Disruptive Innovation:

How GE reinvents itself to be fit for the future – and how Hungary and GE can benefit each other?

Joerg Bauer

Miskolc, 4. September 2015

We Are GE

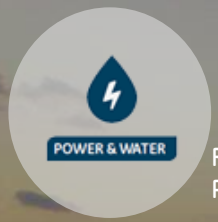
We are 300,000 people operating in 175 countries

Inventing the next industrial era to build, move, power, and cure our world

Imagining things others don't | Building the things others can't | Delivering outcomes that make the world work better

version 4/2015

Our Businesses deliver value



Revenue: $27.6B
Profit: $5.4B

Leading globally in power generation & water technologies

Revenue: $18.7B
Profit: $2.6B

Pushing the boundaries of technology in oil & gas to bring energy to the world

Revenue: $7.3B
Profit: $0.2B

Enabling utilities and industry to efficiently manage electricity from the point of generation to the point of consumption

Revenue: $24.0B
Profit: $5.0B

Providing our aviation customers with the most technologically advanced & productive engines, systems & services for their success

Revenue: $18.3B
Profit: $3.0B

Developing transformational medical technologies & services that are shaping a new age of patient care

Revenue: $5.7B
Profit: $1.1B

Being a global technology leader & supplier to the railroad, mining, marine, stationary power & drilling industries

Revenue: $8.4B
Profit: $0.4B

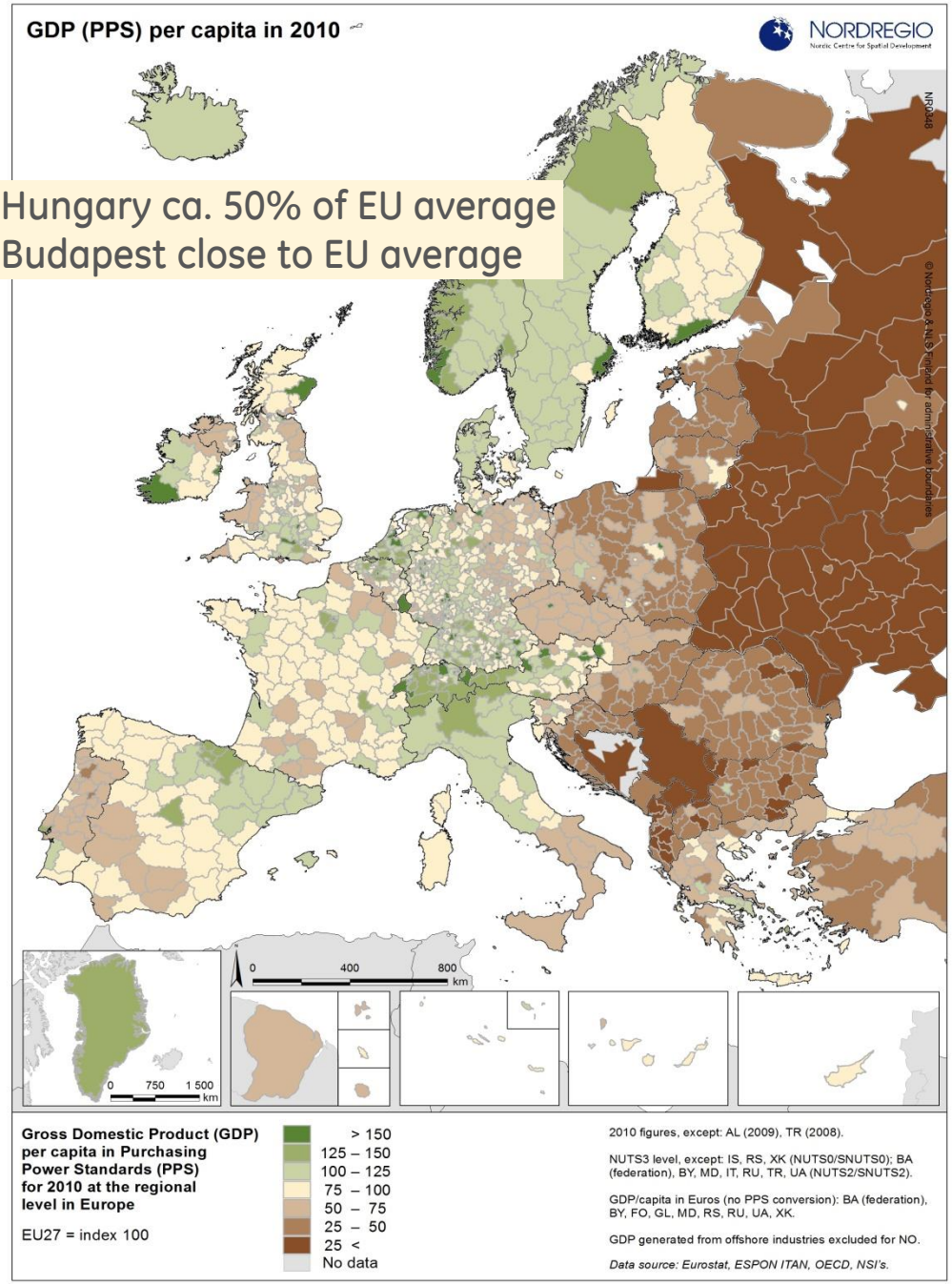
Answering real-life needs, defining trends & simplifying routines. Leading a global lighting revolution to deliver innovative solutions

Investing financial, human & intellectual capital to help our customers build their businesses

Source: 2014 GE Annual Report

What is economic thinking all about?

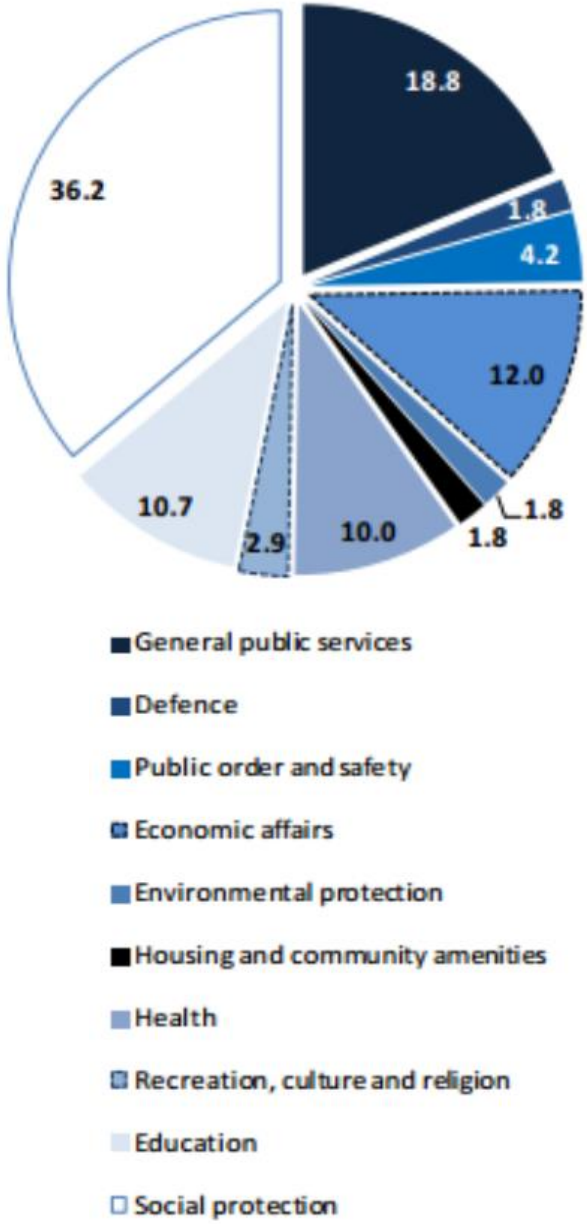
Maslow Pyramid



http://www.nordregio.se/en/Maps--Graphs/03-Economy-trade-and-industry/GDP-per-capita-in-20101/

Hungarian Goverment Expenditure

2008



http://www.oecd.org/gov/48214236.pdf
Government at a Glance 2011 Country Note: HUNGARY

Standard of Living the last 2000 years

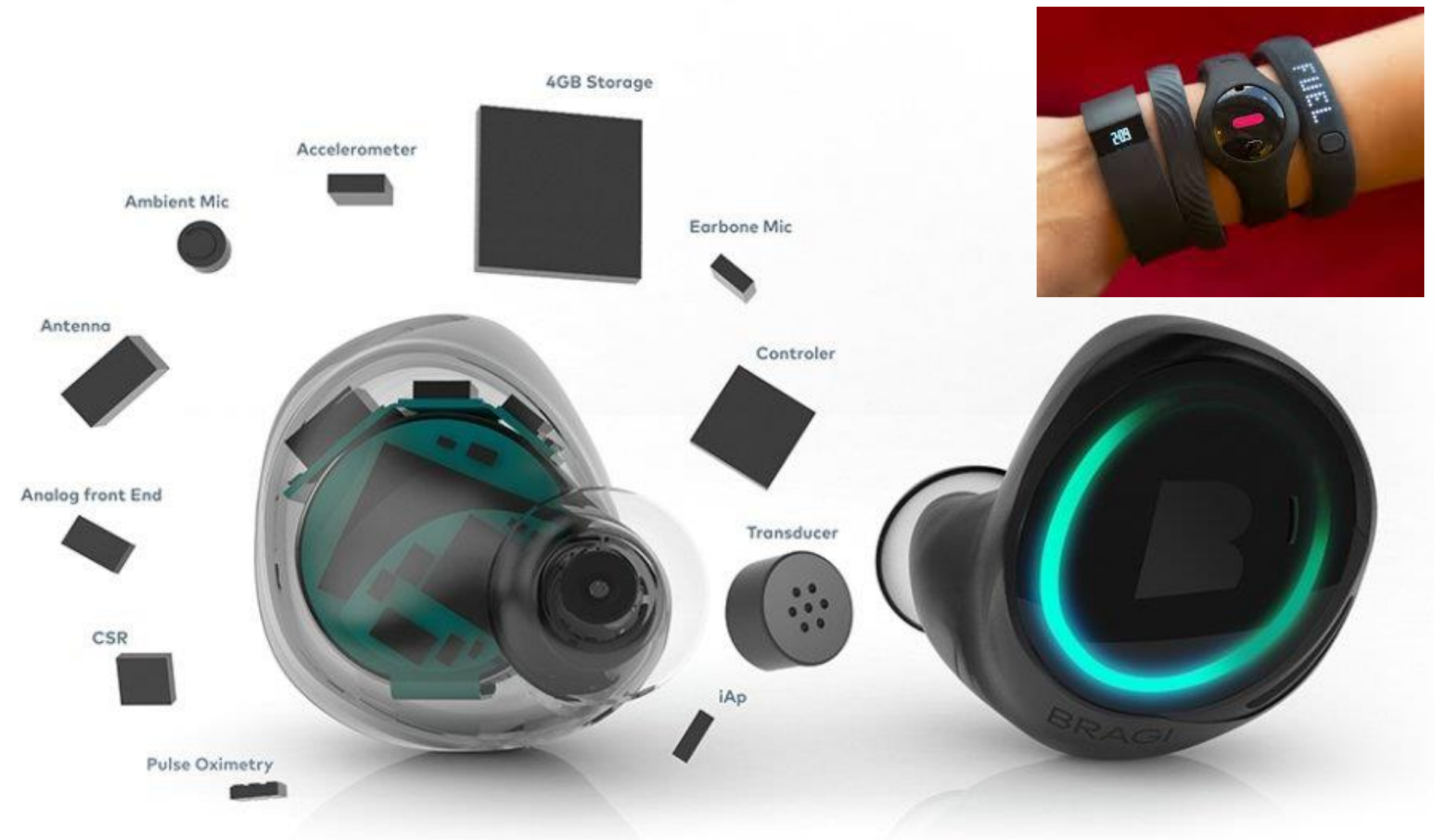
1850 years

150 years

imagination at work

Augmented Human Physis

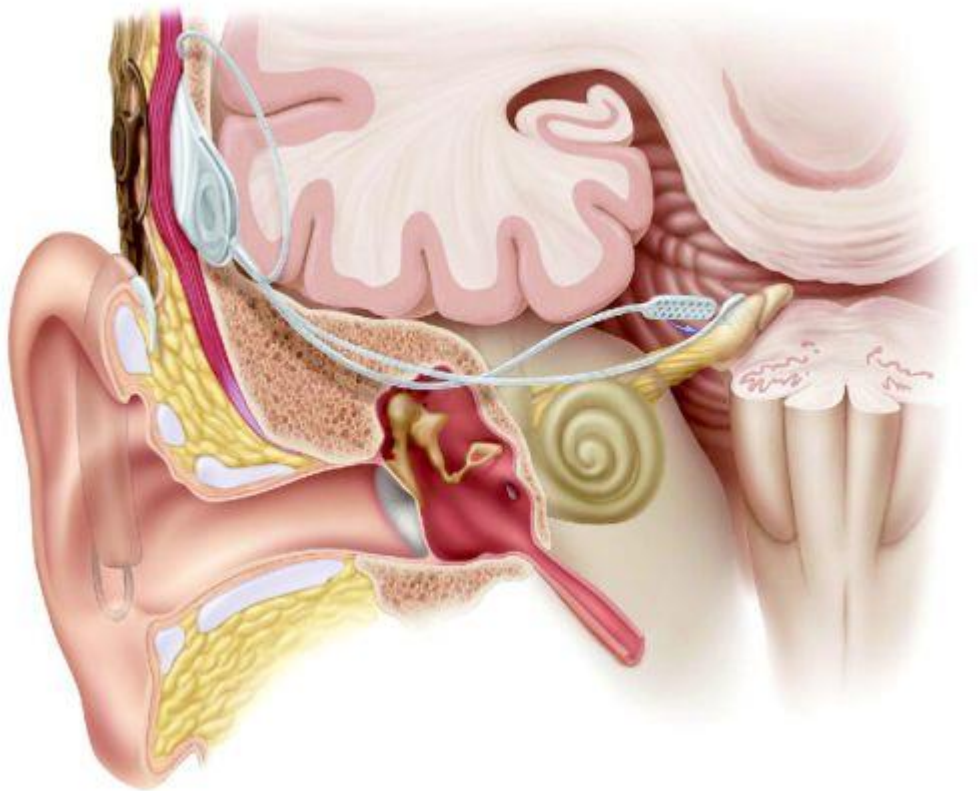

CATERPILLAR
CAT 797F
797F
31895

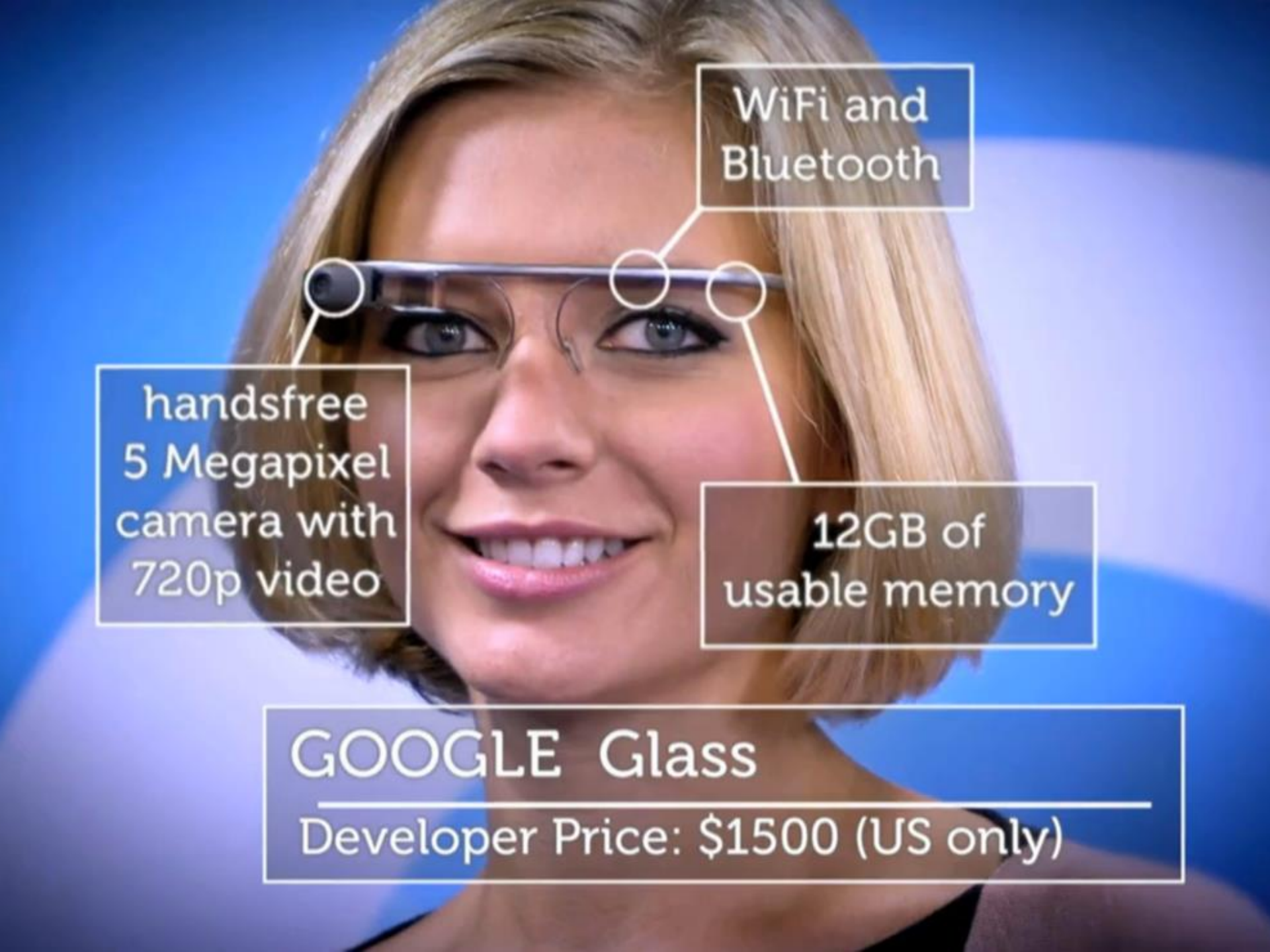


Hearables

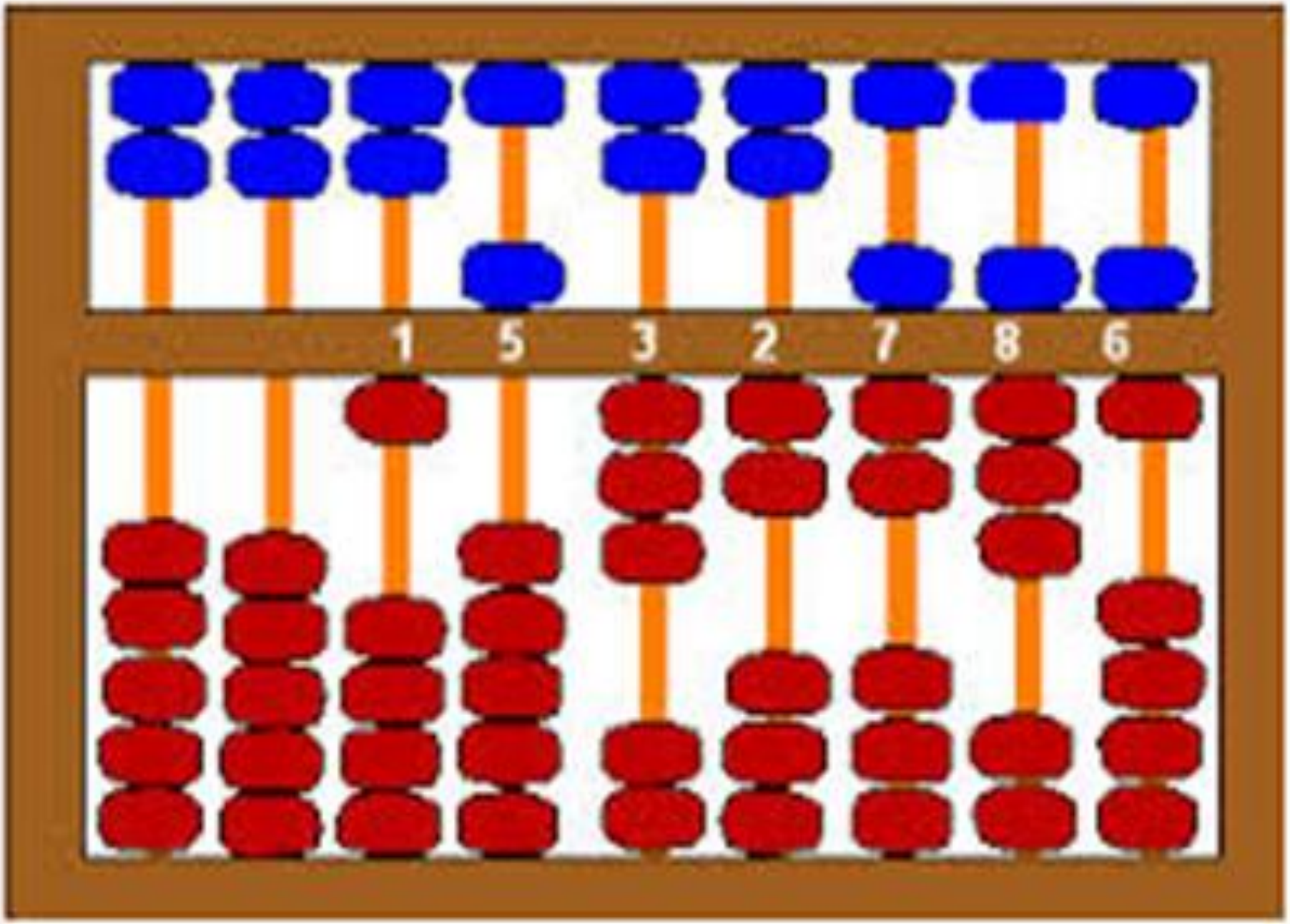
Wearables ...

Hearing aid




WiFi and
Bluetooth
handsfree
5 Megapixel
camera with
720p video
12GB of
usable memory
GOOGLE Glass
Developer Price: $1500 (US only)

Augmented Human Intellect


1 5 3 2 7 8 6

Computing Power

=

Illiac IV 1975
$ 5 MM

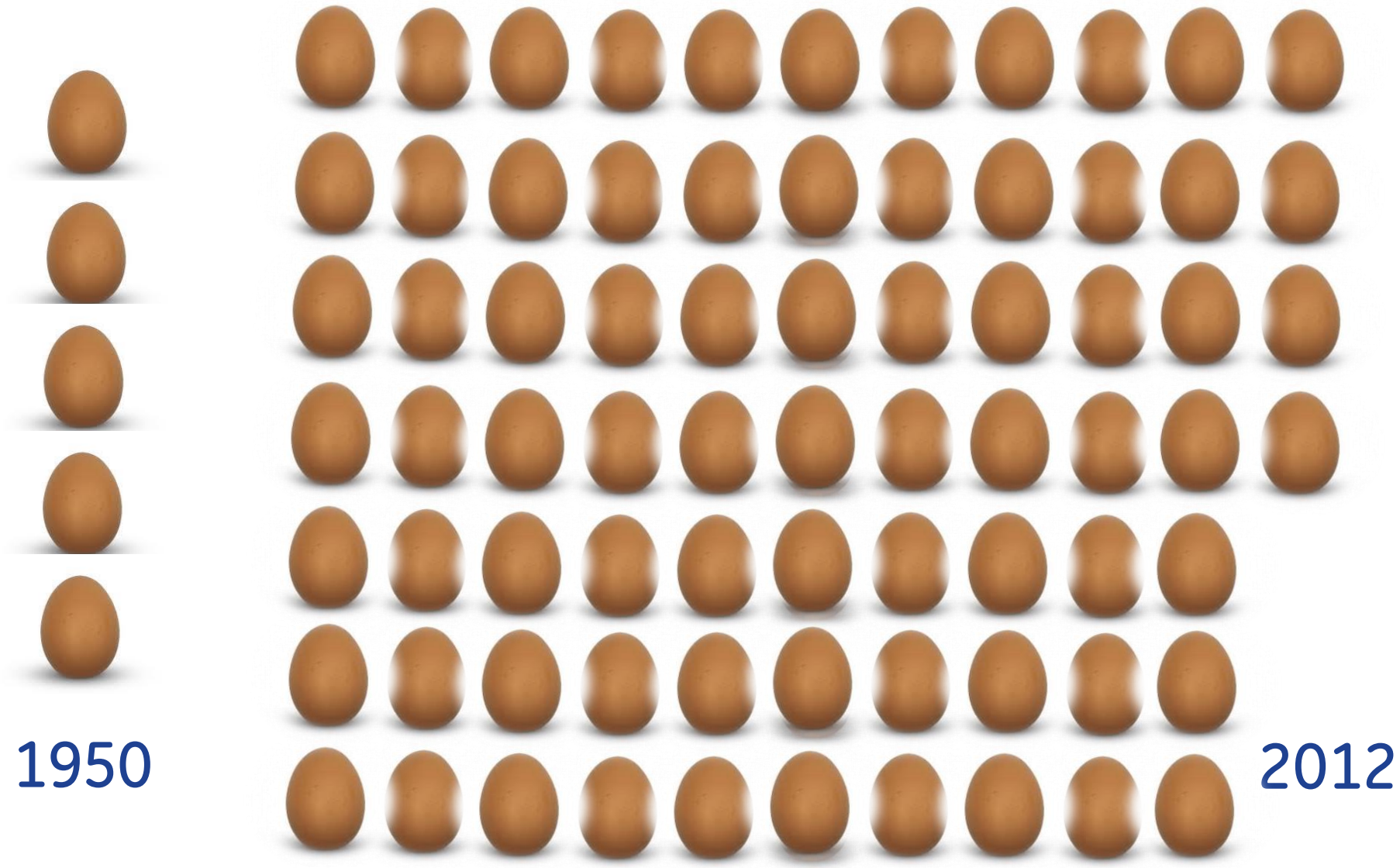
iPhone IV 2013
$ 400

imagination at work


Cloud Computing

What did we achieve?

How many eggs for one hourly salary?*



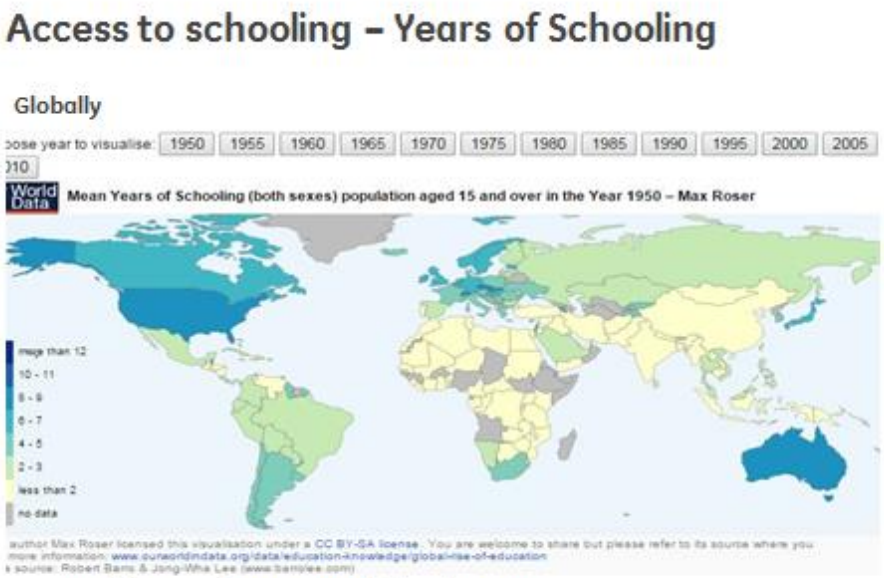
imagination at work

(*in Germany, source DIW: http://www.iwkoeln.de/de/infodienste/iw-dossiers/beitrag/kaufkraft-der-nettoverdienste-20280)

www.gapminder.org

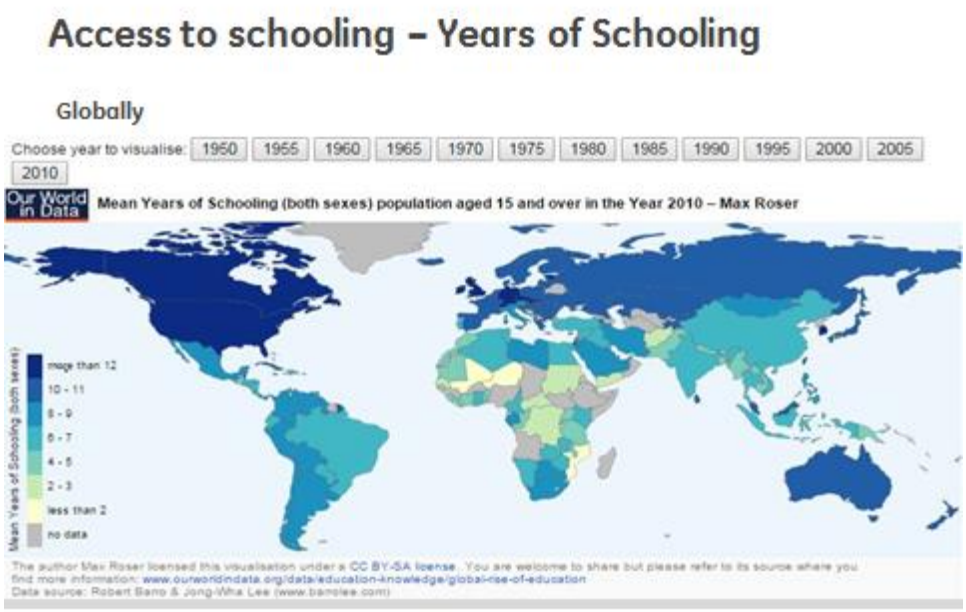
Years of Schooling 1950 vs- 2010: darker = more

1950



World maps of mean years of schooling, 1950

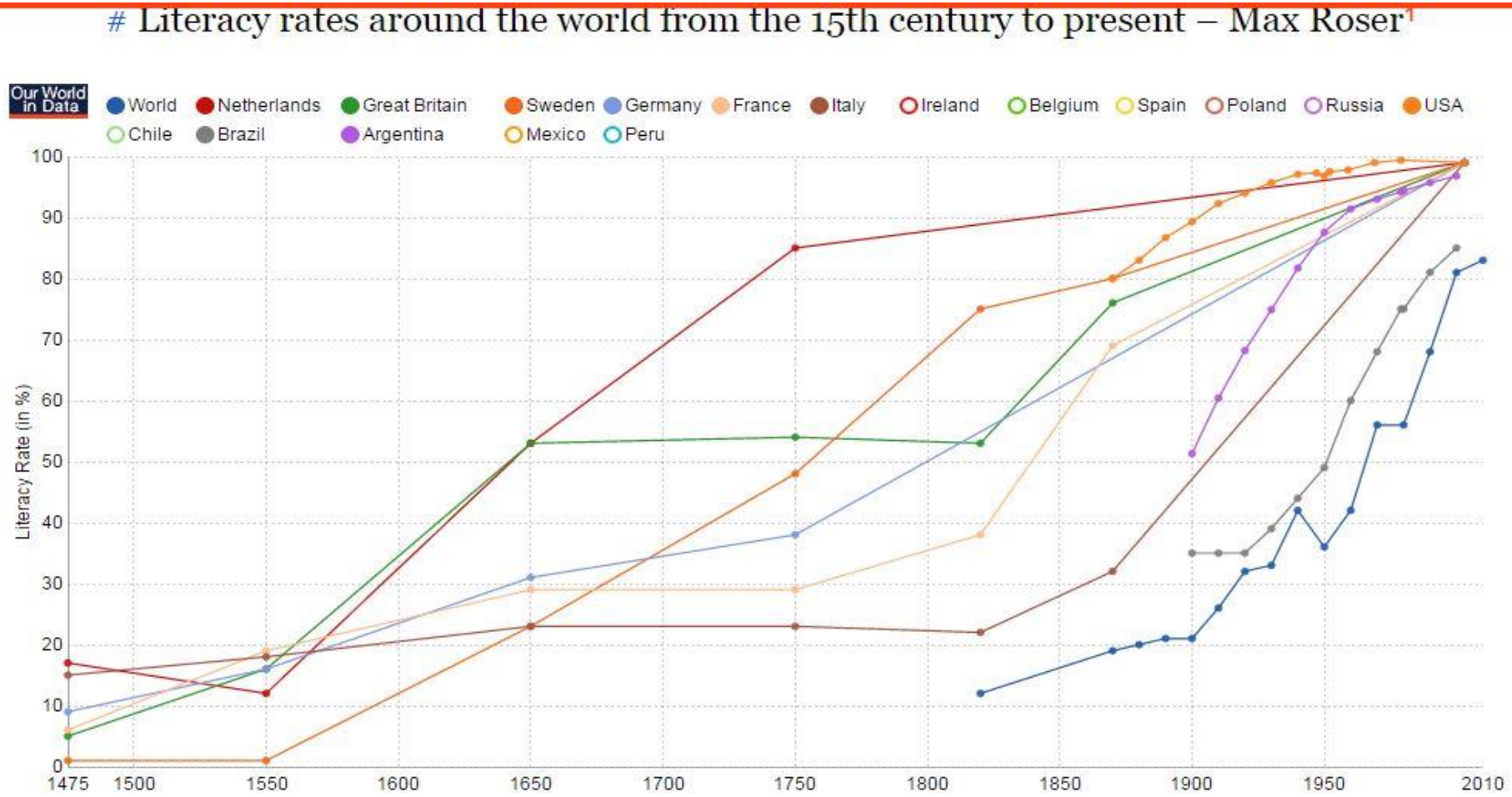
2010



World maps of mean years of schooling, 2010

Literacy rates

Globally



http://ourworldindata.org/data/education-knowledge/literacy/

Global literacy rate rocketing from 1950 till 2010

Going Forward

Where will the puck be?

Wayne Gretzky

Selected Disruptive technologies

source: McKinsey

Estimated potential economic impact by 2025, GE involvement

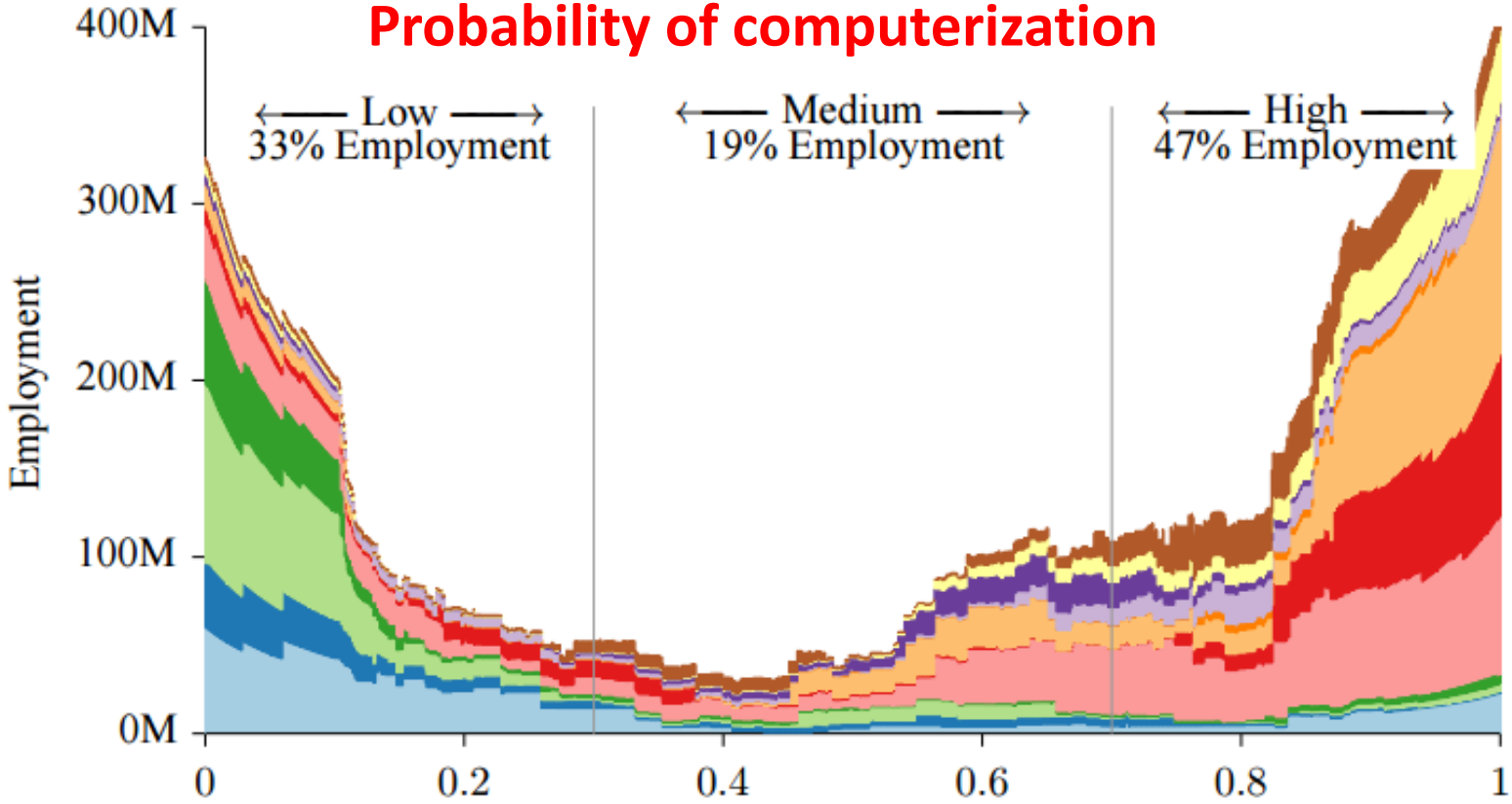
1.	Mobile Internet	$$$
2.	Automation of knowledge work	$$
3.	Internet of things / Industrial Internet	$$$
4.	Cloud	$$$
5.	Advanced Robotics	$$
6.	Autonomous / near-autonomous vehicles	$$
7.	Next generation genomics	$
8.	Energy storage	$
9.	3-D printing	$
10.	Advanced materials	$
11.	Advanced oil & gas exploration & recovery	$
12.	Renewable Energies	$

GE plans to invest $1 bn in Industrial Internet capabilities by 2015

Gartner Inc.: Hype Cycle for Emerging Technologies, 2015

http://www.gartner.com/newsroom/id/3114217?xid=nl_daily

Probability of computerization



47% of all US jobs are in the high risk category

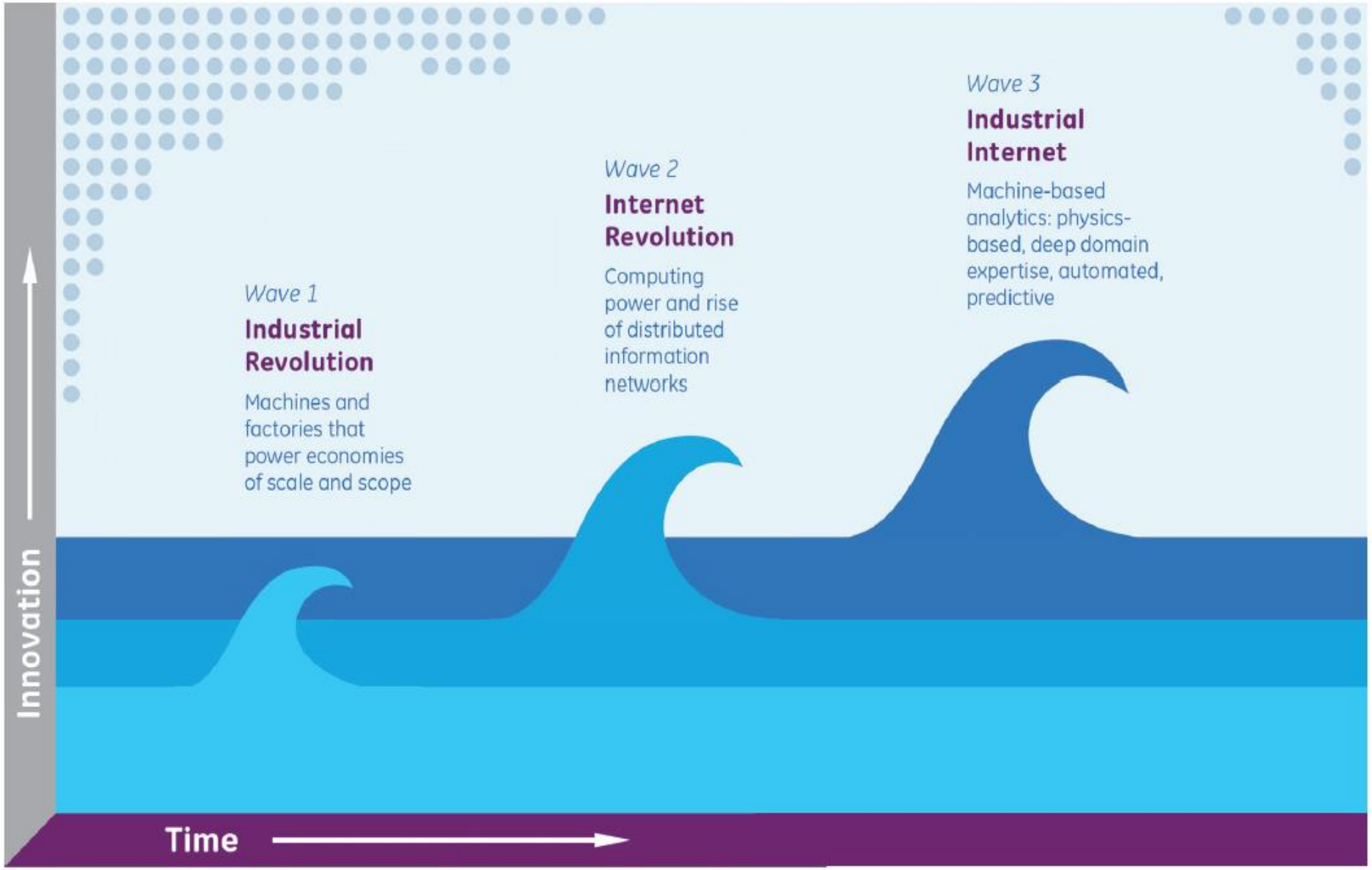
The distribution of BLS 2010 occupational employment over the probability of computerisation, along with the share in low, medium and high probability categories. Note that the total area under all curves is equal to total US employment.

Source:
http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

- Management, Business, and Financial
- Computer, Engineering, and Science
- Education, Legal, Community Service, Arts, and Media
- Healthcare Practitioners and Technical
- Service
- Sales and Related
- Office and Administrative Support
- Farming, Fishing, and Forestry
- Construction and Extraction
- Installation, Maintenance, and Repair
- Production
- Transportation and Material Moving

Industrial Internet

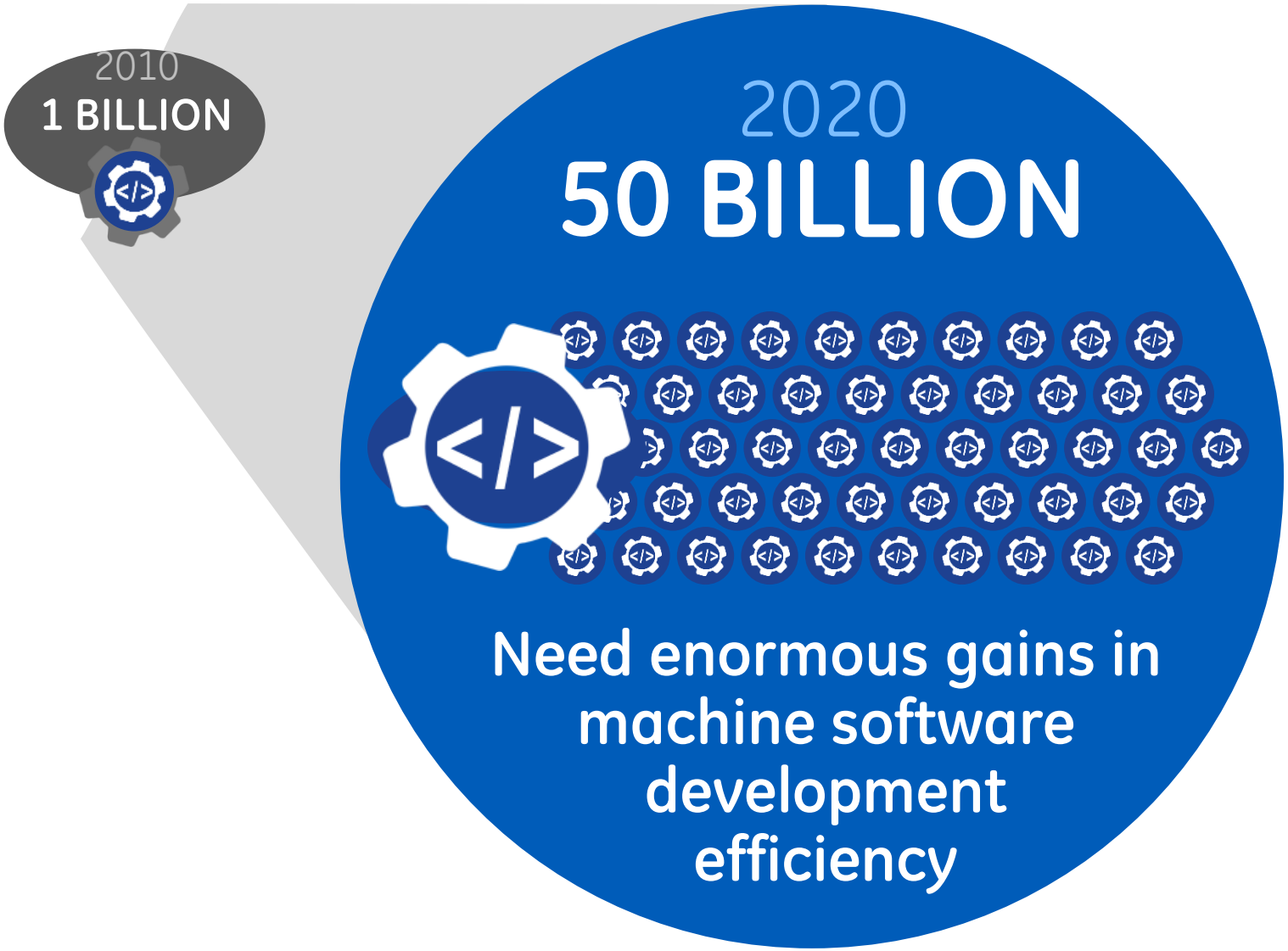
Figure 1. **Rise of the Industrial Internet**



Waves of Innovation and Change

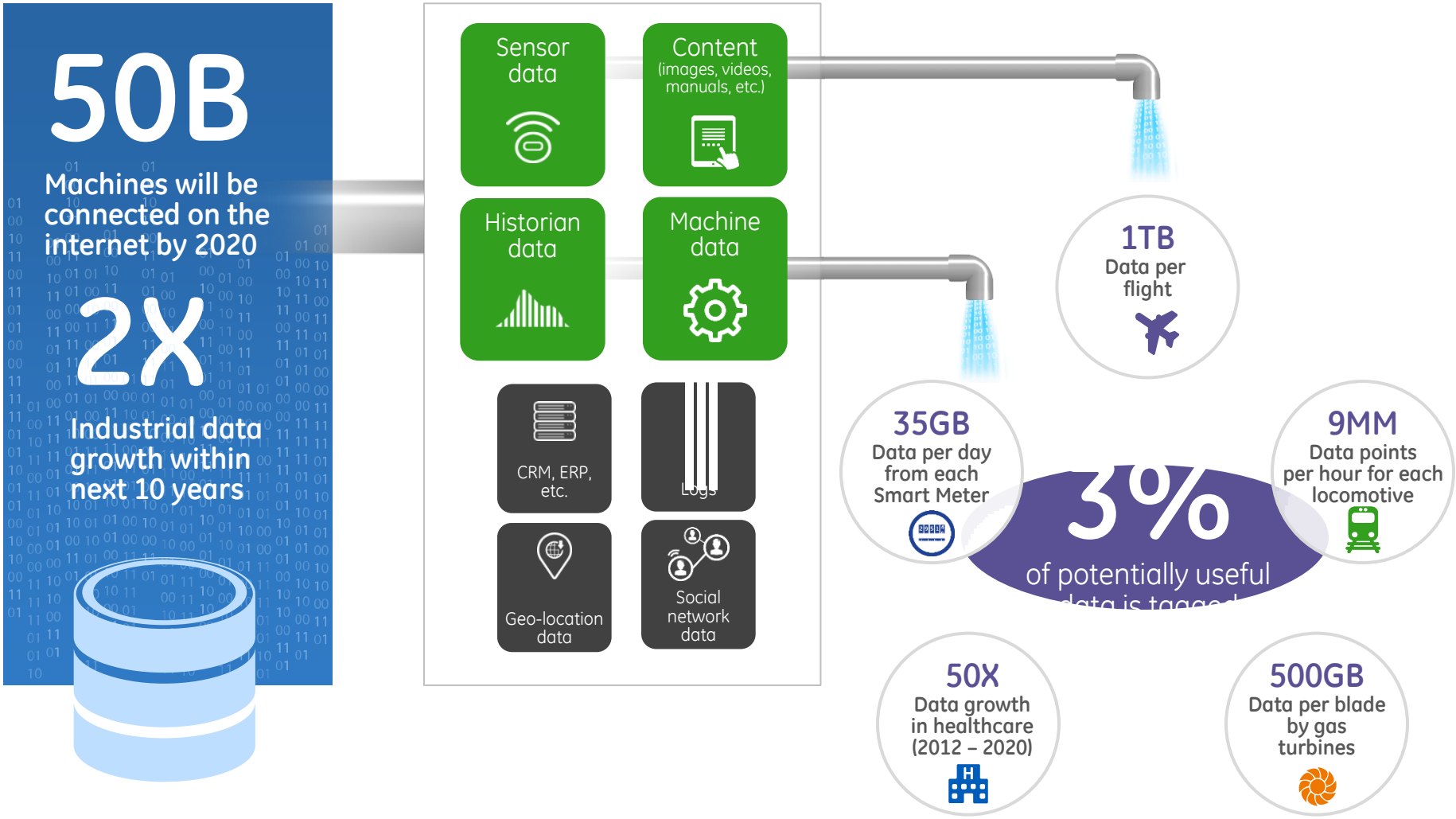
http://www.ge.com/europe/downloads/IndustrialInternet_AEuropeanPerspective.pd

Industrial Internet is here



Sources: Cisco, Harbor Research, http://www.futuristspeaker.com

Industrial Big Data – fast and vast



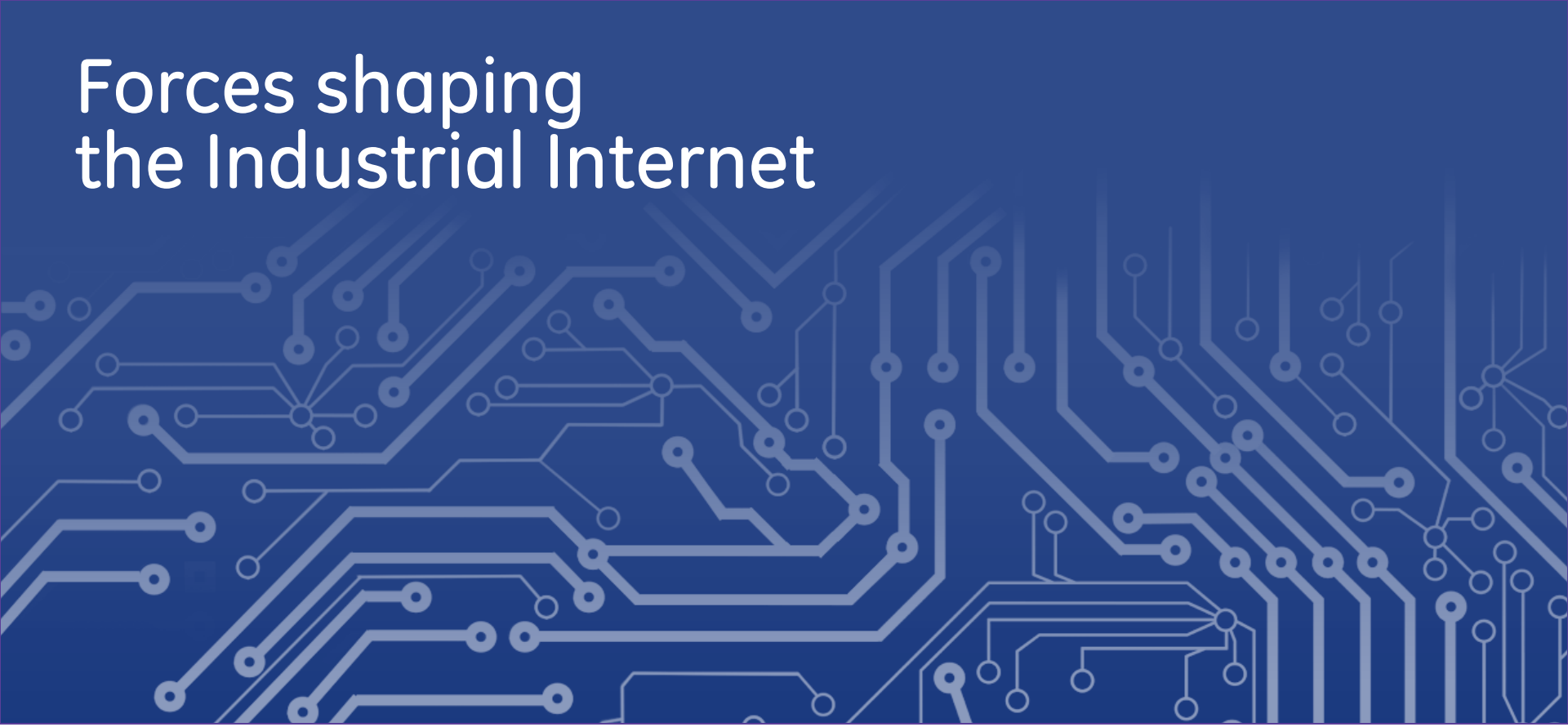
*Source: IDC

A Boeing jet generates 10 terabytes of data per engine every 30 min of flight, 28,537 flights per day in the US alone = 833.280.400 terabyte per year = 833.280 Petabyte = 833 Exabyte (every flight = 1 hour)

Library of congress	3 Petabyte
All words ever spoken	5 Exabyte

8 bits = 1 byte
1,000 byte = 1 kbyte 1,000
1,000 kbyte = 1 Mbyte 1,000,000
1,000 MByte = 1 GigaByte 1,000,000,000
1,000 GByte = 1 TeraByte 1,000,000,000,000
1,000 TByte = 1 PetaByte 1,000,000,000,000,000
1,000 PByte = 1 Exabyte 1,000,000,000,000,000,000
1,000 EByte = 1 Zettabyte 1,000,000,000,000,000,000,000
1,000 Zettabyte = 1 YottaByte 1,000,000,000,000,000,000,000

Forces shaping the Industrial Internet



1 Internet of things

A living network of machines, data, and people

2 Intelligent machines

Increasing system intelligence through embedded software

3 Big Data

Transforming massive volumes of information into intelligence

4 Analytics

Generating data-driven insights and enhancing asset performance

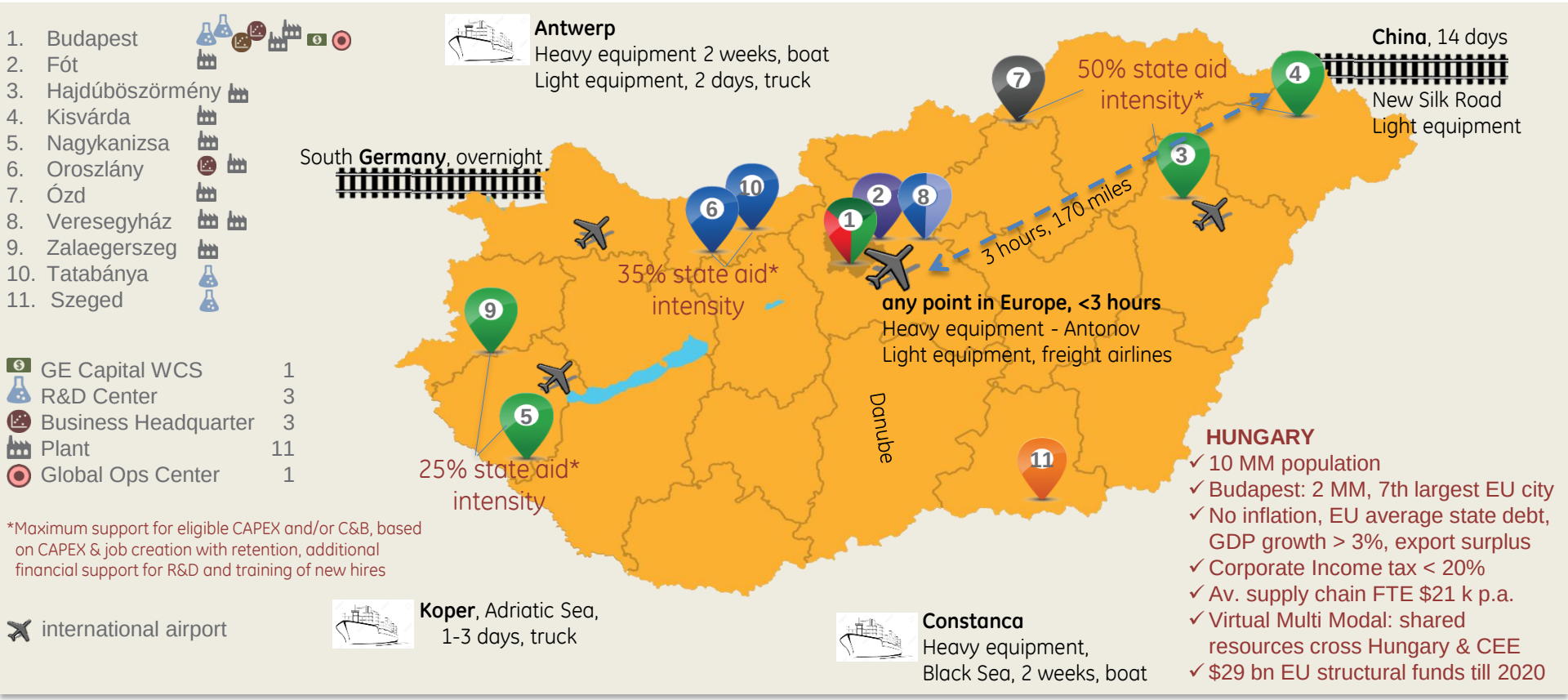
GE and Hungary

imagination at work

GE in Hungary:

developed Europe education, productivity, IP safety, and infrastructure @ **developing Europe cost and flexibility**

• Global Operations • Lighting • Power & Water • Healthcare • Oil & Gas • Aviation • Energy Management • Capital



GE Hungary figures

- **7 of 8 GE businesses** present in **11** cities with **11,000+** employees: ~9.500 industrial, 1,200 Global Ops, ~500 R&D
- **3rd largest Hungarian company**, $6.5 bn industrial revenue, **99% export;** low landed cost to GE growth markets
- **1.200+ qualified suppliers =** $900 MM local purchases, 65% of GE Hungary's external needs, **strong EXIM HU**
- **Global Operations Center, Budapest:** one of GE's 5 global centers, hired **>1,000 new employees** from January 2014
- **PREDIX for Healthcare**, >50% state funded: 170 software engineers & 3 universities; **total ~600 IT staff in country**

Selected Academic Partnerships in Hungary

- ~ 14 academic sites
- ~ + 15 R&D Projects
- ~ 500+ internal / 100+ Researchers
- ~ + $ 40 m Funding (2012-2017)
- ~ annual 80 Talents
- ~ Patents & Publications

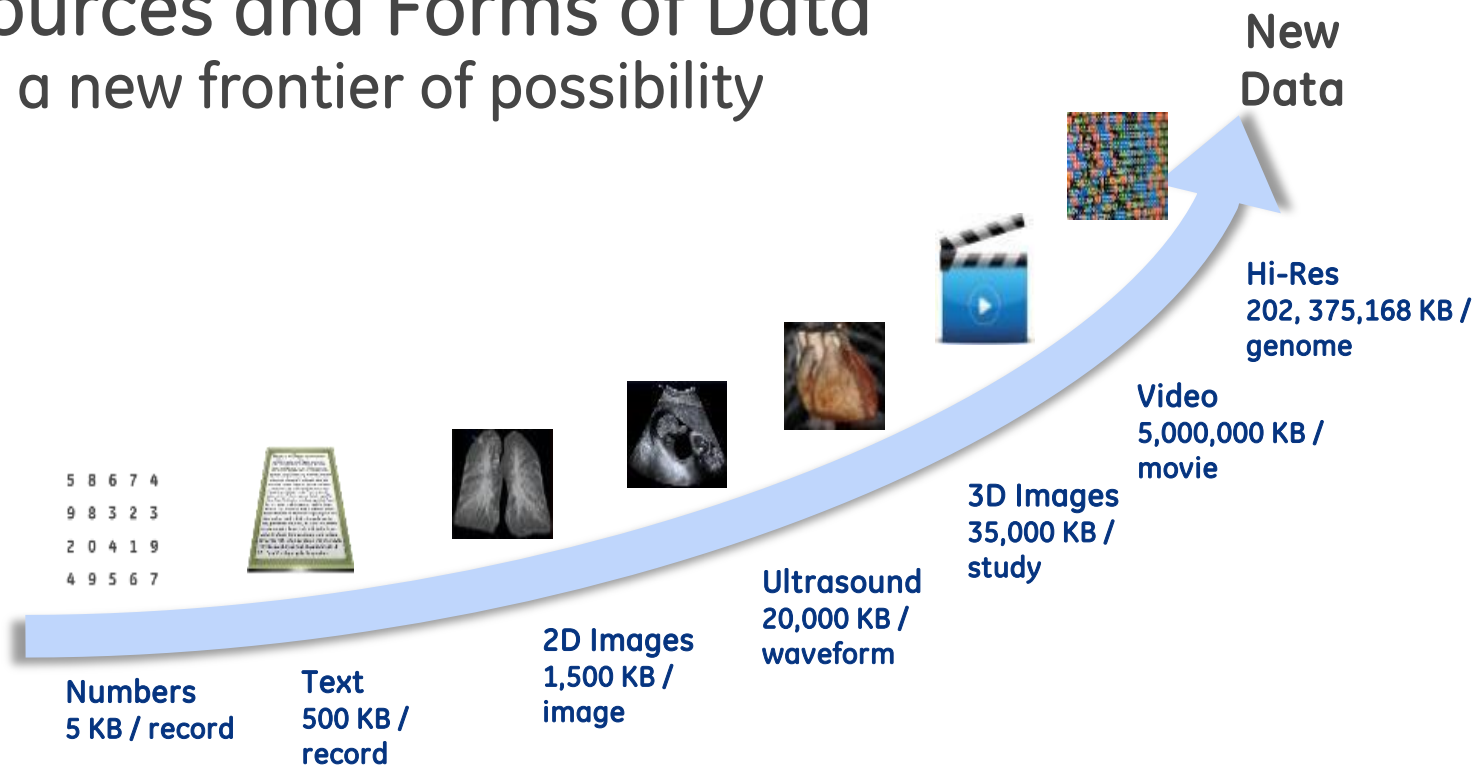
GE Healthcare Semmelweiss University	1	R&D Collaboration (Genetics, TBI)
GE Healthcare National Institute of Clinical Neurosciences		CaseXchange Project (HIP)
GE Healtchare National Institute of Oncology		Oncology Project
GE Healthcare Semmelweiss Cardiology Center		Research & Trials
GE Appl & Lighting Budapest University of Technology and Economics		SMEs, Intern program
GE Appl & Lighting Moholy- Nagy University of Art Design Budapest		Outdoor Design Concept
GE Power & Water Óbudai University		SMEs, Intern program
GE Healthcare University of Pannonia	2	Cloud Projects, Masters Education
GE Appl & Lighting University of Pannonia		Human Effects, Motion Sensor
GE Healthcare University of Pécs	3	R&D Grant, SW development
GE Power & Water Eötvös József University	4	Education and Purification Research
GE Healthcare University of Szeged	5	Electric Car Project (planned)
GE Energy Management University of Debrecen	6	Neuro, Onco Projects
GE Appl & Lighting Zalaegerszeg	7	Education and Intern Program
GE Appl & Lighting Sopron University	8	Intern Program

- Healthcare
- Power & Water
- Appl & Lighting
- Energy Management

Every 5th international patent in Hungary comes from GE Hungary

New Sources and Forms of Data

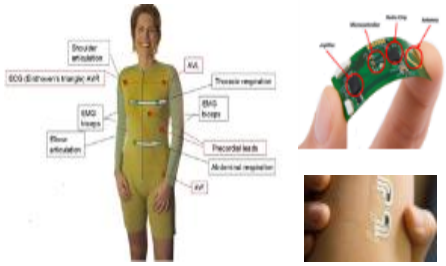
Entering a new frontier of possibility



Mobile Devices

Registries / Exchanges

Wearable Sensors



Activity Tracking

Bio Diagnostics

A transformational shift happening in healthcare delivery

Past	Future
Patient care	Population care
Episodic of care	Clinical pathway
Cure the symptom	Discover the cause
Heal the sick	Prevent the sickness

Summary & Conclusion

Productivity (driven by augmentation) is the basis of increased standard of living. We experience substantial improvements within one generation.

Individuals, Companies, States, Europe have to assess their capabilities to succeed in a rapidly changing world & derive necessary reforms

Historically changes have resulted in winners and losers – opportunities and challenges for all of the above players.

There will be very few areas without heavy IT impact: Can Hungary be the ‚Switzerland of IT'?

GE is embracing disruptive technologies and investing in Industrial Internet globally and in Hungary; GE turns innovation into global products

Clusters consisting of public, academics, SME & start ups and large enterprizes will be one of the tools to create economic value **– GE Hungary is ready to take an active role.**

Questions