Get ready!

The future is happening around us

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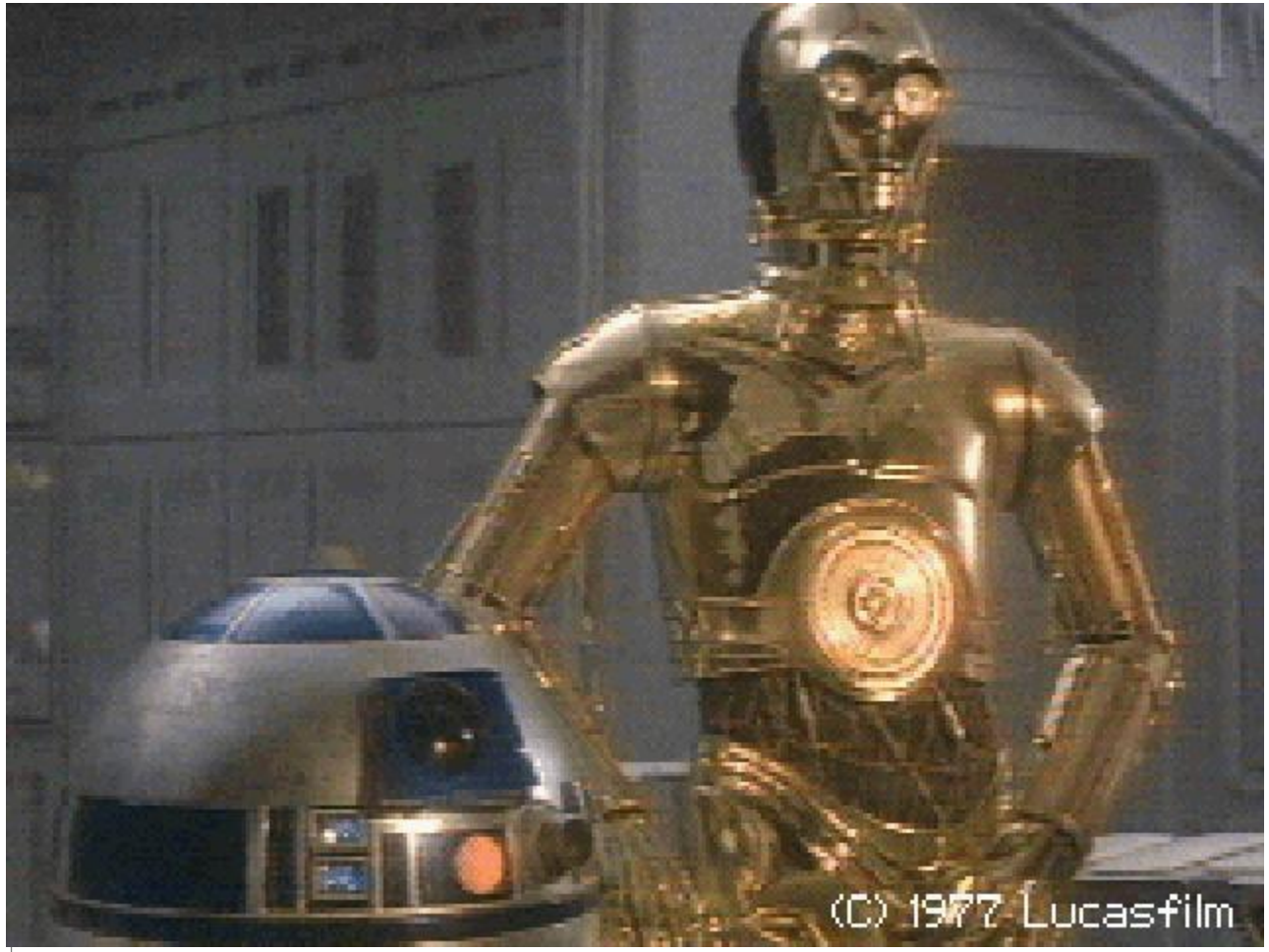
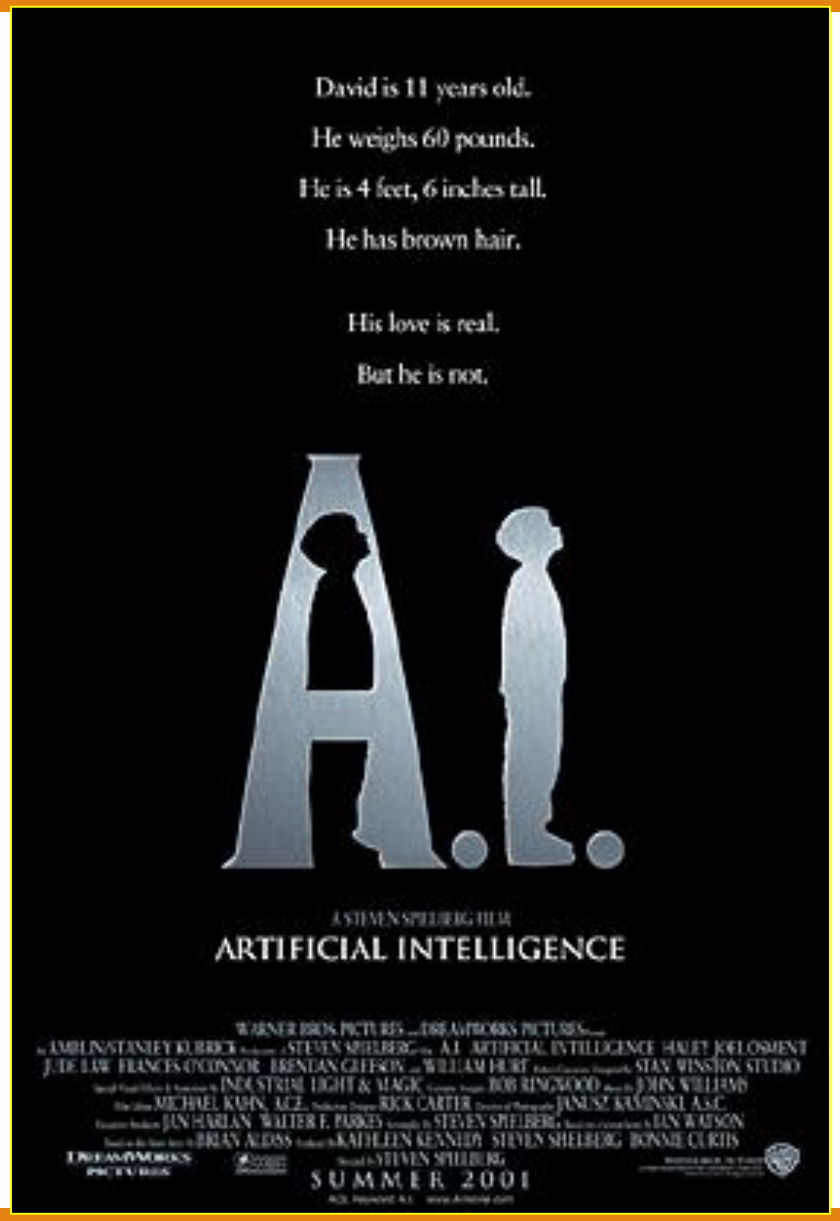
Mestrado Integrado em Engenharia Informática

Sistemas de Representação de Conhecimento e Raciocínio

Lucas, 1977

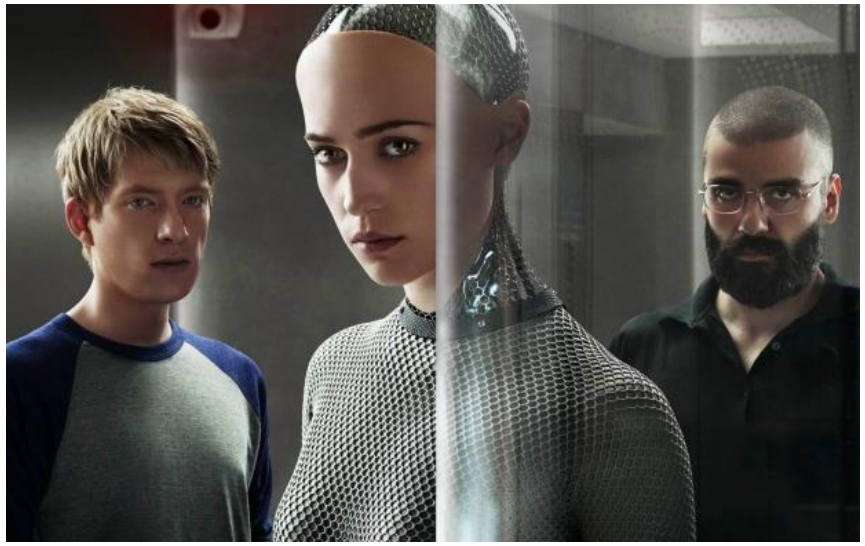


Spielberg, 2001



Cameron, 2009

Ex Machina, 2015



Imagination vs Logic

"Logic will get you from A to Z; imagination will get you everywhere."

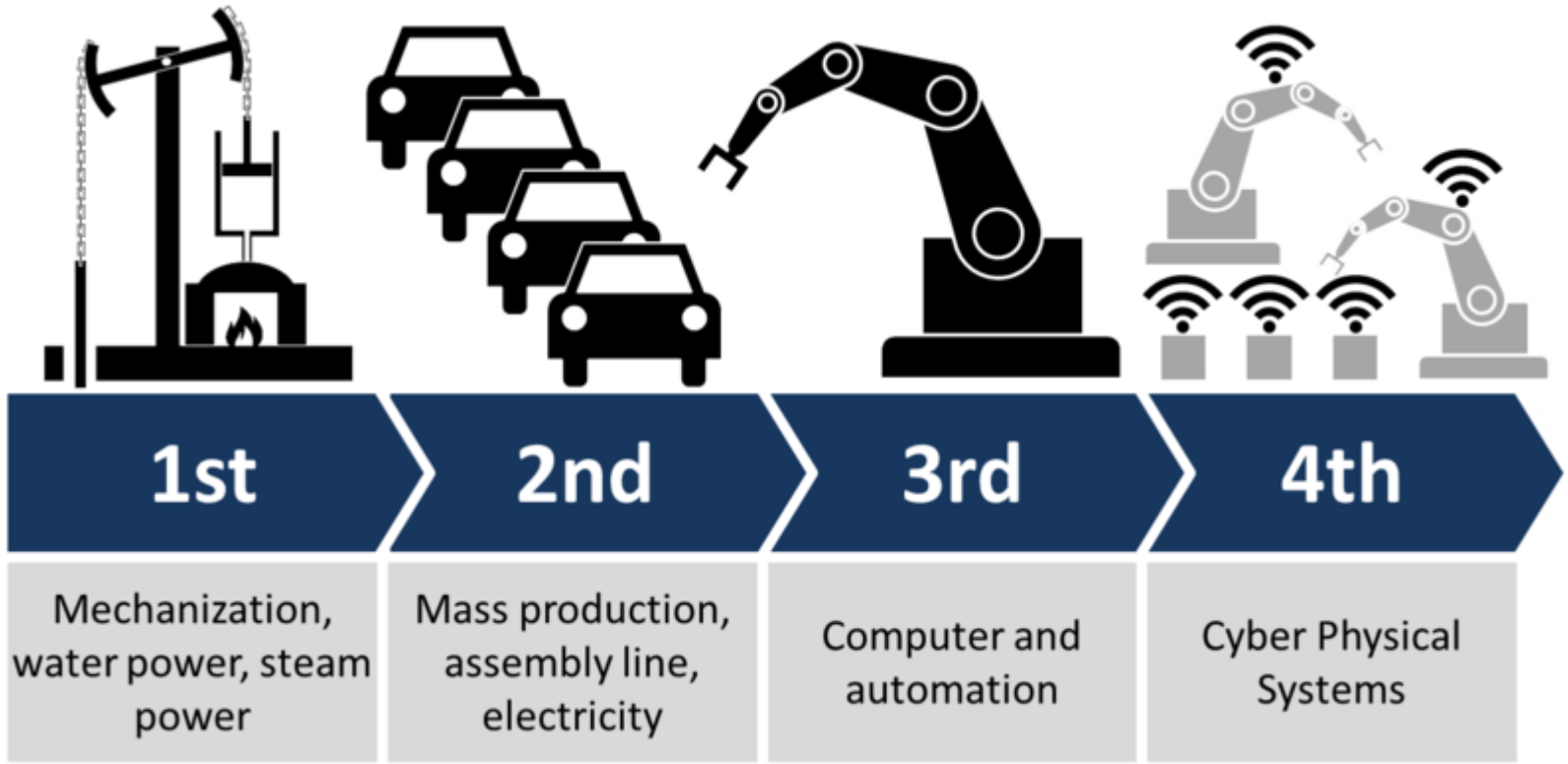
"Imagination is more important than knowledge. For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand."

Albert Einstein (1879-1955)

Not true?

AI example

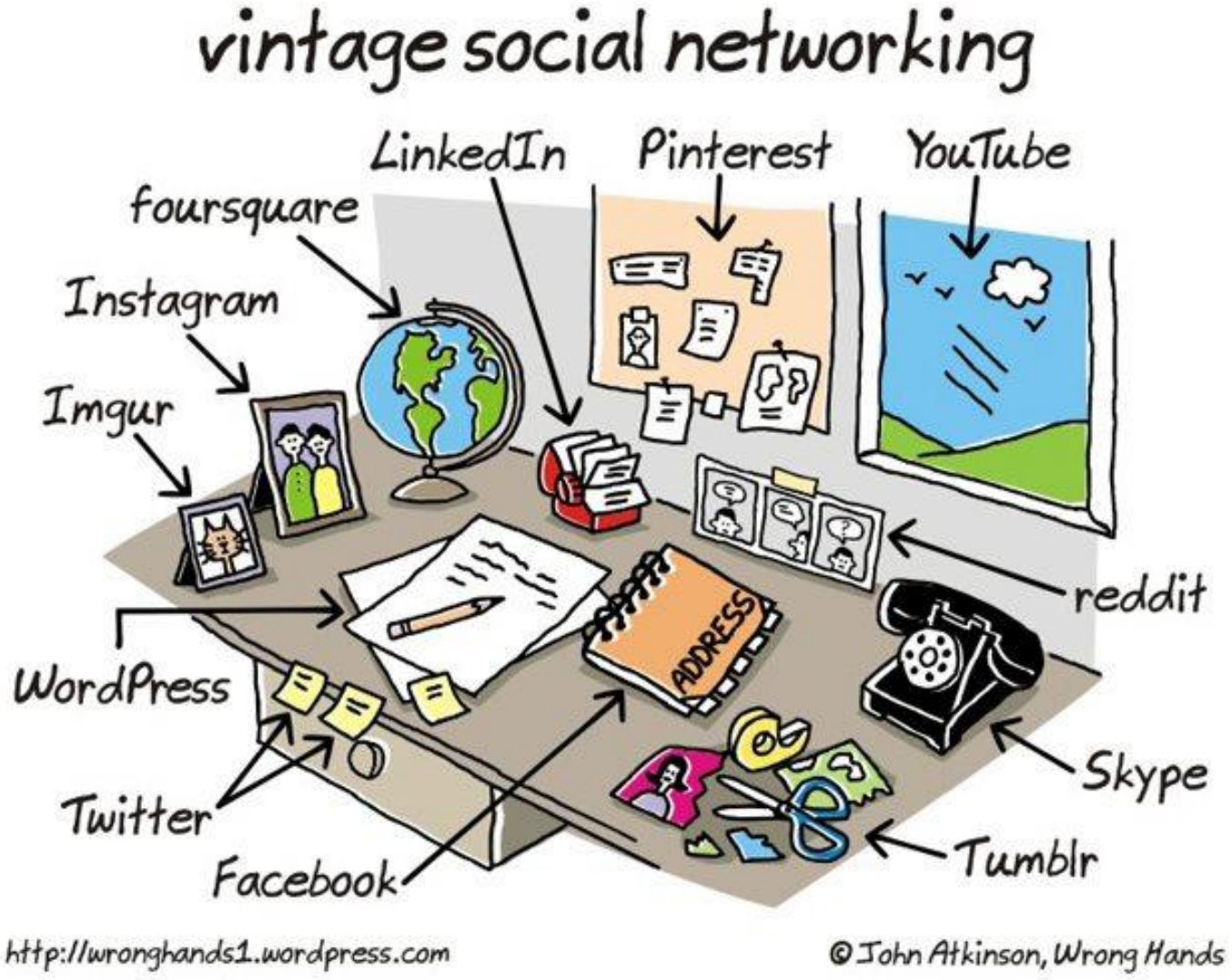
The New Revolution



The 4 Industrial Revolutions (by Christoph Roser at AllAboutLean.com)

The New Real World

New "smarter" Tools



Digital Lifestyle

"In the years ahead, further exciting innovations will unify the software, hardware and services in people's lives, offering them even richer, more engaging and deeply connected experiences."

Bill Gates, Outlines Vision for the Digital Lifestyle (2006)

New ways

“Computing is not about computers any more.

It is about living.”

Nicholas Negroponte

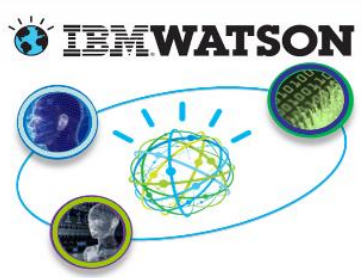
“AI will help us solve big problems in genomics, energy, and climate science.”

Eric Schmidt, Google Chairman, Sept 14, 2015.

Recent News

Watson (IBM)

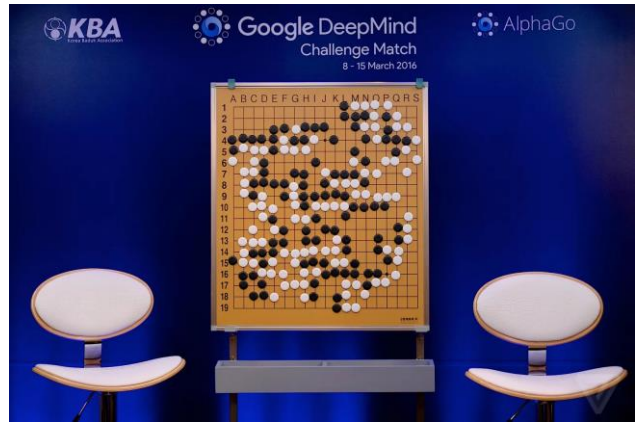
- In February 2011, Watson beat the two best players in the USA program TV Jeopardy (Brad Rutter and Ken Jennings);
- Watson represents an important step in the development of cognitive systems.
- It use Natural language processing, generation and evaluation of hypotheses and learning.
- Deep QA



Recent News

AlphaGo (Google DeepMind)

- The match between man and the machine did not go well for Lee Se-dol the Go game world champion;
- Go is a board game for 2 players that is similar to chess but more complex in relation chess.
- AlphaGo combines deep neural networks (evaluation) and Monte Carlo tree search (choice). With a combination of supervised learning and reinforcement.



Strong demand in AI

- What makes Facebook, Google, Apple, Amazon, Microsoft or IBM look for AI?
- Startups acquisition (DeepMind, UK, Google);
- DeepMind created a neural network that learns to play video games, similar to humans!
- Creating and investing in laboratories and institutes.

Started in 1956

John McCarthy

Marvin Minsky

Ray Solomonoff

Oliver Selfridge

Claude Shannon

Nathaniel Rochester

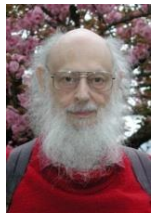
Trenchard More

Arthur Samuel

Allen Newell

Herbert Simon







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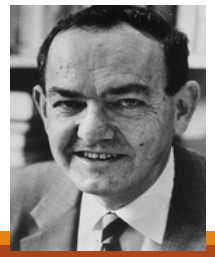


The Invention of AI

The expression Artificial Intelligence appear for the first time in 1956, the Dartmouth Conference, when it was defined as:

“(Artificial Intelligence is) making a machine behave in ways that would be called intelligent if a human were so behaving.”

John McCarthy.

What is AI?

It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.

John McCarthy, 2003

Why AI now?

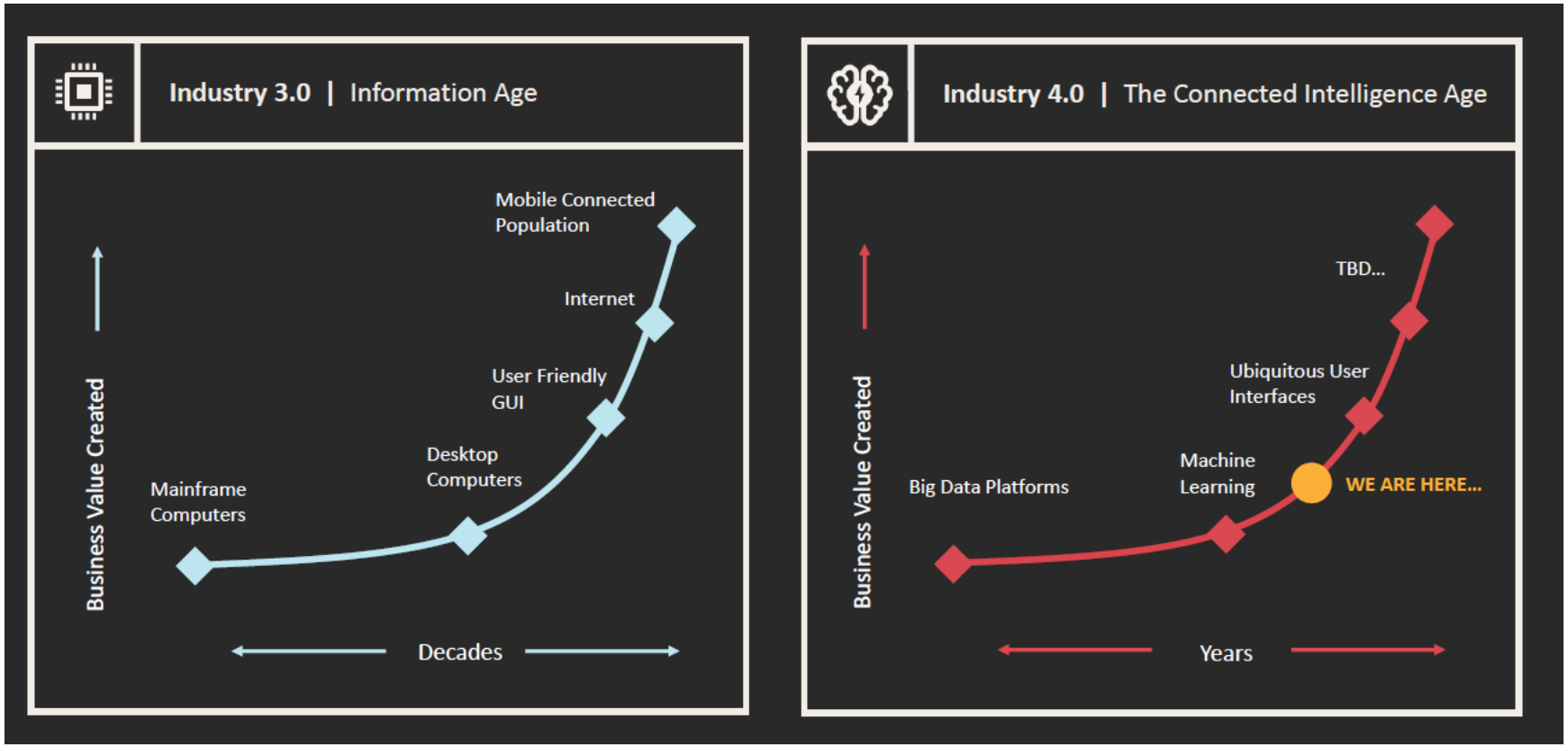
Historically the acceptance and diffusion of technology (in my humble opinion) depends on two factors:

- Labour price;
- Scalability.

Example:
Henry Bessemer (1856) - the steelmaking process
But however the invention remote to 2000 a.C. Anatolia.

This (I think) is the AI moment.

The AI time



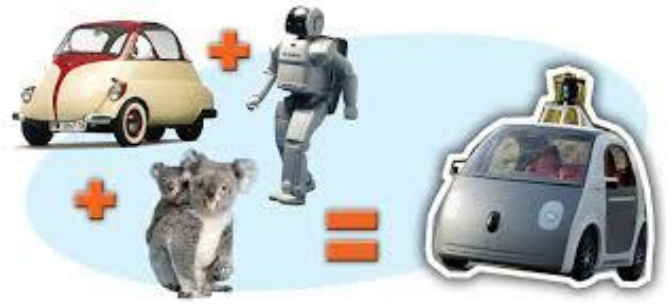
Josh Sutton, Publicis.Sapient, 2016

Humanoid robot

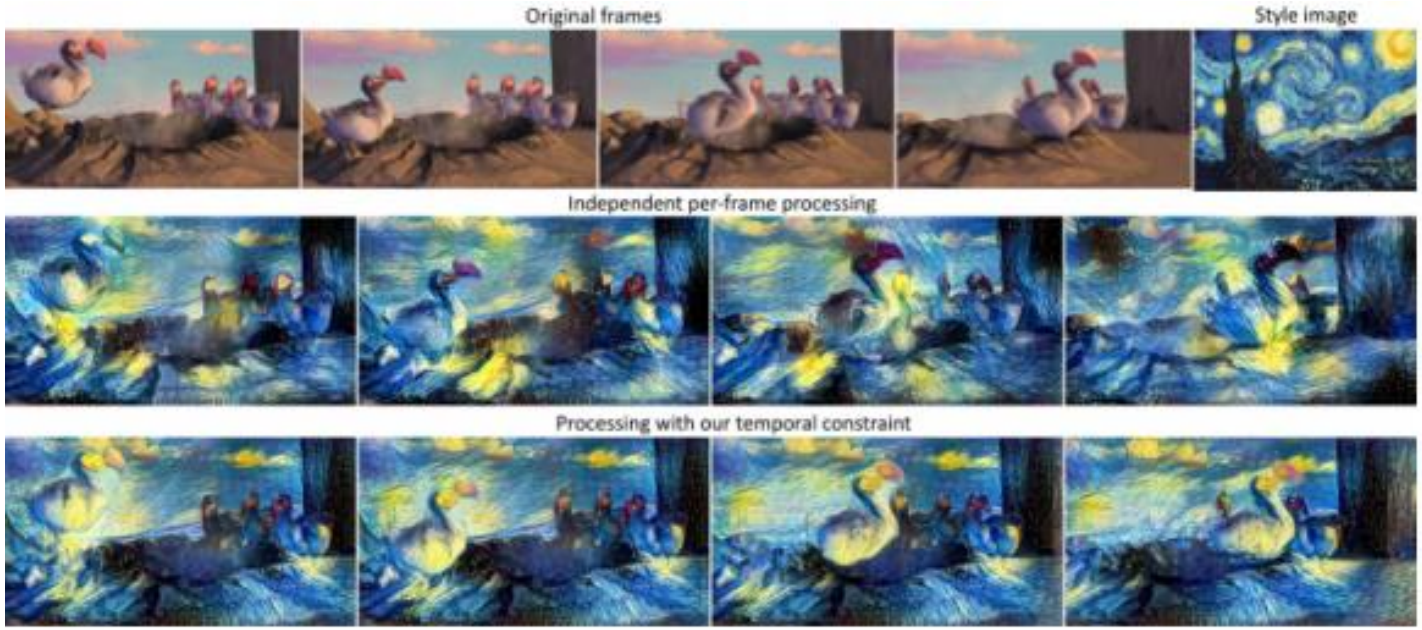
Google Self-Driving Car Project

- Car (Electric) self-developed by Google;
- Google Chauffeur Software;

- This project was previously led by Sebastian Thrun, former director of the Intelligence Laboratory of Stanford Artificial and Google Street View co-inventor.



Creativity (?)



Algorithm Clones Van Gogh's Artistic Style and Pastes It onto Other Images, Movies

A deep neural network has learned to transfer artistic styles to other images.

MIT Technology Review

https://www.technologyreview.com/s/601424/algorithm-clones-van-goghs-artistic-style-and-pastes-it-onto-other-images-movies/#/set/id/601422/

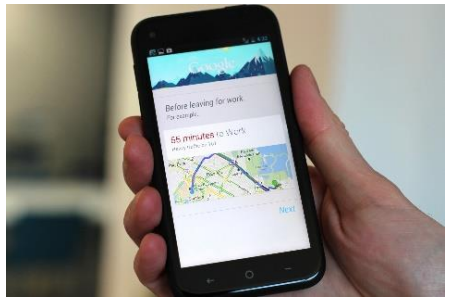
Personal Digital Assistants

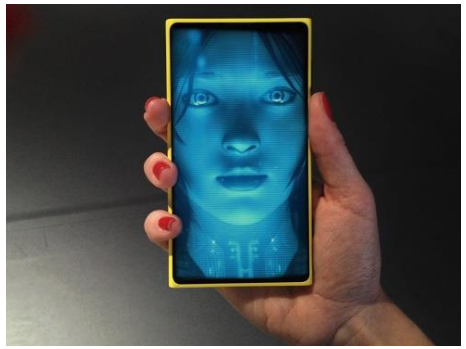
Siri (Apple iPhone);

Messenger (Facebook);

Google Now (Google);

Cortana (Windows Phone, Microsoft).





News areas

- IBM Watson-like cognitive service (namely in medicine) (search and Nature Language);
- Apple iPhone is answering our queries (Siri service with TrapIt: digital assistant) with voice (Speech Recognition);
- Deep Mind is now approaching the market with better Nature Language processing. Google is going into Photo and Video Recognition.

Market

- During 2014, according to Quid Inc, AI attracted over USD 17 billion in investments since 2009.
- In 2013, more than $2 million was invested in 322 companies with AI technology.
- Yahoo !, Intel, Dropbox, LinkedIn, Pinterest and Twitter have acquired AI companies.
- In the last four years: only Google bought 14 AI based companies and Robotics!

AI anywehre

- Personal photo archivist;
- Self driving car (Toyota);
- Universal translator (Skype);
- Body tracker (Microsoft Xbox Kinect tv);
- Smarter news feed (speech and image recognition software).

Shift

- Learning (Big Data)
  - Deep Learning
  - Machine Learning
  - Web Search
  - Speech Recognition
- Autonomy
  - Google car
  - Drones (UAV's - unmanned aerial vehicles)
  - AUV's (autonomous underwater vehicles)

Everything we electrified, we will now "cognitise"(cognitive power);

AI will also augment us individually as people (deepening our memory, speeding our recognition) and collectively as a species.

(Hélder Coelho, 2015)

Threats

Computers are not immune to human imbecility

http://expresso.sapo.pt/sociedade/2016-04-03-Os-computadores-nao-sao-imunes-a-imbecilidade-humana

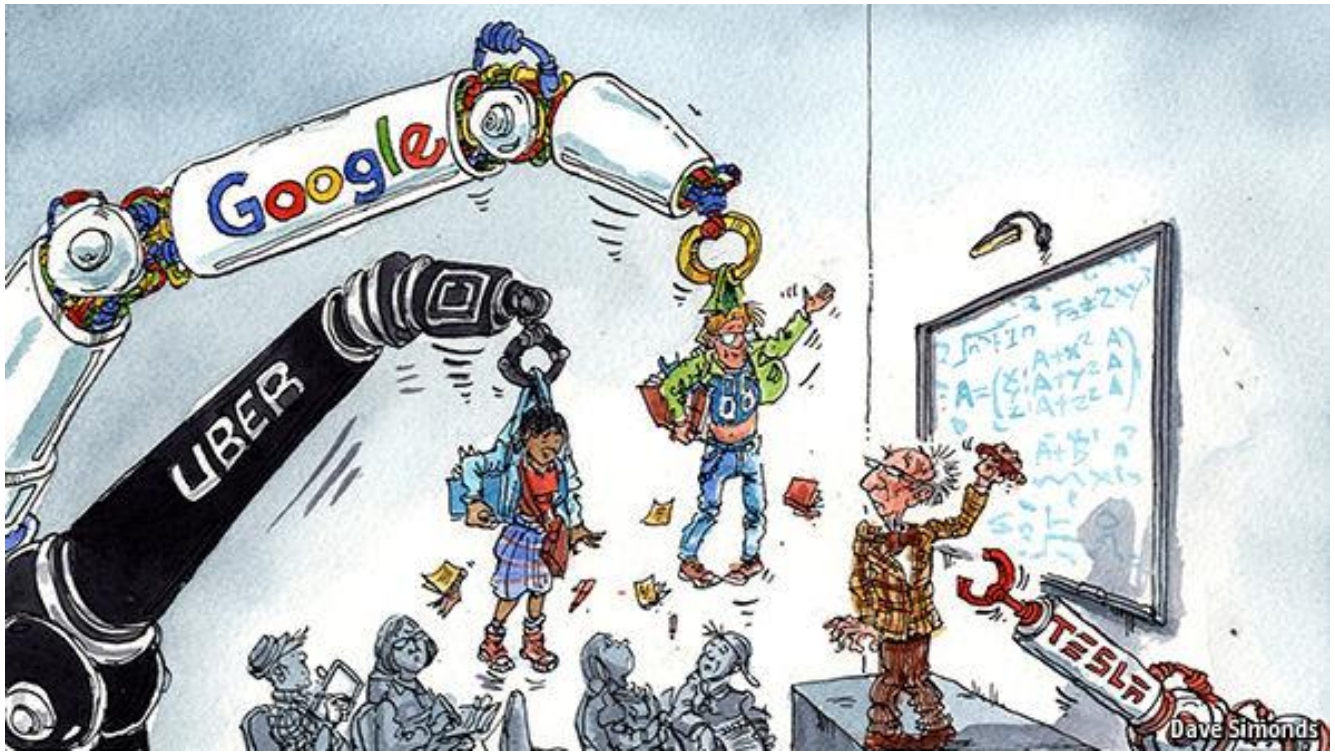
Machines or Humans?

Dave Coplin, Microsotf, 2016

New challenges

- From intelligence to instinct and intuition;
- Citizen empowerment;
- Contactless services;
- Smart mobility;
- Smart cities and transports;
- Cyber security and identity.

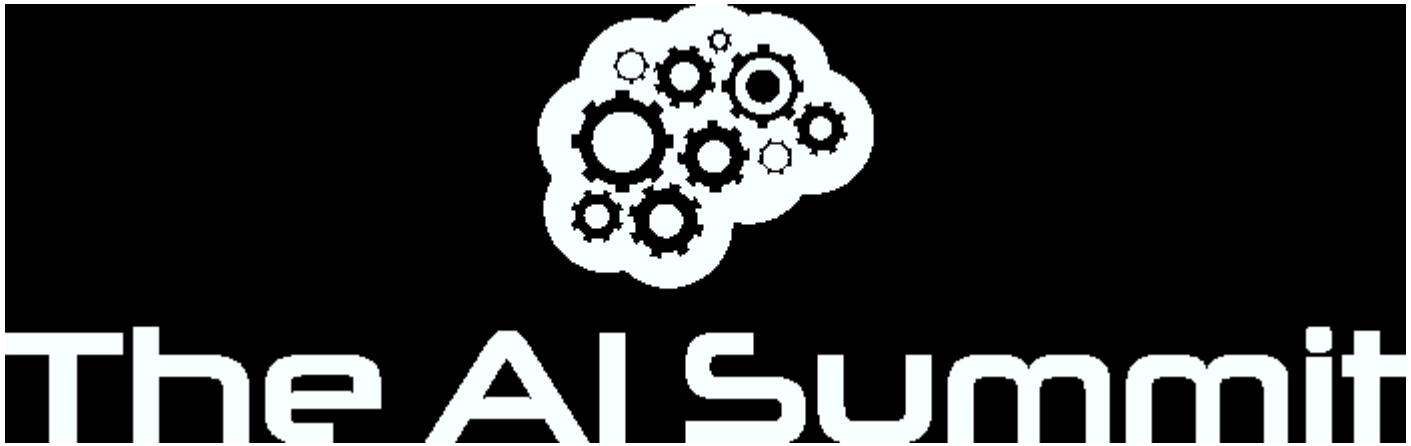
AI demand



"As Silicon Valley fights for talent, universities struggle to hold on to their stars"

Economist, April 2016

AI Summit, 2016



Around us

"Google wants to be the best in search. To reach that goal Google wants to have the world's top AI research laboratory." Larry Page, Google, 2006

"Siri and virtual assistants like her will soon change everything. I. Mean. Everything." Mike Elgan, in Computerworld, Sep 21, 2015

"The speed of current breakthroughs has no historical precedent. When compared with previous industrial revolutions, the Fourth is evolving at an exponential rather than a linear pace. Moreover, it is disrupting almost every industry in every country."

Klaus Schwab, Founder and Executive Chairman, World Economic Forum

"Looking to the future, the next big step will be for the very concept of the 'device' to fade away. Over time, the computer itself — whatever its form factor — will be an intelligent assistant helping you through your day. We will move from mobile-first to an AI-first world"

Sundar Pichai, Google CEO April 28 2016

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Departamento de Informática

Universidade do Minho – Portugal

http://islab.di.uminho.pt/

https://www.facebook.com/IntelligentSystemsLab/