

Robots vs. Lawyers...? Briefing FRONTIERS

Navigating the rapidly evolving landscape



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londonfuturists.com

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<http://todocumentaryfilms.com/will-work-for-free/>

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Atlas, The Next Generation

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

Boston Dynamics



Typing pool

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<http://antiscapty.co.uk/2011/11/25/vintage/>

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Elevator operator



Till operator



Bank teller



Passport checker

@dw2 [https://www.fch.uni-lj.si/~rcfk/pv44870b26520v2.../](https://www.fch.uni-lj.si/~rcfk/pv44870b26520v2...) Page 5

**Foxconn factory employees reduced from 110k to 50k, thanks to robots
Kunshan, in Jiangsu province**



"...tasted success in reduction of labour costs.
More companies are likely to follow suit..."

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<http://www.scribd.com/news/china/economy/article/4930938/niss-robots-80000-employees-reduced-at-smr-factory-china>

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Four theses to be explored

AI is over-hyped(?) ? AI progress will speed up Anticipate creative, caring robots

Progress with AI will slow down(?) ✗

AI won't impact the creative, higher-level jobs(?) ✗

AI will create more jobs than it destroys(?) ✗

The fourth Industrial Revolution is different

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Four stages of resistance

(by lawyers to ideas about technological change)

1. "This is worthless nonsense"
2. "This is an interesting but perverse point of view"
3. "This is true but quite unimportant"
4. "I have always said so"

Major opportunity here



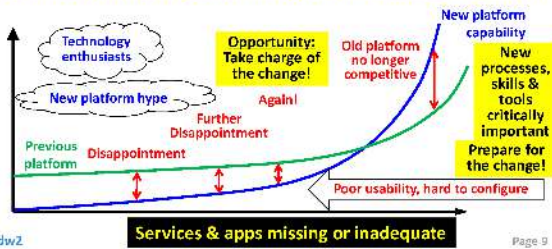
Professor Richard Susskind OBE
<http://www.dur.ac.uk/campbell.com/richard-susskind/>

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Disruptions can take a long time in gestation

Even though they may eventually seem to blossom quickly

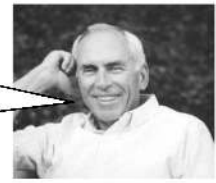


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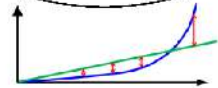
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Amara's Law

We tend to **overestimate** the effect of a technology in the **short run** and **underestimate** the effect in the **long run**

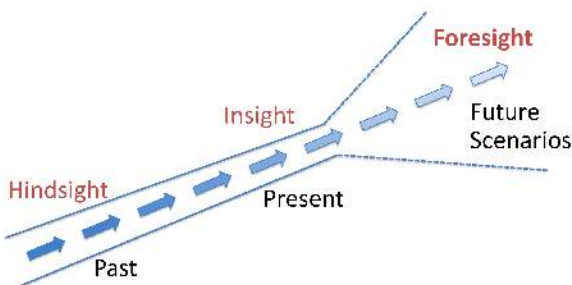


Roy Amara
 President, Institute for the Future



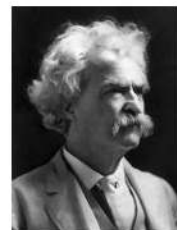
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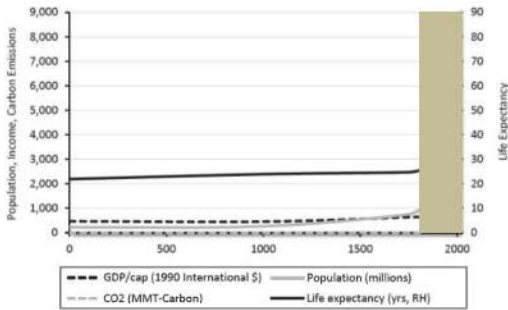
"History does not repeat itself, but it rhymes"

Attributed to Mark Twain, novelist

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<http://cucteinvestigator.com/2014/05/12/history-rhymes/>

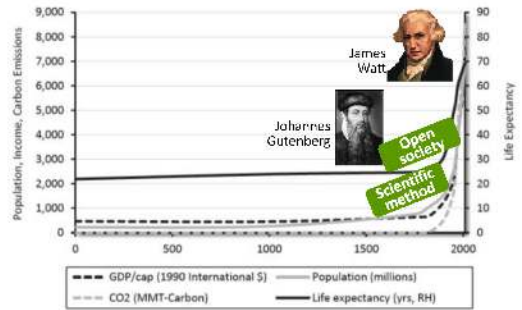
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<http://subject.cato.org/sites/cato.org/files/pubs/pdf/pa715.pdf>

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<http://object.cato.org/sites/cato.org/files/pubs/pdf/pa715.pdf>

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"The average lifespan of a company listed in the Standard & Poor 500 index of leading US companies has decreased from 67 years in the 1920s to just 15 years today"

- Richard Foster, Yale

In 8 years time, "more than 3/4 of the S&P 500 will be companies that we have not heard of yet"

"Uber is higher valued than GM, Ford and most of the S&P 500"



<http://www.nasdaq.com/article/uber-is-higher-valued-than-gm-ford-and-most-of-the-sp-500-cm551162>
 @dw2 <https://www.bbc.co.uk/news/business-16611080> <http://som.yale.edu/richard-n-foster>

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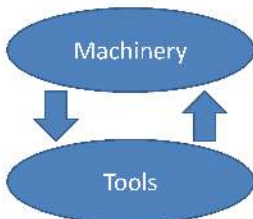


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<http://www.visua.capitalist.com/chart-largest-companies-market-cap-15-years/>

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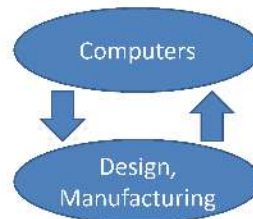
Positive feedback cycles



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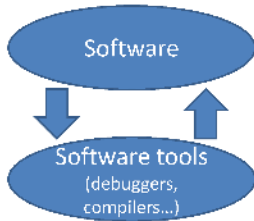
Positive feedback cycles



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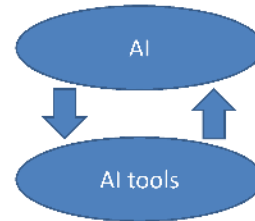
Positive feedback cycles



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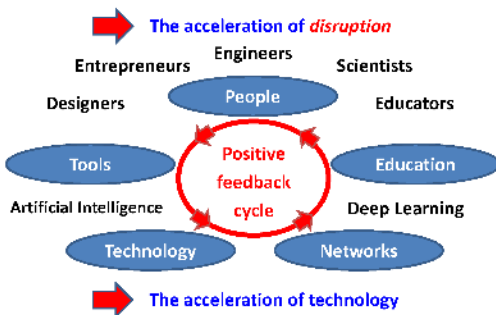
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Positive feedback cycles



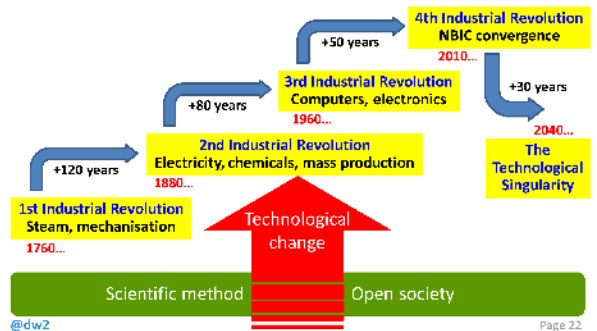
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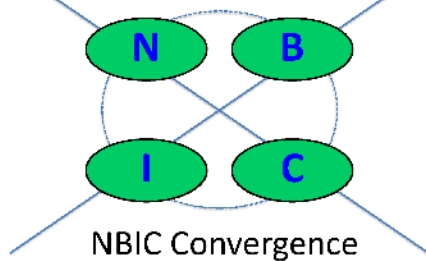
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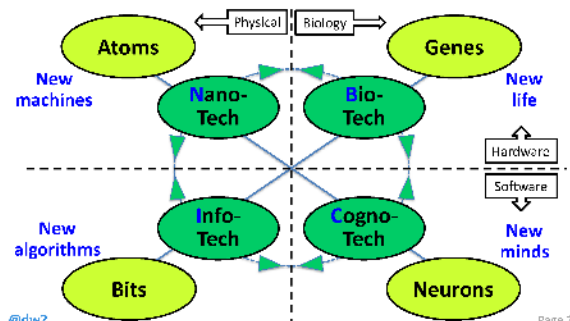
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The 4th Industrial Revolution



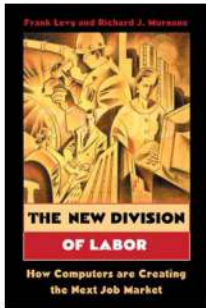
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Frank Levy
MIT



Richard J. Murnane
Harvard

GOOPS

2004

"Computerisation should have little effect on the percentage of the work force engaged in these tasks..."

Examples include driving a truck...

"Non-routine manual tasks: physical tasks that cannot be well-described as following a set of If-Then-Else rules, because they require optical recognition and fine motion control that have proven extremely difficult for computers to carry out..."

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<http://www.amazon.com/The-New-Division-Labor-Computers/dp/009119724>

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Sandstorm: Winner of 2004 DARPA Grand Challenge



150 miles in the Mojave Desert region of the US

Completed <5% of the course

2005 Challenge: Five vehicles completed whole course

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http://ar.voldocidocs.com/vol/05376_Grand_Challenge

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Robobear



"Japan is running out of people to take care of the elderly, so it's making robots instead"

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<http://uk.businessinsider.com/japan-developing-carebots-for-elderly-care-2015-11>

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Paro



"emobot"

"Robots in Japan now have emotions"

Pepper

"AI Robots Can Now Read Human Emotions"

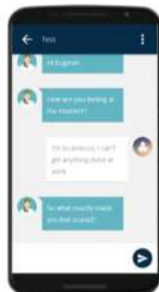
- noticing human facial expressions
- deciphering mood based upon their tone of voice

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<http://pninfo.com/35584>

<https://qz.com/433877/robots-in-japan-now-have-emotions/>

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- COGNITIVE EMOTIONAL BEHAVIORAL THERAPY
- PSYCHOLOGICAL COACHING
- MATERNITY EVALUATION FOR PREGNANT WOMEN
- QUESTIONNAIRE AUTOMATION
- IMPROVED THERAPY ADHERENCE
- MENTAL SUPPORT WHILE WAITING IN A MEDICAL SETTING
- COPIING WITH MENTAL ISSUES TIED TO MEDICATION
- MAKING PSYCHOLOGICAL BOD MORE AFFORDABLE
- CAREGIVER BURNOUT PREVENTION

Affordable, on-demand, and quality mental healthcare for everyone using Psychological Artificial Intelligence

Tess

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<https://a2.ai/>

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AI creating music as good as... Bach



Prof David Cope
University of California at Santa Cruz

"wonderful... the music touched my innermost being"
glum silence... anger

"Musical Turing test"
University of Oregon

Actual Audience guess

Bach Dr. Steve Larson

"Ermy" Bach

Dr. Steve Larson Computer



"Bach is absolutely one of my favourite composers, my admiration for his music is deep and cosmic. That people could be duped by a computer program was very disconcerting." – Steve Larson

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<http://www.creativehistory.com/archives/algorithmic-music-david-cope-a-vid-av/>

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“Human Poker Pros Are Getting Trounced By an AI”



@dw2 <http://gimodo.com/web/tutorials-that-human-poker-pros-are-getting-trounced-1791555531> Page 31



@dw2 <http://www.toishare.com/news/alpha-go-defeats-sedol-second-time-23377.html> Page 32

The third machine age

1. Machines replaced **human muscular effort**
 - They manipulated **energy**
 - They produced **motion**
2. Then machines replaced **human calculation effort**
 - They manipulated **information** (using algorithms)
 - They produced **numerical results**
3. Machines are now replacing **human creative effort**
 - They manipulate **“learning data”** to reveal cause-effect patterns
 - They produce **algorithms** (using information)
 - They progress from a **seed algorithm** to unexpected **new insight**

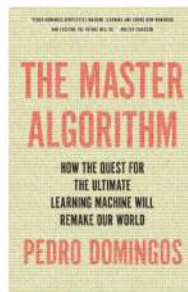


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“The Master Algorithm”

Pedro Domingos, 2015

Multi-convergence of “tribes”



Tribe	Origin	Core algorithm
Symbolists	Logic & philosophy	inverse deduction
Connectionists	Neuroscience	back propagation
Evolutionaries	Evolutionary biology	genetic programming
Bayesians	Statistics	probability inference
Analogizers	Psychology	kernel machines

“How the quest for the ultimate learning machine will remake our world”

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@dw2 <https://med.um.cu/backchannel/google-search-will-be-you-next-brain-52U72bec523> Page 35



Photo via Andrew Ng, Chief Scientist, Baidu

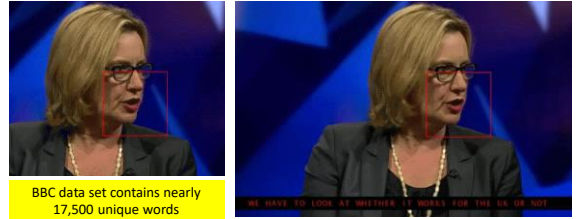
@dw2 <http://www.sideshare.net/ExtractConf/andrew-ng-chief-scientist-at-baidu> Page 36

“Smartphones will save lives by spotting skin cancer early”



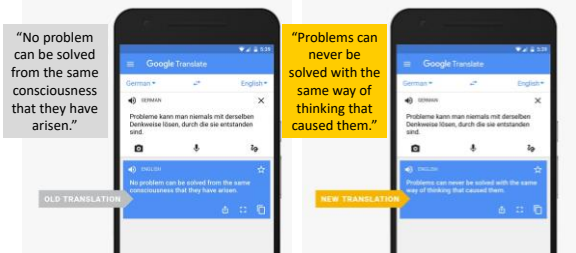
@dw2 <http://www.thetimes.co.uk/article/smartphones-will-save-lives-by-spotting-skin-cancer-early-ztbx7zdf> Page 37

“Google’s DeepMind AI can lip-read TV shows better than a pro”: 46.8% words correct vs. 12.4%



@dw2 <https://www.newscientist.com/article/2113299-googles-deepmind-ai-can-lip-read-tv-shows-better-than-a-pro/> Page 38

“With this update, Google Translate is improving more in a single leap than we’ve seen in the last ten years combined. But this is just the beginning...”



@dw2 <https://www.blog.google/products/translate/found-translation-more-accurate-fluent-sentences-google-translate/> Page 39



“Computers will have developed ‘common sense’ within a decade and we could be counting them among our friends not long afterwards”

Geoffrey Hinton
University of Toronto and Google

@dw2 <http://www.macleans.ca/society/science/the-meaning-of-alphago-the-ai-program-that-beat-a-go-champ/>
<https://www.theguardian.com/science/2015/may/21/google-a-step-closer-to-developing-machines-with-human-like-intelligence> Page 40

5 unpredictable factors accelerating AI

- Hardware with higher performance: Continuation of Moore’s Law?**
 - “18 different candidates” in Intel labs to add extra life to that trend
 - Hard-to-predict breakthroughs with **Quantum Computing**
- Software algorithm improvements?** **Improvements from Big Data**
 - Can speed things up faster than hardware gains – e.g. chess computers
 - Compare: Andrew Wiles, **unexpected proof** of Fermat’s Last Theorem (1993)
- Learnings from studying the human brain?**
 - Improved scanning techniques -> “neuromorphic computing” etc
 - Philosophical **insight into consciousness/creativity?**!
- More people studying these fields than ever before** **(Smarter people?!)**
 - Stanford University online course on AI: 160,000 students (23,000 finished it)
 - More components / databases / tools / methods **ready for re-combination**
 - Unexpected **triggers for improvement** (malware wars, games AI, financial AI...)
- Transformation in society’s motivation?** **“Sputnik moment!”?**
 - Financial motivation

@dw2 <http://intelligence.org/2013/05/15/when-will-ai-be-created/> Page 41

“China’s Artificial-Intelligence Boom”

The U.S. no longer leads the world in journal articles on Deep Learning. Now China leads.

“The velocity of work is much faster in China than in most of Silicon Valley,” says Andrew Ng, chief scientist at Baidu.



@dw2 <https://www.theatlantic.com/technology/archive/2017/02/china-artificial-intelligence/516615/> Page 42

http://www.ers.usda.gov/media/259572/eib3_1.pdf



1900: 41%
 1930: 22%
 1945: 16%
 1970: 4%
 2000: 1.9%

Farm worker
 ↓
 UX designer in web firm

Will lawyers be like farm workers?

@dw2 http://www.bonsonhistory.co.uk/html/james_b_1825.html Page 43

http://www.humanesociety.org/assets/pdfs/hsp/soaiv_07_ch10.pdf



1900: 21M
 1915: 26M
 1935: 17M
 1950: 8M
 1960: 3M

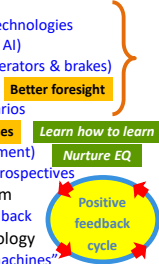
Farm worker
 ↓
 UX designer in web firm

Will lawyers be like horses?

@dw2 <http://www.bonzie.com/pictures-over-time/pictures-taken-in-1900/page-7/picture-0a7a09w8/size-4/malemy/life-on-the-farm-at-malemy-1900-1910> Page 44

Preparing for a fast-changing future

1. Fight **techno-myopia**
 - Become literate about NBIC and other exponential technologies
 - Particularly about *Deep Learning* (second generation AI)
 - Factors influencing speed ups and slow downs (accelerators & brakes)
2. Fight **techno-centrism & techno-fatalism**
 - Anticipate and influence the human aspects of scenarios
3. Fight **inertia & complacency**
 - Learn about Agile & Lean (not just software development)
 - Increments; sprints; value-flow; pivots; feedback; retrospectives
4. Open collaboration -> Practice collaborative futurism
 - Improve your scenario planning through regular feedback
5. Intelligence Augmentation (IA): partner with technology
 - Race “with the machines” rather than “against the machines”



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