



The Digital Coalface: Ethical Dilemmas of Artificial Intelligence

Douglas Austrom & Carolyn Ordowich

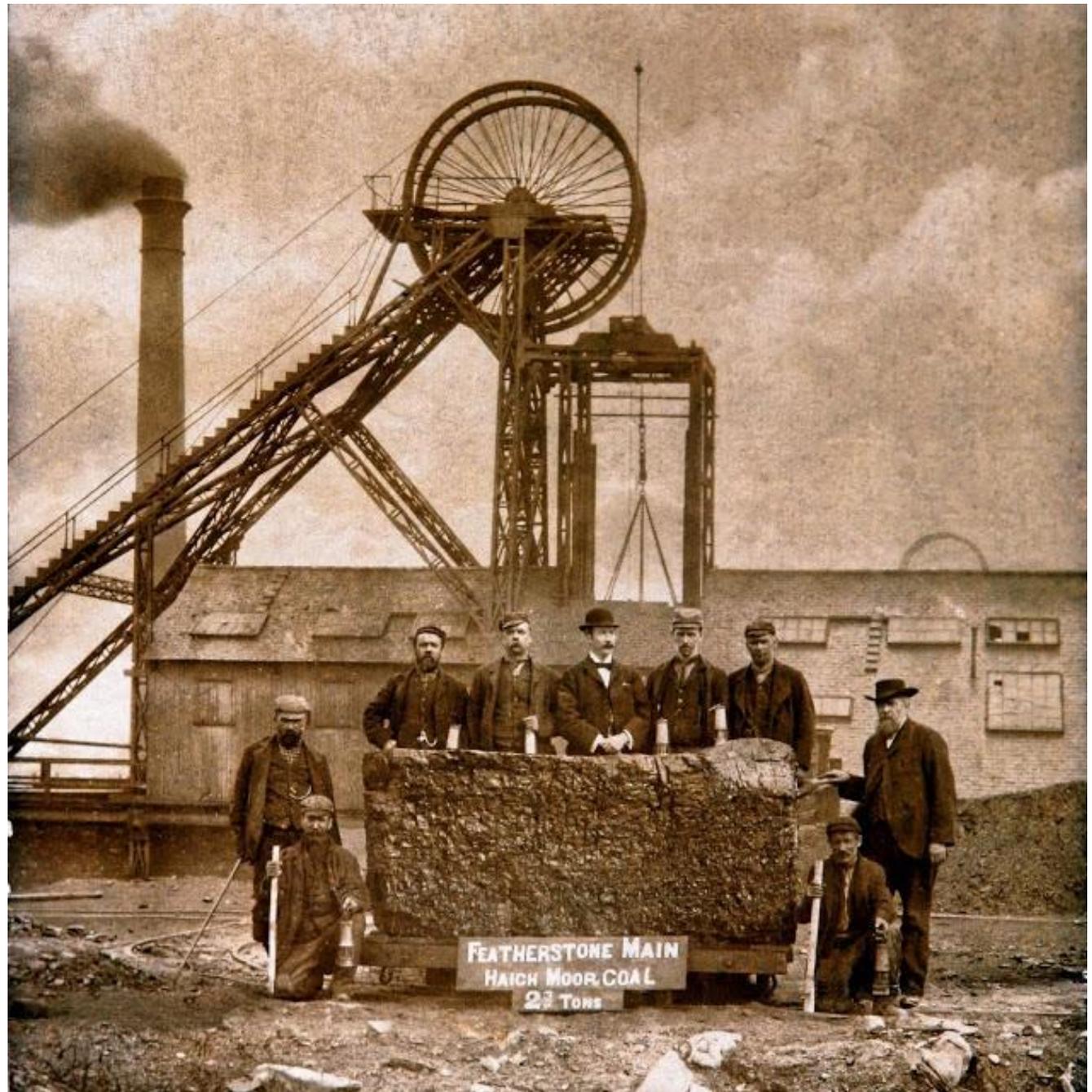
**Global Network for SMART
Organization Design**

Leiden, September 7, 2018

PURPOSE OF WORKSHOP

- To raise awareness of, and explore, ethical considerations (challenges, opportunities - both intended and unintended) that arise in the development and application of digital technologies.
- To explore principles already in existence to counteract technodeterminism
- To examine our own awareness of these ethical issues and how to address as a designer

Haigh Moor Colliery





The Harsh Reality



The Faces of Coal Mining in 1911

The **F**ace of Coal Mining Today



Choice and the Techno-Bureaucratic Imperative

There has arisen in organizational studies a theory and practice that has disestablished the technological imperative from its long reign of unchallenged rule which has created the technocratic bureaucracies that still remain the predominant organizational form in advanced industrial societies.

Eric Trist, 1973

Digital Technology will Either Be ...

Constraining

- *Diminish life and human dignity*
- Digital Taylorism and an insidious extension of bureaucratic design principles ... pervasive use of cameras, facial recognition, wearables/implantables ... “Big Brother” monitoring of all our movements
- Reinforce **C&C v1** for how we coordinate human endeavors...
 - **COMMAND & CONTROL**

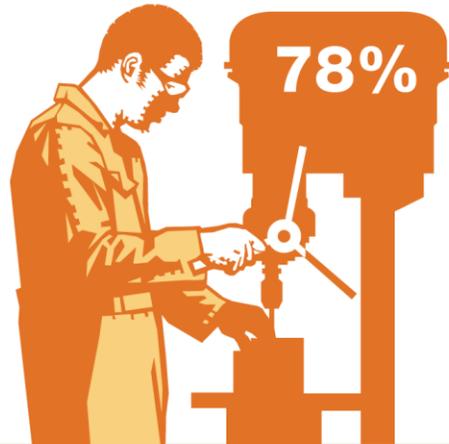
Liberating

- *Give people and life the potential to flourish as never before*
- Positively augment and extend human capabilities ... facilitating horizontal coordination while reducing transaction costs to virtually zero
- Enable **C&C v2** for how we coordinate human endeavors ...
 - **CONNECT & COLLABORATE**

It's more technically feasible to automate predictable physical activities than unpredictable ones.

Technical feasibility of automation, %¹

Predictable physical work



For example, welding and soldering on an assembly line, food preparation, or packaging objects

Unpredictable physical work



For example, construction, forestry, or raising outdoor animals

¹% of time spent on activities that can be automated by adapting currently demonstrated technology.

Use Case ... Wikipedia

It's hard to grasp just how important Wikipedia has become for the world, and how vulnerable. It is the fifth most visited website, serving more than 15 billion pageviews per month. It includes nearly 50 million articles, written in almost 300 languages—only 13% in English. It boggles the mind that all of this is created by human volunteers.

The human authorship of Wikipedia is its strength. The deliberative process of the editors ensures that Wikipedia remains robust and tends toward consensus. Just visit Twitter to see what a non-deliberative information platform looks like where bots roam free.

But with human hands come human limitations. As it becomes more and more essential to the world, biased and missing information on Wikipedia will have serious impacts. The human editors of the most important source of public information can be supported by machine learning. Algorithms are already used to detect vandalism and identify underpopulated articles. But the machines can do much more. They can track and summarize information missing from Wikipedia articles. They can even identify articles that are missing altogether, and generate the first draft.

To solve the recall problem of human-generated knowledge bases, we need to superpower the humans.

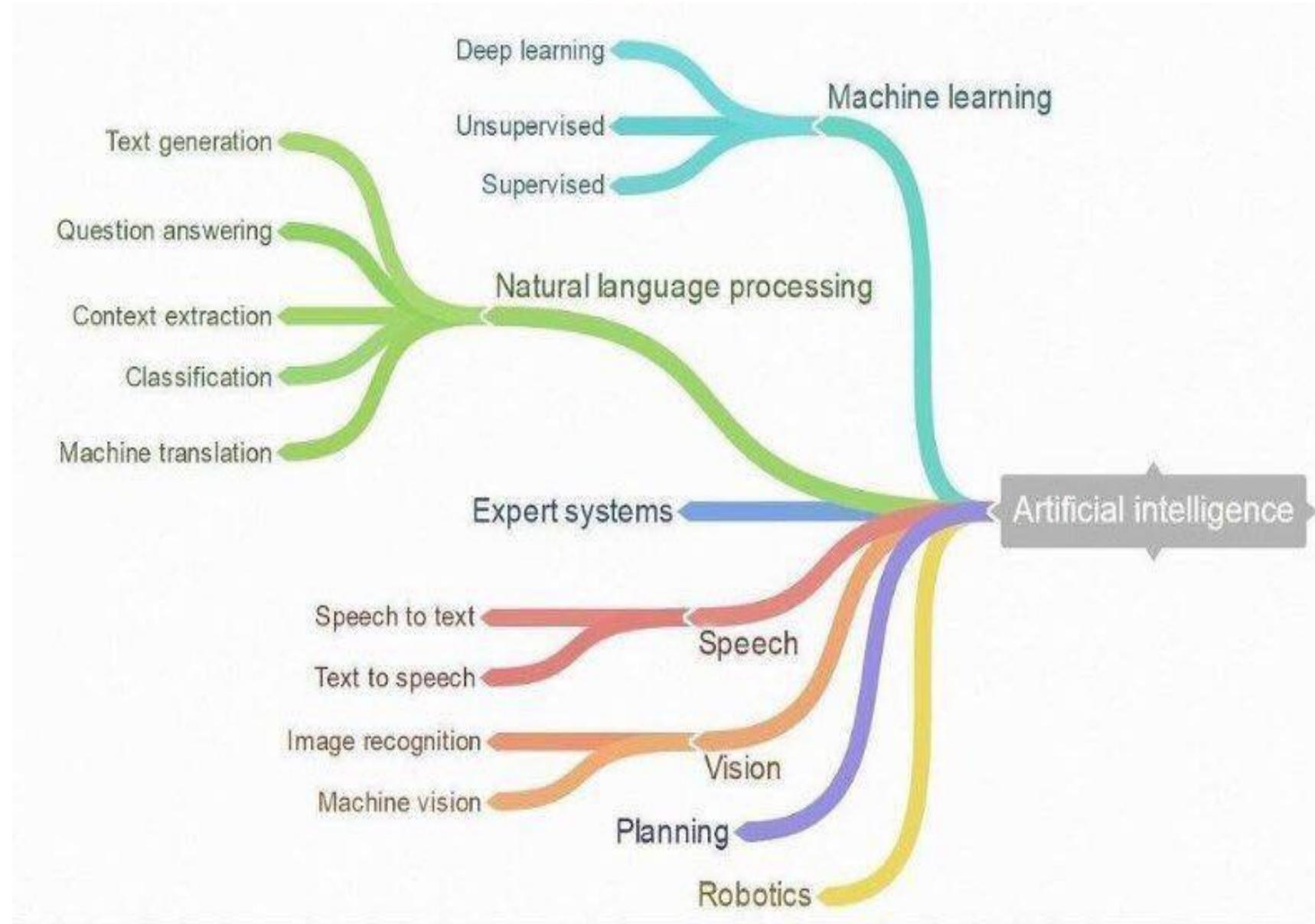


Use Case ... Workers in Exoskeleton Robotic Suits

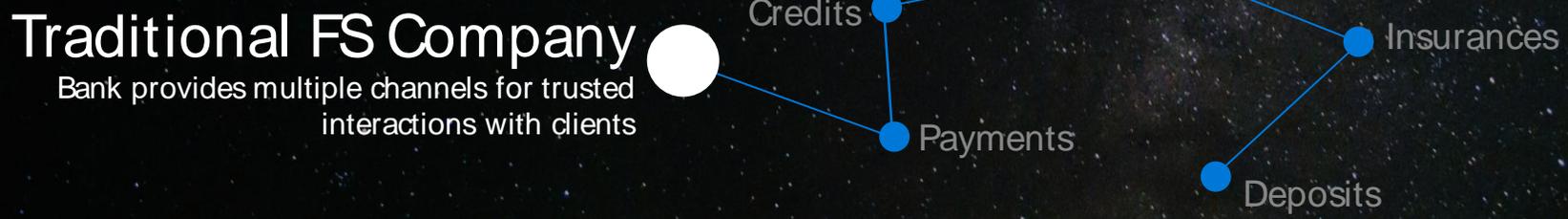
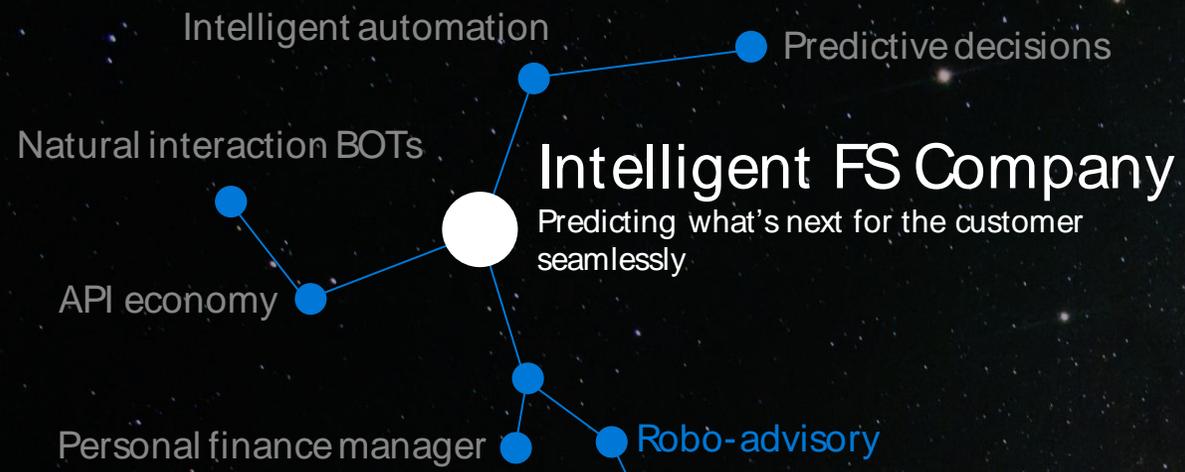


Making Sense of Artificial Intelligence

AI is going to be a seismic shift in business – and it's expected to create a [\\$15.7 trillion economic impact](#) globally by 2030.



Where is the Financial Services ecosystem going?



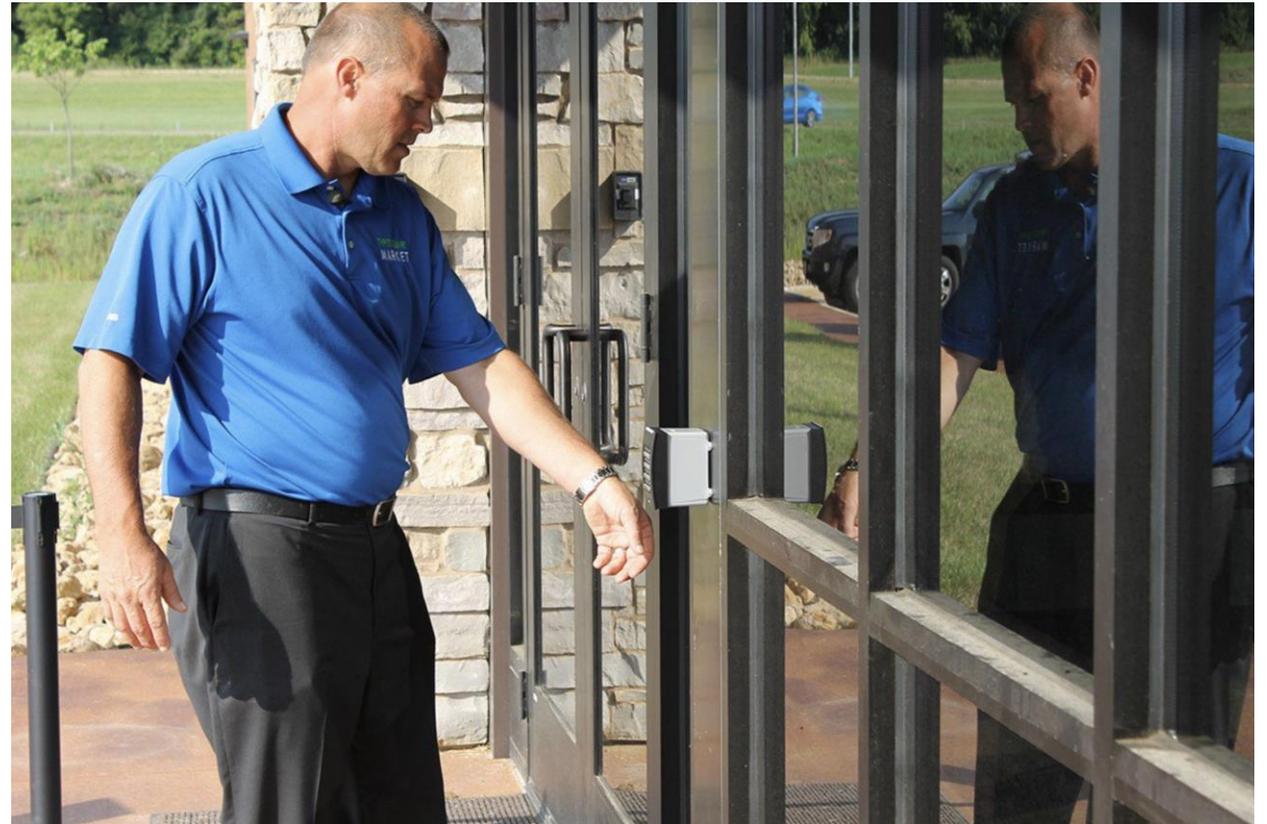
The ultimate goal is the provision of a single experience for customers through one interface – a seamless end-to-end journey to the desired customer outcome.



This company embeds microchips in its employees, and they love it

Last August, 50 employees at Three Square Market got RFID chips in their hands. Now 80 have them.

by Rachel Metz August 17, 2018





Who needs democracy when you have data?

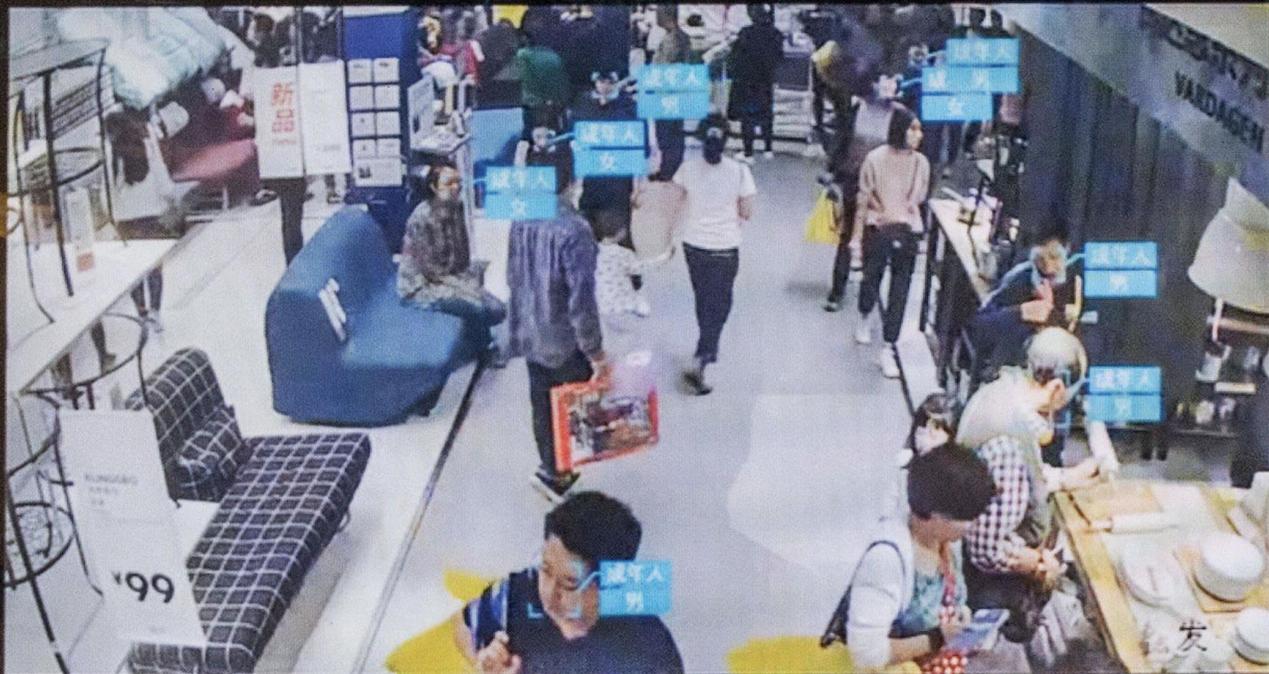
Here's how China rules using data, AI, and internet surveillance.

by Christina Larson August 20, 2018

People in Beijing are always under the watchful eye of Mao—and myriad surveillance cameras.



入口区



数据统计

	全景	入口区
今日累计人数	3720	3720
平均停留时长	105分钟	10分钟

入口区群体分布 | 购物区群体分布 | 服务区



群体停留时间

入口区

老年男性	5
老年女性	31
成年男性	12
成年女性	16
儿童	21

购物区

老年男性	30
老年女性	12
成年男性	13
成年女性	17
儿童	11

入口区



购物区



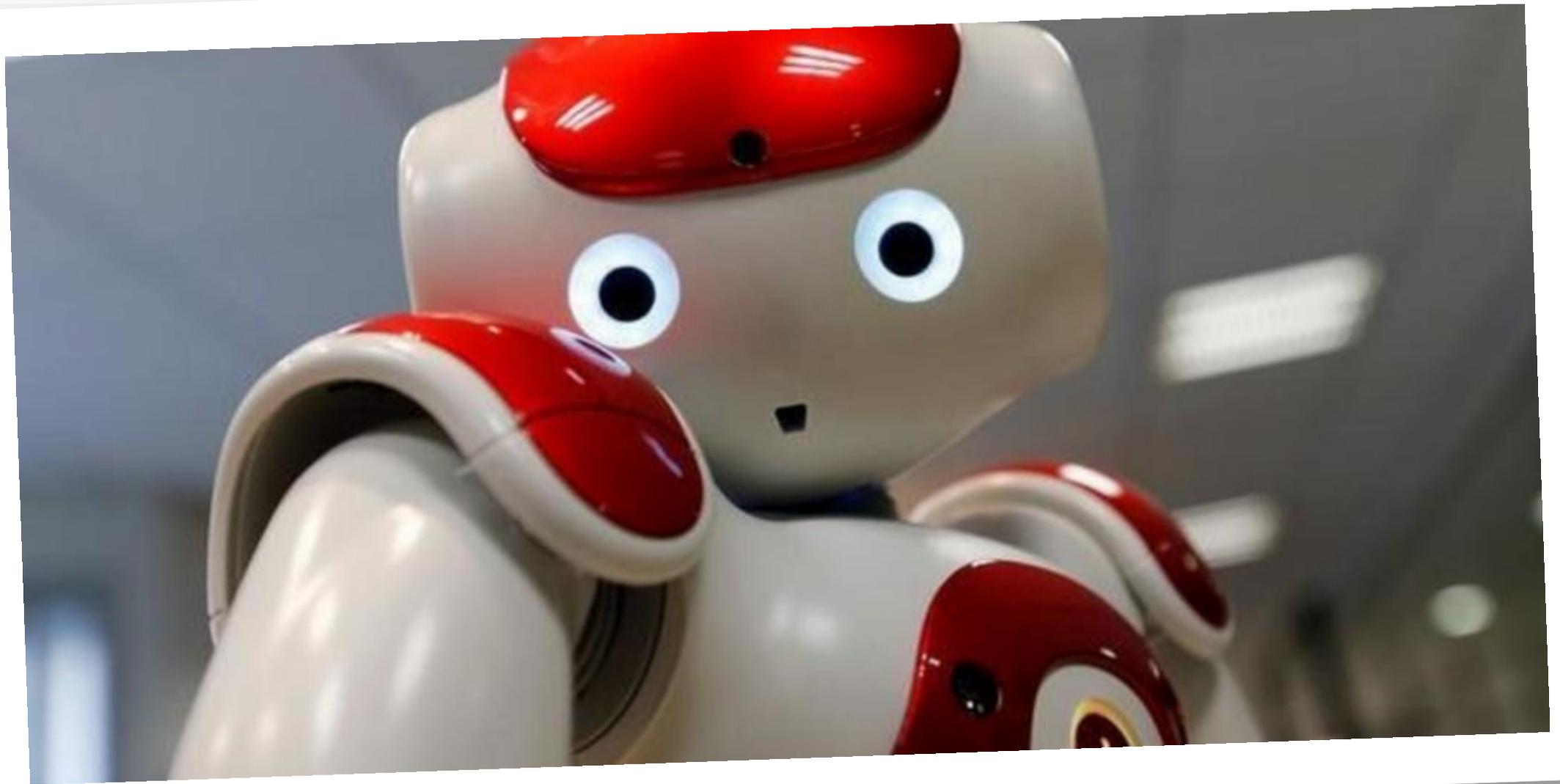
服务区





姓名 陈XX
身份证 422228XXXXXXXXX31
违法时间 2018-05-29 09:33:35

红灯停
绿灯行





<https://www.youtube.com/watch?v=maC2D4KZTyE>

Not with a Bang, but ...

One Convenience at a Time

Smartphones insinuated themselves into our lives. Now, think about the iPhone. Ten years ago, smartphones barely existed. Five years ago, they were mediocre phones, maybe good music players with short battery lives and not much else because the Wi-Fi was so bad everywhere you couldn't do much with them. Today, everybody uses them to do everything. No one made that decision. No one said, "OK, now we're going to let iPhones change our lives, disrupt our dinner conversations, and change the way we conduct business meetings." It happened one convenience, one cost saving at a time, and it changed our societies.

***That, to me, is how future globalization will occur: one convenience at a time, one job at a time—not being replaced in every variety of office. Nobody will ever decide to have a job apocalypse in which we replace all the service-sector workers or all the doctors or all the lawyers.** But it's already happening in media. It's happening in law. It's happening at the low end of medicine. And I think we're getting close to the holy-cow moment.*

How They Capture Our Attention ...

... isn't always best for our well-being.

- *Snapchat turns conversations into streaks, redefining how our children measure friendship.*
- *Instagram glorifies the picture-perfect life, eroding our self-worth.*
- *Facebook segregates us into echo chambers, fragmenting our communities.*
- *YouTube auto plays the next video within seconds, even if it eats into our sleep.*

These are NOT neutral products. They are part of a system **designed to addict us.**



Why and How Things Are Different Now



Artificially Intelligent

No other media drew on massive supercomputers to predict what it could show to *perfectly* keep you scrolling, swiping or sharing.



24/7 Influence

No other media steered two billion people's thoughts 24/7 – checking 150 times per day – from the moment we wake up until we fall asleep.



Social Control

No other media redefined the terms of our social lives: self-esteem, when we believe we are missing out, and the perception that others agree with us.



Personalized

No other media used a precise, personalized profile of everything we've said, shared, clicked, and watched to influence our behavior at this scale.

Choices, Choices, Choices

From	To
End-users being disengaged bystanders	Individuals negotiating with companies on equal terms
Opacity	Transparency
Unawareness	Agency
No control over how data is used	Ownership and profit sharing when data is used
Lack of awareness of the underlying values	Global agreement on the values that should enshrined

Digital Technology will Either Be ...

Constraining

- *Diminish life and human dignity*
- Digital Taylorism and an insidious extension of bureaucratic design principles ... pervasive use of cameras, facial recognition, wearables/implantables ... “Big Brother” monitoring of all our movements
- Reinforce **C&C v1** for how we coordinate human endeavors...
 - **COMMAND & CONTROL**

Liberating

- *Giv people and life the potential to flourish as never before*
- Positively augment and extend human capabilities ... facilitating horizontal coordination while reducing transaction costs to virtually zero
- Enable **C&C v2** for how we coordinate human endeavors ...
 - **CONNECT & COLLABORATE**

Moving from 'Can We' to 'Should We'

Technologists, business people and **organization designers** need to ask key user-centered questions before launching new business models, new products or new ways of organizing.

They must understand technology's impact on their context by asking themselves ...

- *Will this technology result in overall good?*
- *What might be some unintended consequences of this technology?*
- *What are the social and ethical impacts of the technology?*
- *Will this technology augment human intellect, disrupt it, or substitute for it?*
- *How could this technology be used negatively against users?*

strategy+business

AUTUMN 2018 ISSUE JULY 31, 2018

The Future of Artificial Intelligence Depends on Trust

If it is to drive business success, AI cannot hide in a black box.

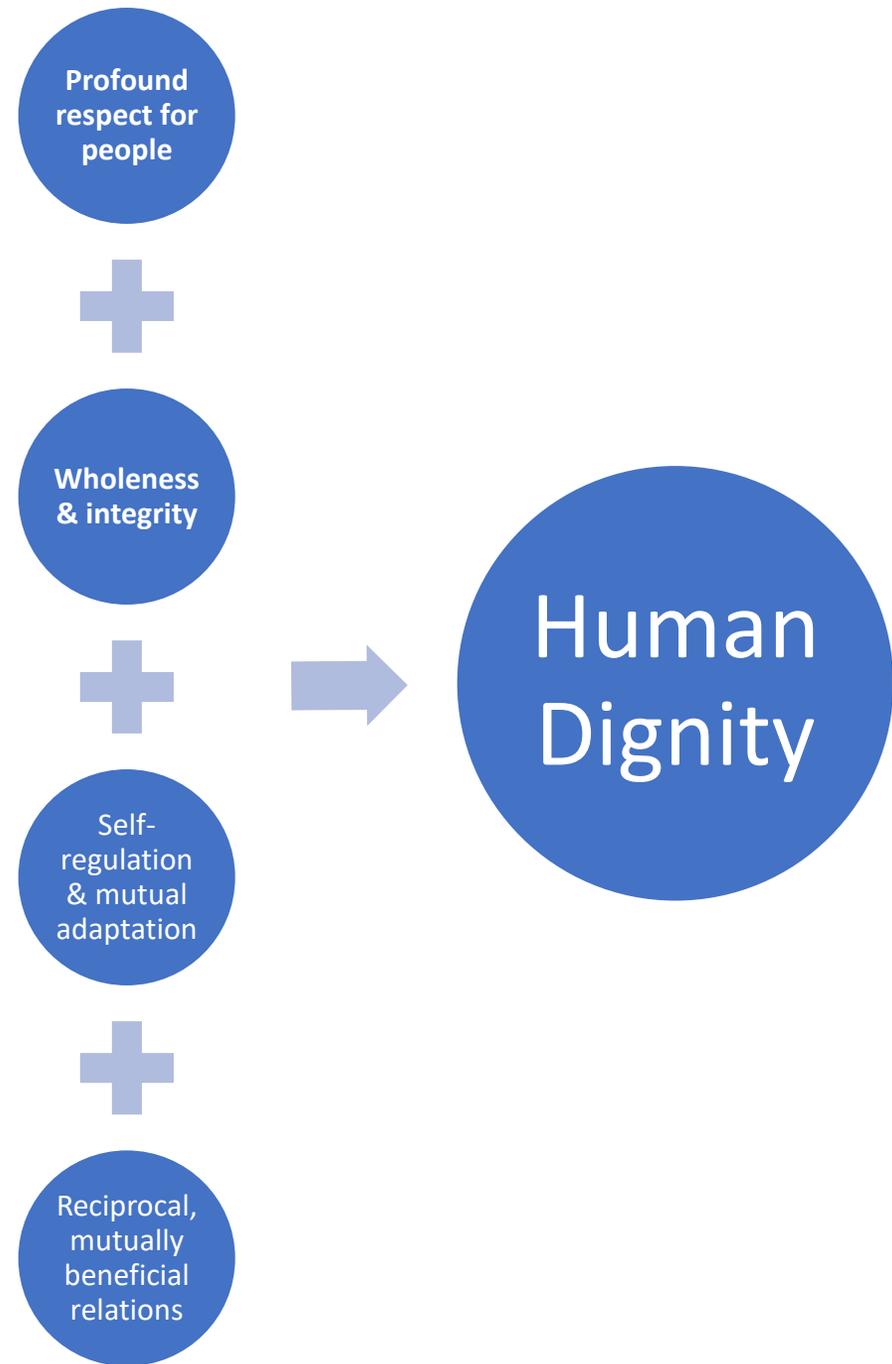
	Ethics	Morals
What are they?	The rules of conduct recognized in respect to a particular class of human actions or a particular group or culture.	Principles or habits with respect to right or wrong conduct. While morals also prescribe dos and don'ts, morality is ultimately a personal compass of right and wrong.
Where do they come from?	Social system - External	Individual - Internal
Why we do it?	Because society says it is the right thing to do.	Because we believe in something being right or wrong.
Flexibility	Ethics are dependent on others for definition. They tend to be consistent within a certain context, but can vary between contexts.	Usually consistent, although can change if an individual's beliefs change.
The "Gray"	A person strictly following Ethical Principles may not have any Morals at all. Likewise, one could violate Ethical Principles within a given system of rules in order to maintain Moral integrity.	A Moral Person although perhaps bound by a higher covenant, may choose to follow a code of ethics as it would apply to a system. "Make it fit"
Origin	Greek word "ethos" meaning "character"	Latin word "mos" meaning "custom"
Acceptability	Ethics are governed by professional and legal guidelines within a particular time and place	Morality transcends cultural norms

Defining Moment for AI Ethics is ... NOW!

*The decisions we make now are going to sit at the core of our models for years and continue to evolve, continue grow and continue to learn. So we need to set them on **a firm ethical foundation** so that as they grow through the years they'll continue to reflect our values.*

Darin Stewart, VP Gartner Research

STS First Principles

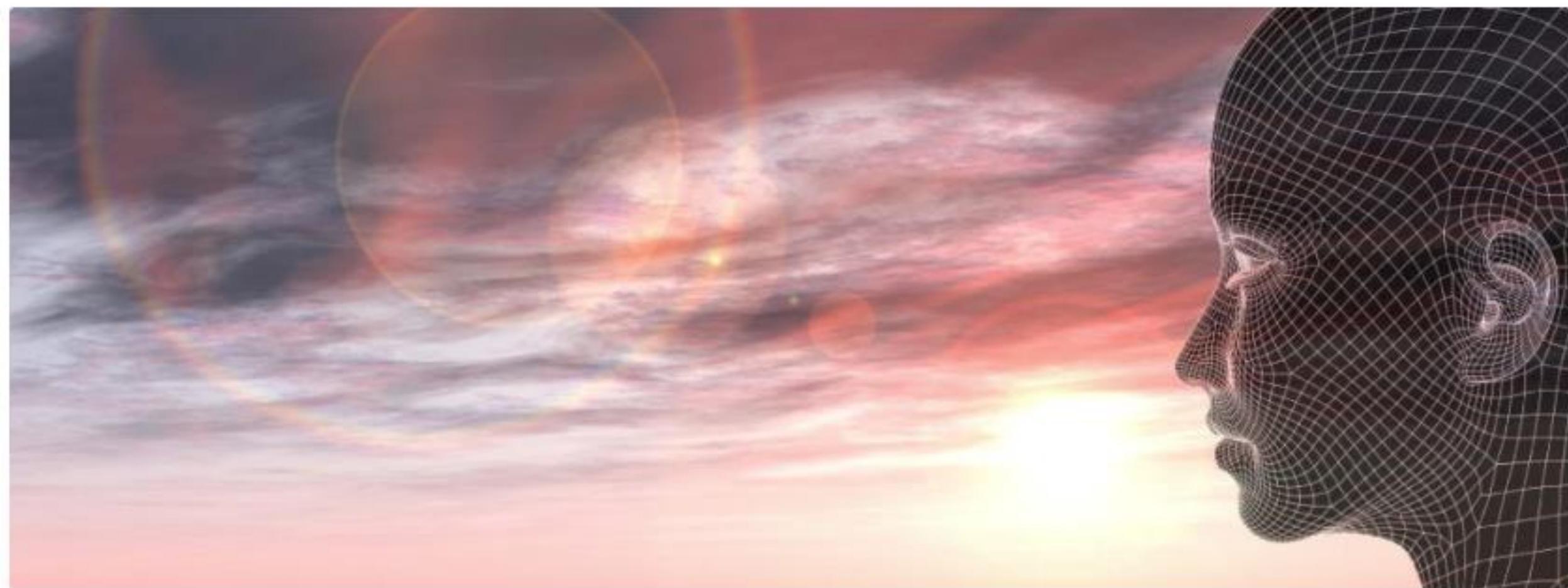


Google's Believes that AI Should ...

- Be socially beneficial.
- Avoid creating or reinforcing unfair bias.
- Be built and tested for safety.
- Be accountable to people.
- Incorporate privacy design principles.
- Uphold high standards of scientific excellence.
- Be made available for uses that accord with these principles.

AI Applications Google Will Not Pursue

- Technologies that cause or are likely to cause overall harm. Where there is a material risk of harm, we will proceed only where we believe that the benefits substantially outweigh the risks, and will incorporate appropriate safety constraints.
- Weapons or other technologies whose principal purpose or implementation is to cause or directly facilitate injury to people.
- Technologies that gather or use information for surveillance violating internationally accepted norms.
- Technologies whose purpose contravenes widely accepted principles of international law and human rights.



State of California Endorses Asilomar AI Principles

August 31, 2018 / by The FLI Team

Artificial intelligence has vast potential, and its responsible implementation is up to us.

Small Group Deliberation – 25 min

- In your small group discuss ...

What are the ethical principles that you believe we as **organization designers** need to incorporate in our work in order to challenge techno-determinism and the Digital Coalface?

- Identify your top 3-5 ethical principles
- Prepare to share with the total group

Group Reports

- 3 minutes per group
- Each group listens to other groups for similarities and tick those on your flipchart which match what you heard from other groups
- Whole group to reflect on “common ground”

TABLE OF DISRUPTIVE TECHNOLOGIES

HIGH	De Digital footprint eraser 91 DE	Ps Personal digital shields 92 DE	Ht Human head transplants 93 HA	Hc Human cloning & de-extinction 94 HA	Da Distributed autonomous corporations 95 DE	Sp Space solar power 96 SP	El Space elevators 97 SP	Vr Fully immersive virtual reality (VR) 98 DE	Co Artificial consciousness 99 EA	Qt We can't talk about this one 100
	Ci Conversational machine interfaces 81 MI	Le Life-expectancy algorithms 82 DE	Sa Stratospheric aerosols 83 SP	Br Battlefield robots 84 EA	Ad AI advisors & decision-making machines 85 DE	Ab AI board members & politicians 86 EA	Is Invisibility shields 87 SP	Ph Factory photosynthesis 88 SP	Th Transhuman technologies 89 HA	Te Telepathy 90 HA
	Ss Planetary-scale spectroscopy 71 SP	Ip Implantable phones 72 MI	He e-tagging of humans 73 DE	Mp Male pregnancy & artificial wombs 74 HA	Dn DNA data storage 75 DE	Gv Genomic vaccines 76 SP	Qs Quantum safe cryptography 77 DE	Cp Cognitive prosthetics 78 HA	Ud Data uploading to the brain 79 HA	Rd Reactionless drive 80 SP
	Gh Predictive gene-based healthcare 61 DE	Ak Automated knowledge discovery 62 EA	Rs Autonomous robotic surgery 63 EA	Em Emotionally aware machines 64 MI	Xx Humanoid sex robots 65 MI	Bh Human bio-hacking 66 HA	Me Internet of DNA 67 DE	Tc Thought control machine interfaces 68 MI	Dr Dream reading & recording 69 HA	Wh Whole Earth virtualisation 70 DE
	Md Mega-scale desalination 51 SP	Sw Self-writing software 52 EA	Mm Public mood monitoring 53 DE	Pb Programmable bacteria 54 SP	Et Peer-to-peer energy trading & transmission 55 DE	La Lifelong personal avatar assistants 56 MI	Sd Smart dust 57 DE	Lc Low-cost space travel 58 HA	Pc Planet colonization 59 HA	Sh Shape-shifting matter 60 SP
	Mc Medical tricorders 41 DE	Sf Smart flooring & carpets 42 DE	Dt Diagnostic toilets 43 DE	Se Smart energy grids 44 SP	Bf Algal bio-fuels 45 SP	Op Human-organ printing 46 SP	Bs Artificial human blood substitute 47 SP	Nm New materials 48 SP	Fu Fusion power 49 SP	Mr Self-reconfiguring modular robots 50 SP
	Dl Distributed ledgers 31 DE	Pa Precision agriculture 32 SP	Av Autonomous vehicles 33 EA	Id Intention decoding algorithms 34 MI	Df Drone freight delivery 35 EA	Ap Autonomous passenger aircraft 36 EA	Fp 3D-printing of food & pharmaceuticals 37 SP	Sr Swarm robotics 38 EA	Fd 4-dimensional materials 39 SP	Ze Zero-point energy 40 SP
	Rc Robotic care companions 21 MI	Sc Smart controls and appliances 22 DE	Cm Cultured meat 23 SP	Ro Delivery robots & passenger drones 24 EA	As Autonomous ships & submarines 25 EA	Rg Resource gamification 26 SP	Wa Water harvesting from air 27 SP	Eb Broadcasting of electricity 28 SP	Bp Bio-plastics 29 SP	Be Beam-powered propulsion 30 SP
	Cr Cryptocurrencies 11 DE	So Concentrated solar power 12 SP	Pp Predictive policing 13 DE	Eh Micro-scale ambient energy harvesting 14 SP	Wt Airborne wind turbines 15 SP	Ac Avatar companions 16 MI	Mh Metallic hydrogen energy storage 17 SP	Sg Smart glasses & contact lenses 18 HA	Pe Pollution eating buildings 19 SP	Ff Force fields 20 SP
LOW	Sn Smart nappies 1 DE	Dw Deep ocean wind farms 2 SP	Va Vertical agriculture 3 SP	We Wireless energy transfer 4 SP	Bi Balloon-powered internet 5 SP	Px Powered exoskeletons 6 HA	Cc Computerized shoes & clothing 7 DE	Vt Vacuum-tube transport 8 SP	Sj Scram jets 9 SP	Am Asteroid mining 10 SP
	SOONER				TIME*					LATER

A dashboard of 100 wonderful, weird (and possibly worrying) ways the world might change in the foreseeable future

Example of organizations active in each area

- 1 **Monit** (South Korea), **Abena Nova** (Denmark), **Siempre Secos** (Spain)
- 2 **Statoil** (Norway), **Siemens** (Germany), **Voltturn** (US), **UMaine** (US)
- 3 **Green Skies Vertical Farms** (US), **Aero Farms** (US), **Neo Farms** (Germany), **Urban Crop Solutions** (Belgium)
- 4 **WiTricity** (US), **Powermat** (Israel), **Apple/Power By Proxi** (US), **Qualcomm** (US), **Mojo Mobility** (US), **Mopar** (US), **Fulton Innovation** (US)
- 5 **Google/Alphabet** (US)
- 6 **ReWalk** (US), **Rex Bionics** (US), **SuitX/US Bionics** (US), **Ekso Bionics** (US), **Lockheed Martin** (US)
- 7 **Google/Alphabet** (US), **Samsung** (Korea), **Hexoskin** (Canada), **Owlet** (US), **Komodo Tech** (Canada), **Shiftwear** (US), **Lechal** (India), **OM Signal** (Canada)
- 8 **The Boring Company/Elon Musk** (US), **China Aerospace Science and Industry Corporation** (China)
- 9 **Reaction Engines** (UK), **NASA** (US), **Boeing** (US), **Lockheed Martin** (US), **Airbus** (France)
- 10 **Deep Space Industries** (US), **Planetary Resources** (US), **Made in Space** (US)
- 11 **Bitcoin** (Japan), **Ripple** (US), **Litecoin** (US)
- 12 **Solarreserve** (US), **Abengoa** (Spain), **North China Power Engineering** (China), **Shanghai Electric** (China), **Zhejiang Supcon Solar** (China), **NWEPDI** (China)
- 13 **PredPol** (US), **ECM Universe** (US)
- 14 **Pavegen** (UK), **ECEEN** (China)
- 15 **Google/Alphabet** (US), **Joby Energy** (US), **Altaeros** (US), **Kitegen** (Italy), **Enerkite** (Germany)
- 16 **Pullstring** (US), **Amazon** (US), **Alphabet/Google** (US), **Nintendo** (Japan), **Invisible Girlfriend/Boyfriend** (US)
- 17 **NASA** (US)
- 18 **Alphabet/Verily** (US), **Amazon** (US), **Vuzix** (US), **Everylight** (Israel)
- 19 **Elegant Embellishments** (Germany), **iNova** (Spain), **Studio Roosegaarde** (Netherlands), **Prosolve 370e** (Germany)
- 20 **Dstl** (UK), **Boeing** (US)
- 21 **Softbank** (Japan), **AIST** (Japan), **Blue Frog Robotics** (France), **Care-o-bot** (Germany), **Riken/Sumitomo Riko** (Japan), **Mayfield Robotics** (US)
- 22 **Amazon** (US), **Google/Alphabet** (US), **Philips** (Netherlands), **Samsung** (South Korea), **Dyson** (UK), **Miele** (Germany), **iRobot** (US)
- 23 **Impossible Foods** (US), **Memphis Meats** (US), **Super Meat** (Israel), **Finless Foods** (US), **New Harvest** (US)
- 24 **Wing/Alphabet** (US), **Starship Technologies** (UK), **Volocopter** (Germany), **eHang** (China), **Piaggio** (Italy)
- 25 **Leidos** (US), **Boeing** (US), **Rolls Royce** (UK)
- 26 **Joulebug** (US), **Waterpebble** (UK)
- 27 **Permalution** (US), **Sun to Water** (US)
- 28 **Powercast** (US)
- 29 **NatureWorks** (US), **Gruppo MAIP** (Italy), **Genomatica** (US), **Green Dot Bioplastics** (US)
- 30 **NASA** (US)
- 31 **Everledger** (UK), **Stampery** (Spain), **Brickblock** (Germany), **Stock.it** (Germany)
- 32 **Blue River Technology** (US), **Hortau** (Canada)
- 33 **Google/Waymo** (US), **Voyage** (US), **Nvidia Automotive** (US), most major auto-makers
- 34 **Amazon** (US), **Google/Alphabet** (US), **Philips** (Netherlands), **Samsung** (South Korea), **Dyson** (UK), **Miele** (Germany), **iRobot** (US)
- 35 **Google/Alphabet** (US), **Amazon** (US), **Flirtey** (US)
- 36 **Airbus** (France), **Boeing** (US)
- 37 **FabCafe** (Japan), **NASA** (US)
- 38 **SRI International** (US)
- 39 **Stratasys** (US), **Autodesk** (US)
- 40 **NASA** (US)
- 41 **Basil Leaf Technologies** (US), **Dynamical Biomarkers Group** (US/Taiwan), **Scanadu** (US)
- 42 **Starwood Hotels** (US), **MariCare** (Finland), **Scanalytics** (US), **NASA** (US), **Boeing** (US), **Lockheed Martin** (US), **Airbus** (France)
- 43 **Flowsky** (Japan), **Scanadu** (US)
- 44 **Tesla** (US), **ABB** (Switzerland), **Siemens** (Germany), **IBM** (US), **Itron** (US)
- 45 **Synthetic Genomics/ExxonMobil** (US), **Global Algae Innovations** (US), **Algenol** (US)
- 46 **Organovo** (US), **Envision TEC** (Germany), **RegenHU** (Switzerland), **Cellink** (Sweden), **Seraph Robotics** (US)
- 47 **Hb02 Therapeutics** (South Africa), **Biospace** (US)
- 48 **For example Vantablack by Surrey NanoSystems** (UK), **Microsoft** (US)
- 49 **ITER** (EU/France), **Tokamak Energy** (UK), **Alphabet/Google/Tri Alpha Energy** (US), **General Fusion** (Canada), **Helion Energy** (US), **Lockheed Martin** (US)
- 50 **Festo** (Germany)
- 51 **Israel Desalination Enterprises Technologies** (Israel), **Acciona** (Spain), **Fluence Corporation** (US)
- 52 **Microsoft** (US), **Google/Alphabet** (US), **Open AI** (US)
- 53 **Open Utility/Essen** (UK/Netherlands), **Knowlsys** (China)
- 54 **Gingko Bioworks** (US), **US Naval Research Laboratory** (US), **US Army Research Lab** (US), **Darpa** (US)
- 55 **Open Utility** (UK/Netherlands), **Power Ledger** (Australia), **LO3 Energy** (US), **Energy Web Foundation** (Switzerland)
- 56 **Konami Corp** (Japan), **Mitsuku** (UK)
- 57 **MOOG** (US), **Darpa** (US)
- 58 **Space X/Elon Musk** (US), **Blue Origin** (US), **Virgin Galactic** (UK), **Rocket Lab** (US), **Axiom Space** (US), **SpaceIL** (Israel), **Firefly Aerospace** (US)
- 59 **Space X** (US), **UAE Mars Mission** (UAE), **NASA** (US)
- 60 **Intel** (US)
- 61 **Kite Pharma/Gilead Sciences** (US), **23andMe** (US), **Phenogen Sciences** (US), **Regeneron** (US), **Veritas Genetics** (US)
- 62 **IBM** (US)
- 63 **Intuitive Surgical** (US), **Verb Surgical/Alphabet/Johnson & Johnson** (US), **Da Vinci Surgery** (US)
- 64 **IBM** (US), **Toyota** (Japan), **Mimosys** (Japan), **Persado** (US), **Joy AI** (US)
- 65 **Realbotix** (US), **True Companion** (US)
- 66 **BioTeq** (UK), **Grindhouse Wetwear** (US), **Dangerous Things** (US), see also **The Eyeborg Project** and the **Cyborg Foundation**
- 67 **Alphabet/Google Genomics** (US), **Amazon** (US), **illumina** (US), **Oxford Nanopore Technologies/Metricor** (UK)
- 68 **CTRL-Labs** (US), **Emotiv** (US), **Neuralink** (US), maybe **Facebook** (US)
- 69 **No example found**
- 70 **Impossible** (UK)
- 71 **European Organization for Astronomical Research in the Southern Hemisphere** (European consortium of 16 countries)
- 72 **No example found**
- 73 **Epicerator** (Sweden) and **Three Square Market 32M** (US) are close
- 74 **No example found**
- 75 **Twist Bioscience** (US)
- 76 **Vaccinogen** (US), **EpiVax** (US), **IBM** (US), **Juno Therapeutics** (US)
- 77 **Alphabet/Google** (US), **KETS** (UK), **IDQ** (Switzerland), **Isara** (Canada)
- 78 **Darpa** (US)
- 79 **Kernel** (US), **Neuralink/Elon Musk** (US), **2045 Initiative** (Russia), **Darpa** (US), **General Electric/Braingate** (US), possibly **Facebook** (US)
- 80 **NASA** (US), **Cannae** (US)
- 81 **Apple** (US), **Amazon** (US), **Alphabet/Google** (US), **Microsoft** (US)
- 82 **No example found**
- 83 **CIA** (US)
- 84 **Lockheed Martin** (US), **QinetiQ** (UK), **Boston Dynamics/Softbank** (US/Japan)
- 85 **Woebot** (US), **Pefin** (US), **LV** (UK)
- 86 **Deep Knowledge Ventures** (Hong Kong), **Tieto** (Finland)
- 87 **BAE Systems** (UK), **Toyota** (Japan), **NB**. Big difference between optical camouflage and bending light to make things disappear
- 88 **Breakthrough Energy** (US), **RIPE** (US), **Joint Centre for Artificial Photosynthesis** (US)
- 89 **SENS Research Foundation** (US), **Methuselah Foundation/Peter Thiel** (US)
- 90 **Facebook** (US), **Neuralink/Elon Musk** (US)
- 91 **Suicide Machine** (Netherlands), **Just Delete Me** (US)
- 92 **No example found**
- 93 **Turin Advanced Neuroimmunology Group** (Italy)
- 94 **Sooam** (South Korea), **Revive and Restore** (US)
- 95 **No example found**
- 96 **Rebeam** (US), **Solaren Corp** (US)
- 97 **Thoth Technology** (Canada)
- 98 **Impossible** (UK), **HelloVR** (US), **Magic Leap** (US), **Microsoft** (US), See also **Mind Maze** (US), **Facebook** (US) and possibly **Apple** (US)
- 99 **Possibly Alphabet/Google** (US)
- 100 **As it says, we can't say**

In the Future

Will we will look back at today as a turning point towards humane design ... when we moved away from technology that extracts attention and erodes society, towards technology that protects our minds and replenishes society?