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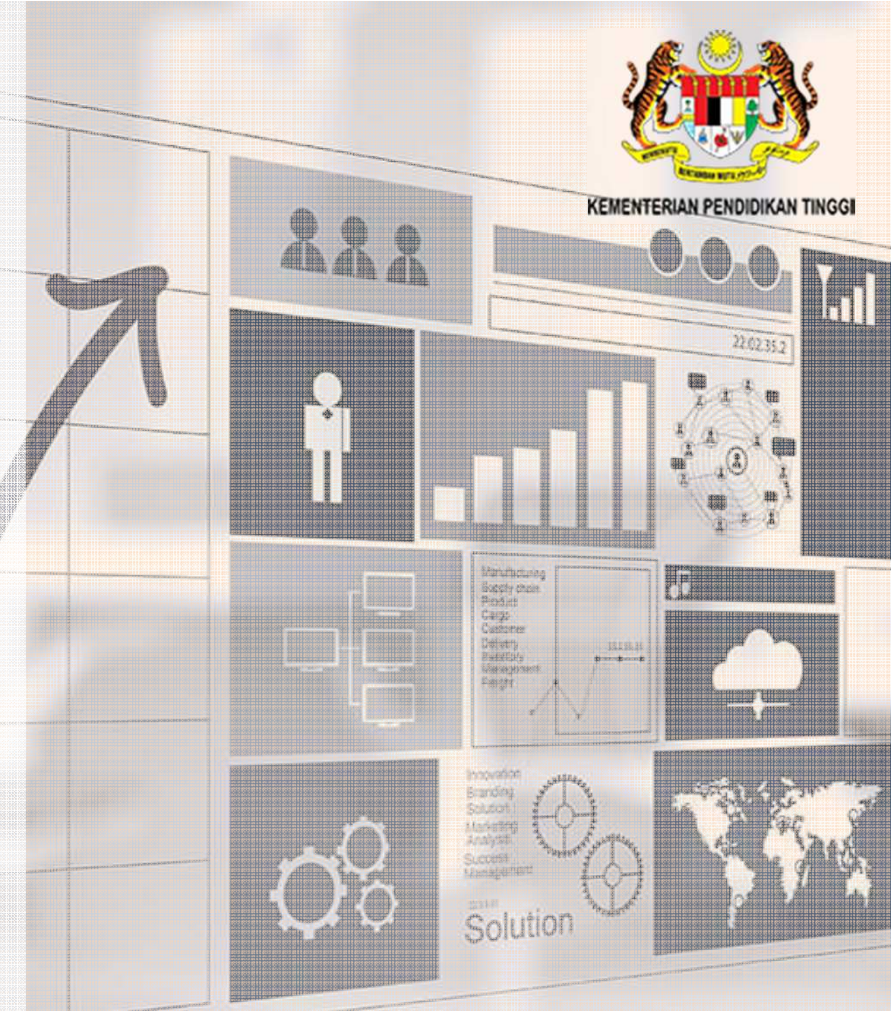


KEMENTERIAN PENDIDIKAN TINGGI

Higher Education 4.0 : Current Status and Readiness in Meeting the Fourth Industrial Revolution Challenges

Ali Selamat

**Chief Information Officer (CIO)
Universiti Teknologi Malaysia &
Chair – IEEE Computer Society Malaysia
Email: aselamat@utm.my**



Redesigning Higher Education Towards Industry 4.0, Kuala Lumpur, Malaysia (23-24 August 2017)

***The materials are compiled with the co-authors:**

Rose Alinda Alias, Syed Norris Hikmi, Marlia Puteh and Siti Hamisah Tapsir

**SOARING
UPWARDS**
MALAYSIAN HIGHER EDUCATION



- Datin Paduka Ir. Dr. Siti Hamisah Tapsir
 - Director General of Higher Education (Ministry of Higher Education, Malaysia)
- Assoc. Prof. Dr Marlia Puteh
 - Head - Strategic Communications Unit (Ministry of Higher Education, Malaysia)
- Prof. Dr Rose Alinda Alias
 - President – MyAIS - Association for Information Systems (Malaysia Chapter) & Senior IT Fellows (Center of Information & Communication Technology, UTM)



- Dr. Syed Norris Hikmi Syed Abdullah
 - Deputy Director – Center of Information
 - & Communication Technology, UTM

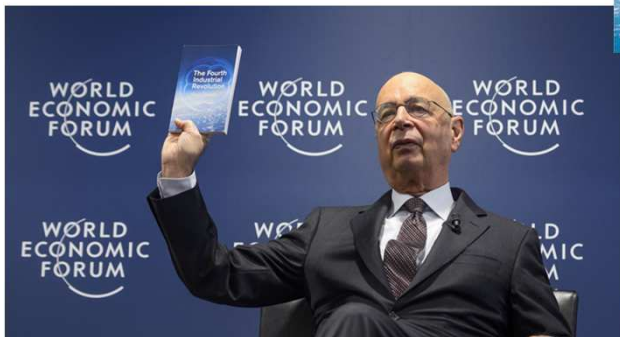
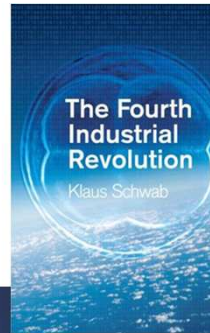


- Industrial Revolution 4.0
- Current Status and Readiness
 - Seminar and activities related to IR4.0
 - Fourth Industrial Revolution Challenges
 - Malaysia Higher Education 4.0 (MyHE 4.0)
- Challenges of Industrial Revolution 4.0 in higher education
- Conclusions and future outlook

The 4th Industrial Revolution

World Economic Forum Annual Meeting 2016, Davos-Klosters, Switzerland.

Theme: “Mastering the Fourth Industrial Revolution”
20-23 January 2016



Professor Klaus Schwab,
Founder and Executive Chairman of the
World Economic Forum

4IR (Fourth Industrial Revolution)

FOREIGN
AFFAIRS

THE FOURTH INDUSTRIAL REVOLUTION
Klaus Schwab



FROM THE ANTHOLOGY: THE FOURTH INDUSTRIAL REVOLUTION

SNAPSHOT December 12, 2015

Science & Technol...

The Fourth Industrial Revolution

What It Means and How to Respond

By *Klaus Schwab*



We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society.



COMMITTED TO IMPROVING THE STATE OF THE WORLD

Global Challenge Insight Report

The Future of Jobs

Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution

January 2016



January 2016



THE DIGITAL REVOLUTION
The impact of the Fourth Industrial Revolution on employment and education

Edge Foundation
Champion of technical, practical and vocational learning

Kenneth Baker
Chairman of the Edge Foundation



COMMITTED TO IMPROVING THE STATE OF THE WORLD

White Paper

Realizing Human Potential in the Fourth Industrial Revolution

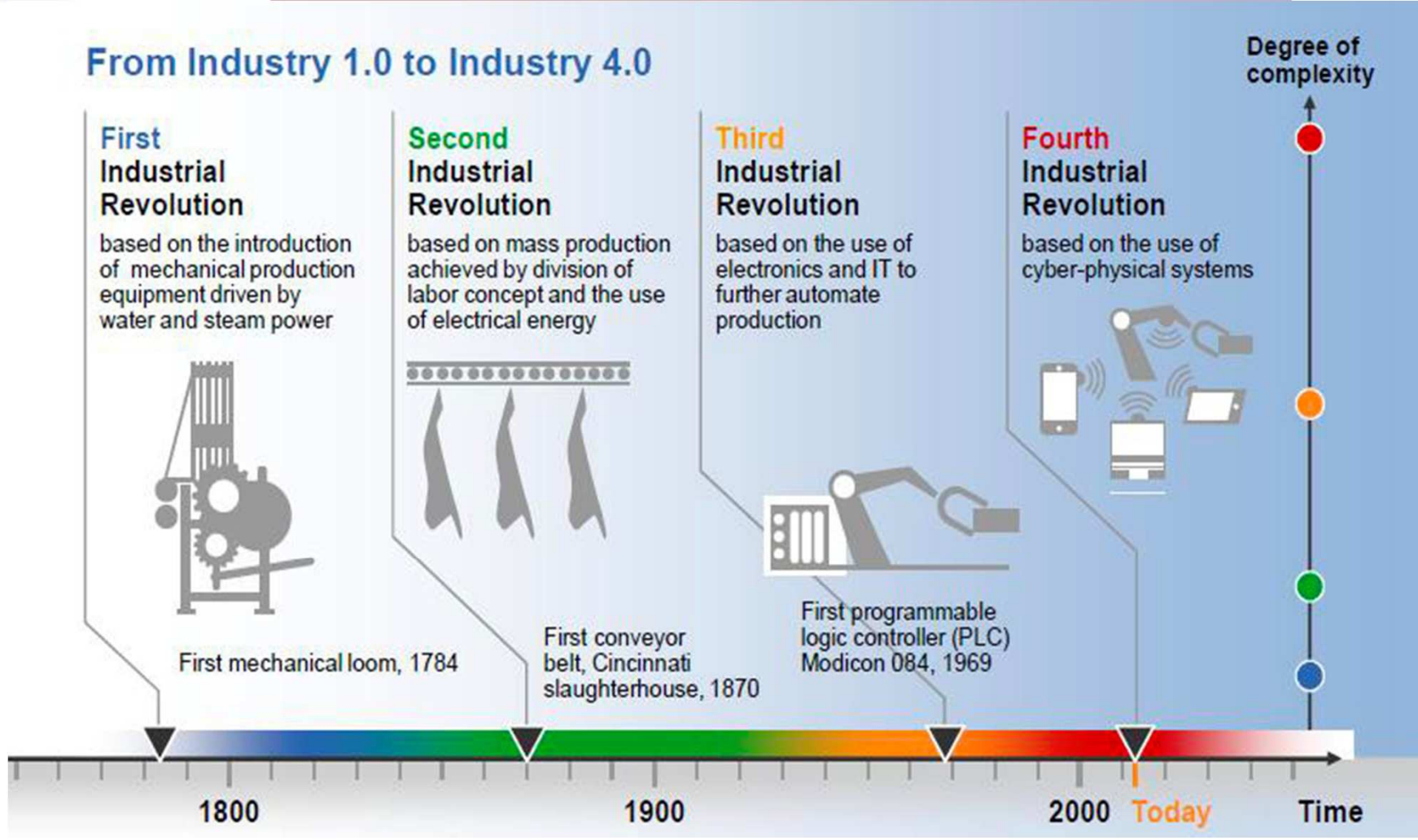
An Agenda for Leaders to Shape the Future of Education, Gender and Work

January 2017



January 2017 

From Industry 1.0 to Industry 4.0



- The **digital consumer**, who enjoys more interactive and personalized experiences thanks to SMAC (social, mobile, analytics and cloud) technologies;
- The **digital enterprise**, which leverages SMAC technologies to optimize the cost of corporate functions and to transform enterprise collaboration for greater productivity;
- The emerging **digital operations wave** – the companies are revolutionizing their business with the use of artificial intelligence, robotics, cognitive computing and the Industrial Internet of Things (IOT).

DIGITIZATION AND DIGITAL TRANSFORMATION



BUSINESS AS USUAL:

Organizations operate with a familiar legacy perspective of customers, processes, metrics, business models, and technology, believing that it remains the solution to digital relevance.



PRESENT AND ACTIVE:

Pockets of experimentation are driving digital literacy and creativity, albeit disparately, throughout the organization while aiming to improve and amplify specific touch-points and processes.



FORMALIZED:

Experimentation becomes intentional while executing at more promising and capable levels. Initiatives become bolder and, as a result, change agents seek executive support for new resources and technology.



STRATEGIC:

Individual groups recognize the strength in collaboration as their research, work, and shared insights contribute to new strategic roadmaps that plan for digital transformation ownership, efforts, and investments.



CONVERGED:

A dedicated digital transformation team forms to guide strategy and operations based on business and customer-centric goals. The new infrastructure of the organization takes shape as roles, expertise, models, processes, and systems to support transformation are solidified.



INNOVATIVE AND ADAPTIVE:

Digital transformation becomes a way of business as executives and strategists recognize that change is constant. A new ecosystem is established to identify and act upon technology and market trends in pilot and, eventually, at scale.

<http://www.briansolis.com/2017/01/definition-of-digital-transformation/>

“the change that occurs when new digital technologies and business models affect the value proposition of existing goods and services”

“a transformation that is caused by emerging digital technologies and business models,

- which can impact the value of existing products and services offered in the industry,
- and disrupts the current market and causes the need for re-evaluation.”

















- Clayton Christensen:
- “An innovation that is **disruptive allows a whole new population of consumers access to a product or service** that was historically only accessible to consumers with a lot of money or a lot of skill.
- **Characteristics of disruptive businesses** can include lower gross margins, smaller target markets, and simpler products and services that may not appear as attractive as existing solutions when compared against traditional performance metrics.”



Digital Disruption can occur at various levels:

- Disruptions to **individual life practices** (e.g., mobile connectivity disrupts established work-life boundaries)
- Disruptions to **work practices** (e.g., microblogging in the workplace changes what counts as (valuable) work)
- Disruptions to **business practices** (e.g., workplace social media disrupt the way information travels in the organization)
- Disruptions to **industry structures** (e.g., digitization of media content and user-generated content disrupts traditional value chains of content production and delivery)
- Disruptions to **society** (e.g., social media participation disrupts traditional practices of public opinion making)

Examples of Digital Disruptions

 UBER World's largest taxi company Owns NO 	 airbnb World's largest Accommodation provider Owns NO 	 skype WeChat World's largest Phone companies Owns NO 	 Alibaba Group World's most Valuable retailer Owns NO 
 facebook. Most popular Media owner Owns NO 	 SocietyOne World's fastest Growing bank Owns NO 	 NETFLIX World's largest movie house Owns NO 	 Apple Google World's largest Software vendors Owns NO 

**DISRUPTION
NEEDS
PLATFORMS**

Seven (7) of these companies did not exist twenty years ago

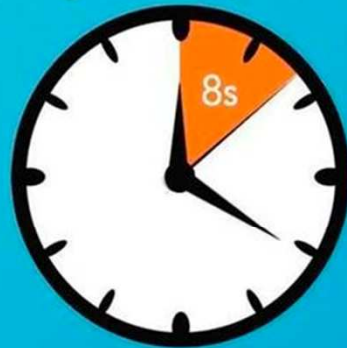
MORE BUZZWORDS THAT WE COME ACROSS DAILY

HOW HARD IS IT TO PAY ATTENTION?

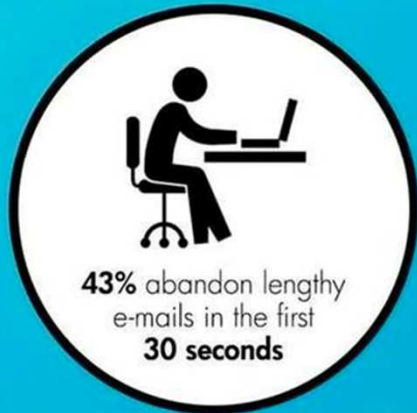
Average Attention Span in 2000



Average Attention Span in 2013

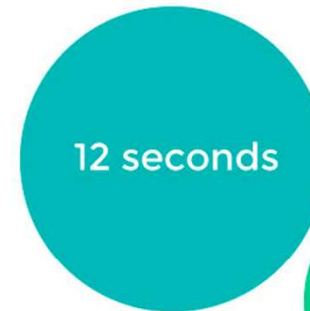


Attention Span in the Office



SOURCE: THE BRIEF LAB

 NIGHTLY NEWS
with BRIAN WILLIAMS



THE AVERAGE HUMAN ATTENTION SPAN IN 2000



THE AVERAGE HUMAN ATTENTION SPAN IN 2013

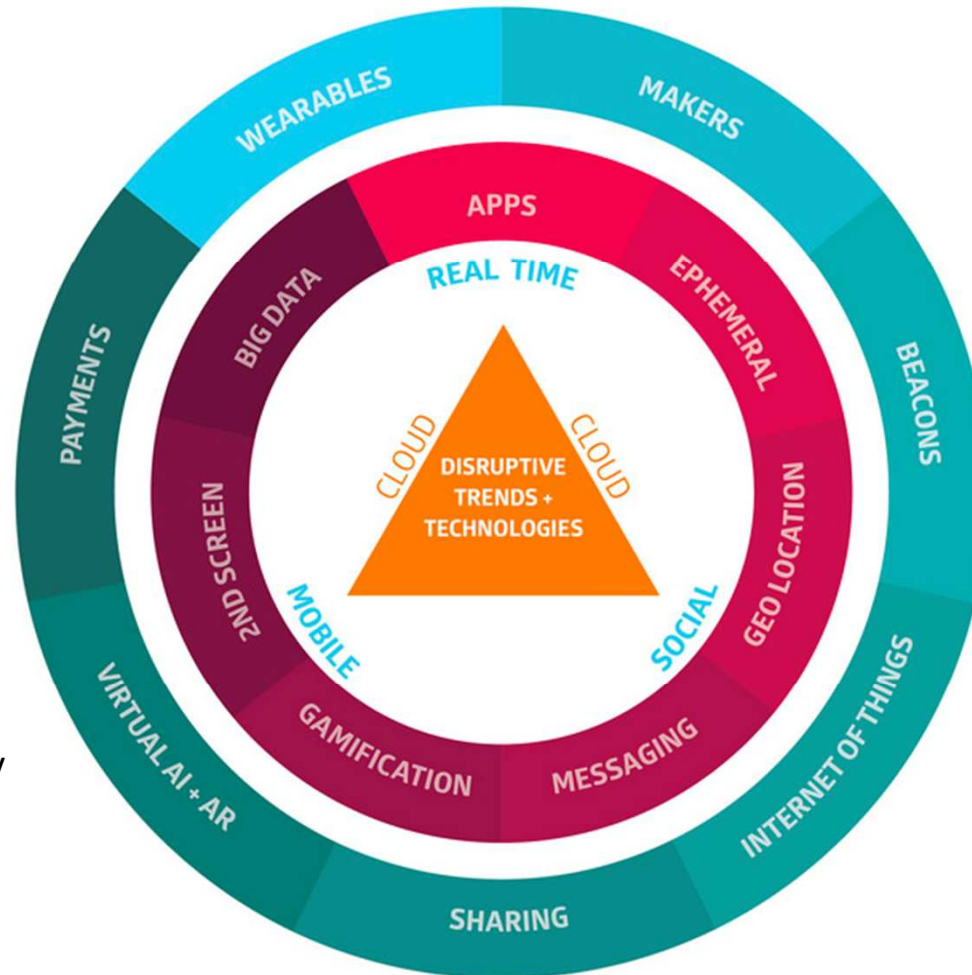


THE AVERAGE ATTENTION SPAN OF A GOLDFISH

<http://www.rubberneckzine.com/what-is-your-attention-span-and-are-there-any-tips-to-better-it/>

- **New generation of students**, constantly changing
- Everybody (not just a student) **has too many sources of distraction**
- Indeed, **our brains are constantly being rewired**; as a result of reduced attention spans
- What **you learn during your education won't last** for your entire career (since progress is accelerating)
- **Schools are often not very helpful** in choosing a career path

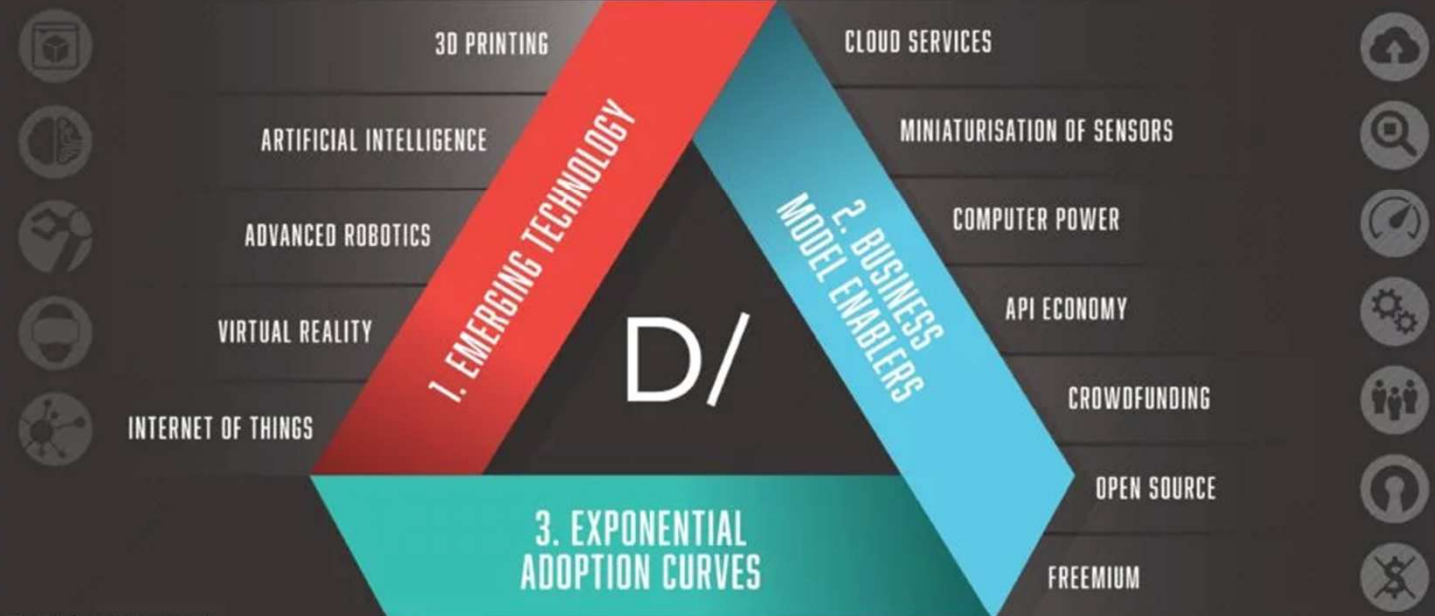
THE WHEEL OF DISRUPTION



Within the Wheel of Disruption, the "Golden Triangle" is encircled by other emergent technologies and sectors affected by mobile, social, and real-time, such as big data, geo-location, cloud, and more.

<https://thenextweb.com/entrepreneur/2014/04/16/digital-disruption-changing-business-technology-isnt-answer/>

THE 3 DIMENSIONS OF DISRUPTION



The intersection and interaction of Emerging Technologies, Innovative New Business Models, and Exponential Adoption Curves is leading to large scale disruption of industries at an unprecedented rate.

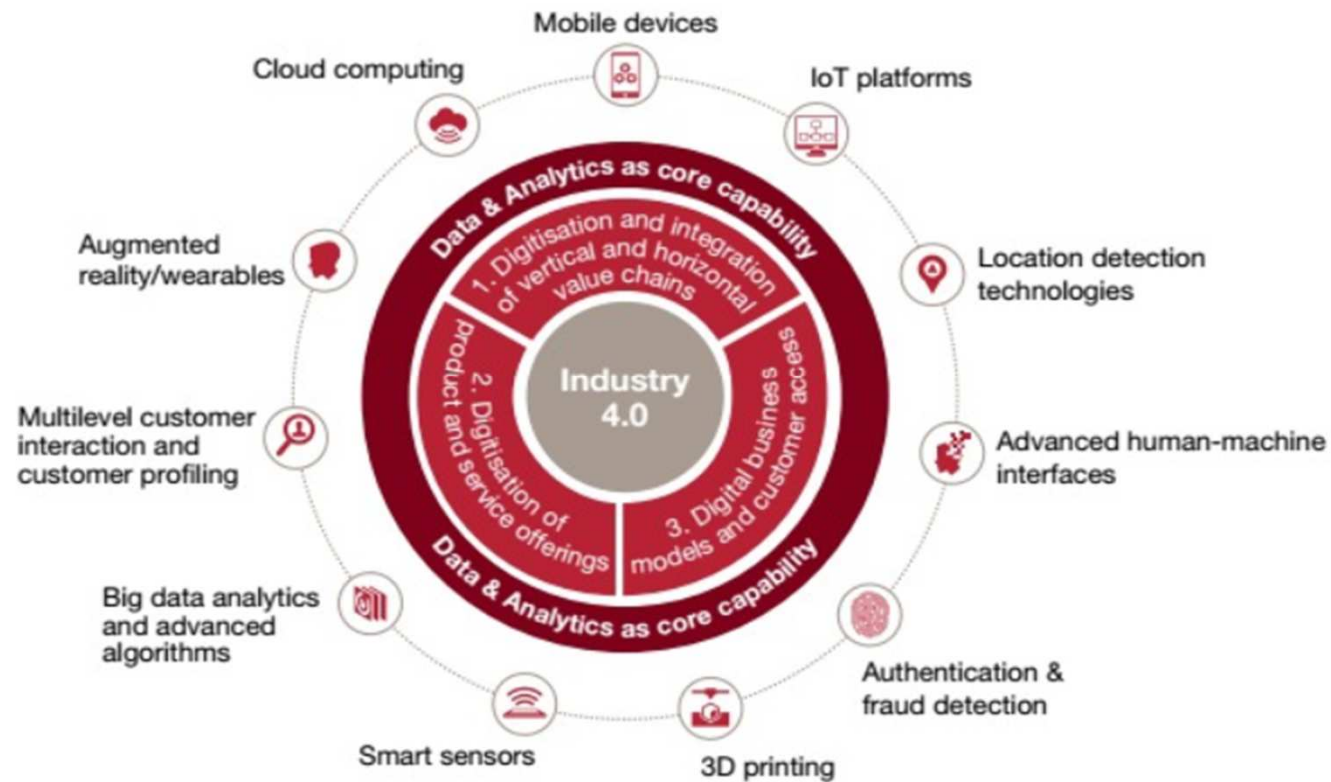


D/SRUPTION

disruptionhub.com

Industry 4.0 Framework (PwC, 2016)

Industry 4.0 framework and contributing digital technologies



Source: PwC, 2016

Industry 4.0 Characteristics & Components

- 01 Industry 4.0 is **interconnection**
- 02 Industry 4.0 is **data**
- 03 Industry 4.0 is **integration**
- 04 Industry 4.0 is **innovation**
- 05 Industry 4.0 is **transition**

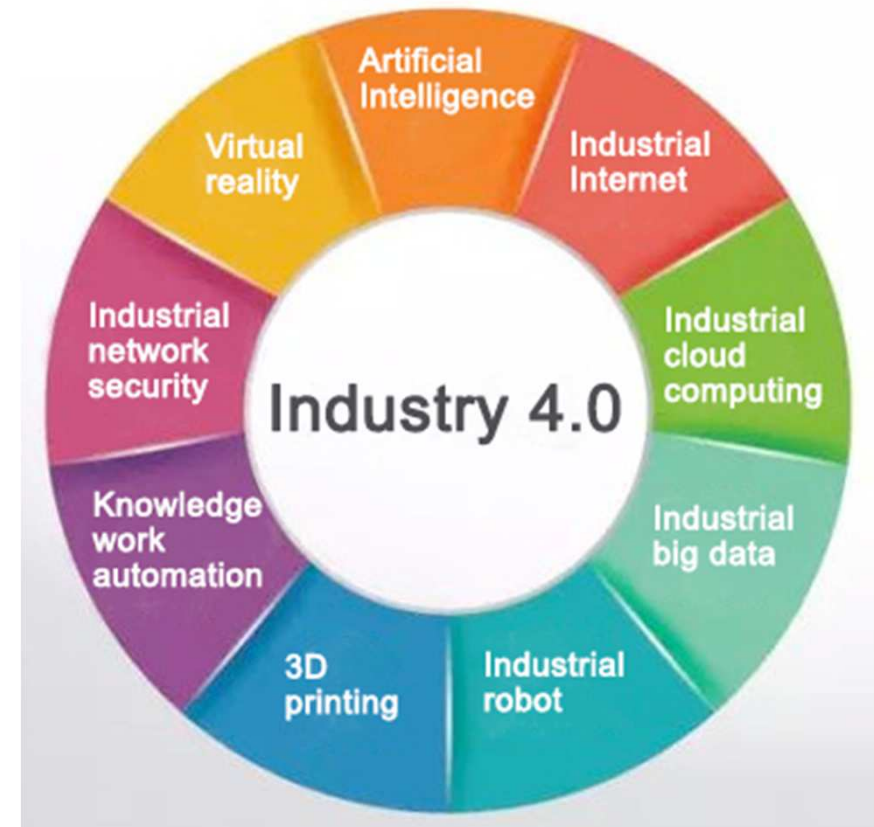


Table 5. Potential Industry 4.0 applications for engineering transformation

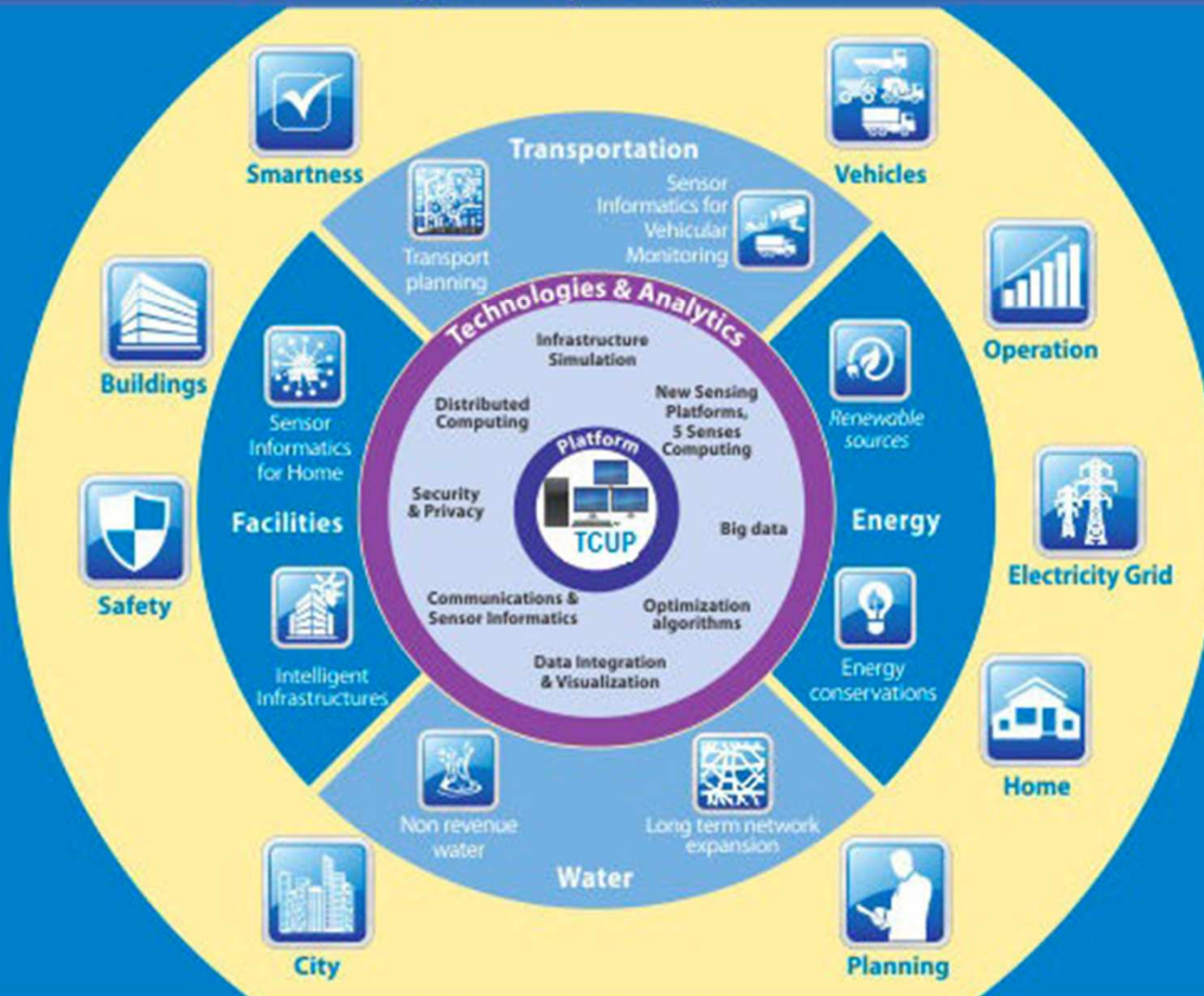
Engineering impact	Potential IT/OT applications
Reduce idea-to-market time	Use rapid prototyping and production capabilities to design new products and eliminate supply chain dependencies; configure new software solutions through cloud-enabled development tools
Better link design to product intelligence	Use data to anticipate design flaws and correct for them; design products and simulate usage based on total cost of ownership and supply implications; evaluate product design options based on manufacturability
Improve the overall effectiveness of engineering³²	Design and test new products through virtual simulation software; allow open source sharing of intellectual property to spur or improve designs

Source: Deloitte analysis.

Graphic: Deloitte University Press | DUPress.com

- Systems of collaborating computational elements that control physical entities, generally using feedback from sensors they monitor.
- Engineered systems that are built from, and depend upon, the seamless integration of **computational algorithms** and **physical components**.

Cyber-Physical Systems



Cyber-physical systems (CPS)

Source: <http://www.pixelsolutionbd.com/cyber-physical-system/>

THE FUTURE FOR ARTIFICIAL INTELLIGENCE IN EDUCATION: Barbara Kurshan, 2016

The Future of Artificial Intelligence in Education



Barbara Kurshan, CONTRIBUTOR

I write on edtech, OER, ecosystems and investing in education. [FULL BIO](#) ▾
Opinions expressed by Forbes Contributors are their own.

TWEET THIS



Why is education lagging behind? Why has the momentum for artificial intelligence in education seemed to have largely faded in the past few years?



I believe that artificial intelligence could play a role in the growing field of learning analytics, evaluating the quality of curricular materials, and in adaptive learning and recommendation engines. There is also the potential for artificial intelligence to create unique learning pathways for individual learners in MOOCs and blended and online learning

Our world as we know it is running on artificial intelligence. Siri manages our calendars. Facebook suggests our friends. Computers trade our stocks. We have cars that park themselves, and air traffic control is almost fully automated. Virtually every field has benefited from advances in artificial intelligence, from the military to medicine to manufacturing.

However, almost none of the recent advancements in artificial intelligence have advanced the education industry. Why is education lagging behind? Why has the momentum for

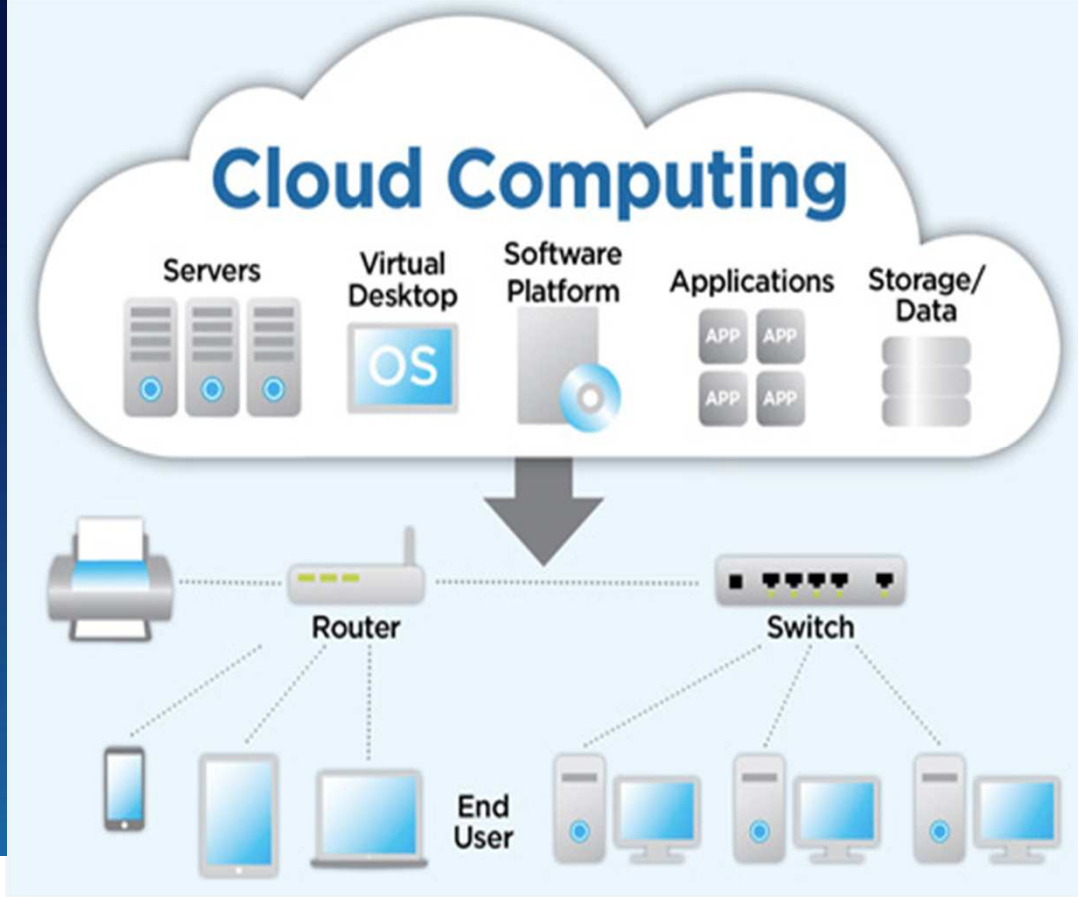
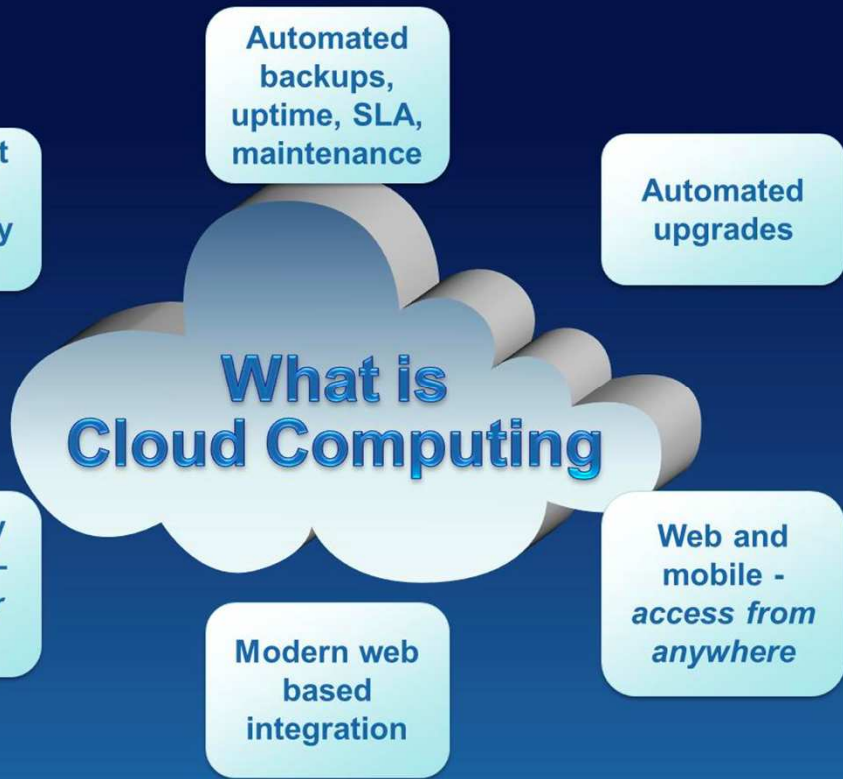
- Our world as we know it is running on artificial intelligence.
- Siri manages our calendars.
- Facebook suggests our friends. Computers trade our stocks.
- We have cars that park themselves, and air traffic control is almost fully automated. Virtually every field has benefited from advances in artificial intelligence, from the military to medicine to manufacturing.
- However, almost none of the recent advancements in artificial intelligence have advanced the education industry. [Why is education lagging behind? Why has the momentum for artificial intelligence in education seemed to have largely faded in the past few years?](#)

ARTIFICIAL INTELLIGENCE IN EDUCATION: Barbara Kurshan, 2016



GRAND CHALLENGES FOR ARTIFICIAL INTELLIGENCE IN EDUCATION

- [Woolf, et al., \(2013\)](#) proposed some “grand challenges” that artificial intelligence in education should work to address, including:
- **Virtual mentors for every learner:** Omnipresent support that integrates user modeling, social simulation and knowledge representation.
- **Addressing 21st century skills:** Assist learners with self-direction, self-assessment, teamwork and more.
- **Analysis of interaction data:** Bring together the vast amounts of data about individual learning, social contexts, learning contexts and personal interests.
- **Provide opportunities for global classrooms:** Increase the interconnectedness and accessibility of classrooms worldwide.
- **Lifelong and lifewide technologies:** Taking learning outside of the classroom and into the learner’s life outside of school.



<https://u.osu.edu/cloudcomputing/application-in-business/>

delivery of computing services—servers, storage, databases, networking, software, analytics and more—over the Internet (“the cloud”).

Virtual Reality vs. Augmented Reality

- Virtual reality (VR)



<https://www.linkbcit.ca/virtual-reality-for-business/>

- Augmented reality (AR)



- **Big data analytics** is the process of examining **large** and varied **data** sets -- i.e., **big data** -- to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful information that can help organizations make more-informed business decisions.

- **Cost reduction.** Big data technologies such as Hadoop and cloud-based analytics bring significant cost advantages when it comes to storing large amounts of data – plus they can identify more efficient ways of doing business.
- **Faster, better decision making.** With the speed of Hadoop and in-memory analytics, combined with the ability to analyze new sources of data, businesses are able to analyze information immediately – and make decisions based on what they've learned.
- **New products and services.** With the ability to gauge customer needs and satisfaction through analytics comes the power to give customers what they want. Davenport points out that with big data analytics, more companies are creating new products to meet customers' needs.

McKinsey & Company
McKinsey Global Institute

12 Disruptive Technologies

Renewable energy

- 21,000 TWh annual global electricity consumption
- 13 billion tons in annual carbon dioxide emission from electricity generation
- \$3.5 trillion value of global electricity consumption
- 85% lower price for solar photovoltaic cell per watt since 2000

Advanced oil & gas exploration & recovery

- 3x increase in efficiency of US gas wells between 2007 & 2011; 2x increase for oil wells over the same period
- 30 billion barrels of crude oil produced globally
- \$3.4 trillion revenue from global sales of crude oil

Advanced materials

- \$1000 vs \$50: Price difference of 1 gram of nanotube over a decade
- 115x strength-to-weight ratio of carbon nanotubes vs steel
- \$4 billion revenue from global carbon fibre sales

3D printing

- 90% decrease in price of home 3D printers compared to 2009
- \$11 trillion worth in global manufacturing GDP
- 8 billion pieces of toys manufactured globally a year

Energy storage

- 40% price decline in Lithium-ion battery pack in an electric vehicle since 2009
- \$100 billion estimated value of electricity for households currently without access
- 1.2 billion people without access to electricity
- 100x increase in acreage of genetically modified crops between 1990 to 2012; 2.5 billion people employed in agriculture

Next-generation genomics

- 10 months to double sequencing speed per dollar
- \$6.5 trillion global health-care costs

Mobile Internet

- Fastest supercomputer in 1975 costs \$5m, with equal performance as an iPhone 4, which costs \$400
- 4.3 billion people yet to be connect to the Internet today
- \$1.7 trillion worth of GDP related to the Internet
- 1.1 billion smartphone users, with potential to use automated digital assistance apps

Automation of knowledge work

- 100x increase in computing power from IBM's Deep Blue (1997) to Watson (2011)
- \$9+ trillion global costs of employing knowledge workers, which is 27% of global employment costs
- 300% increase in connected machine-to-machine devices since 2008
- 1 billion things that could be connected to the Internet across different industries

Internet of Things

- \$36 billion operating costs of key affected industries (mining, health-care, manufacturing)

Cloud technology

- 18 months to double server performance per dollar
- 2.7 billion Internet users served by 50 million servers worldwide
- \$3 trillion spending by enterprises on information technology

Advanced robotics

- 170% growth in sales of industrial robots between 2009 and 2011
- 320 million manufacturing workers may be potentially affected
- \$6 trillion in global manufacturing employment costs, which is 19% of global workforce

The source of information in this Mind Map comes from http://www.mckinsey.com/insights/business_technology/disruptive_technologies

Created by:
 Daniel Tay
 May 2013 Singapore
 boingx5@gmail.com
www.tayxiongsheng.com
 @tayxiongsheng

- New technologies transform our lives “by inventing new, undreamed of things and making them in new, undreamed of ways”, says the economist Richard Lipsey.
- The introduction of new technologies can have the following effects on society ^[15] :
 - Initial productivity slowdown and delayed productivity payoff from the new technologies
 - Destruction of human capital (as many old skills are no longer wanted)
 - Technological unemployment (temporary but serious)
 - Widening disparities in the distribution of income, which tends to be temporary until the supply of labor catches up to the new mix of skill requirements
 - Big changes in regional patterns of industrial location (globalization)
 - Big changes in required education
 - Big changes in infrastructure (e.g., the information highway)
 - Big changes in rules and regulations (intellectual property, antimonopoly, etc.)
 - Big changes in the way we live and interact with each other

Source: Sabina Jeschke, Engineering Education for Industry 4.0, 2016

! Challenges of future teaching and learning must be turned into opportunities for change!

Change of organisational structures

- Change of business models
- Cooperative Structures enhancing interdisciplinarity
- New concept for faculties or departments

Change of accreditation procedures

- New role of examination offices
- No fixed degree programmes
- Acceleration in education according to fast innovation cycles

Change of teaching methods

- New teaching concepts (e.g., flipped classroom)
- New teaching infrastructures (e.g. equipment for virtual worlds)
- Digital rights management

Change of learning

- Massive vs. Personalized learning
- New learning infrastructures e.g. increased computing capacities
- Shift from presence learning to distance learning

Digital culture

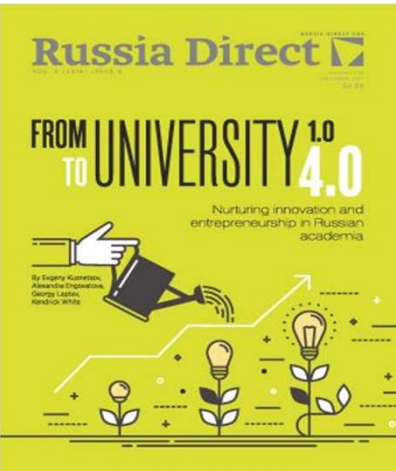
- Digital technologies pervade and connect all aspects of daily life
- Development of various digital lifestyles
- New mental models, e.g. distance no longer dominated by geogr. distances
- ! New forms of social communication, participation and organisation
- ! Leading to globalization of education
- ! New learning/problem solving styles
- ! NLP, Web „4.0“ on its way
- ↗ Semantics makes „search“ more efficient
- ↗ Googles on-demand philosophy spreading
- ↗ Melting of all types of information, seamless integration



Individualization

- Individualism – a global phenomenon
- Few strong, many loose relationships
- ! Complex biographies and identities
- ! Personalisation and individualisation in learning and education „DIY education“
- ! Social cohesion shifted from physical to virtual world
- ! Distances in mind sets become even more visible
- ↗ Individual education for the masses
- ↗ Self-paced learning
- ↗ Individual modular degrees

Innovation-Driven University



Moving from University 1.0 to University 4.0, the depth of “processing” the talents and knowledge rises: more and more added value is created within the university campus rather than delivered to the economy in the form of “semi-finished products” (specialists and general knowledge).

The transformation of universities towards the 4.0 model may lead to a greater contribution of universities to the development of society and the market, as well as help to reduce the dependence of the universities on state financing.

No Semi-Finished Products, but to Ending Users

Greater Social Impact & Financial Autonomy

(Prof. Nguyen Huu Duc, Vietnam National University, 2017)

Self Driving Car



TANGIBLE AND INTANGIBLE



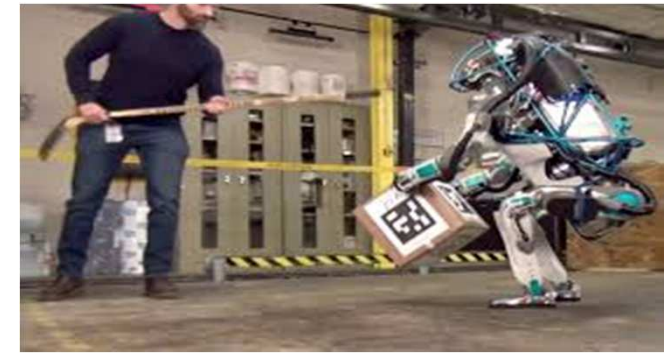
Tesla



3D Printing



SpaceX Reusable Rocket



Boston Dynamics Robots

PRIMARILY STEM SKEWED



Virtual and Augmented Reality



Drone



Microsoft Holoportation



Realtime Face2Face Reenactment of Video



Google AlphaGo





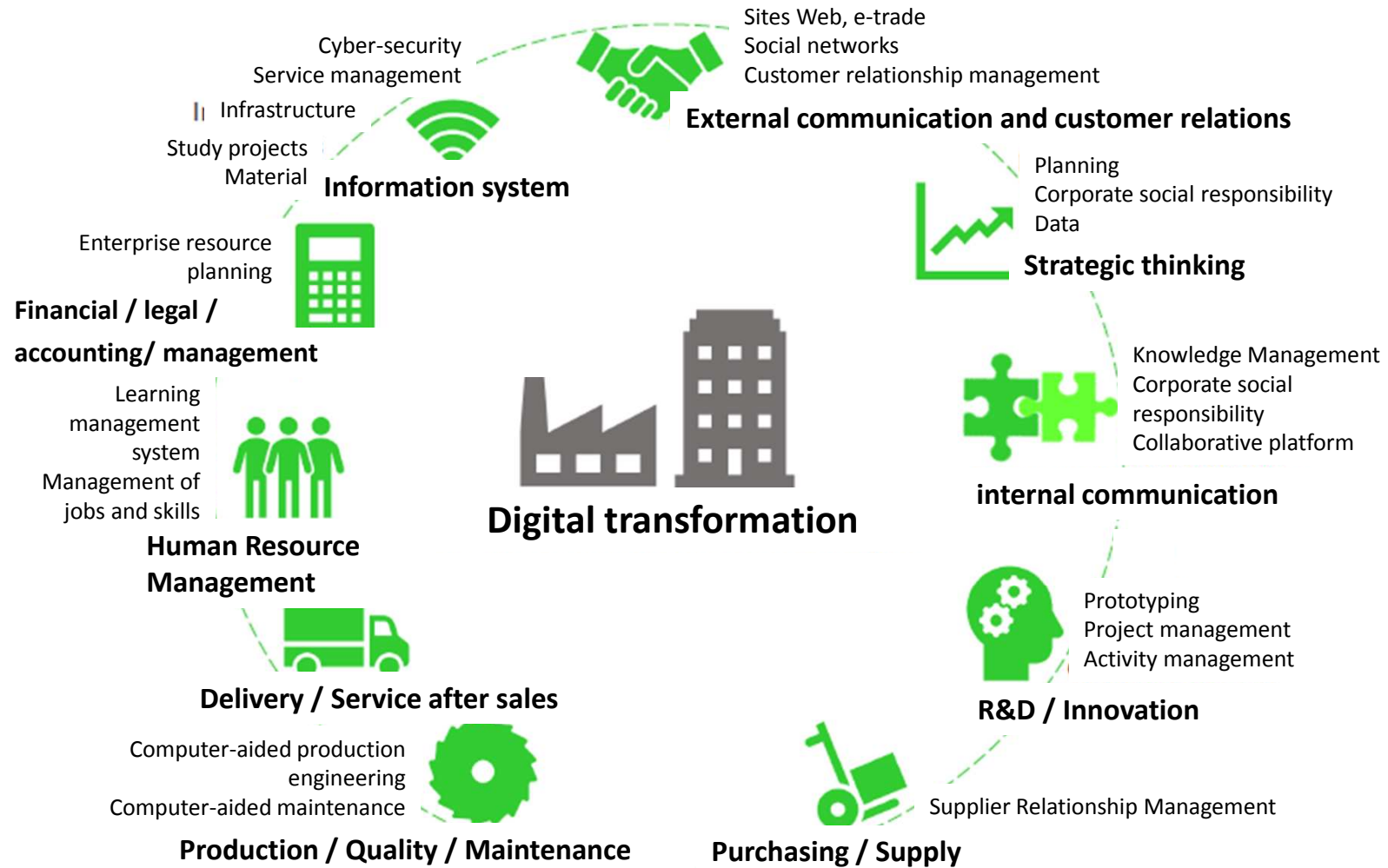
**Repetitive jobs
that can be
automated will be
replaced**

Digital Transformations (DX)

The application of 3rd Platform–related technologies to **fundamentally change the way something is done**, generally with a **design-led approach** to business process redesign.



Digital Transformation (DX)



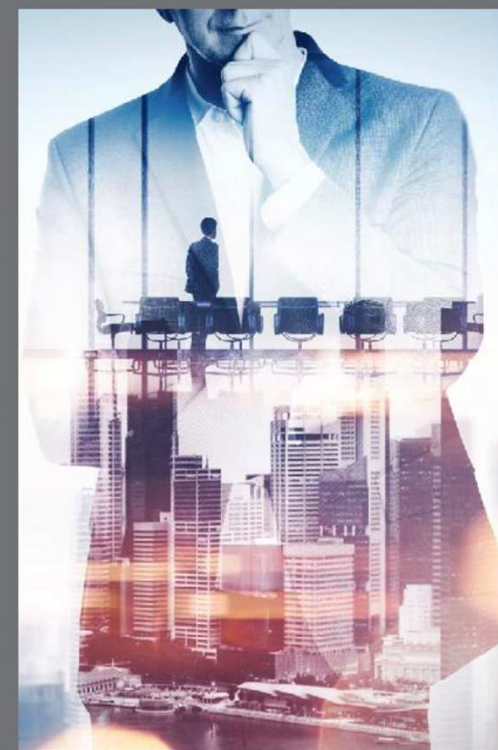
WHAT IF...



PROFITABILITY



**NET PROMOTER
SCORE**



**CUSTOMER
ACQUISITION**

The DX Journey

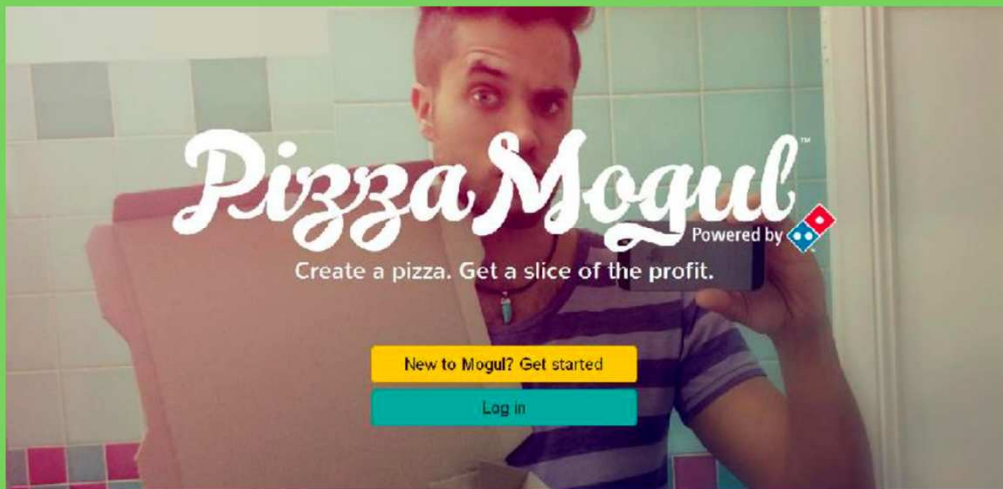


Which areas are being transformed?



Omni-Experience

Leaders create market-altering interactive experiences



Domnios Pizza

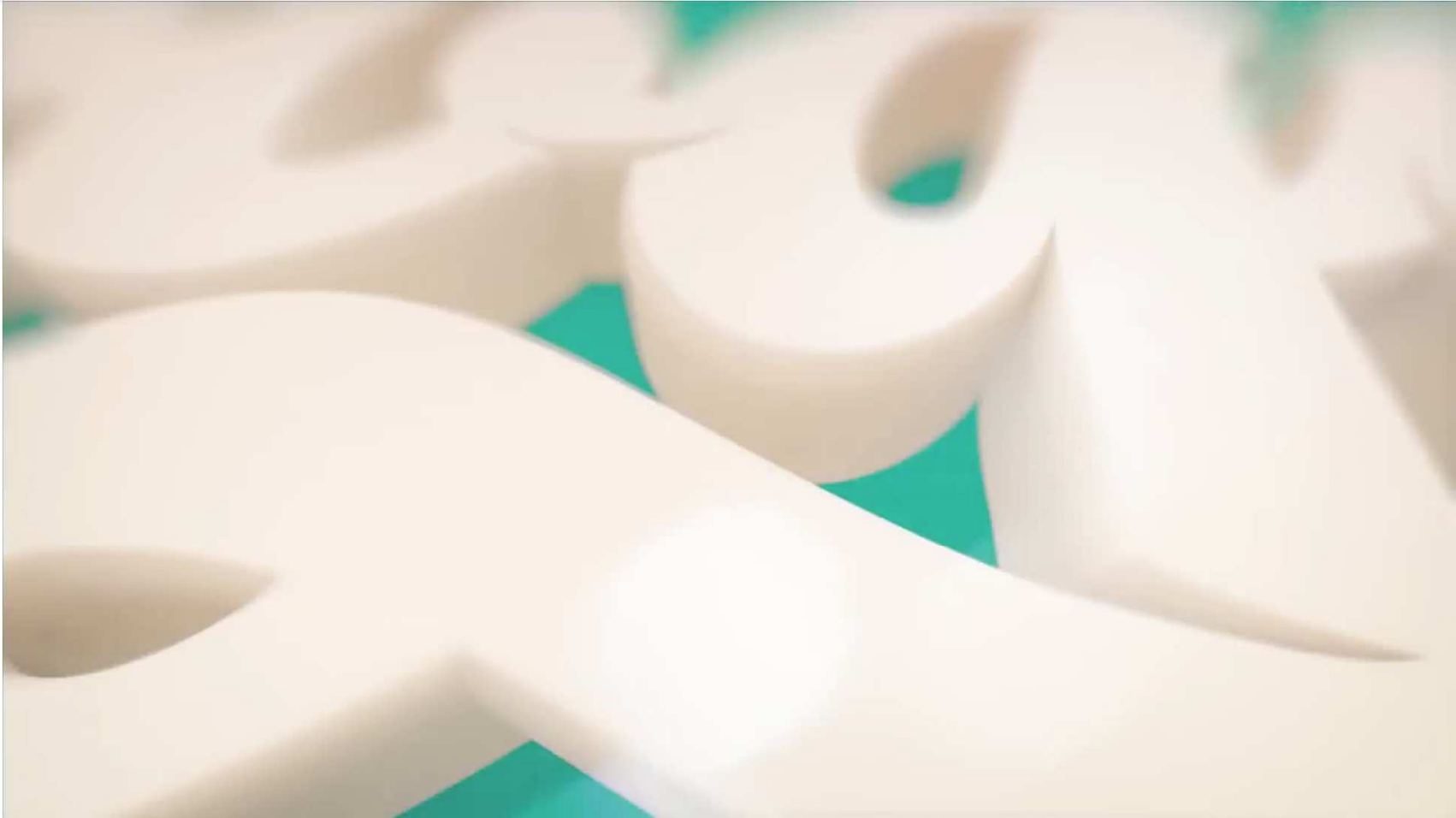
Delivering great CX - Social crowdsourcing/Gamification & me-tailing



Chow Sang Sang

Delivering personalized experiences - AR

Domino Pizza Mogul



Information

Leaders leverage information effectively for competitive advantage



Kroger, Tesco

Data monetization. Leveraging customer data for improved service and loyalty



Beam

A startup building an insurance business around a smart toothbrush (usage-based insurance—Smart premiums)

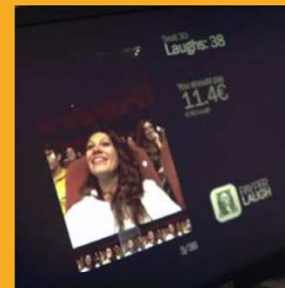
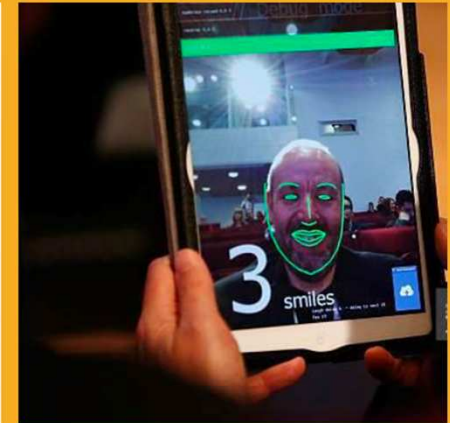
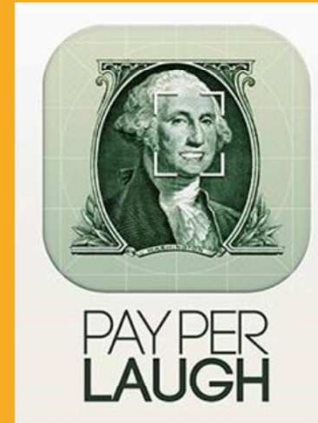
Operating Model

Leaders challenge traditional business and operating models



Yihaodian

Challenging traditional retail models with augmented reality



TeatreNeu

Disrupting the arts scene with an innovative business & operating model

ACCESSIBILITY TO TECHNOLOGY AND CONNECTIVITY.....BEYOND TECHNOLOGY ...INEQUALITY



**Displaced
because of
lost jobs**



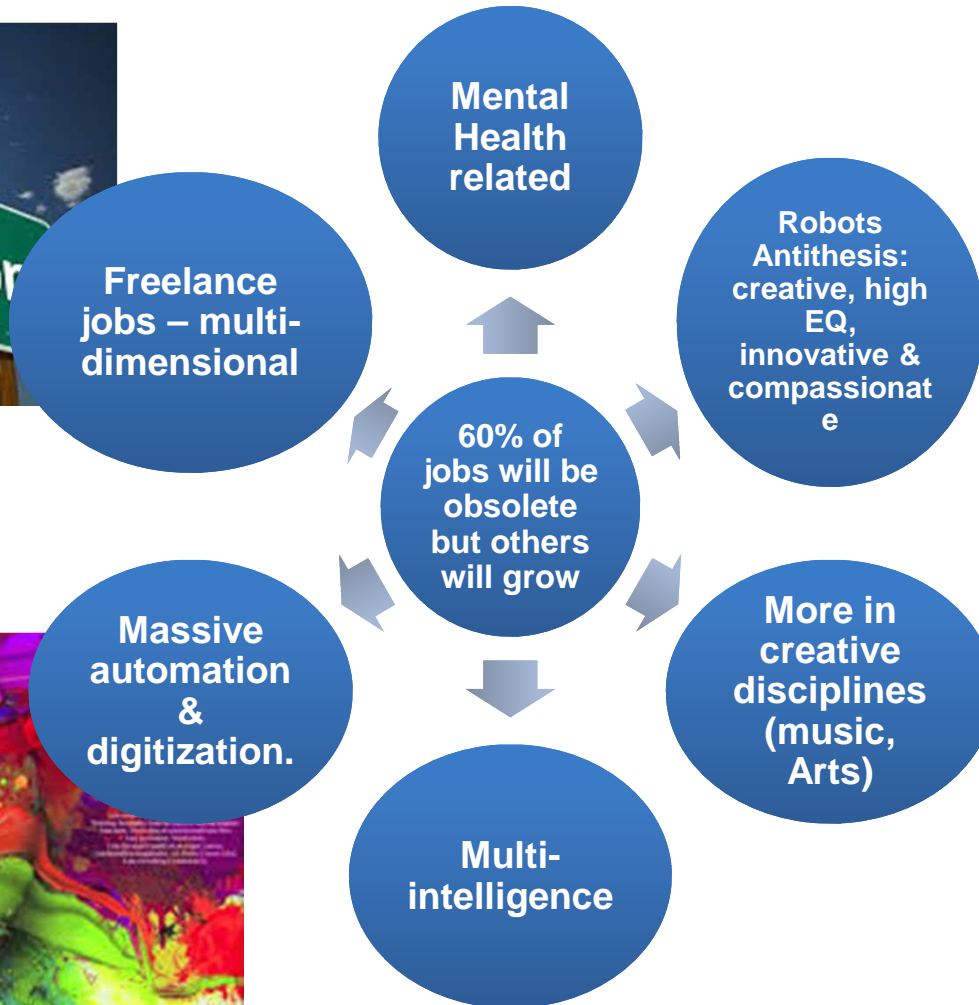
Immigrants



**7 Bill world population but only 4 Bill
have access to connectivity**



FUTURE JOB TRENDS



The best talent is not the machines but combination of both human and machines

1. **Data Analytics** – to help companies make sense and derive insights from the data generated by technological disruptions.

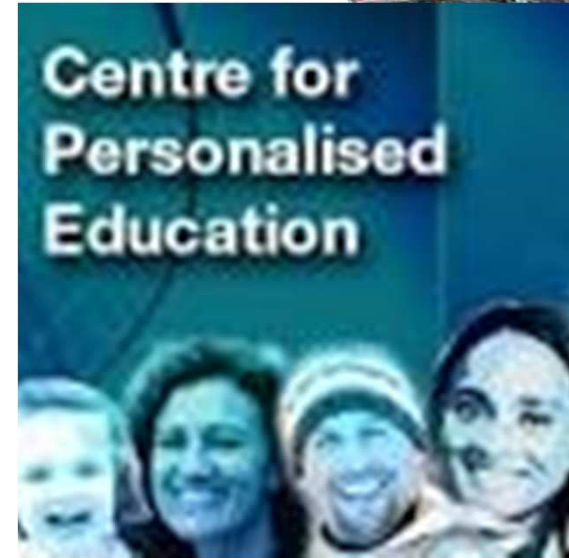


2. **Social skills such as persuasion, emotional intelligence & teaching others** - higher demand across industries than narrow technical skills (programming or equipment operation and control)

In essence, technical skills will need to be supplemented with strong social and collaborative skills.



- How will the lecturers teach?
(method)
- How will the students learn?
- What will the lecturers teach
(content)?
- How will the learning space look
like?
- What are the role of the lecturers?
- What are the role of the students?
- What are the attributes of the
students/lecturers?



The logic of education systems should be reversed so that it is the system that conforms to the learner rather than the learner to the system. This is the essence of personalisation.


Personalisation and Digital Technologies

Current Developments





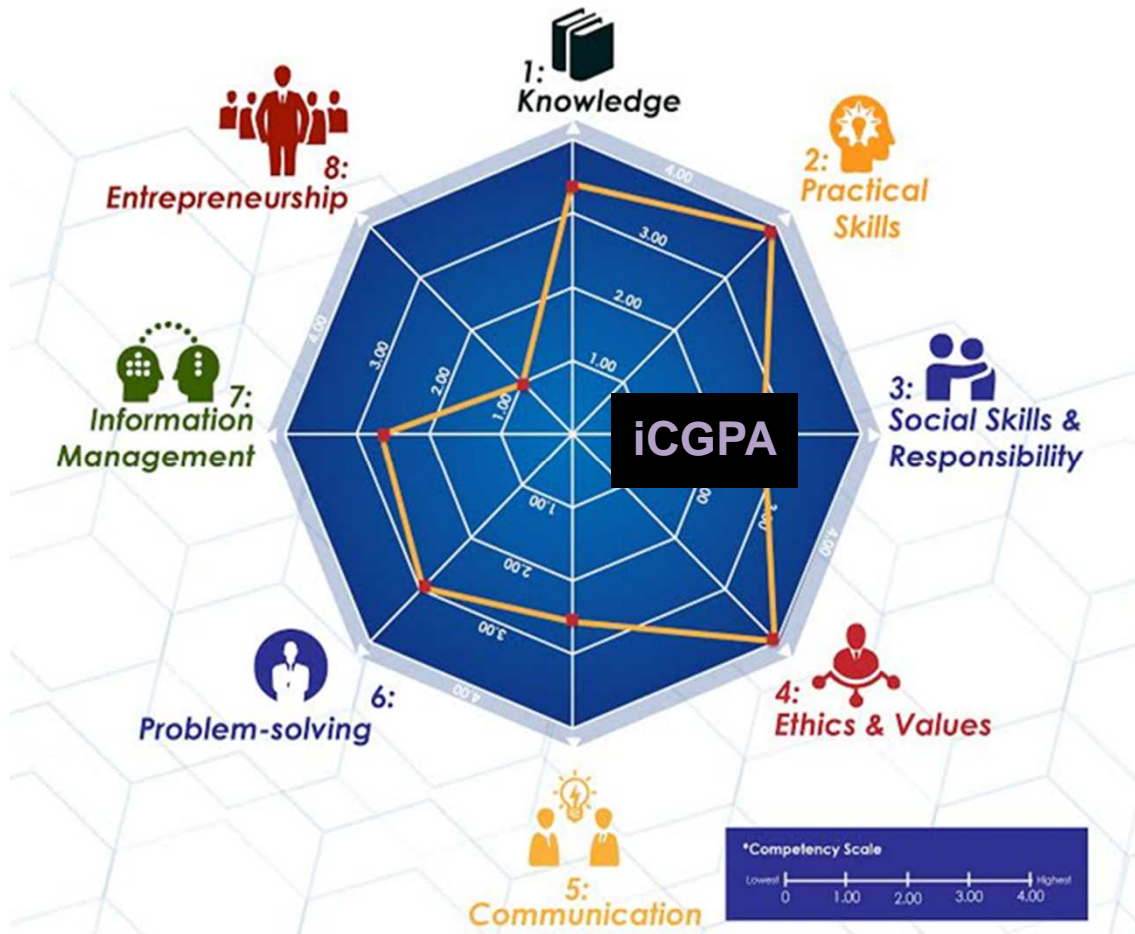
Malaysia Education Blueprint 2015-2025
 (Higher Education)



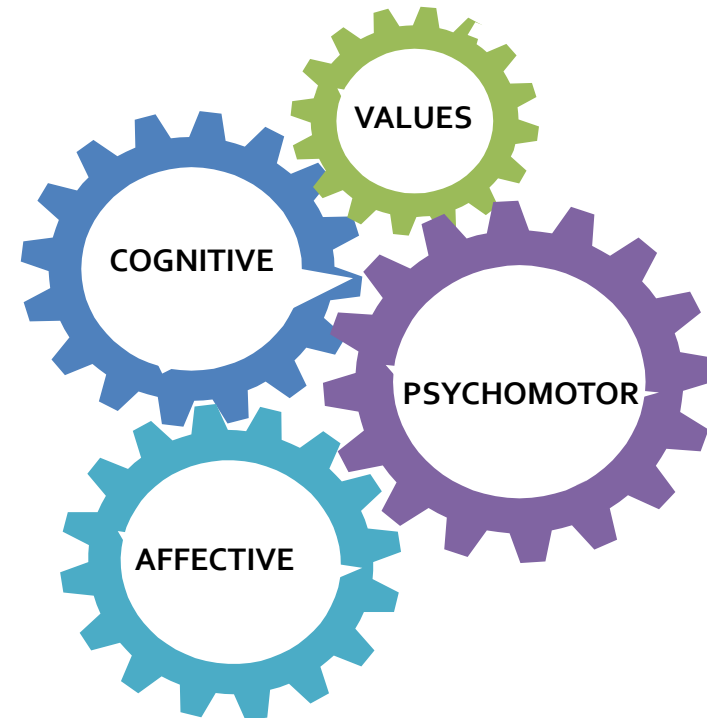

Foundation for Individual Student Aspirations in the Blueprint







Balance Development Needed



21st Century Learning Framework – Student Outcomes



High Order Thinking and
Multiple Intelligences

Learning and Innovation
Skills
(4Cs: Critical Thinking,
Communication,
Collaboration and Creativity)

Content Knowledge and 21st
Century Themes

Information, Media and
Technology Skills

Life and Career Skills:

(Datin Paduka Ir.
Dr. Siti Hamisah
Tapsir, , University
Presidential forum
2017)

Curriculum Content



21st Century Learning Framework – Student Outcomes

High Order Thinking and Multiple Intelligences

Learning and Innovation Skills
(4Cs: Critical Thinking, Communication, Collaboration and Creativity)

Content Knowledge and 21st Century Themes

Information, Media and Technology Skills

Life and Career Skills:

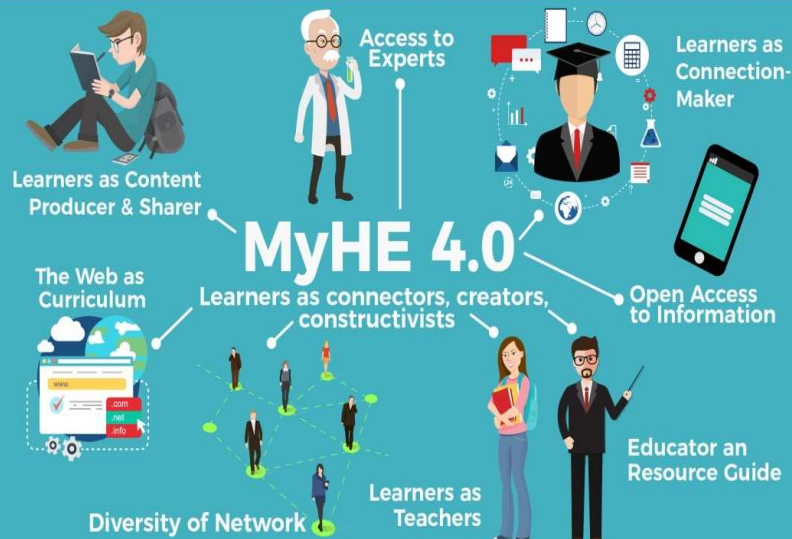
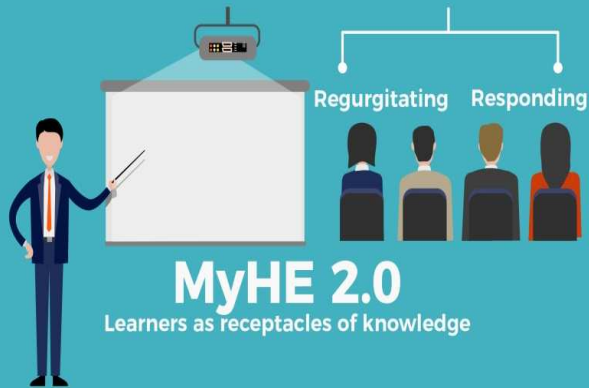
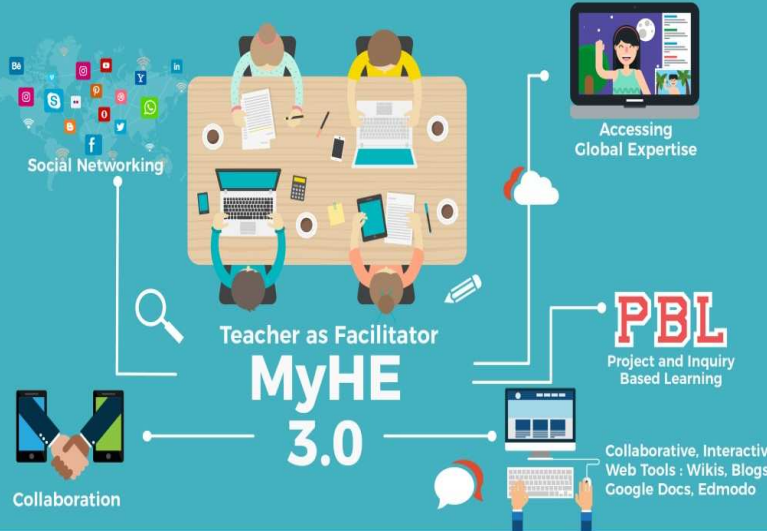
Sustainable Development Goals



(Datin Paduka Ir.
Dr. Siti Hamisah
Tapsir, , University
Presidential forum
2017)



MyHE 1.0
Teachers - centred



(adapted from Jackie Gerstein, 2014)

(Datin Paduka Ir.
Dr. Siti Hamisah
Tapsir, , University
Presidential forum
2017)

Meeting the Challenges of the 4th IR

"I'm not worried about artificial intelligence giving computers the ability to think like humans." I'm more concerned about people thinking like computers."

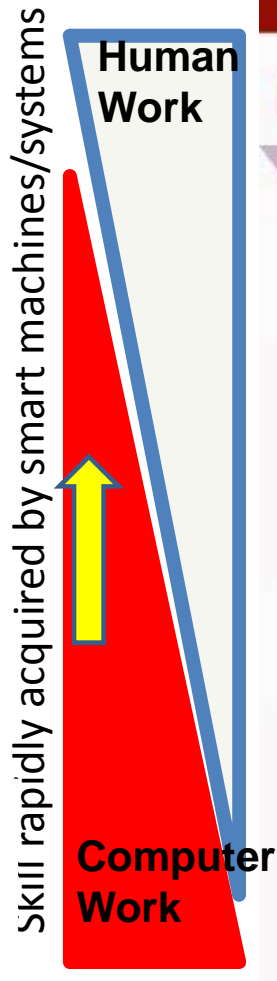
(Apple's Tim Cook speech at MIT Commencement)

- 1) **Heutagogy – personalisation of learning**
- 2) **Delivery of Higher Education**
- 3) **Curriculum Content**
- 4) **Translational Research**

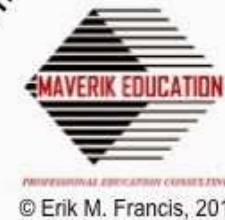
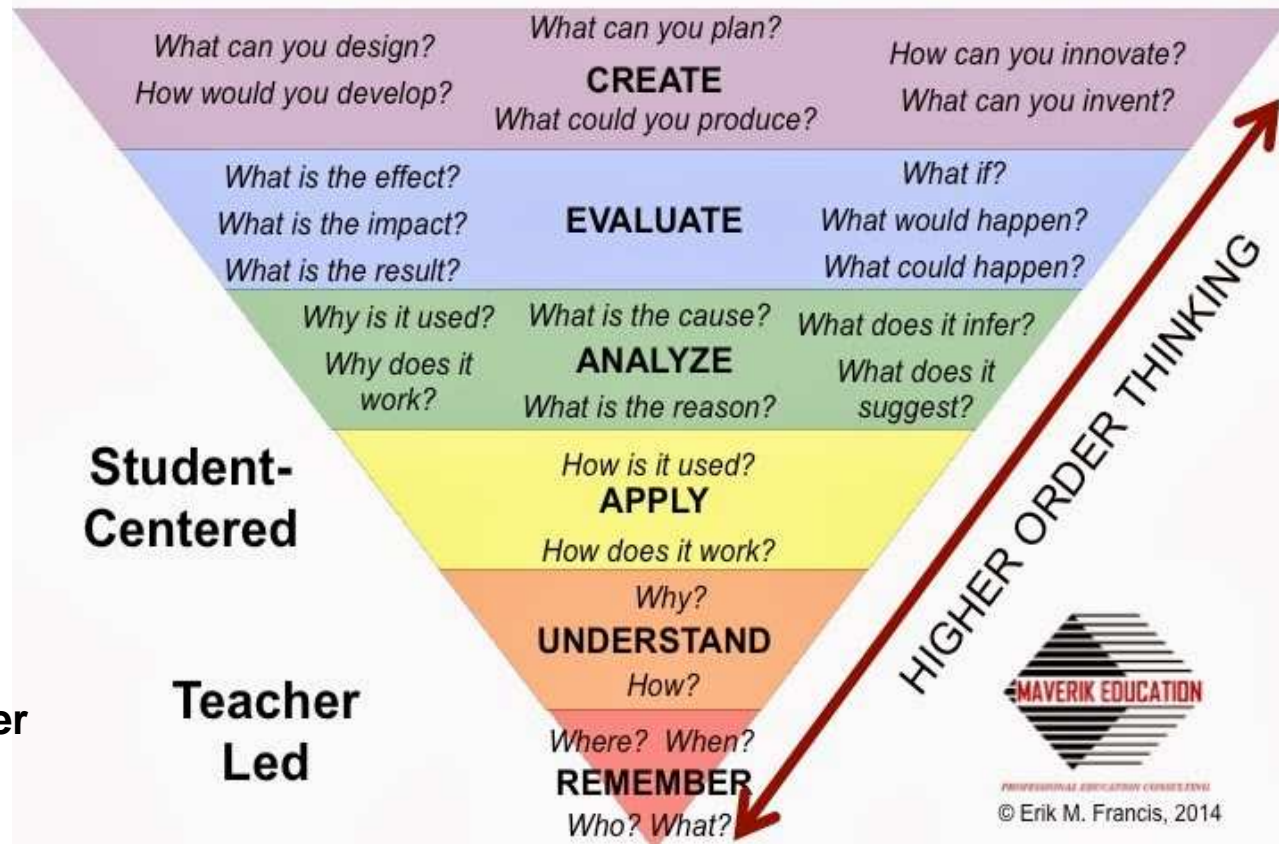
HOW DO WE SERVE HUMAN KIND?

(Datin Paduka Ir. Dr. Siti Hamisah Tapsir, , University Presidential forum 2017)

Higher Order Thinking



Higher Order Thinking (Bloom's Revised Taxonomy)



PRESENT



Co-curators of Knowledge

**Blurring in Academic
Disciplines**

(Datin Paduka Ir.
Dr. Siti Hamisah
Tapsir, ,
University
Presidential
forum 2017)

Sources:
Siemens, G. (2014, October 22). The Data / Analytics Cycle. Retrieved January 29, 2015, from <http://youtu.be/J7ZlijM1P8E>

Clow, D. (2012). The learning analytics cycle: closing the loop effectively. In *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge - LAK '12* (p. 134). New York, New York, USA: ACM Press. doi:10.1145/12330601.2330636



"Bridging the Gap"



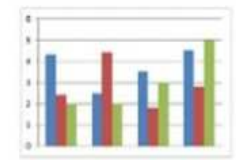
Interventions



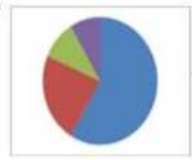
Teachers | Administrators | Other Faculty



Learners

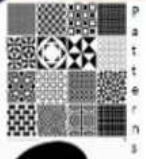


Visualizations/ Dashboards



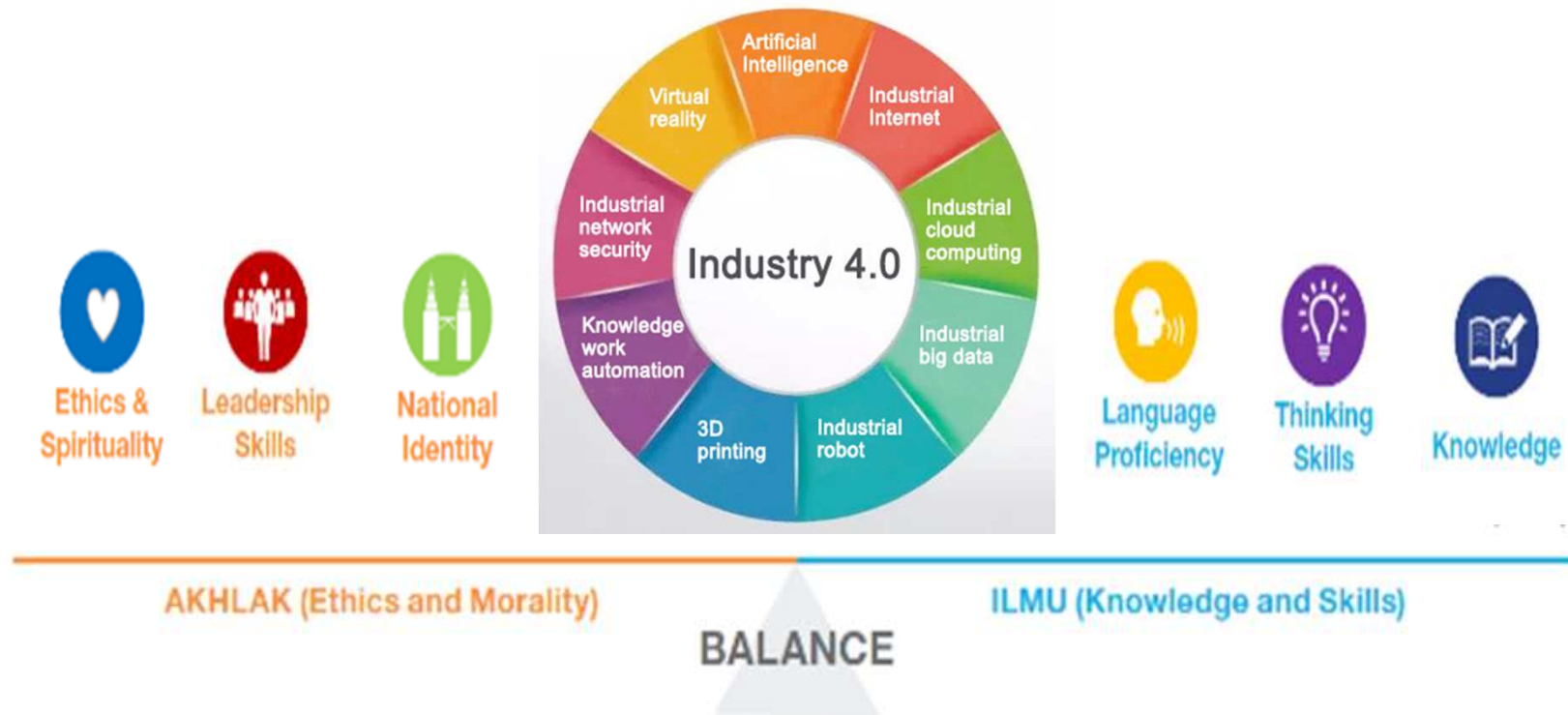
Data

Learning Management Systems



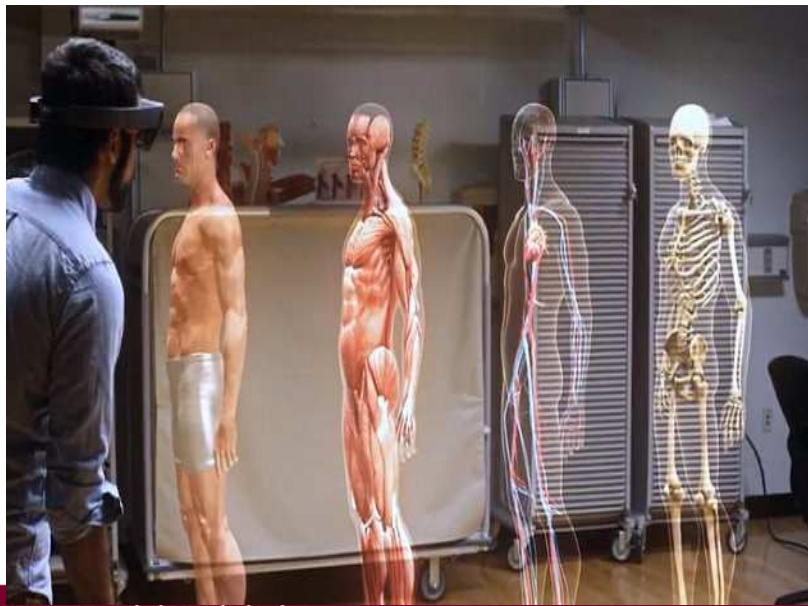
Questions

thinglink..

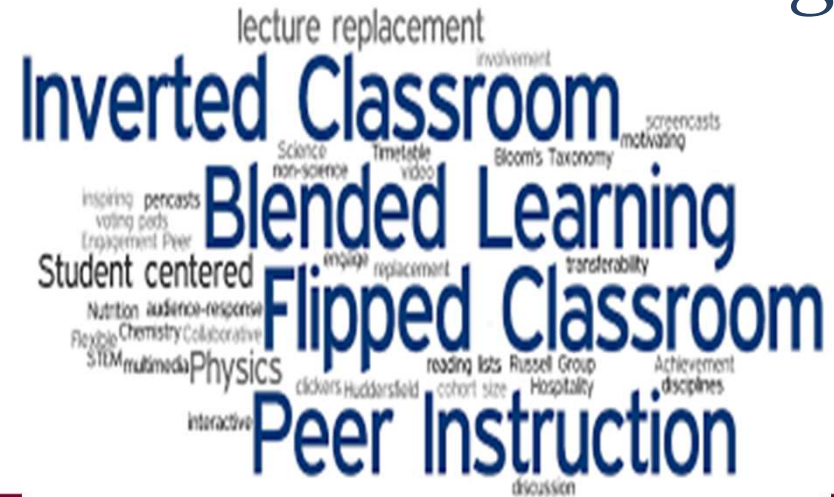


21st Century Curriculum for MyHE 4.0

(Datin Paduka Ir. Dr. Siti Hamisah Tapsir, , University Presidential forum 2017)



On-demand Learning



MaGICX: First gamification centre of excellence launched by PM

December 6, 2016 by Office of Corporate Affairs



Prime Minister signing plaque to mark the officiating of MaGICX.

ISKANDAR PUTERI, 6 December 2016 – Media and Game Innovation Centre of Excellence (MaGICX) has been launched by the Prime Minister of Malaysia Dato' Sri Mohd Najib Tun Abdul Razak, during the 10th Year Anniversary of Iskandar Malaysia(IM10), today.

MaGICX is a strategic cooperation between Universiti Teknologi Malaysia (UTM) and Iskandar Regional Development Authority (IRDA) to support and promote the development and ecosystem of creative



Classroom of the future @ MagicX UTM



MaGICX Classroom 4.0

MaGICX UTM lancar bilik kuliah masa hadapan

JOHOR BAHRU 21 Ogos - Pusat Kecemerlangan Inovasi, Media dan Permainan Digital (MaGICX) Universiti Teknologi Malaysia (UTM) dengan kerjasama Cisco System Malaysia melancarkan konsep bilik kuliah masa hadapan atau dikenali sebagai *Classroom of Future*.

Pelancaran tersebut disempurnakan Menteri Pendidikan Tinggi, Datuk Seri Idris Jusoh sempena lawatan kerja ke universiti awam berkenaan baru-baru ini.

Pengarah MaGICX, Prof. Madya Dr. Mohd. Shahrizal Sunar berkata, konsep bilik kuliah masa hadapan itu menggunakan teknologi *Realiti Maya* (VR) dan *Cisco Spark* bagi membolehkan proses pengajaran dan pembelajaran dilaksanakan dengan lebih interaktif.

“Penggunaan teknologi berkenaan dapat membantu penuntut merasai pengalaman seperti berada dalam situasi sebenar dan mereka dapat berinteraksi dengan pensyarah atau pakar yang berada di tempat lain dalam masa nyata.

“MaGICX menggunakan kepakaran mereka dalam membantu membangunkan inovasi pembelajaran berasaskan teknologi digital bagi pendidikan tinggi di Malaysia,” katanya ketika ditemui di sini.

Yang turut hadir Ketua Pengarah Pendidikan Tinggi, Datin Paduka Ir. Dr. Siti Hamisah Tapzir dan Naib Canselor UTM, Prof. Datuk Ir. Dr. Wahid Omar.

Mohd. Shahrizal berkata, teknologi VR sangat signifikan untuk menyokong penuntut berinteraksi dengan kandungan pembelajaran di samping da-



IDRIS JUSOH ditemani **Wahid Omar** (dua dari kiri) merasmikan *Classroom of Future* di Pusat Kecemerlangan Inovasi, Media dan Permainan Digital UTM Skudai, Johor Bahru, Johor, baru-baru ini.

pat merasai pengalaman berada dalam situasi sebenar selain dapat mengurangkan kos pembelajaran.

Jelasnya lagi, penggunaan teknologi VR juga membolehkan mahasiswa dan pensyarah Sarjana Muda Kejuruteraan Petroleum dapat belajar seperti berada di pelantar minyak di tengah laut tanpa perlu berada di tempat sebenar.

“Teknologi ini boleh digunakan mahasiswa dan pensyarah pelbagai jurusan yang memerlukan pendedahan dan pengalaman sebenar di lapangan

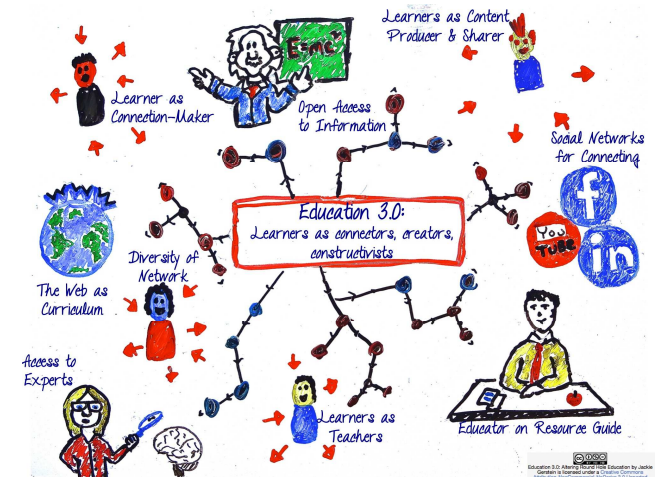
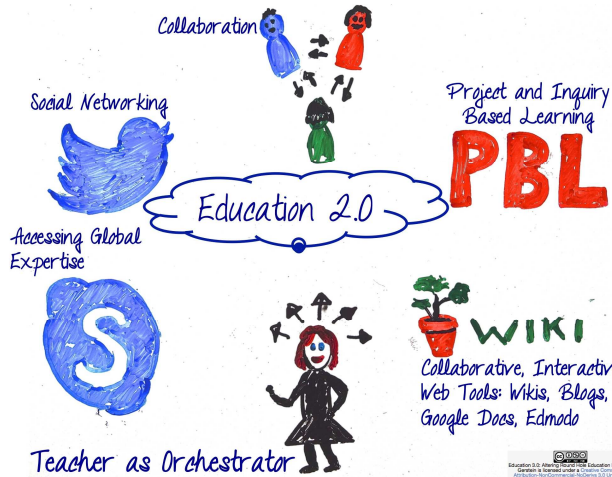
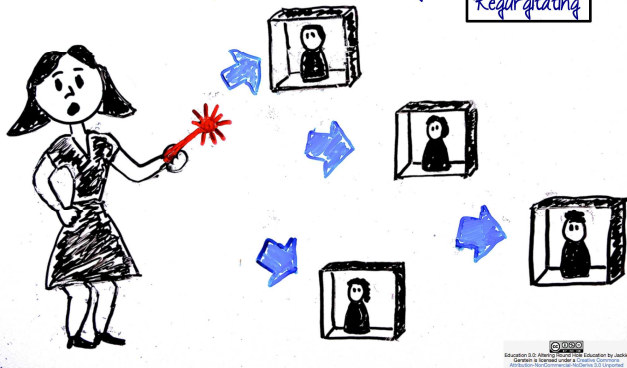
tanpa perlu hadir di lokasi sebenar.

“Konsep Pendidikan *Juke Box* dalam mereka bentuk semula pengajaran dan pembelajaran pendidikan tinggi merupakan salah satu pendekatan pendidikan yang melangkaui kampus dan sempadan,” ujarnya.

Tambahnya, konsep tersebut juga membolehkan penuntut mengambil bahagian dalam program ditawarkan serta menggunakan fasiliti dan sumber di UTM tidak kira di mana mereka berada.

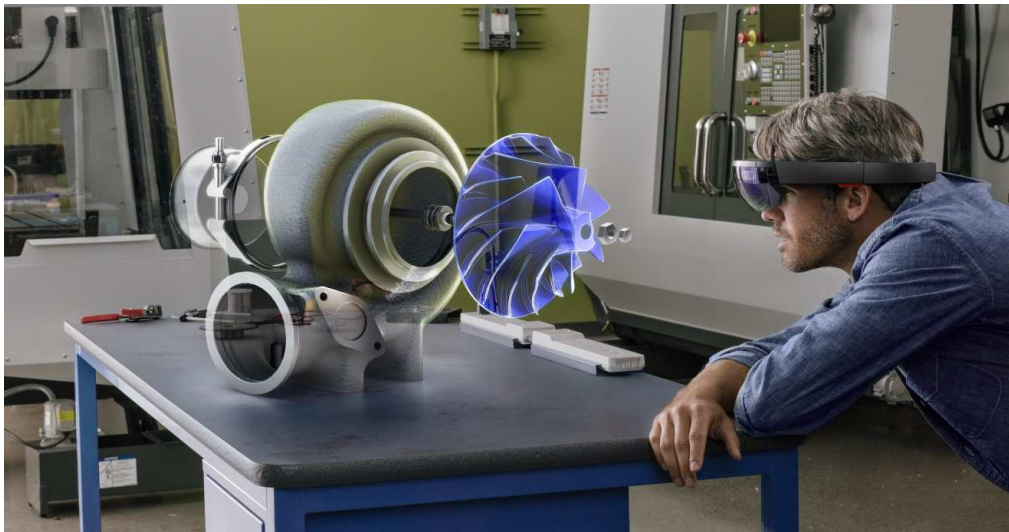
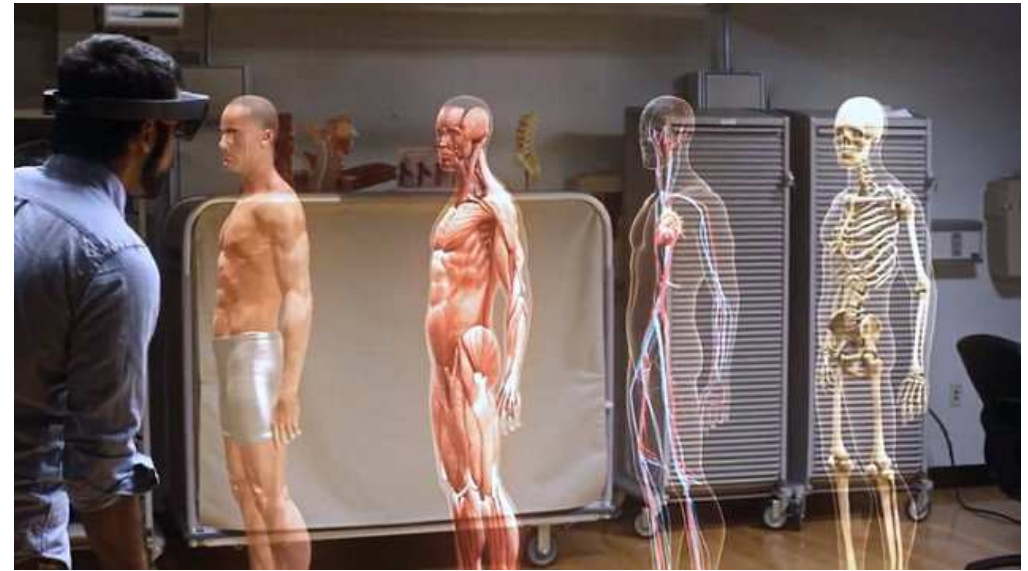
Education 1.0:
Learners as receptacles of knowledge

Receiving
Responding
Requirigating

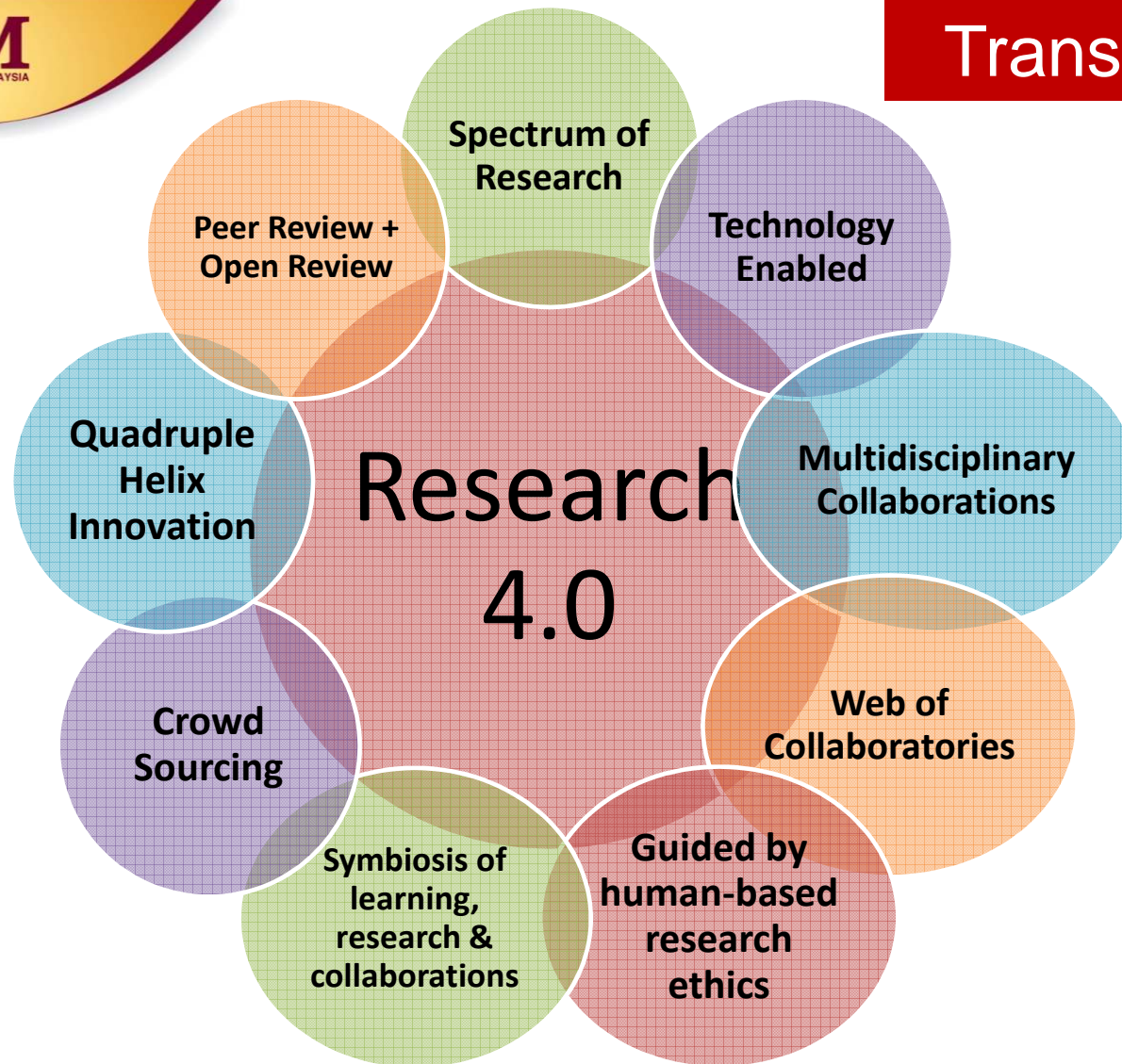


(Jackie Gerstein , 2014)

Future of Education in 4th Industrial Revolution



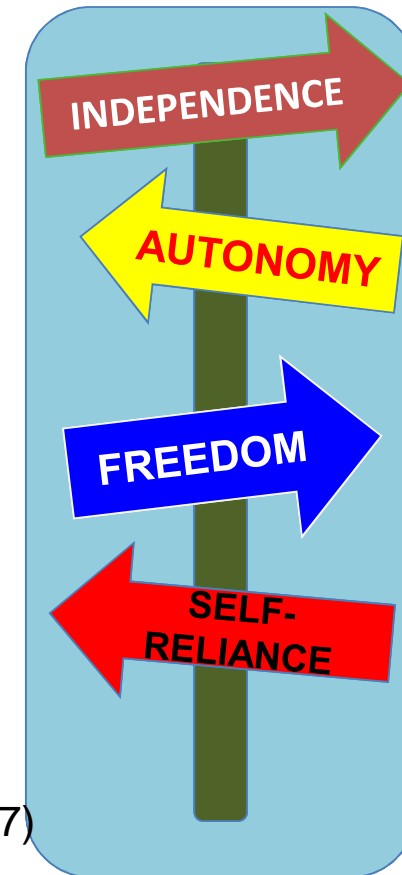




(Datin Paduka Ir. Dr. Siti Hamisah Tapsir, , University Presidential forum 2017)

Agile University Governance

1. Self-Governing Institutions – autonomous, both UA/US (high) Compoundable
2. Self-Accreditation
3. Waqaf Contribution and University Revenue = 30 to 50%?
4. Open Academic Tenureship (Freelance)
5. Shared Governance – student representative in Senate or Board of Directors
6. Innovative MOHE/MQA
7. Co-Regulatory Approach - policies



(Datin Paduka Ir. Dr. Siti Hamisah Tapsir, , University Presidential forum 2017)

Higher Education 4.0 (TANGIBLE)

Challenged by emerging technologies in 4th IR

Hidden Elements of 4th IR (INTANGIBLE)

Powered by character building, higher order thinking, multiple intelligences, soft skills, lifelong learning, etc. to face the new challenges

Malaysia Higher Education 4.0 (MyHE 4.0)



MyHE4.0

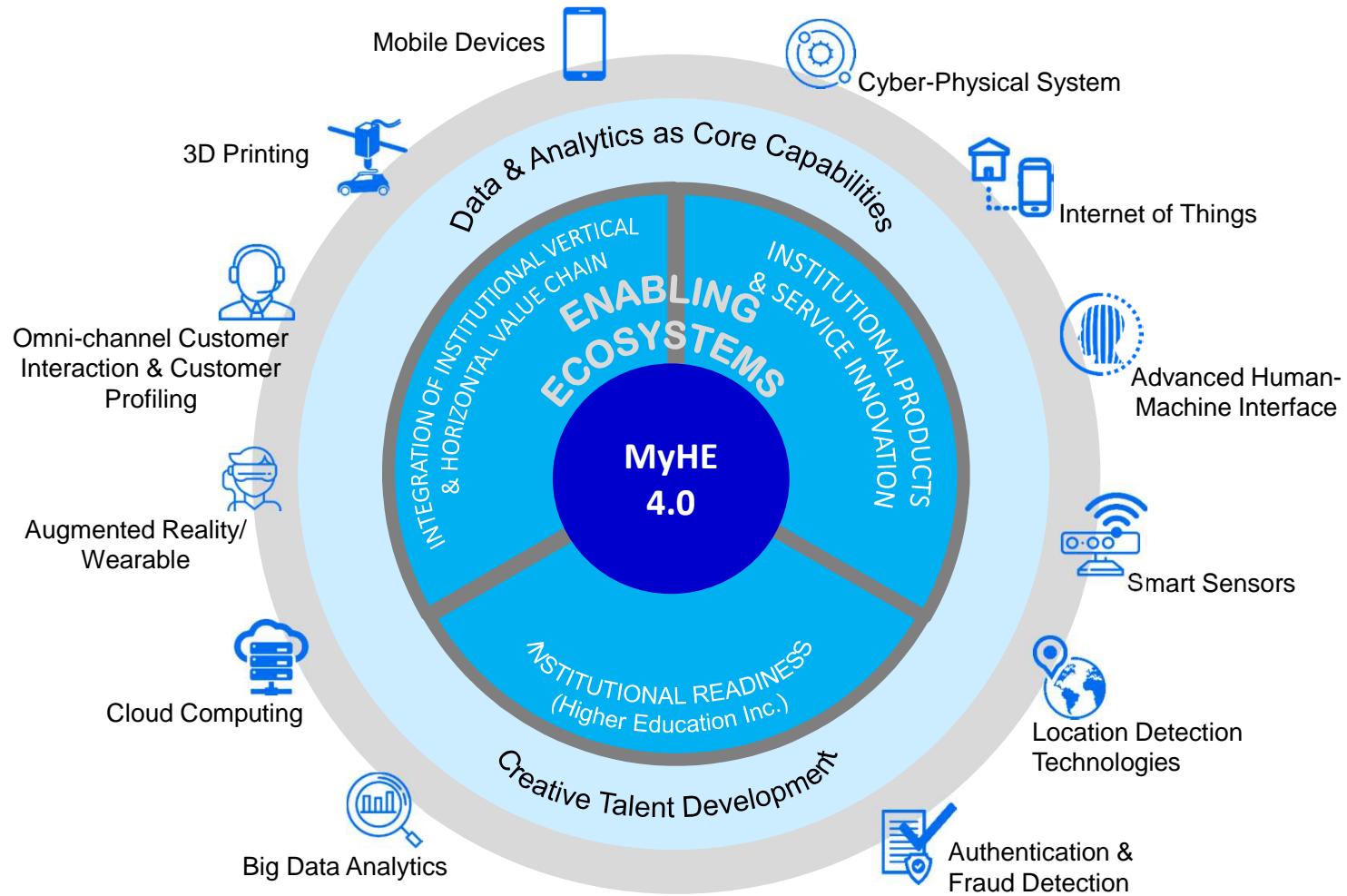
ENABLER for Malaysia Higher Education 4.0



FRAMEWORK

MALAYSIA HIGHER EDUCATION FOR FOURTH INDUSTRIAL REVOLUTION (proposed)

MyHE4.0 Enabler



Enabling Ecosystems

INSTITUTIONAL READINESS

Managing
Convergences,
Fluidity,
Powershift,
Contingency

Capability &
Competency

Digital
Governance &
Accountability

Financial
Investment

Digital Resilience

Social, Cultural &
Ethical

INTEGRATION OF INSTITUTIONAL VERTICAL & HORIZONTAL VALUE CHAINS

Vertical
Networking of
Smart
Institutional
Systems

Horizontal
Integration via a
New Generation
of Global Value
Chain Networks

INSTITUTIONAL PRODUCTS AND SERVICES INNOVATIONS

Curriculum

Academic
Programs

MOOCs

Research

Professional
Development

Consultancy

Data Services

Proposed by: Rose Alinda Alias, Ali Selamat, Norris Syed Abdullah, Suraya Miskon, Nazmona Mat Ali

Enabling Ecosystems



Mobile Devices

First point of access to the Internet

Mobile devices provide ubiquitous connectivity and an array of applications and services that impact almost every facet of Malaysia higher education environment and opens up a huge range of activities that were previously inaccessible.



Location Detection Technologies

Detect its current location to control events and information

Location is detected through the use of various sensors and methods of calculating geographical location such as through GPS technology. MOHE can add value by enhancing products and services offered by institutions with location detection technologies.



IoT Platforms

Bridge between the devices' sensors and the data networks

Internet of Things (IoT) platforms which is positioned to revolutionize the entire Malaysia higher education value chain by providing an unprecedented level of connectedness and functionality.

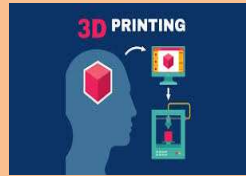


Advanced Human-Machine Interfaces

Method of teaching and learning for modelling and simulation of the real situation.

Advanced Human-Machine-Interface is considered as an interface that allows humans to interact with the machine. This method can be deployed to games for education, simulation-based training applications and intelligent tutoring systems.

Enabling Ecosystems



3D Printing

An effective way to enrich learning in virtually any discipline.

Nothing conveys an idea better than holding it in your hand. An excellent match for STEM curriculum projects at undergraduate and graduate levels. 3D Printing can be used with virtually all types of 3D CAD software.



Authentication & Fraud Detection

Secure all digital transactions.

The ability to learn about the latest trends in fraud, either internally through sophisticated data analysis or through external sources. Using up-to-date fraud information, MOHE can rapidly respond to new types of fraud and makes changes to their systems.



Smart Sensors

Towards smart education environment

A smart sensor is a device that takes input from the physical environment and uses built-in compute resources to perform predefined functions upon detection of specific input and then process data before passing it on.



Big Data Analytics and Advanced Algorithms

Faster, better decision making

With the speed of business analytics tools, combined with the ability to analyze new sources of data, organizations are able to analyze information immediately – and make decisions based on what they have learned.

Enabling Ecosystems



Augmented Reality/ Wearables

Bridging the gap between the virtual and physical worlds

Augment changes the way we see, imagine, and learn about the world around us. The augmented reality (AR) app and platform enables students and teachers to visualize 3D models in the real environment, in real time, and at scale.



OMNI Channel Customer Interaction

Continuous experience across different channels

An omni-channel platform for higher education puts post-secondary institutions in line with the needs and demands of their students – the majority of whom are digital natives – and helps them soar into the digital age.



Cloud Computing

Delivery of computing services

The cloud computing is connected to the internet and allows for remote access to services, apps, and stored data.



Cyber-Physical Systems

Cyber and physical components deeply inter-point

A cyber-physical system is characterized by a physical asset, such as a machine, and its digital twin; basically a software model that mimics the behavior of the physical asset.

SEMINARS ON 4.0 organised by Malaysian Universities in Collaboration with the Ministry of Higher Education (June 2017 – November 2017)

1. University of The Future Seminar Series 2/2017 - 4th Industrial Revolution by Prof Sohail Inayatullah, 19 June 2017
2. Humanity in the Midst of 4IR, USIM, 11 July 2017
3. Embracing Industry 4.0- Will Universities Make Difference for Malaysia, by Dato Shahril Ridza (CEO EPF), UM, 12 July 2017
4. University of The Future Seminar Series 3/2017 - Education 4.0: The Human Revolution & Future Proofing our Graduates, Herriot-WATT, 24 July 2017
5. International Conference on University 4.0, Ho Chi Minh City Vietnam, 20-21 July
6. UTM University Presidents Forum (UPF) 2017, Institutional Sustainability: Meeting Challenges of the 4th Industrial Revolution, 8-10 August 2017, UTM

1. MOHE 4IR. A collaboration between MOHE and the World Bank, 24-25 August 2017, Royale Chulan Hotel.
2. International Conference on Malaysia Higher Education 4.0, 11 September 2017, UPSI
3. R&D and Talent Development Challenge in 4IR
4. MOHE-UKM 4IR Sept 2017, Research Triangle Inst US, September 2017
5. Foresight Workshop: Leaders, Laggards, Losers or Lost: The Alternative Futures of Malaysian Universities by Prof Sohail Inayatullah, 27-29 November 2017

Fourth Industrial Revolution Challenges

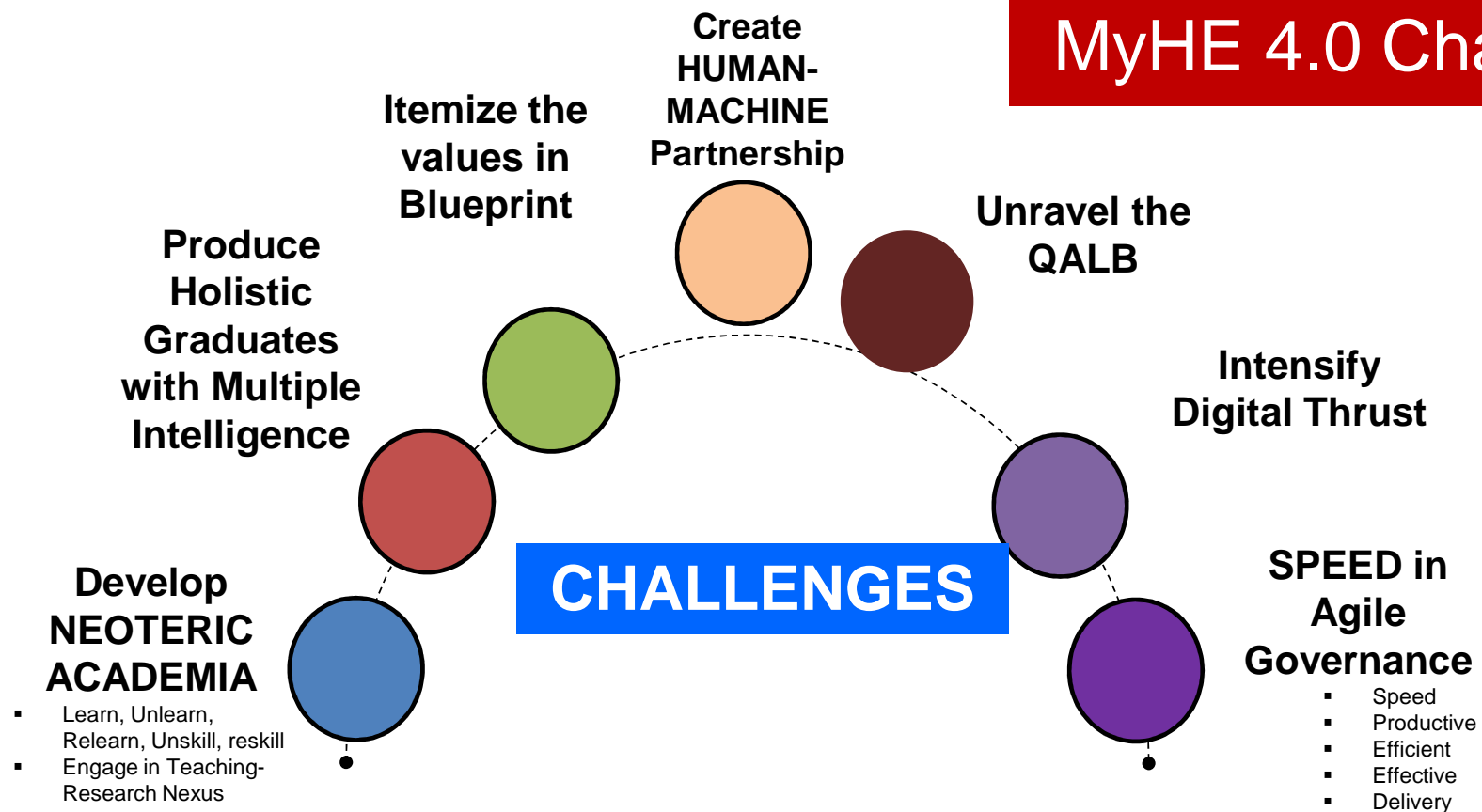
- “their readiness in responding to the 4th IR, and questioned if universities are capable of **managing the convergence, fluidity, power shifts, contingency and ethical issues that came along with the 4th IR**. He emphasised that **investment in emerging technologies and human connectivity, building digital resilience**, as well as **institutional capabilities in digital governance and accountability**, are key strategies for survival; however, it is unclear whether the higher education community are doing enough to adapt”

(Prof. Dr. Colin B. Grant, Vice President (International), University of Southampton, University Presidential forum 2017)

- “**create an enabling environment** for learners, academics and practitioners to break barriers, imagine, innovate, create, and collaborate;
- **develop a 4.0-ready ecosystem** fitting to institutional contexts;
- **stimulate greater human connectivity** through the exchange of students and staff, which is enabled through global and regional networks, and consortium of higher education institutions;
- **incorporate spiritual values, ethics and morality**, national identity and a sense of connection to the community, through curriculum delivery and technology transfer; and
- **be mindful of the benefits and risks** brought about by the 4th Industrial Revolution. “

(Wahid Omar, Vice Chancellor UTM, University Presidential forum 2017)

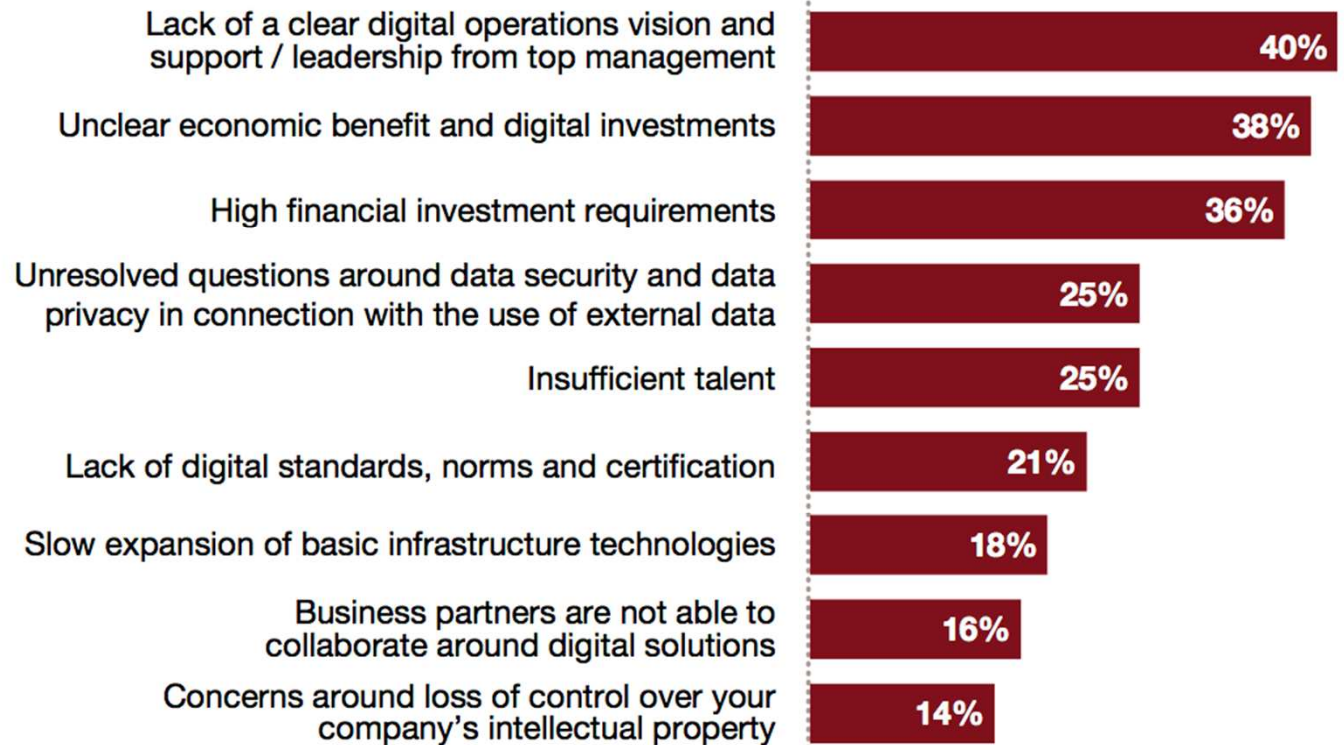
MyHE 4.0 Challenges



(Datin Paduka Ir. Dr. Siti Hamisah Tapsir, , University Presidential forum 2017)

Fourth Industrial Revolution Challenges - 4

Lack of digital culture and training is the biggest challenge facing companies



Source: 2016 Global Industry 4.0 Survey - www.pwc.com/industry40

Conclusions and future outlook

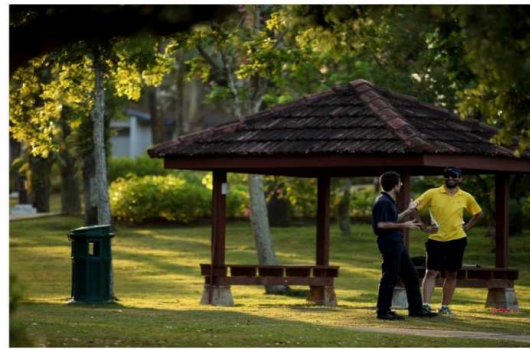
- **Digital disruptions** are happening every single day. We need to preserve our core values, ethical principles and Malaysian identity as we embrace the Fourth Industrial Revolution.
- **Innovation** amongst Malaysian universities is key competitive factor of Digital Transformation in IR 4.0
- Higher Education leaders should **exploit the potential opportunities** brought by the IR4.0 with much responsibility and wisdom, by providing **digital leadership for their institutions.**

- Technologies brought forth in the 4th IR if wrongly used could easily lead us **astray from our culture, core values** and identity that Malaysia is proud of.
- Thus, it is important for Malaysia to provide a **Code of Ethics and Responsible Conduct** to guide institutions and individuals in their exploration of these 4thIR technologies.



Terima Kasih

Thank You



**UTM Green
and Sustainable
Eco-Campus**