IChemE ADVANCING CHEMICAL ENGINEERING WORLDWIDE

Revolution X.0 in the Palm Oil Industry

13 November 2018

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Founder Member POPSIG

Advancing chemical engineering worldwide

- More than 40,000 members based in 100 countries
- offices in Australia, New Zealand, Singapore, Malaysia and the UK
- leading accrediting body for university courses and company training
- publisher of The Chemical Engineer
- international events and training provider
- Award Chartered Chemical Engineer status
- Award Professional Process Safety Engineer status

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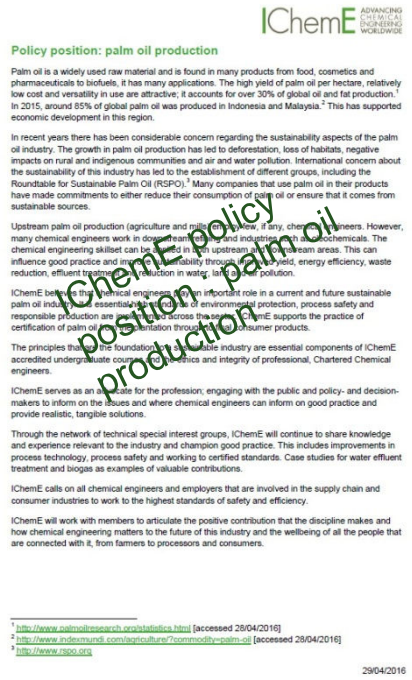
POPSIG

POPSIG was formed on 3rd August 2015 in Kuala Lumpur, Malaysia to provide a forum for the exchange of ideas, the sharing of experiences and encouraging innovation in the palm oil processing industry.

Volunteers passionate about the palm oil industry & process engineering

Not limited to chemical engineers



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Policy position: palm oil production

Palm oil is a widely used raw material and is found in many products from food, cosmetics and pharmaceuticals to biofuels, it has many applications. The high yield of palm oil per hectare, relatively low cost and versatility in use are attractive; it accounts for over 30% of global oil and fat production.[1] In 2015, around 85% of global palm oil was produced in Indonesia and Malaysia.[2] This has supported economic development in this region.

In recent years there has been considerable concern regarding the sustainability aspects of the palm oil industry. The growth in palm oil production has led to deforestation, loss of habitats, negative impacts on rural and indigenous communities and air and water pollution. International concern about the sustainability of this industry has led to the establishment of different groups, including the Roundtable for Sustainable Palm Oil (RSPO).[3] Many companies that use palm oil in their products have made commitments to either reduce their consumption of palm oil or ensure that it comes from sustainable sources.

Upstream palm oil production (agriculture and mill) is not, however, if any, chemical engineers. However, many chemical engineers work in downstream refining and industries such as oleochemicals. The chemical engineering skillset can be applied in both upstream and downstream areas. This can influence good practice and improve sustainability through yield, energy efficiency, waste reduction, effluent treatment, reduction in water, land and air pollution.

IChemE believes that chemical engineers have an important role in a current and future sustainable palm oil industry. The essential skills in the area of environmental protection, process safety and responsible production are applicable across the sector. IChemE supports the practice of certification of palm oil implementation through to consumer products.

The principles that are the foundation of a sustainable industry are essential components of IChemE accredited undergraduate courses. The ethics and integrity of professional, Chartered Chemical engineers.

IChemE serves as an advocate for the profession; engaging with the public and policy- and decision-makers to inform on the issues and where chemical engineers can inform on good practice and provide realistic, tangible solutions.

Through the network of technical special interest groups, IChemE will continue to share knowledge and experience relevant to the industry and champion good practice. This includes improvements in process technology, process safety and working to certified standards. Case studies for water effluent treatment and biogas as examples of valuable contributions.

IChemE calls on all chemical engineers and employers that are involved in the supply chain and consumer industries to work to the highest standards of safety and efficiency.

IChemE will work with members to articulate the positive contribution that the discipline makes and how chemical engineering matters to the future of this industry and the wellbeing of all the people that are connected with it, from farmers to processors and consumers.

[1] http://www.palmoilresearch.org/statistics.html [accessed 28/04/2016]
[2] http://www.indexmundi.com/agriculture/?commodity=palm-oil [accessed 28/04/2016]
[3] http://www.rspo.org

29/04/2016

IChemE policy position - production palm oil

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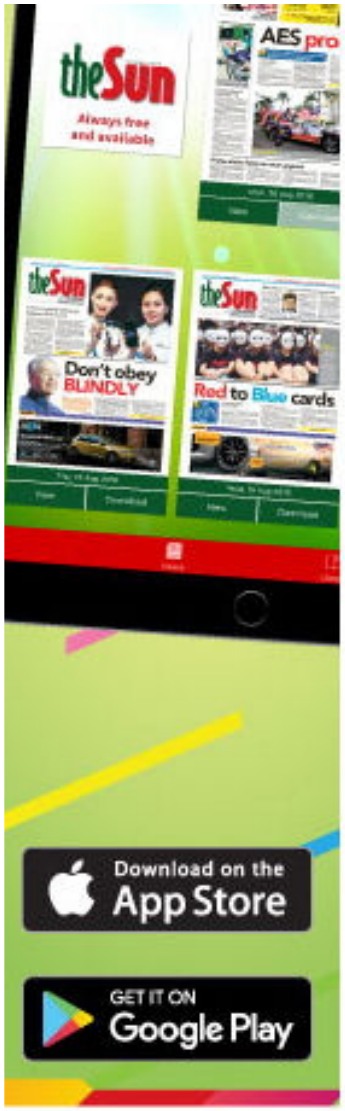


2019 Budget allocates over RM5b to drive Industry 4.0

Posted on 2 November 2018 - 09:04pm

Finance Minister Lim Guan Eng tables th
at the Parliament, on Nov 2, 2018.

Finance Minister Lim Guan Eng tables the 2019 Budget at the Parliament, on Nov 2, 2018.

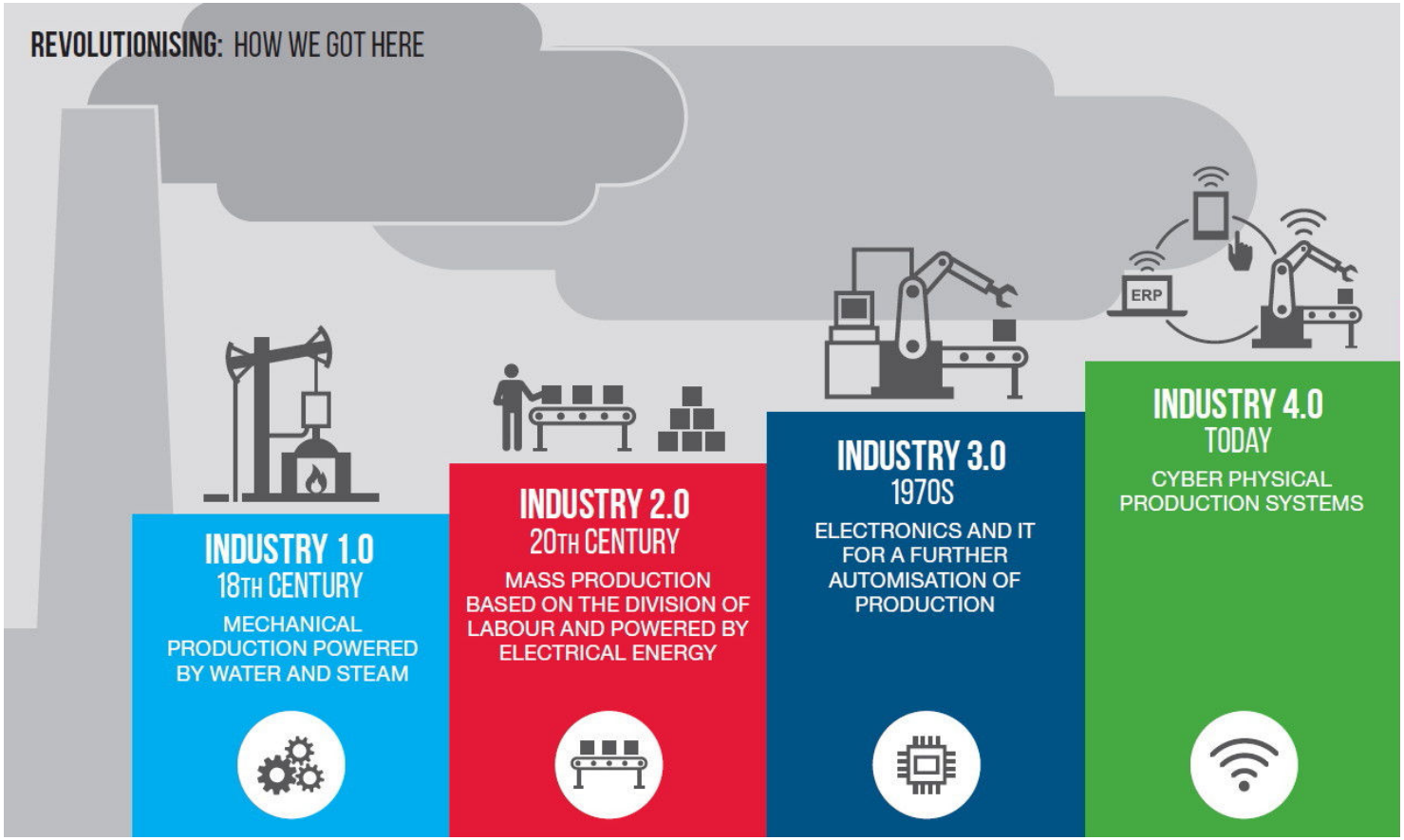
KUALA LUMPUR: The government is allocating more than RM5 billion in the 2019 Budget to propel industries in Malaysia in the wake of the Fourth Industrial Revolution (Industry 4.0), said Finance Minister Lim Guan Eng.

During the tabling of the first budget for the Pakatan Harapan government, Lim said RM210 million had been allocated over three years from 2019 to support the transition and migration to Industry 4.0 in line with the Malaysia National Policy on Industry 4.0 launched recently.

Content

- The Industrial Revolution
- Why Revolution X.0?
- Developments in the PO Industry
- How will you respond?
- Questions?

The Industrial Revolution



Plantation Mill/Crusher Refinery Oleochemicals

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What is IR 4.0?

- The marriage of advanced manufacturing techniques with information technology, data, and analytics.
- Information technology (IT) and operations technology (OT) are combined to create value in new and different ways

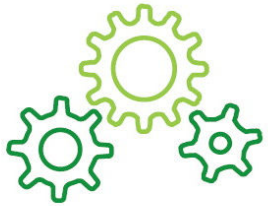
Trends and new ways of working

1. Remove workers from dangerous/tedious jobs
2. Upskill workers with enablers eg Google Glass, tablets
3. Industry “ecosystems” to include companies and their suppliers
4. Advanced analytics to make predictive and proactive decisions

Priority : security of data

The benefits of IR 4.0

Table 1. Industry 4.0 transformational plays for the chemicals industry

Product impact	Key objectives	Transformational plays
 BUSINESS OPERATIONS	Improve productivity	• Smart manufacturing • Supply chain planning
	Reduce risk	
 BUSINESS GROWTH	Add incremental revenue	• Research and development • Smart products and services
	Generate new revenue	

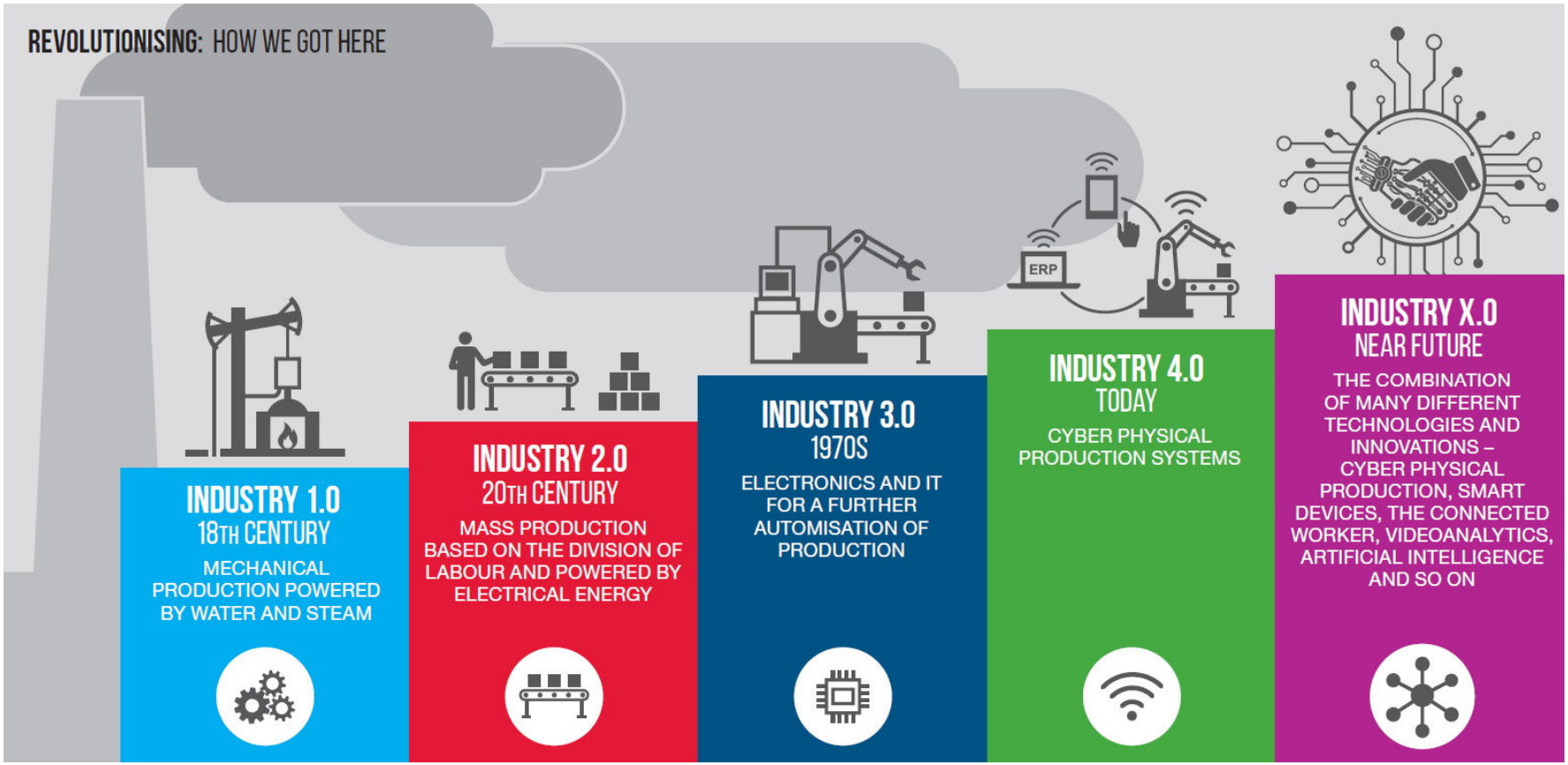
Source: Deloitte analysis.

Graphic: Deloitte University Press

Why Revolution X.0?

- You cannot put a sector into an IR silo
- Connectivity in industry
- Generation C
- Thriving in an Exponential World
- Accenture “ …the speed of change is already moving us beyond Industry 4.0 to Industry X.0”

Industry X.0



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Get It Right

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Build capabilities

- Start with what you know or do best
- Enable a cross-functional Revolution X.0 team
- Build and be a part of a pervasive ecosystem
- Manage your cyber risk

Agriculture

Spring plowing

- more accurate
- 30% less fertilizer
- yields +12%

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An Oil Palm Plantation of the Future

- At nursery chips are implanted
- Drones identify ripe fruit bunches
- Autonomous harvesting vehicles
- 24/7 harvesting
- Continuous mill operations

A Mill of the Future

- A state of the art mill
  - unit operations that understand the characteristic features & biology of the fruit
  - treats the fruit with TLC
  - sensors enable real time operation
- With IT safe, zero waste, energy efficient & top quality CPO

OUT

IN

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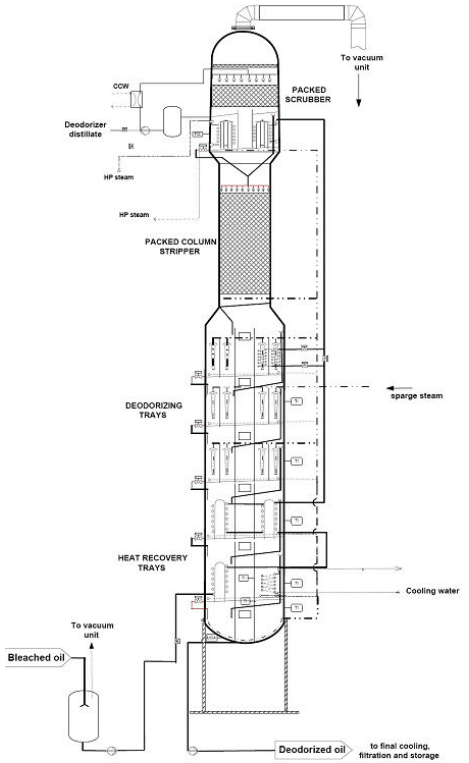
A Palm Oil Refinery of the Future

- Industry ‘ecosystem’ encompasses plantation through to the retailer
- Food contaminants traceability
- Compromise of physical refining of colour, ffa and stability optimized
- In fractionation crystallization is appropriate for end product



Future oleochemicals is here

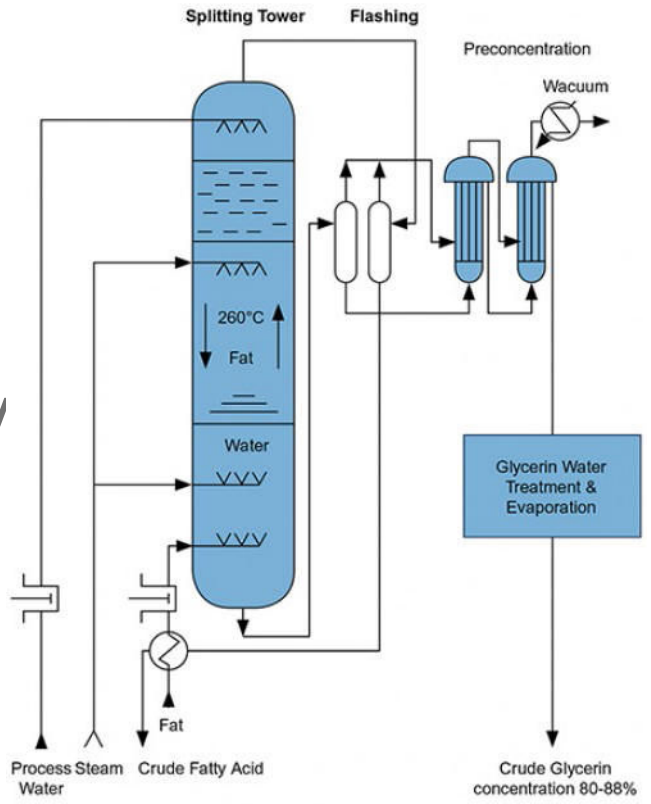
BASF smart factory

- liquid soaps at Kaiserslautern
- user places an order for a customized soap
- RF ID tags on ingredient containers inform production equipment
- desired composition of the soap and packaging selected
- mass customization without human involvement

A ‘dark’ factory

Future upstream oleochemicals

- 3D visualization & VR training
- Greater control over quality
- Predictive asset management
- Soft sensors to improve energy usage & plant efficiency
- Automated Hazard and Operability analysis
- Online sales eg Alibaba



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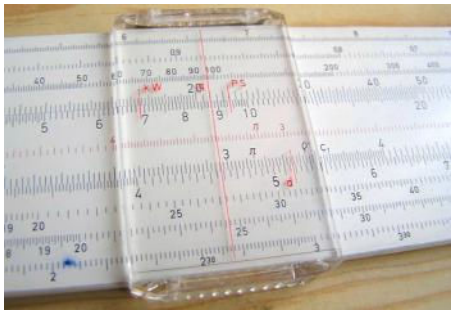
How will you respond?

Within one generation…



Slide rule

Punch cards

Main frame

Desk top

Tablet

The cloud

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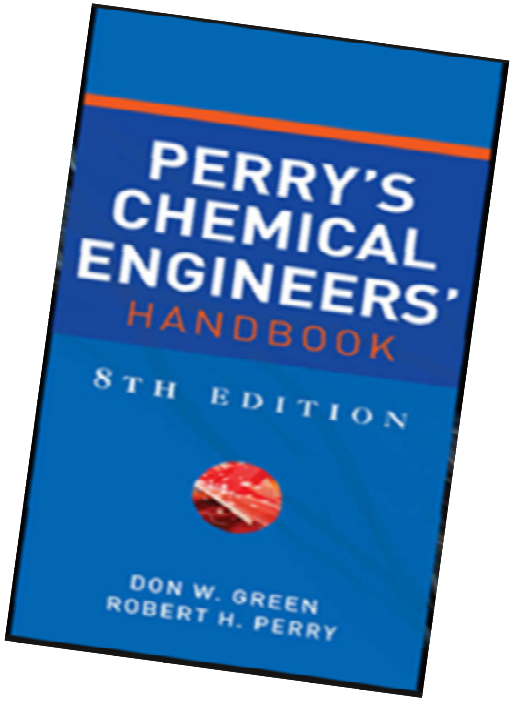
In 2018 Perry's is already virtual



Step 1

Mobile
eBook

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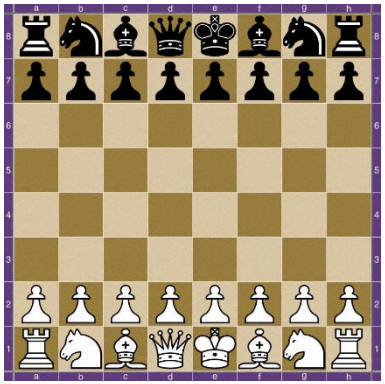
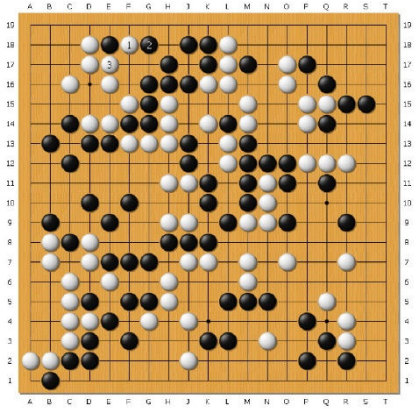
Cognitive meets humans



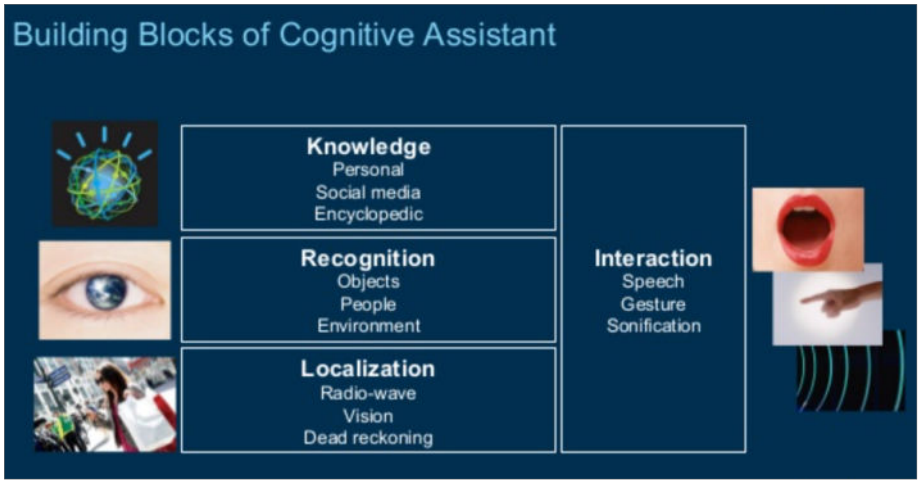
Garry Kasparov, the grandmaster who was famously defeated by IBM’s supercomputer Deep Blue in 1997 said: ‘The ability of a machine to surpass centuries of human knowledge . . . is a world-changing tool.’



In 2016 AlphaGo: Google-developed AI beat South Korean Go grandmaster Lee Se-dol. In four hours, AlphaGo taught itself chess, then beat him with moves never devised in the game's 1,500-year history.

Cognitive meets the professions

"Super Intelligent" Legal Assistant ROSS powered by IBM WATSON



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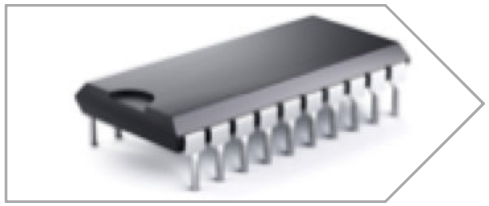
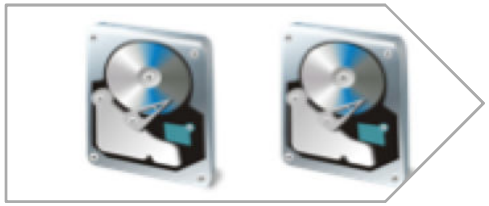
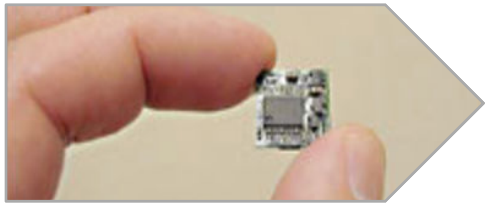
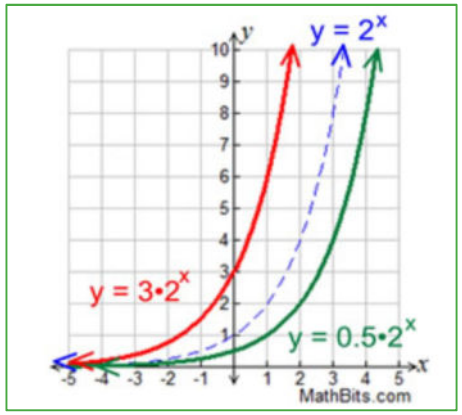
Exponential forces shaping digital









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Exponential trends – just amazing

Capability	Unit	1992	2012
Computing cost	$/million transistors	$222	$0.06
Storage cost	$/Gigabyte of storage	$569	$0.03
Bandwidth cost	$/1,000 Megabytes/Sec	$1,245	$23

Where does exponential end?

Staggering data management capacity

A Petabyte of MP3 tunes would play continuously.for 2,000 years (Think Romans with iPods!)

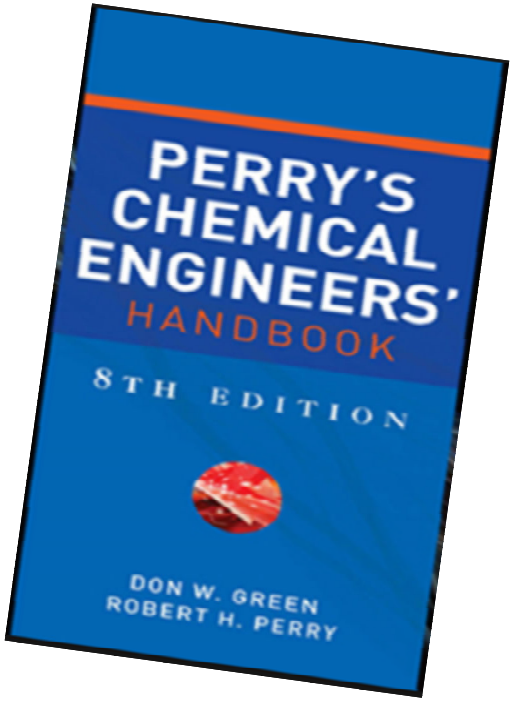
Counting the bits in one petabyte at one bit per second would take 285 million years. (Start in the pre-dinosaur era!)

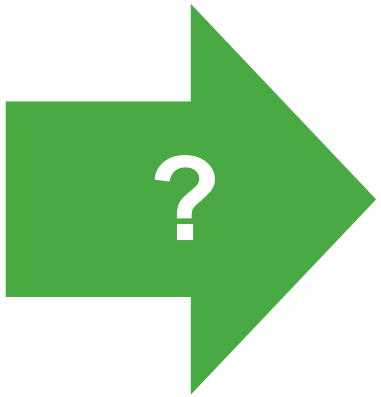
Storing 1 Pb would take 746 Billion 3.5-inch floppy discs weighing 13,500 tonnes (Two Type 45 destroyers!)

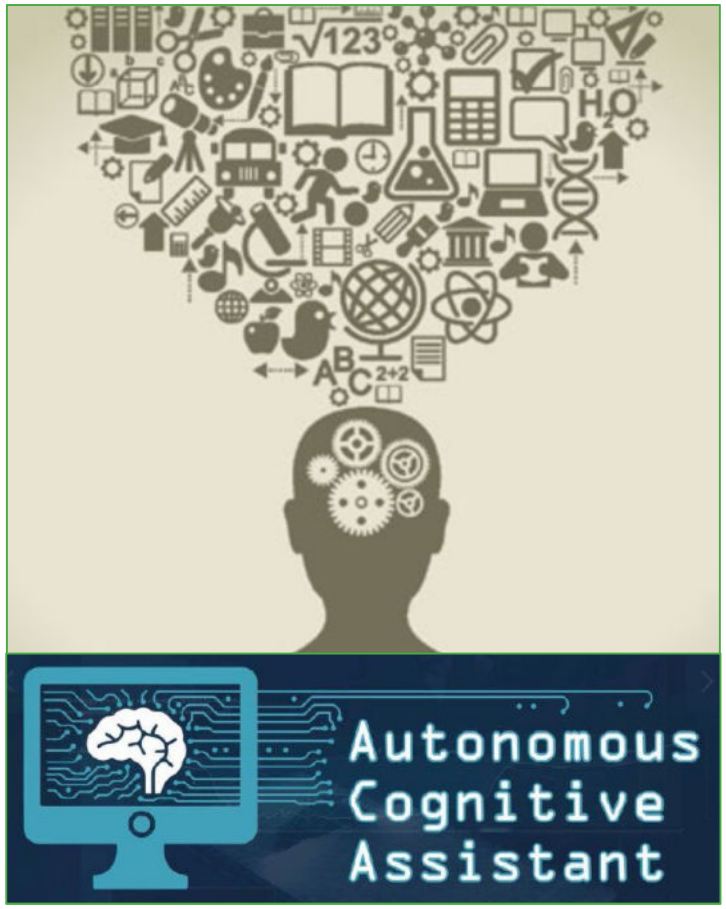
1 Petabyte

(1PB = 1,000 TB)

When will Perry's go cognitive?







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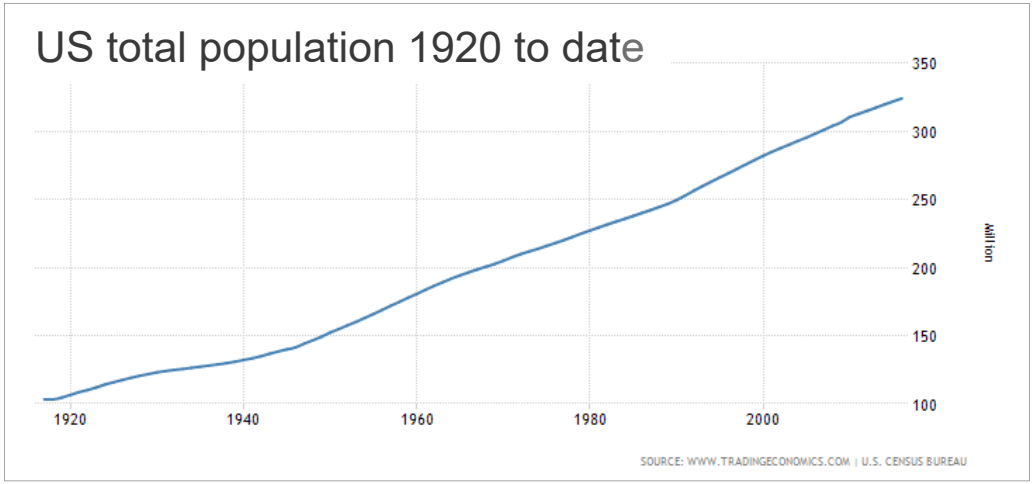
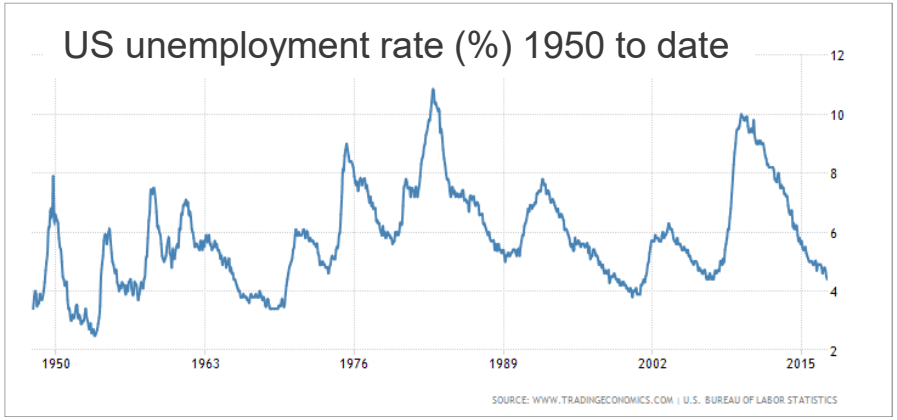
Impact on jobs?



The population of the United States has grown by 200 million people over the last Century

Employment in the United States has grown by just under 100 million since 1950. Today unemployment stands at just over 4%



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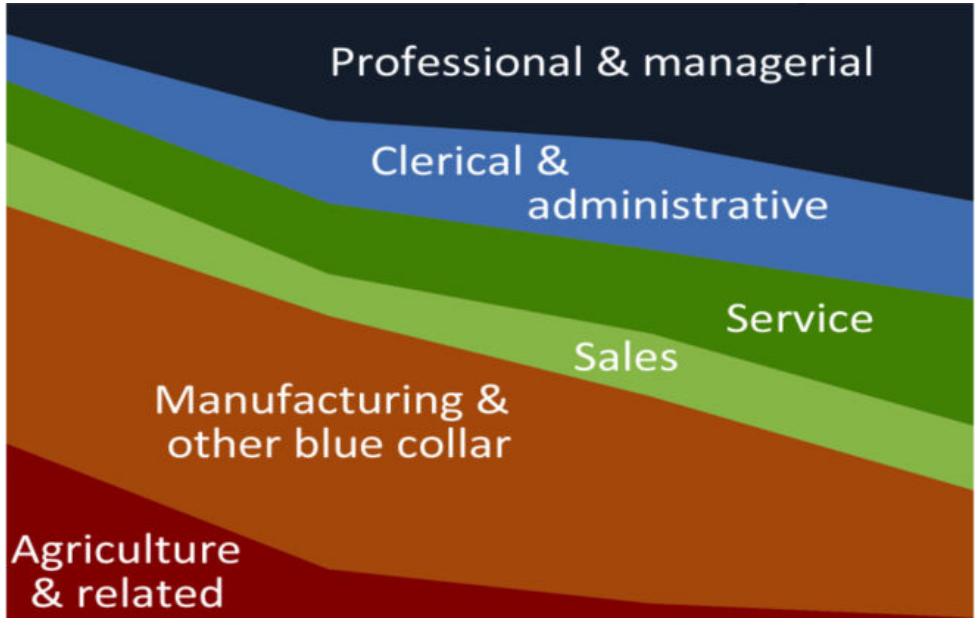
But, what kind of jobs are they?

US employment mix trends 1920 - 2017



1920 2017

Could they have predicted in 1920 that US population would have grown by 200 million with a dramatic shift in the employment mix?

Complex economic systems deliver complex outcomes.

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70 miles from shore with Watson


We can think like a thousand engineers
and add outstanding value

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Thank you

Questions?