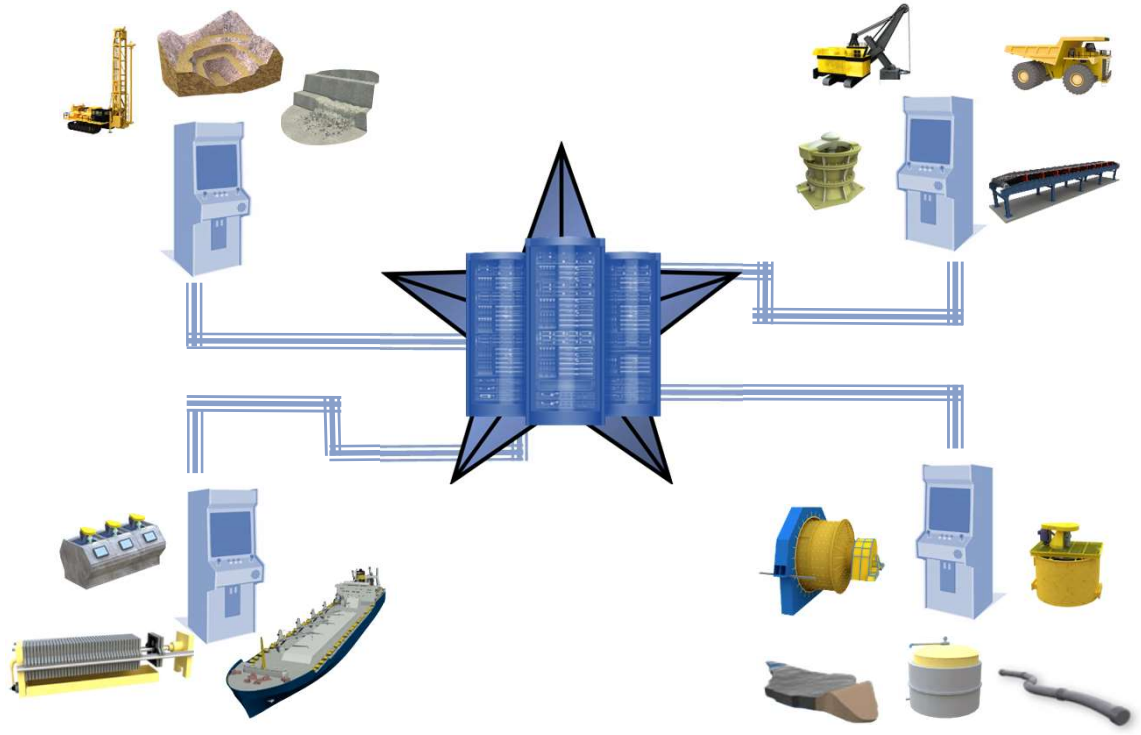
SONY MUSIC

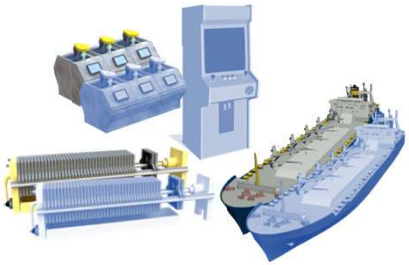
Owner of
"Happy Birthday
to you"
Patty and Mildred
J. Hill, 1893

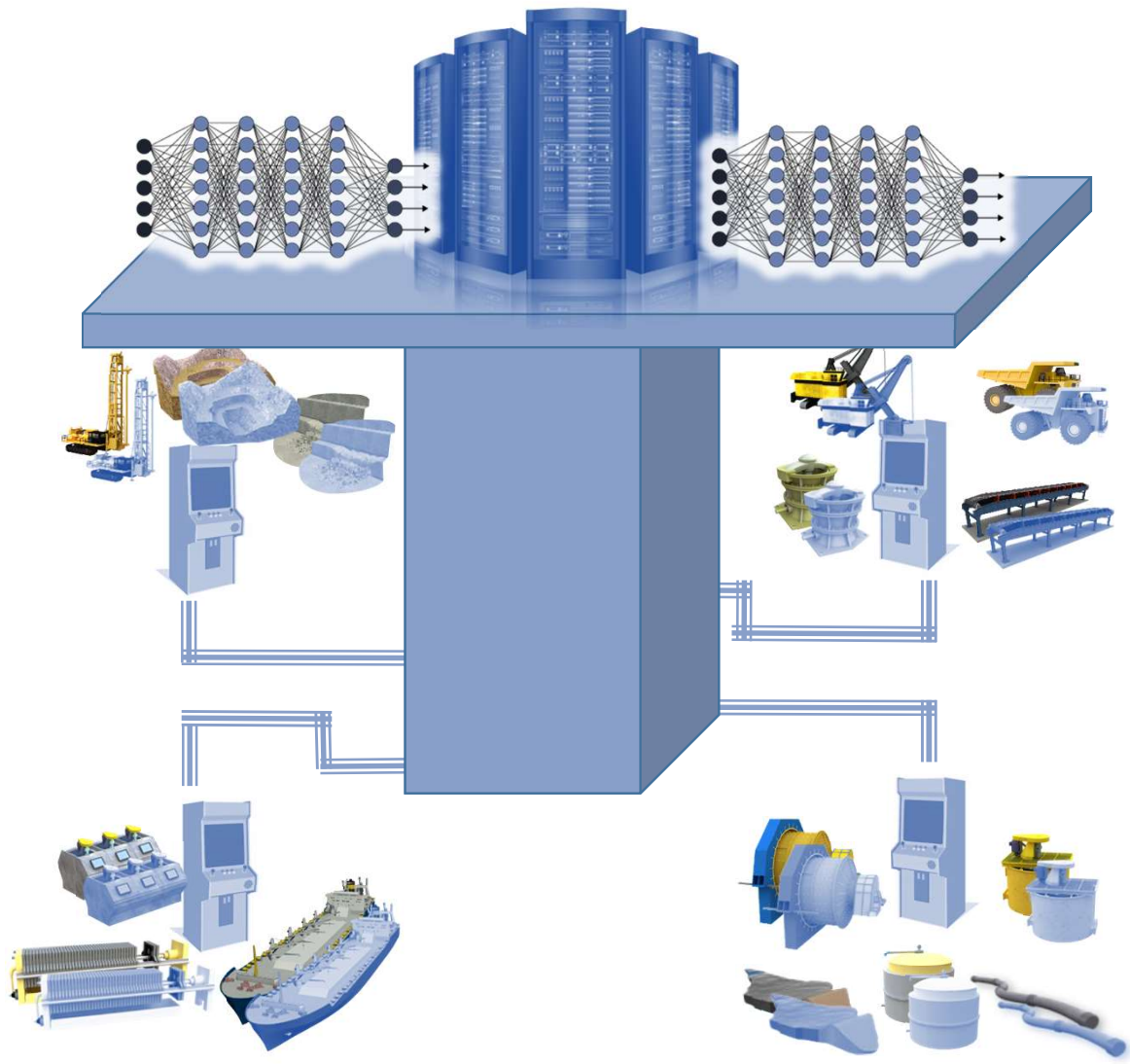




<https://inductiveautomation.com/resources/customerproject/rapid-development-for-natural-gas-utility>









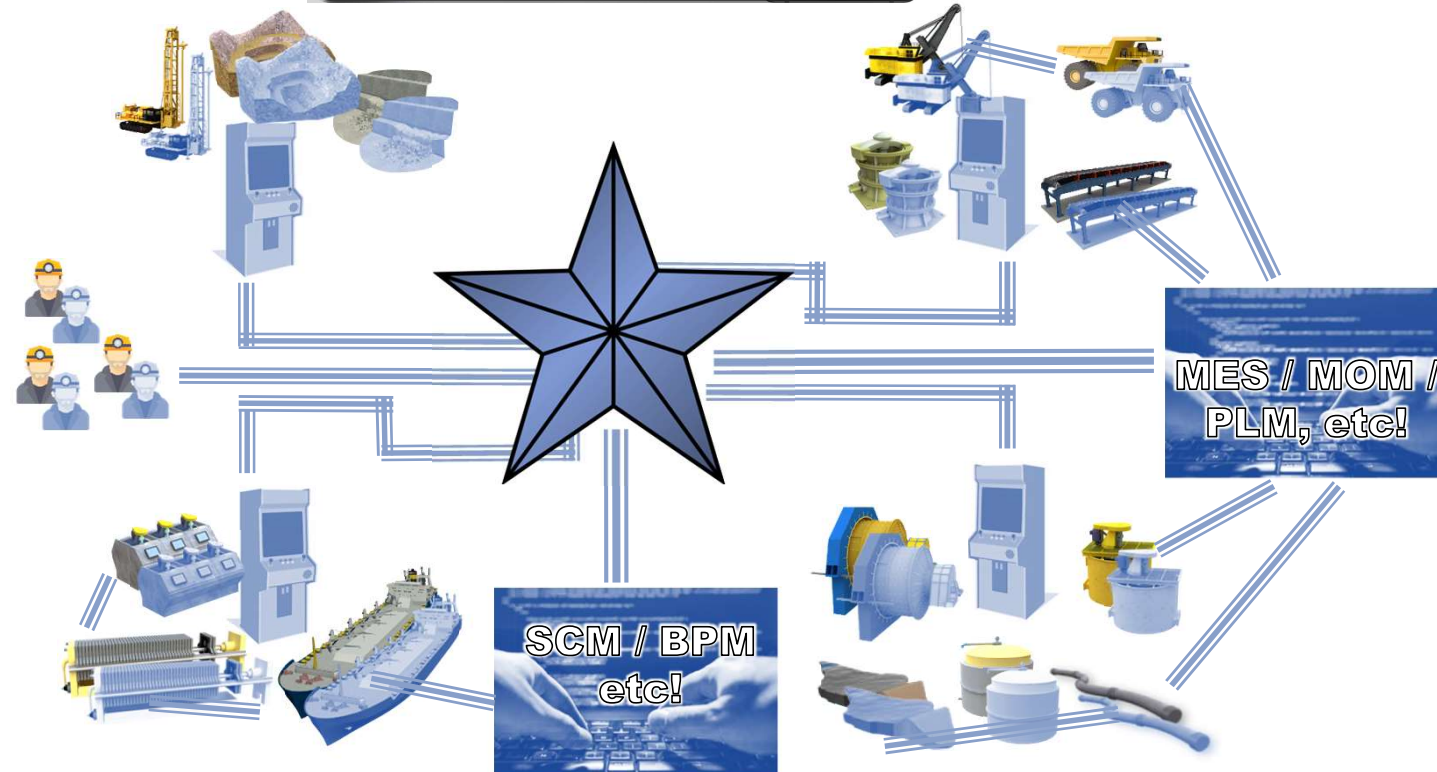
La Estrella de la Información...

3 requisitos:

1) escalable

2) abierto, flexible y non-discriminatoria

3) accionable

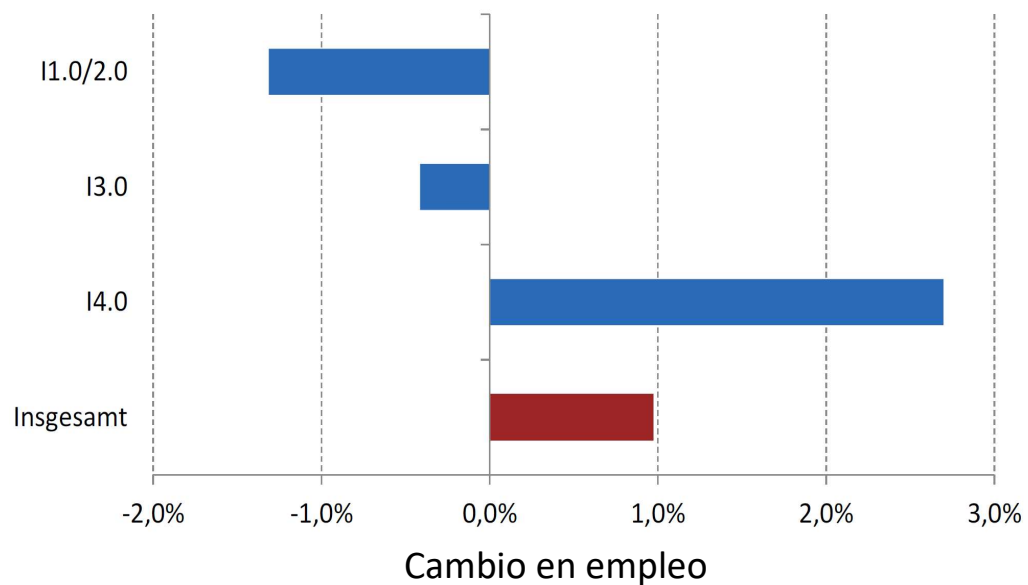


1) El Poder de lo Artificial

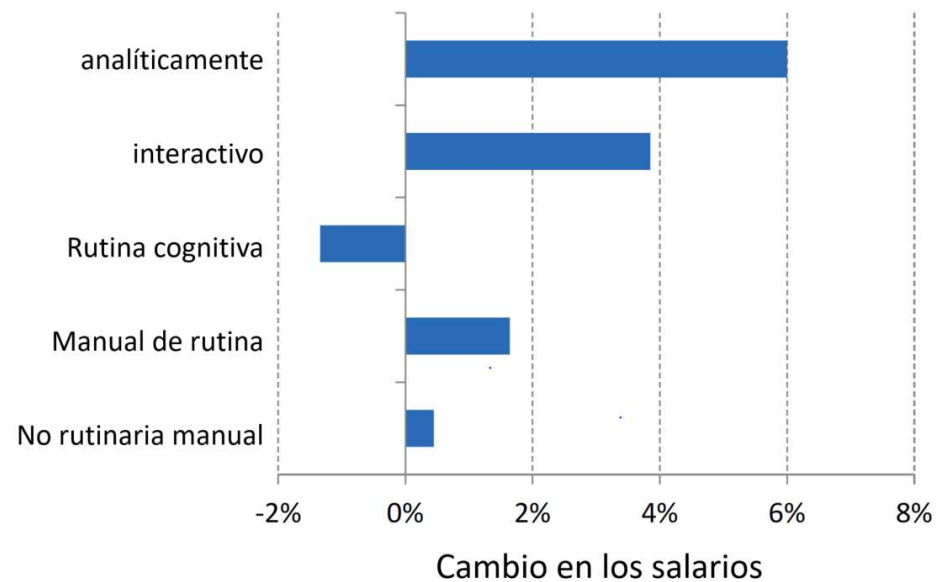
2) El Poder de lo Humano con lo Artificial

3) El Poder de lo Artificial sobre lo Humano

CANTIDAD: Efecto en el empleo por tecnología, 2011-2016



CALIDAD: Efectos salariales por ocupaciones, 2011-2016.



Tecnologías simples (Industria 1.0 / 2.0)

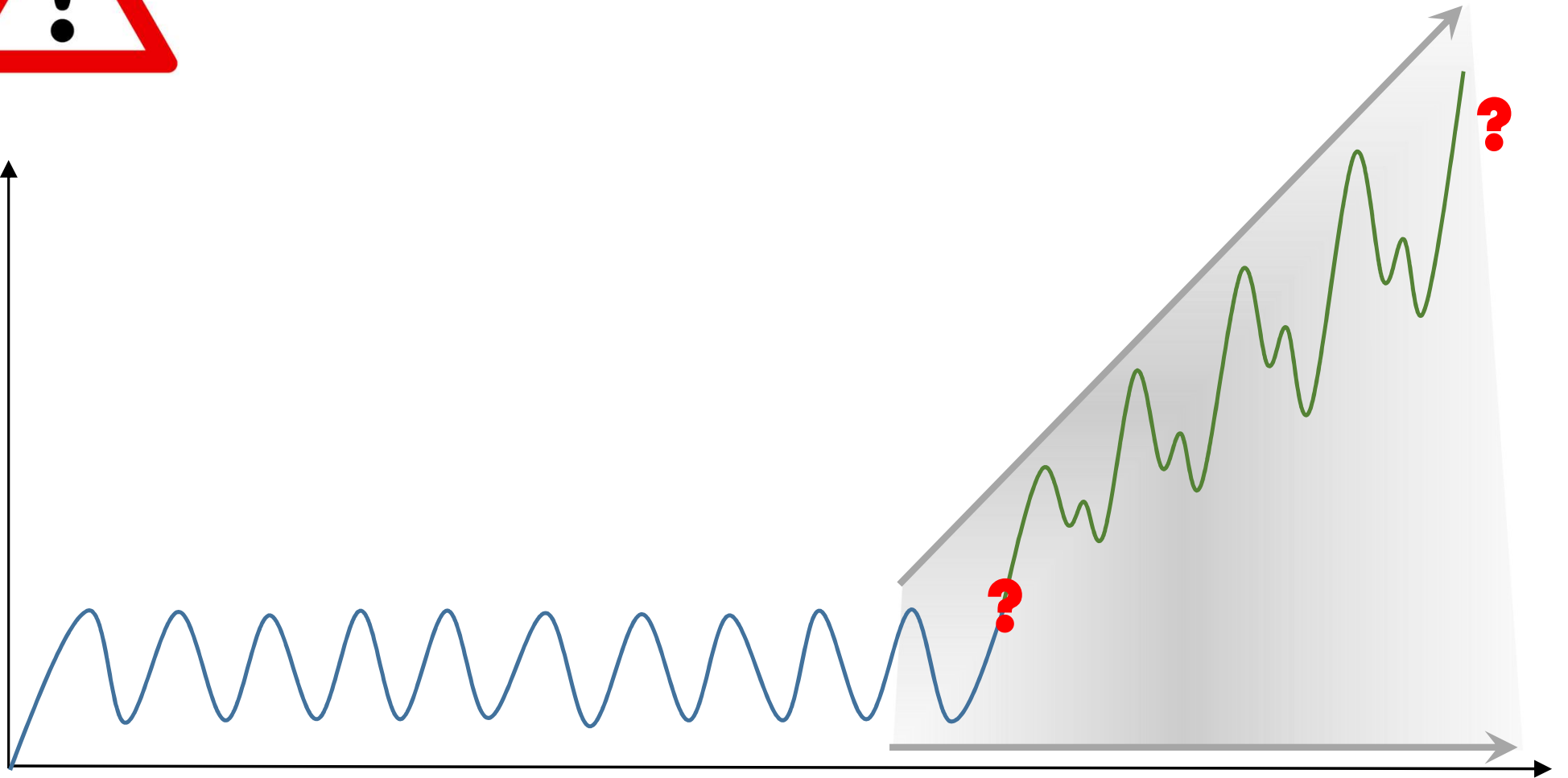
Tecnologías informatizadas/
soportado por computación (Industria 3.0)

Tecnologías de red digital (Industria 4.0)





Past \neq Future





Past ≠ Future

1989

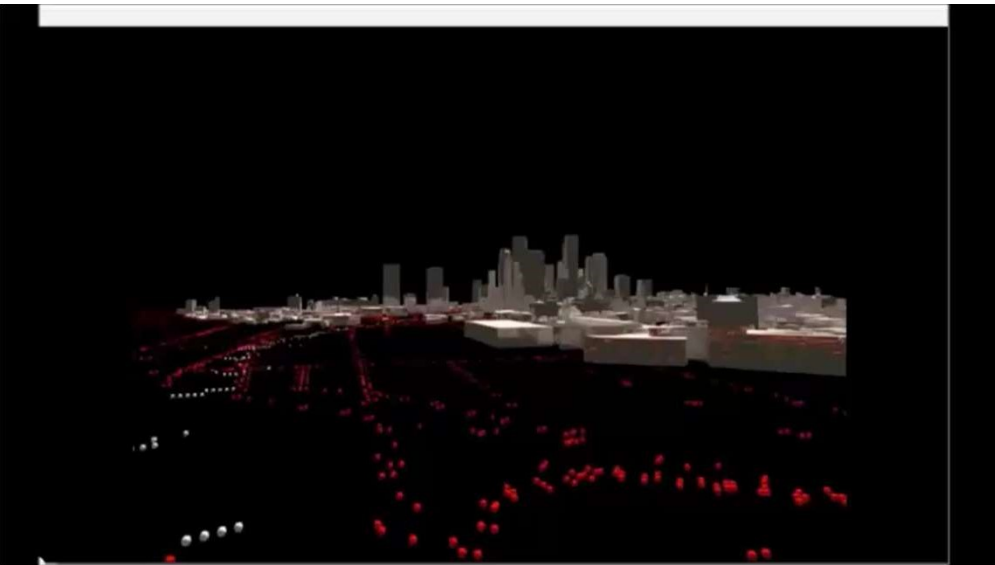


2013

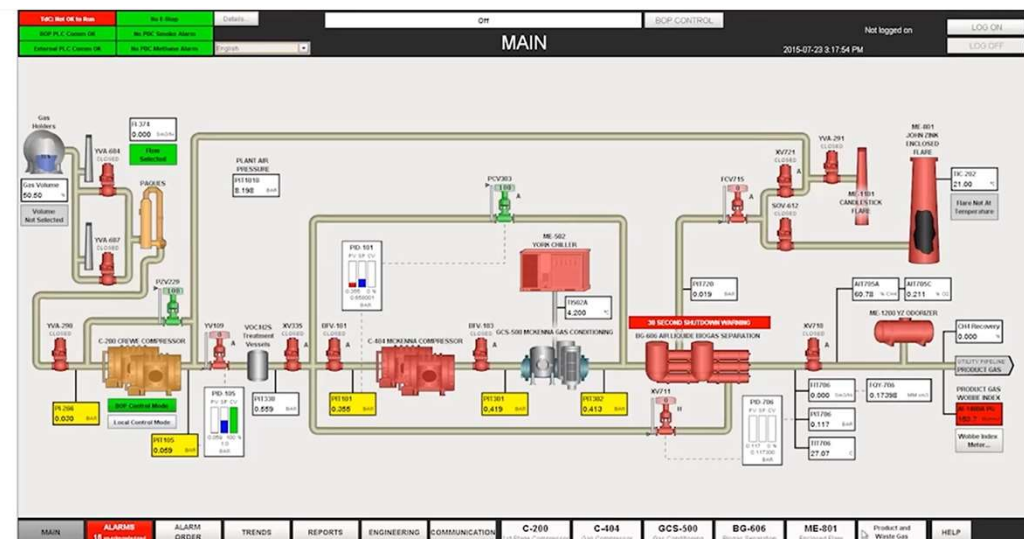


Wikipedia Commons

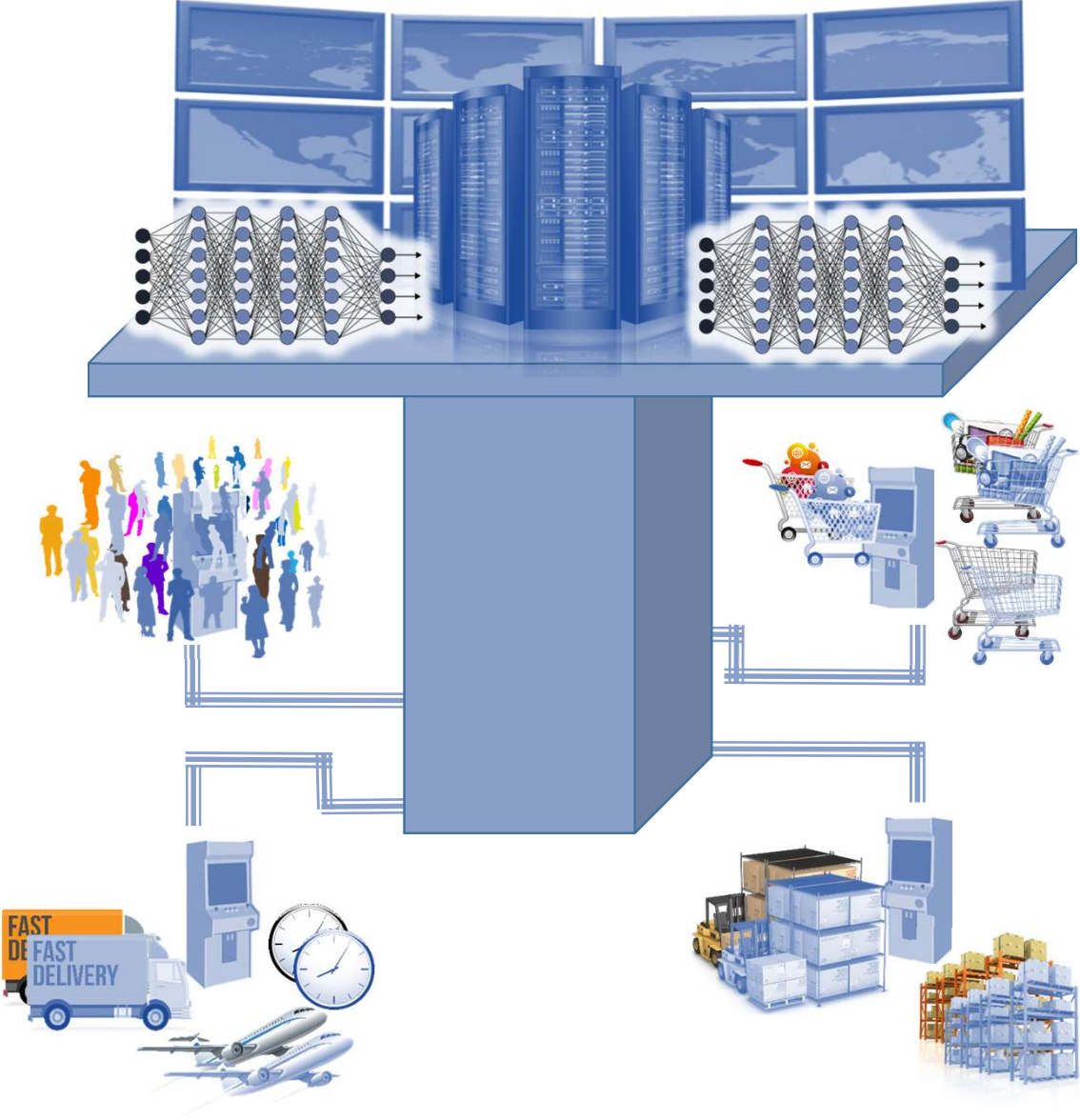
SIMCITY edu



Sources: Bohemia Interactive Simulations, <http://youtu.be/G9P9bUTCdpA> ; TRANSIMS: <http://www.youtube.com/watch?v=mN7kq0ITAYS> ; Epstein, <http://www.youtube.com/watch?v=wZZJCIGtVkw> & <https://inductiveautomation.com/resources/customerproject/rapid-development-for-natural-gas-utility>



amazon



1) El Poder de lo **Artificial**

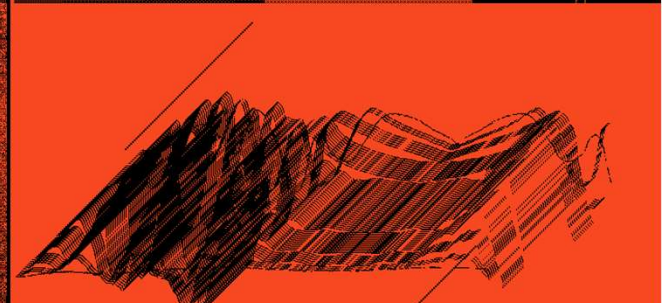
2) El Poder de lo **Humano con lo Artificial**

3) El Poder de lo **Artificial sobre lo Humano**

The Intercept

FINDING YOUR VOICE

Forget About Siri and Alexa — When It Comes to Voice Identification, the “NSA Reigns Supreme”



HUMAN RIGHTS WATCH

Available In 简体中文 English 日本語

China: Voice Biometric Collection Threatens Privacy

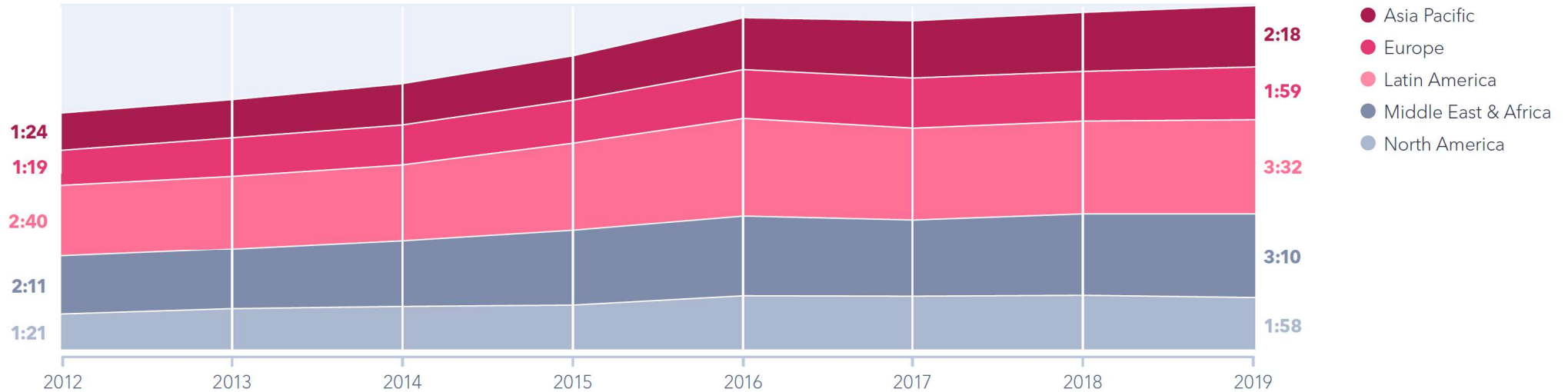
Police, AI Giant Collaboration in Legal Gray Area



<https://theintercept.com/2018/01/19/voice-recognition-technology-nsa/> ; <https://www.hrw.org/news/2017/10/22/china-voice-biometric-collection-threatens-privacy#>
<https://www.nytimes.com/interactive/2019/12/19/opinion/location-tracking-cell-phone.html> ; <https://www.nytimes.com/interactive/2019/12/19/opinion/location-tracking-cell-phone.html>

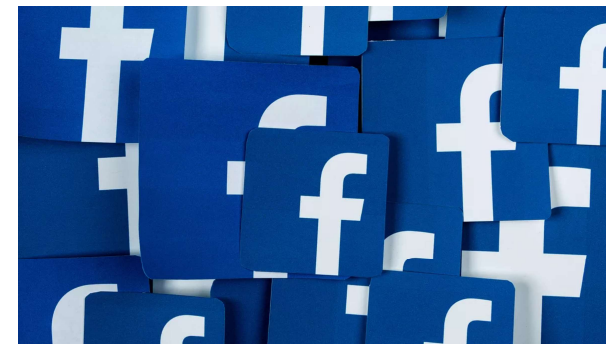
DAILY TIME SPENT ON SOCIAL MEDIA

Average h:mm spent engaging with/connected to social networks/services during a typical day



“Cuando visita un sitio o una aplicación que utiliza nuestros servicios, recibimos información incluso si está desconectado o no tiene una cuenta de Facebook.”

<https://newsroom.fb.com/news/2018/04/data-off-facebook>

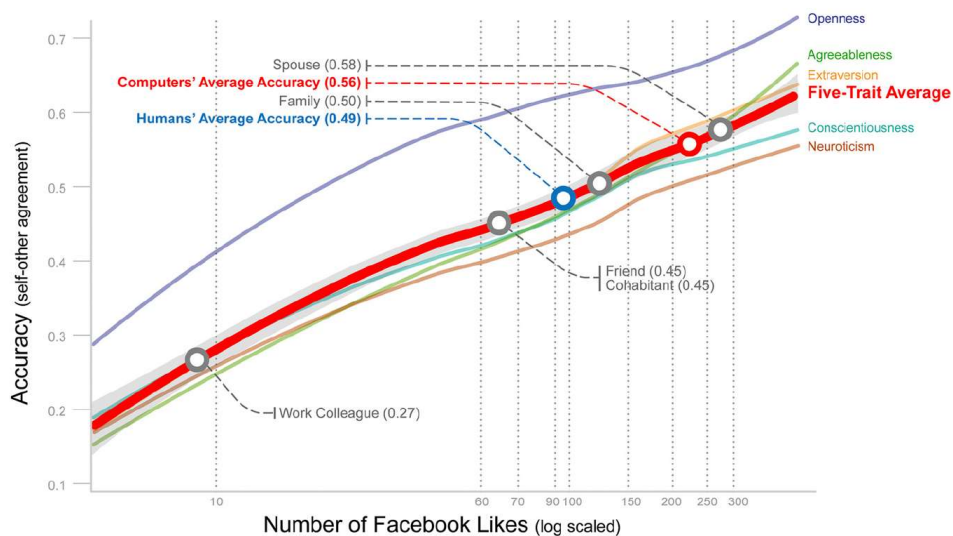


Question: On an average day, how long do you spend on social media? **Source:** GlobalWebIndex 2012-2019 (averages of all waves conducted between Q2 2012 and Q3 2019) internet users aged 16-64

...know us better than we ourselves



KidLogger.net
temporal activity

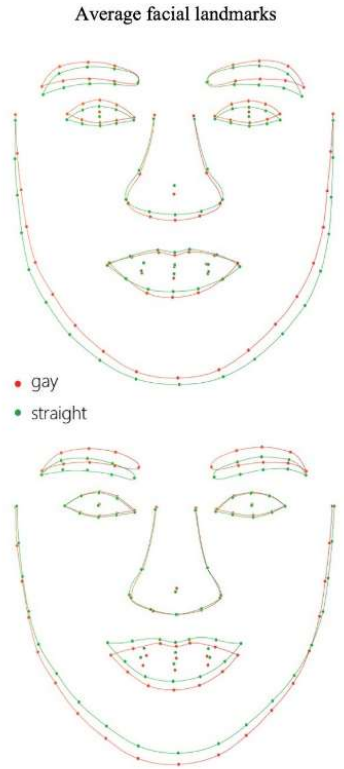
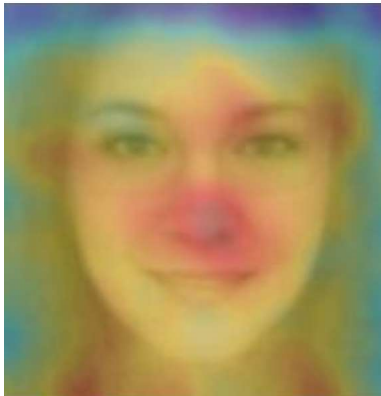
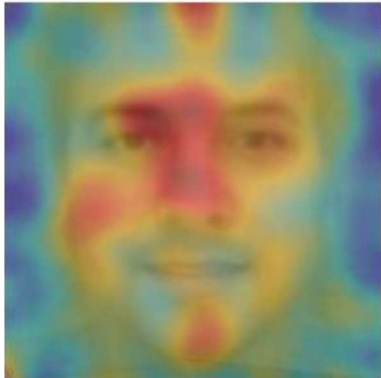


Personality Trait	Accuracy
Openness	.80
Conscientiousness	.65
Extroversion	.72
Agreeableness	.72
Neuroticism	.73

Youyou, Kosinski & Stillwell (2015). Computer-based personality judgments are more accurate than those made by humans. *PNAS*, 201418680. Kosinski, Stillwell, & Graepel (2013). Private traits and attributes are predictable from digital records of human behavior. *PNAS*, 110(15), 5802–5805; Grover, T., & Mark, G. (2017). Digital footprints: Predicting personality from temporal patterns of technology use. *Proc. 2017 ACM*, 41–44. Videoblocks.com

...know us better than we ourselves

	man	woman
Human:	61%	54%
AI (5 pics):	91%	83%



Wang & Kosinski (2018). Deep neural networks are more accurate than humans at detecting sexual orientation from facial images. *J. of Personality and Social Psychology*, 114(2), 246–257.

...know us better than we ourselves



Crum, P. (2018). *Technology that knows what you're feeling*. https://www.ted.com/talks/poppy_crum_technology_that_knows_what_you_re_feeling



BBC NEWS | MUNDO

Noticias América Latina Internacional EE.UU. 2020 ¿Hablas español? Hay Festival

Economía Ciencia Salud Cultura Tecnología Video Centroamérica Cuenta BBC Extra

Martin Hilbert: "La verdadera fuente de poder de las redes ha sido llevarnos a nuestro narcisismo, enojo, ansiedad, envidia, credulidad y, por cierto, a nuestra lujuria"

Daniel Hopenhayn
Especial para BBC Mundo
20 octubre 2020

No sabemos cómo lidiar con el poder de los algoritmos, afirma Martin Hilbert

"El crecimiento de la digitalización siempre fue exponencial, pero la pandemia lo aceleró con esteroides", asegura Martin Hilbert, investigador alemán de la Universidad de California-Davis y autor del primer estudio que calculó cuánta información hay en el mundo.

Reconocido por haber alertado sobre la intervención de Cambridge Analytica en la campaña de Donald Trump un año antes de que estallara el escándalo, Hilbert ha seguido de cerca los efectos digitales del coronavirus y sus conclusiones son poco optimistas: las personas no saben cómo lidiar con el poder de los algoritmos, los gobiernos no saben cómo usarlos en favor de la población y las empresas se resisten a adoptar pautas éticas efectivas.

Esto debiera preocupar especialmente a América Latina, "porque son líderes mundiales en el uso de redes sociales", advierte Hilbert, que vivió una década en Chile como funcionario de la ONU y hoy vive a 40 minutos de Silicon Valley.

En conversación con BBC Mundo compartió su opinión de que las nuevas tecnologías plantean desafíos de alcances tales que podrían exigir una **evolución de la conciencia humana**.

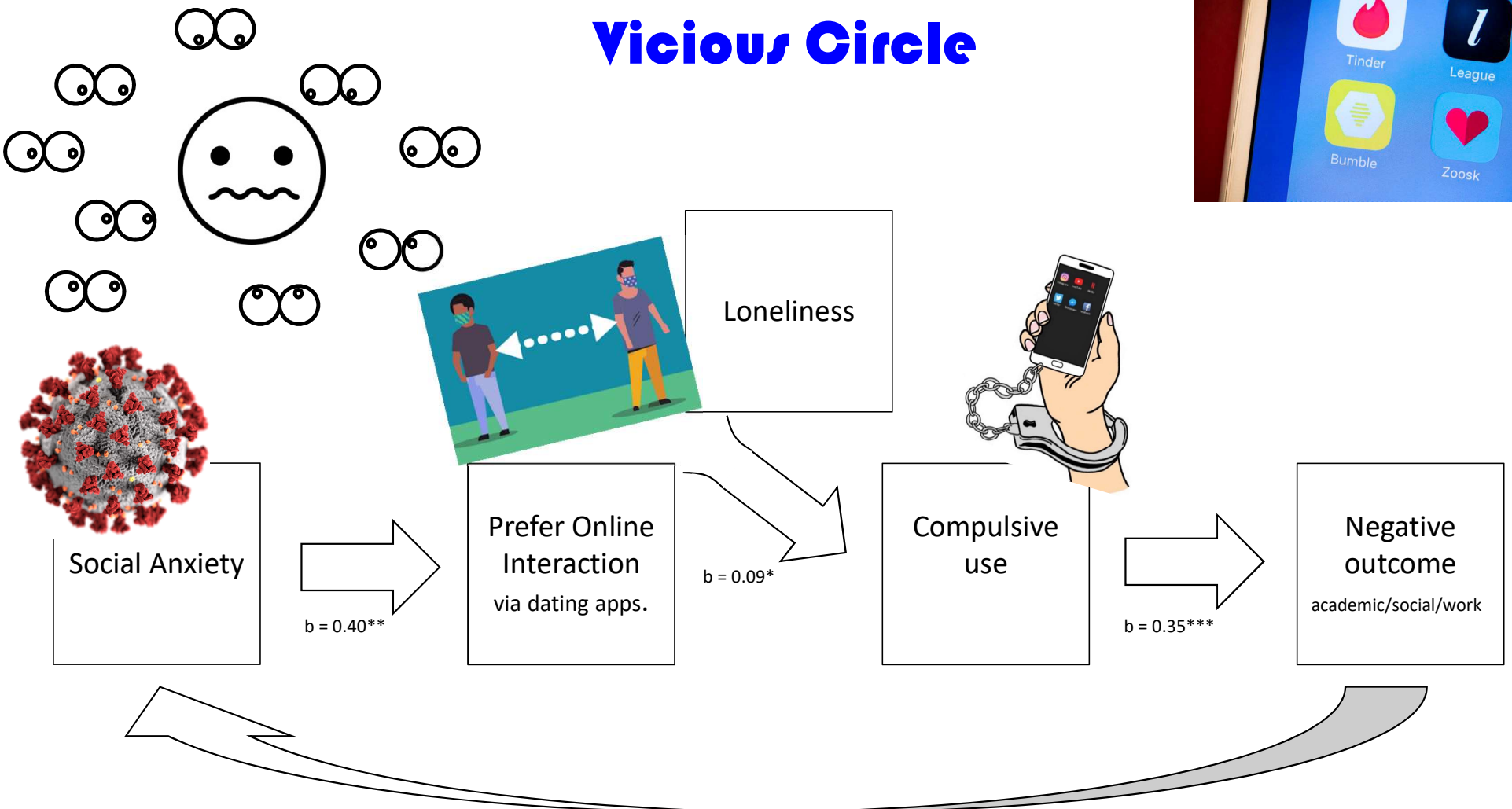
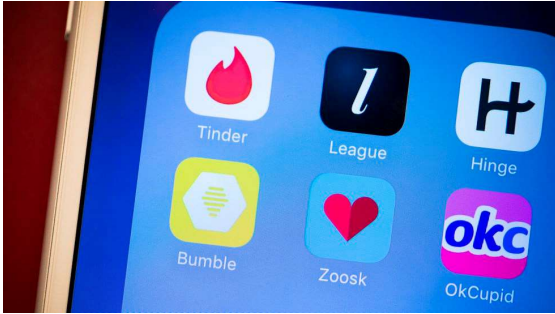
<https://www.bbc.com/mundo/noticias-54484758>

Tech angst is growing

% of global internet users who say they just don't understand computers and new technology



Vicious Circle



Coduto, K. D., Lee-Won, R. J., & Baek, Y. M. (2020). Swiping for trouble: Problematic dating application use among psychosocially distraught individuals and the paths to negative outcomes. *Journal of Social and Personal Relationships*, 37(1), 212–232. <https://doi.org/10.1177/0265407519861153>

Attention Economy



SEGMENTING YOUR
A/B TEST RESULTS



La investigación sobre "juicio bajo incertidumbre" generalmente se reduce a la recopilación de "heurísticas y sesgos cognitivos" (Kahneman, Slovic and Tversky, 1982)



Article [Talk](#)

Confirmation bias

From Wikipedia, the free encyclopedia

88% less likely to identify as fake

69% robust memory even when alerted of misinformation

Murphy, et al. (2019). False Memories for Fake News. *Psych. Sci.*, 30(10).

The screenshot shows the Wikipedia page for 'List of cognitive biases'. It includes a table of contents with 6 items: 1. Decision-making, belief, and behavioral biases; 2. Social biases; 3. Memory errors and biases; 4. See also; 5. Footnotes; 6. References. Below the table of contents is a section titled 'Decision-making, belief, and behavioral biases' with a description: 'Many of these biases affect belief formation, business and economic decisions, and human behavior in general.' Below this is a table with columns 'Name' and 'Description'.

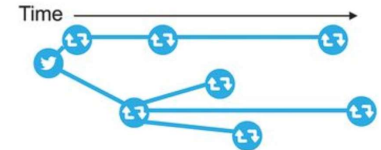
Name	Description
Agent detection	The inclination to presume the purposeful intervention of a sentient or intelligent agent.
Ambiguity effect	The tendency to avoid options for which the probability of a favorable outcome is unknown. ^[11]
Anchoring or focalism	The tendency to rely too heavily, or "anchor", on one trait or piece of information when making decisions (usually the first piece of information acquired on that



Article [Talk](#)

Novelty effect

From Wikipedia, the free encyclopedia



False news spread:

6 x faster

20 x deeper (70% more likely to be retweeted)

2 x broader

Vosoughi, et al. (2018). The spread of true and false news online. *Science*, 359(6380), 1146–1151.



40 min/day * 70 % recommended = 30 min/day

* 0.05 conspiracy = 1.5 min/day 25% of global population

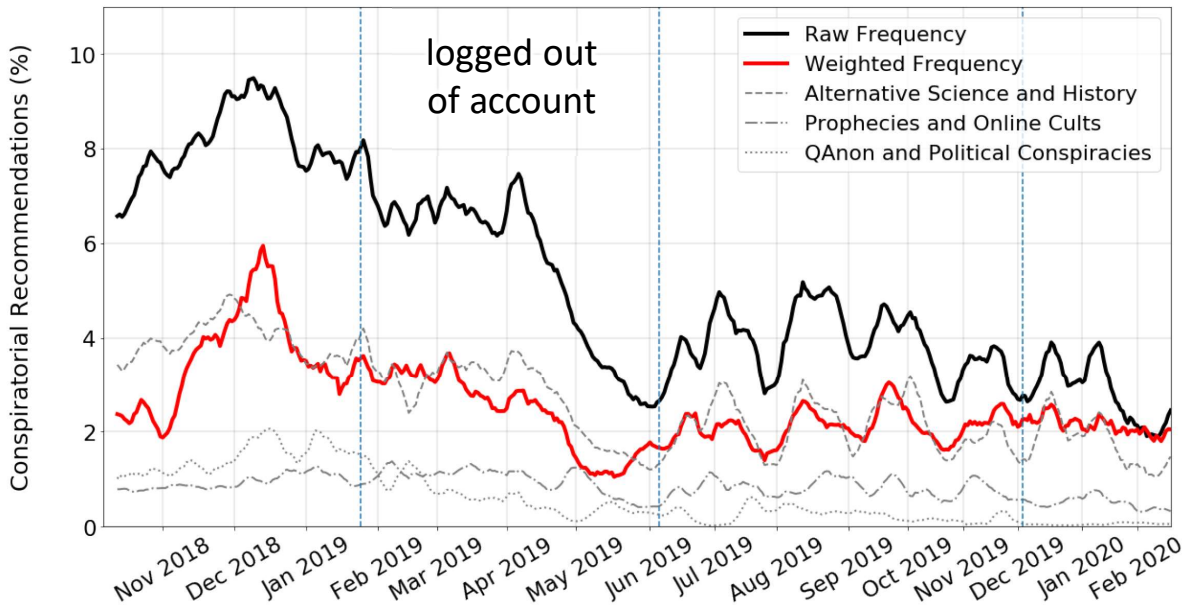
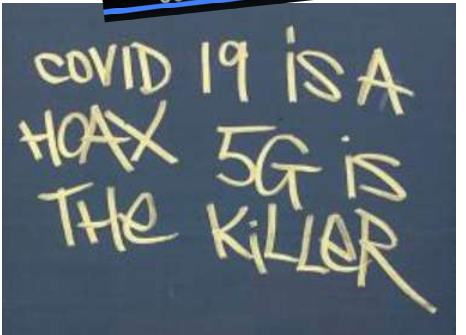
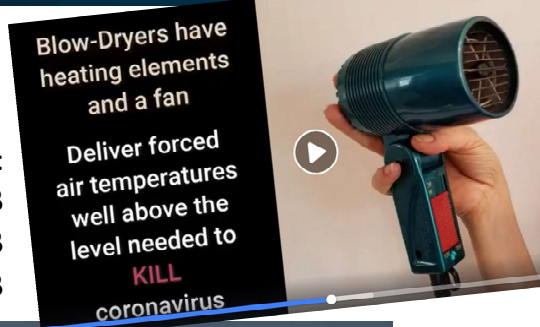


Fig. 2. Longitudinal trends of conspiratorial recommendations from informational channels on YouTube, in which each data point corresponds to a rolling seven day average. The **raw frequency** is an estimate of the percentage of conspiratorial recommendations obtained by weighting all recommendations classified as conspiratorial by their likelihood. This frequency represents the propensity of the YouTube algorithm to recommend conspiratorial content. The **weighted frequency** is an estimate of the percentage of conspiratorial weighted by the number of views of the source video. The **three dashed and dotted lines** correspond to the raw frequency for the top three topics: (1) Alternative Science and History, (2) Prophecies and Online Cults, and (3) QAnon, Deepstate, and New World Order (see Table 2). The **dotted vertical lines** represent the three YouTube announcements related to their efforts to fight conspiratorial content, on January 25th, June 5th and Dec 3rd of 2019.



Worldwide followers:
 Muslims: 1.8 B
 YouTube: 2.0 B
 Christians: 2.2 B





The New York Times

Opinion

TURNING POINTS

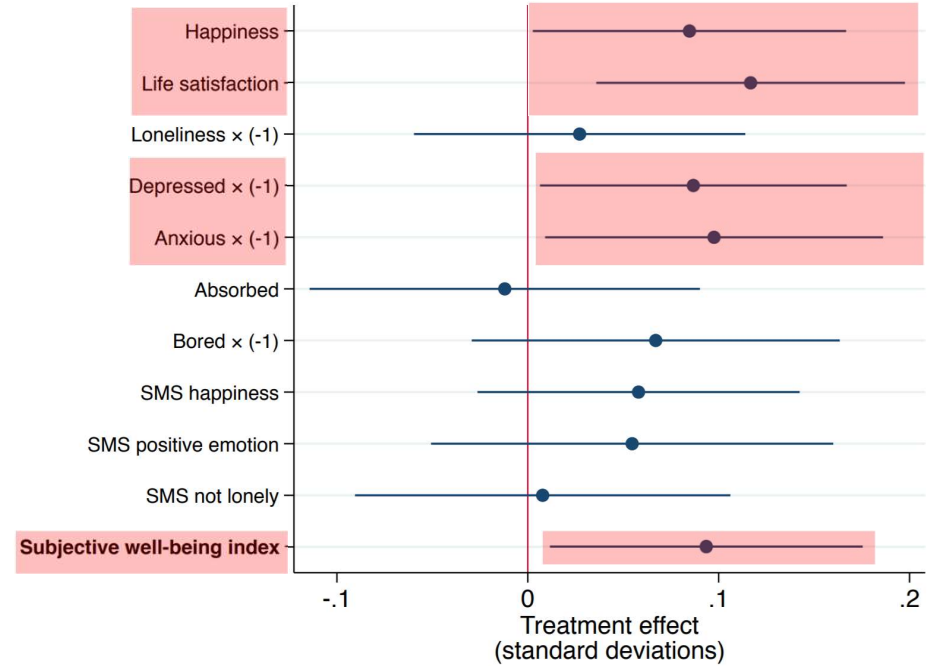
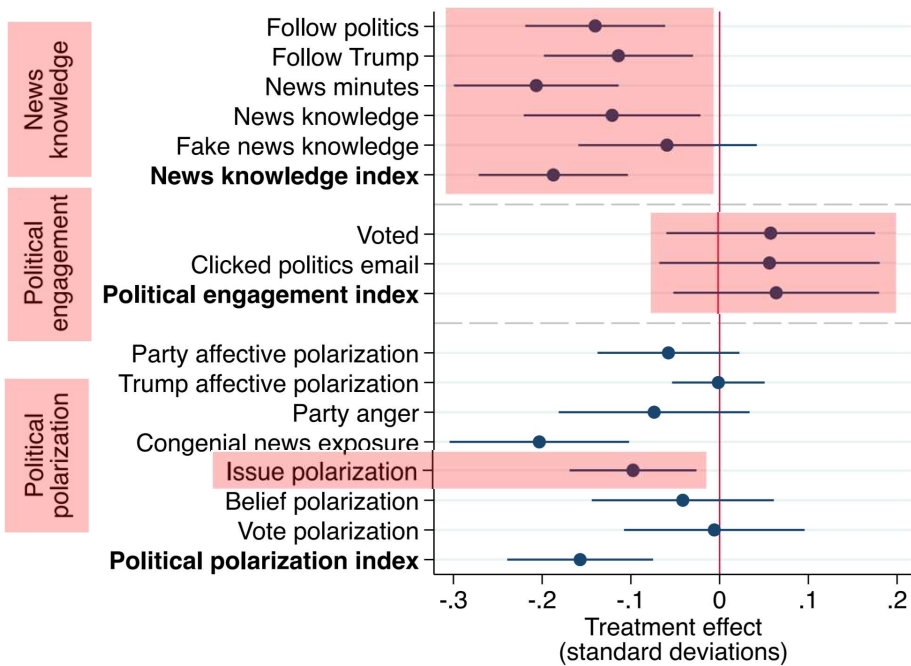
Our Brains Are No Match for Our Technology

By Tristan Harris

Dec. 5, 2019

Deactivate Facebook for 4 weeks

before US Congress mid-term election (2,743 subjects)



→ about half of issue polarization increase btw 1996-2016

→ about 25-40 percent as much as standard psychological therapy

→ about \$30,000 additional income (min \$10,000, decreasing curve)



Course launched on Dec 9, 2019

Computational Social Science Methods



Course launched on Dec 9, 2019

Big Data, Artificial Intelligence, and Ethics



Course launched on Dec 10, 2019

Social Network Analysis



Course launched on Jan 7, 2020

Computer Simulations



Course launched on Feb 4, 2020

Computational Social Science Capstone Project

<https://www.coursera.org/specializations/computational-social-science-ucdavis>

coursera

< Data Science

Computational Social Science Specialization

★★★★★ 4.7



Martin Hilbert

Offered By

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UNIVERSITY OF CALIFORNIA