

**WFEO-CIC INTERNATIONAL SEMINAR**  
*on* **INTERNET OF THINGS (IoT)**



**Swiss-Garden Hotel**  
Kuala Lumpur, Malaysia

13/05/2017



**Keynote Address “Rise of the South, Digital Technologies and Everything” By Academician Dato Ir. (Dr) Lee Yee Cheong, Distinguished Honorary Fellow, Institution of Engineers Malaysia**

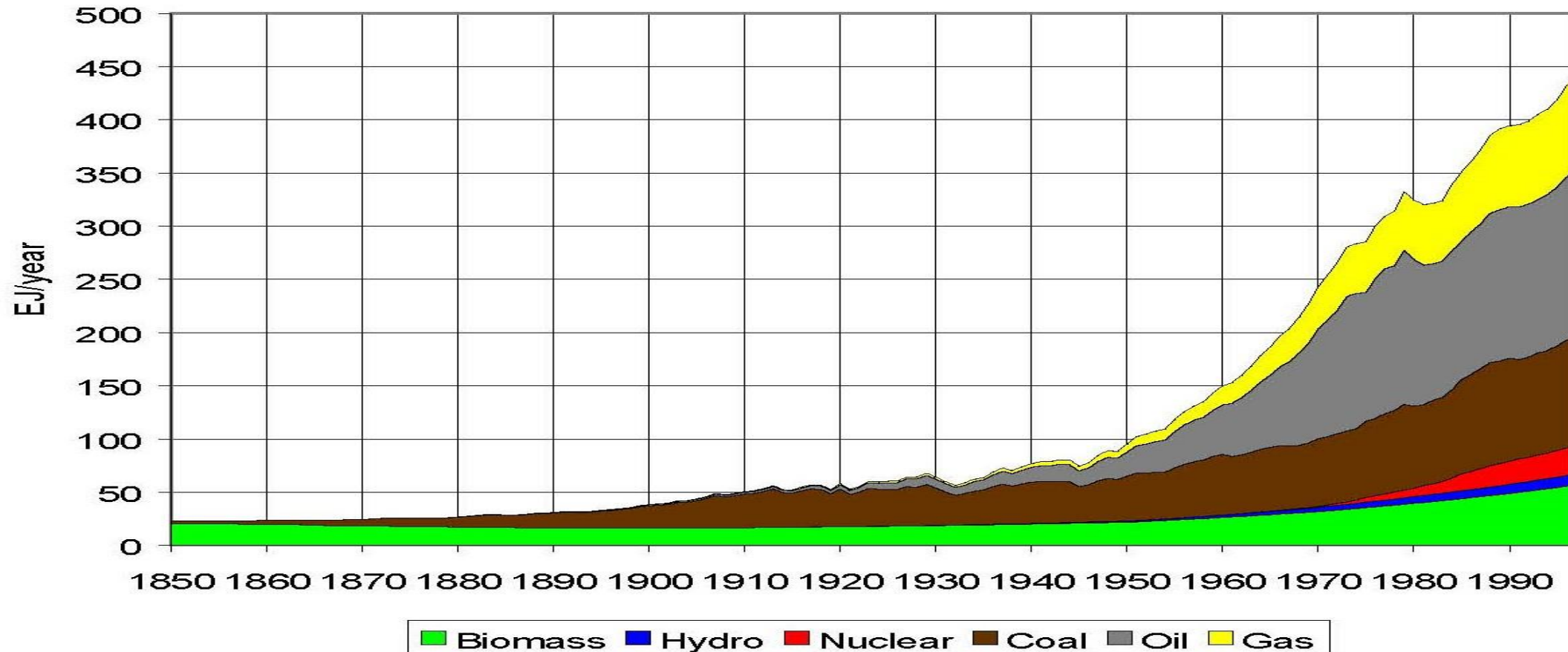
# **The 4<sup>th</sup> Industrial Revolution**

**Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, Spoke in Davos January 2016 about the 4<sup>th</sup> Industrial Revolution:**

- **1<sup>st</sup> Industrial Revolution    1784    Steam and Mechanical Power  
(James Watt)**
- **2<sup>nd</sup> Industrial Revolution    1870    Electric Power and Mass Production  
(Thomas Edison, Henry Ford)**
- **3<sup>rd</sup> Industrial Revolution    1969    Electronics and ICT (William Shockley, Gordon Moore, Charles Kao, Steven Jobs, Bill Gates)**
- **4<sup>th</sup> Industrial Revolution    2015--    Cyber-Physical Systems**

**I would like to suggest there have only been two Global Development  
Revolutions as defined by the best indicator of development: “World Energy  
Supply and Utilization”**

WORLD PRIMARY ENERGY SUPPLY 1850-1997



Professor John Holdren of Harvard, President Obama's Science Advisor

**The graph above shows the growth of world energy supply became markedly exponential after the end of the Second World War (1945)**

**The two Global Development Revolutions are:**

**1) The Industrial Revolution that is continuing from steam and mechanical power to the ongoing digital economy fuelled by digital technologies**

**The Key Driver has been Economic Growth through Consumption in the industrialised countries, leading to colonisation or semi colonisation of less developed countries and regions for raw materials and cheap labour, the competition for markets resulting in two world wars and continued depletion of resources of the Earth.**

**The majority of the world population did not benefit from the fruits of the industrial revolution until the end of the Second World War. Thus world energy supply remained flat.**

**2) The Second Development Revolution: “Rise of the South and South-South Cooperation”, starting from colonies becoming independent nations from the end of the Second World War (1945) and the rise of semi-colonial nations like China.**

**The Rise has been most marked in Asia Pacific, first the Asian Tigers of Korea, Taiwan, Hong Kong and Singapore, then ASEAN, China and India.**

**Their model of development is infrastructure development, nurturing of indigenous SMEs and heavy investment in human capital through education.**

**Developing countries outside of the Asia Pacific region like Africa followed the development model of G7-led development agencies that mainly addressed their soft development issues like education, health, gender, human right and the environment. Their development was also dependent on and constrained by the inadequate development assistance funding from the developed world.**

**Unfortunately, the successful economic development of Asia Pacific was also modelled on that of the developed world i.e. growth through consumption.**

**The adverse consequences are exponential energy consumption growth, global warming through green house gases and faster depletion of Earth's resources.**

**The world energy supply started to grow exponentially due to the increase in consuming power of the large population of the developing world**

**Concerns over the worsening global environment led to the UN Millennium Summit General Assembly 2000 to adopt the Millennium Development Goals (MDGs) 2000-2015 to address global poverty and its attendant ills.**

**Goal 1: Eradicate poverty and hunger**

**Goal 2: Achieve universal primary education**

**Goal 3: Promote gender equality and empower women**

**Goal 4: Reduce child mortality**

**Goal 5: Improve maternal health**

**Goal 6: Combat HIV/AIDS, malaria and other diseases**

**Goal 7: Ensure environmental sustainability**

**Goal 8: Develop a global partnership for development**



## **MDGs 2000-2015**

- **Unambitious: Target to reduce global poverty, hunger, chronic diseases etc only by half;**
- **Silo-like: No Cross Cutting Issues like Energy and Youth Employment;**
- **Government-centric: Private Sector and NGO not direct stakeholders.**

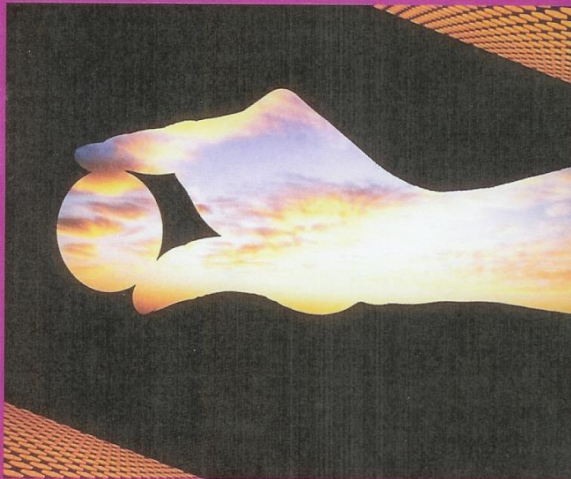
**MDGs were promoted by G7 and mainly addressed their soft development issues mentioned above. MDG targets were constrained by their inadequate development assistance funding with their caveat to developing countries not to expect more.**



**task  
force**

Science, Technology, and Innovation

**Innovation:  
applying knowledge  
in development**



Achieving the Millennium Development Goals

 MillenniumProject

**The shortcomings of the MDGs were redressed somewhat by the UN Millennium Project (MP) Science, Technology and Innovation Task Force. MP Director was Professor Jeffrey Sachs. I was co-chair and co-lead author of UN MP STI Task Force Report.**

**Based on the successful development experience of Asia Pacific, the Report recommends comprehensive infrastructure development and nurturing of indigenous SMEs as cornerstones for developing countries to achieve the MDGs**

**It can be downloaded from:**

**[http://www.unmillenniumproject.org/reports/tf\\_science.htm](http://www.unmillenniumproject.org/reports/tf_science.htm)**

**At the end 2015, many developing countries were still off tracked in MDGs. The overall achievement of poverty alleviation was mainly due to China lifting some 700 million of her population out of abject poverty.**

**The UN MDGs 2000-2015 have been replaced by the UN Sustainable Development Goals (SDGs) 2016-2030 in 2015. 2015 was a landmark year for international development. The Addis Ababa Action Agenda on Financing for Development was also adopted in July 2015. COP 21 in December 2015 in Paris reached agreement on combating global climate change led by USA and China.**

**The 17 SDGs are holistic, cross-discipline and multi-stakeholder in participation. The SDGs are associated with 169 targets.**



**In my view, the transformation from MDGs to the SDGs has been brought about by the dramatic social and economic uplift by South countries through infrastructure construction, domestic manufacture and industrialisation.**

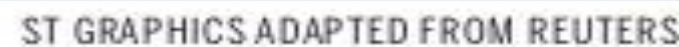
**The euphoria of 2015 evaporated in 2016 with the election of US President Trump, Brexit and protectionist tendencies in Europe, Australia.**

**The baton for sustainable development through the SDGs is now passed to South countries as represented by the Group of G77 now numbering 134 countries in the developing world.**

**Leading Initiatives are the “One Belt One Road” (OBOR) led by China and the “Regional Comprehensive Economic Partnership” (RCEP) of ASEAN + 6 (Australia, China, India, Japan, Korea, New Zealand) taking the place of the Trans-Pacific Partnership (TPP), killed off by President Trump.**

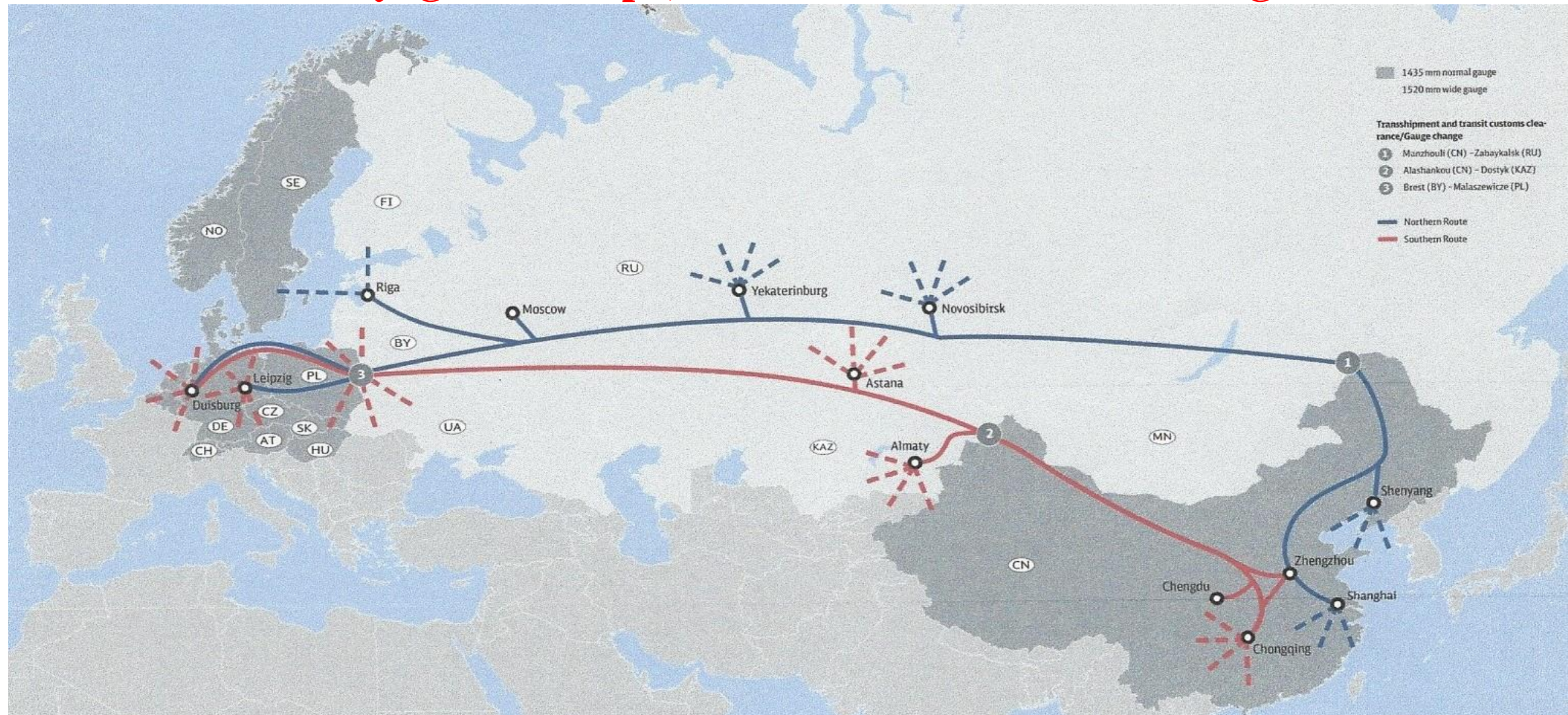


China is pushing to revive its ancient overland and maritime silk routes to Europe. The route connects many land and sea ports over three continents.





**London is the 15th European city in 2017 to find its way on to the ever-expanding map of destinations for China's rail cargo. In 2016, 1,702 freight trains made the voyage to Europe, more than double the 2015 figure.**

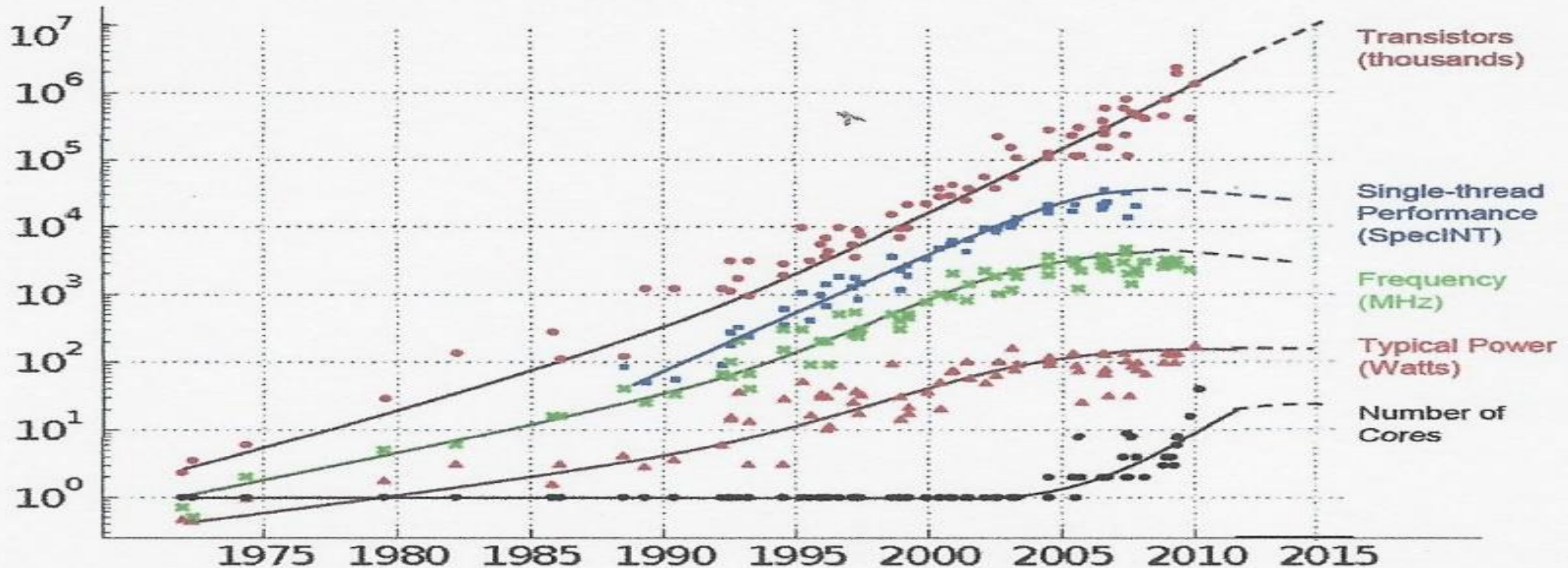




# Now Digital Technologies : Its Most Significant Development

**Moore's Law:** processor speeds, or overall processing power for computers will double every two years, Gordon Moore Co-Founder, Intel 1995.

## 35 YEARS OF MICROPROCESSOR TREND DATA



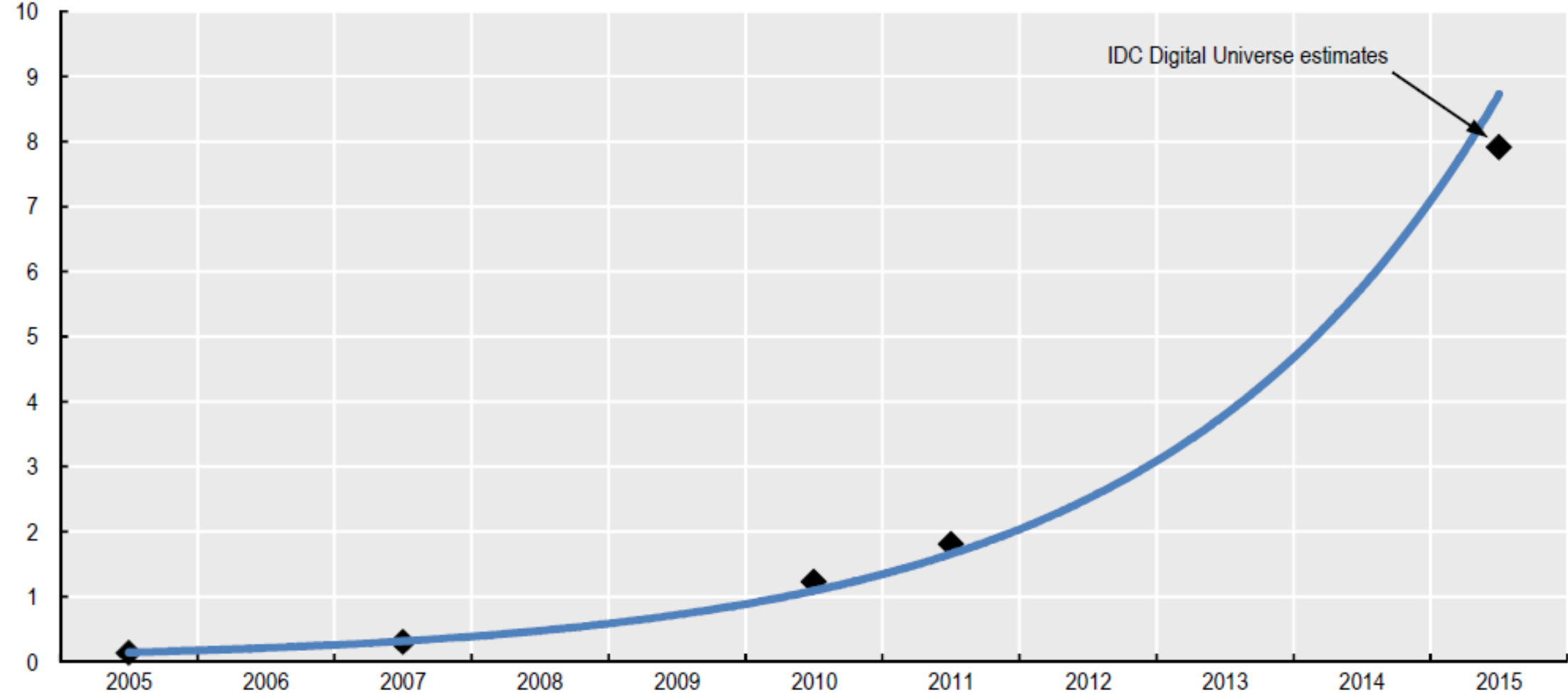
Original data collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond and C. Batten  
Dotted line extrapolations by C. Moore



# From OECD “Data Driven Innovation” Report

Figure 1.1. **Estimated worldwide data storage**

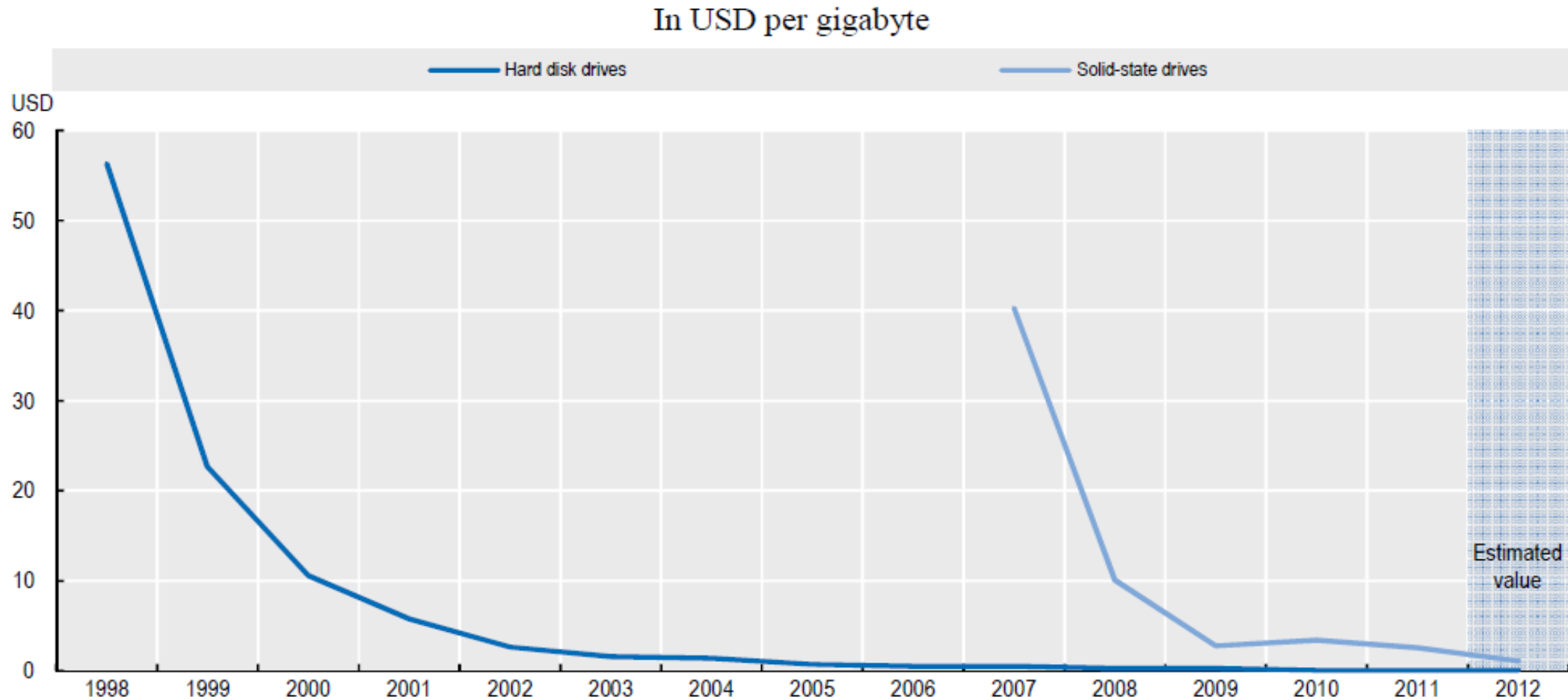
In zettabytes (ZB, trillions of gigabytes)



Source: Based on the IDC (2012) Digital Universe research project.

# From OECD “Data Driven Innovation” Report

Figure 3.9. Average data storage cost for consumers, 1998-2012



*Note:* Data for 1998-2011 are based on average prices of consumer-oriented drives (171 HDDs and 101 SSDs) from M. Komorowski ([www.mkomo.com/cost-per-gigabyte](http://www.mkomo.com/cost-per-gigabyte)), AnandTech ([www.anandtech.com/tag/storage](http://www.anandtech.com/tag/storage)) and Tom's Hardware ([www.tomshardware.com](http://www.tomshardware.com)). The price estimate for SSD in 2012 is based on DeCarlo (2011) referring to Gartner.

*Source:* Based on Royal Pingdom blog, December 2011.

# From UN Broadband Commission State of Broadband Report 2015

Proportion of Households with Internet Access



There are still 3.9 billion of the 7.5 billion of world population without broadband internet access

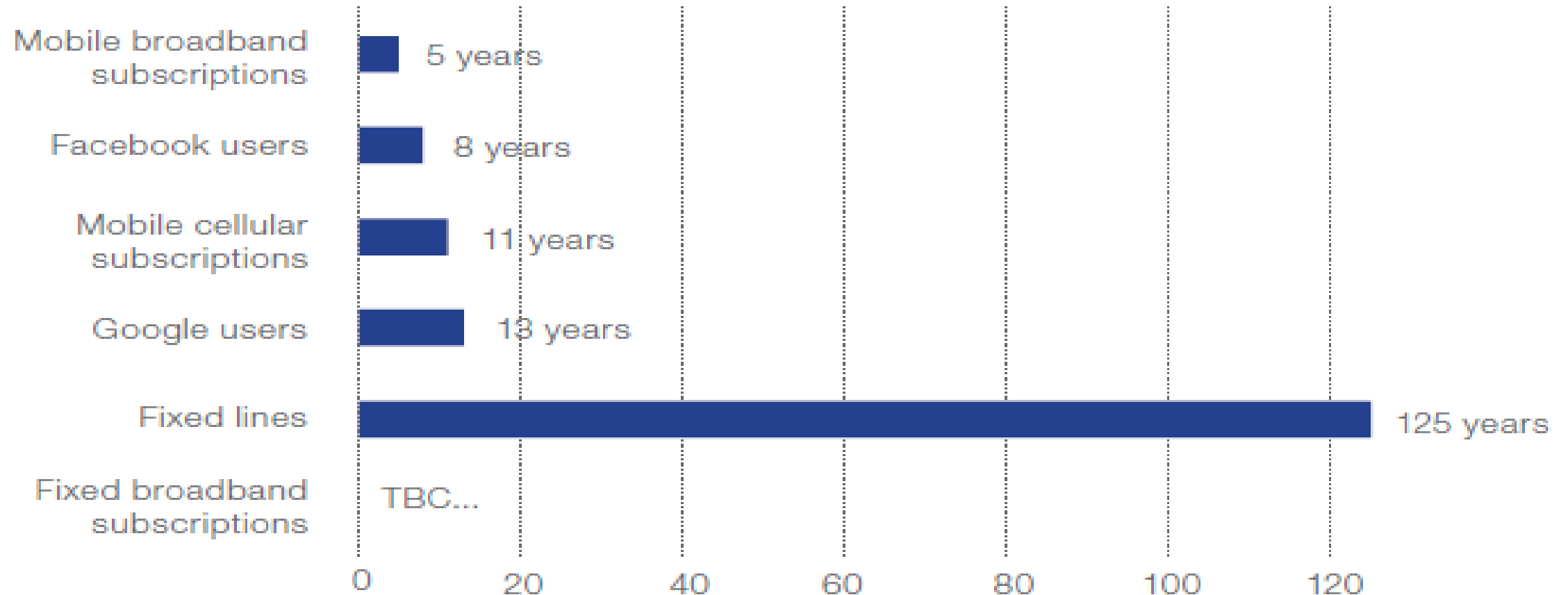
## **UN Broadband Commission “State of the Broadband 2015” Report**

**Global IT and Telecom spending will grow to around US\$ 3.8 trillion for 2015 alone.**

**By the end of 2015, the total number of mobile cellular subscriptions will nearly rival the total global population (7.3 billion) . ITU forecasts 7.1 billion mobile cellular subscriptions.**

**Mobile broadband is the fastest-growing ICT service in history, taking just five years to achieve one billion users**

## Years to Achieve One Billion Users (from Launch)



**From UN Broadband Commission State of Broadband Report 2015**

# **UN Broadband Commission “State of the Broadband 2015” Report**

**Many markets worldwide are now fully saturated with regards to mobile phone penetration – ITU estimates that there will be 121 countries with mobile cellular penetration in excess of 100% by end 2015.**

**Even Moore’s Law is slowing due to the heat that is unavoidably generated when more and more silicon circuitry is jammed into the same small area. Top-of-the-line microprocessors currently have circuit features that are around 14 nanometres across, smaller than most viruses.**

**Nevertheless Advanced Technologies such as Network Function Virtualization (NFV), Software Defined Networking (SDN) and Heterogeneous Network (HetNet) are being deployed by IT and Telecom Operators to help create a hyper-connected society, alongside the development of 5G.**

# Opportunities of Digital Technologies

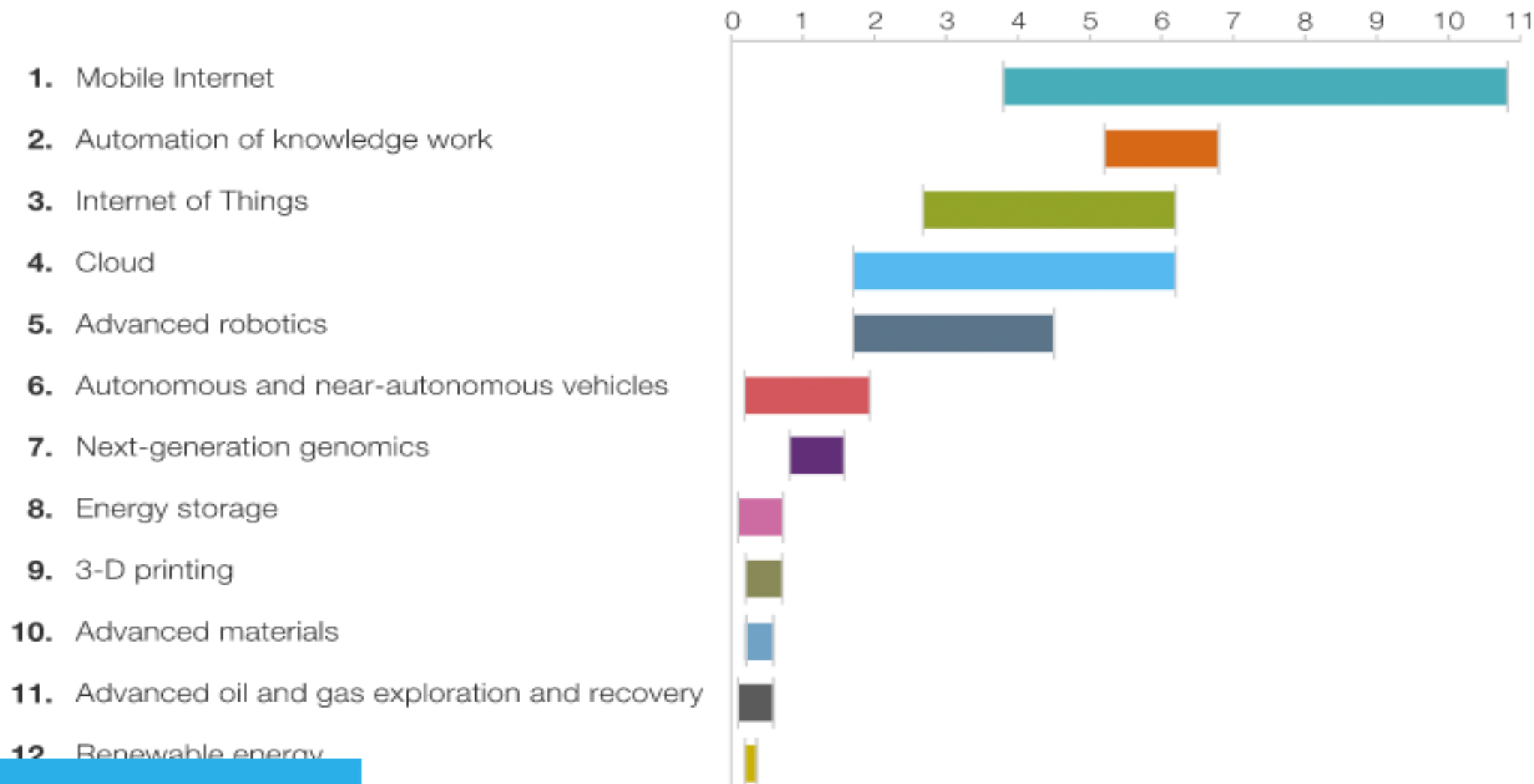
**According to Klaus Schwab, the 4<sup>th</sup> Industrial Revolution offers:**

*The possibilities of billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited.*

*These possibilities will be multiplied by emerging technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing.*



**Estimated potential economic impact of technologies across sized applications in 2025, \$ trillion, annual**



[View slideshow](#)

# Challenges of Digital Technologies

K. Schwab regards **Inequality** as the greatest societal concern.

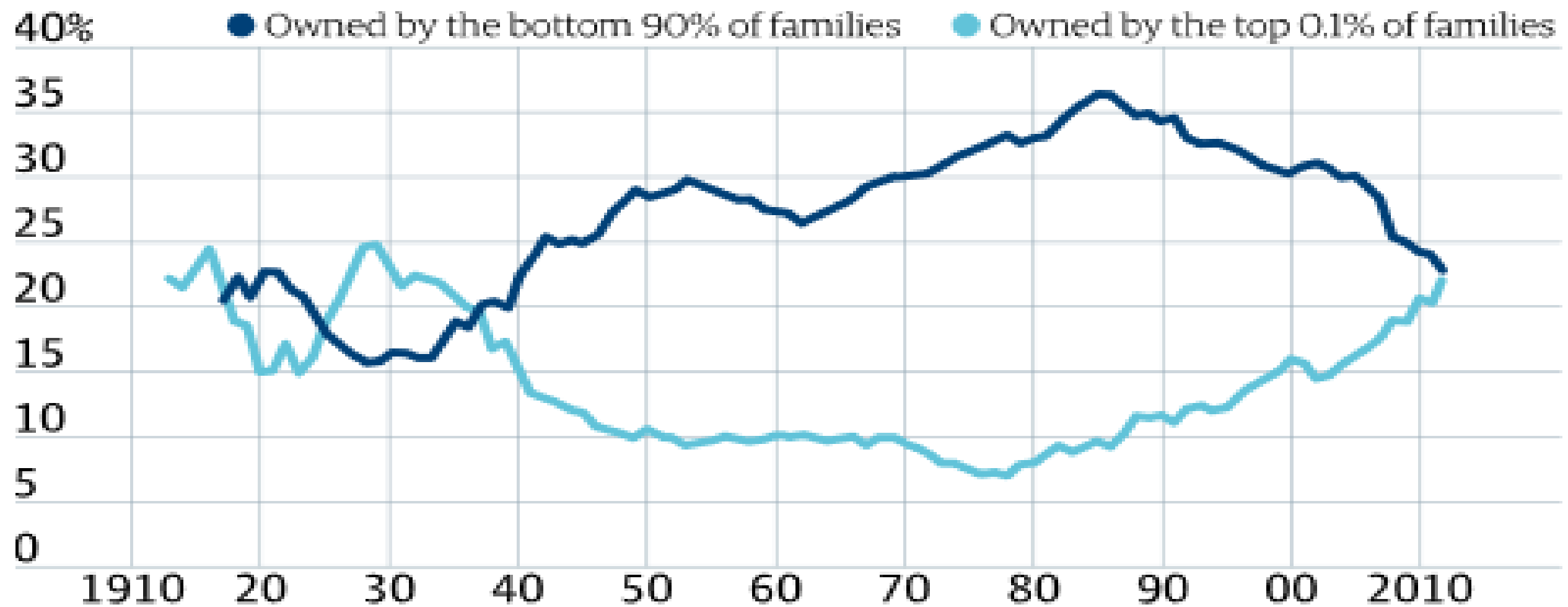
*“The largest beneficiaries of innovation tend to be the providers of intellectual and physical capital—innovators, shareholders, and investors which explains the rising gap in wealth.”*

**According to the UK Guardian Newspaper on US Wealth Inequality: In past three decades, the share of household wealth owned by the top 0.1% has increased from 7% to 22%. The share of wealth owned by the top 0.1% of families is almost the same as the bottom 90% of families.**

**The sharp decline of the middle class helped to elect President Trump!**

# The share of total US wealth

1913-2012



SOURCE: WASHINGTON CENTER FOR EQUITABLE GROWTH

## **Employment Loss**

**According to WEF Davos Study “The Future of Jobs” 2016, digital technologies, combined with other socio-economic and demographic changes, will transform labour markets in the next five years, leading to a net loss of over 5 million jobs in 15 major developed and emerging economies. The new research by the World Economic Forum is the first of its kind, representing more than 13 million employees in nine industry sectors and 15 economies; it aims to guide business and policy-makers on how to equip labour forces with the skills to navigate the disruption of the Digital Economy.**

- Skills and jobs displacement will affect every industry and geographical region, but losses can be offset by job growth in key areas;**
- A clear majority of businesses believe that investing in skills, rather than hiring more short-term or virtual workers, is the key to successfully managing**

- **A clear majority of businesses believe that investing in skills, rather than hiring more short-term or virtual workers, is the key to successfully managing disruptions to the labour market for the long term;**

**New Headline “The head of the World Bank is pushing a terrifying prediction for jobs in developing countries”**

**World Bank president Jim Yong Kim said about two-thirds of jobs in the developing world may be lost due to automation. Kim made the comments on May 1 2017 at the Milken Institute Global Conference. Kim pointed out several countries in particular with high risk of job loss. In Ethiopia, 85% of jobs are vulnerable, compared to 77% in China and 72% in Thailand.**

# **Child Obesity**

**The West especially US has been confronted by obesity due to its lifestyle.**

**It may surprise most people that a developing country like Malaysia is having very serious “Child Obesity” problem. The incidence of diabetes and heart problems of the young is a healthcare time bomb for Malaysia.**

**I attribute the broadband high definition multimedia that bombards our children with advertisements on fast food 24/7 as a major contributing factor, so also the addiction to computer games and the like, making them couch potatoes.**

**WHO regards child obesity as a global problem and has set up “Commission on Ending Childhood Obesity”.**

## **Mass and Social Media Spreading Unrest**

**The West attacked Iraq and unsettled Syria, causing the rise of ISIS or ISIL in Syria and Iraq. ISIL growth has been attributed to expert use of social media.**

**Using global broadband connectivity, ISIS/ISIL has spread fundamentalist ideology throughout the world. Well educated youth from developed world in US, Europe and Australia and from Muslim countries like Malaysia and Indonesia are going to Iraq and Syria to fight as jihadists and suicide bombers.**

**On the other hand, Western developed nations have been funding mass and social media to propagate “democratic values” like human right, gay right, individual liberty and freedom of speech to induce regime change by violent mass demonstrations. They are not adverse of using military might.**



## **Mega-Cities**

**Capital cities are the engines of economic growth in the world. They provide better education, employment and other facilities lacking in smaller communities.**

**However, in the developing world, they are home to slums and hot beds of crime and other social ills. In making them more vibrant by IOT and other innovations of the digital economy, they will act as magnets for more rural youth and migrant workers, legal or otherwise.**

**Besides aggravating the social problems of the capital cities, they deplete the rural areas of farm labour, raising the spectre of global food scarcity. The resultant population explosion in mega-cities of the developing world will also aggravate the challenge of natural and human made disasters.**

# **Human Capital Development in Developing Countries**

**As the OECD DDI Report points out, there is a shortage of big data professionals in the West due to tertiary education curricula in ICT being too focused on the nitty gritty of computer components and devices rather than on system approaches to big data and digital technologies.**

**There is also lack of attention given in schools to curriculum in STEM in general and algorithm writing and mathematical modelling in particular.**

**The situation in the developing world must be worse. The South must pay urgent attention to develop human capital capacity in big data systems and in digital technologies from pre-school upwards.**

## **My Deepest Concern on the Digital Technologies**

**As driven by the West, economic growth of the digital economy is based on more and more consumption, fuelled by incessant advertisements in mass media. Smart phone giants Apple, Samsung, Huawei announce new models every few months making smart phones like costume jewellery. Older phones are thrown away like junk.**

**Social media giants like Google, Facebook and Twitter earn much of their billions by advertisements advocating consumption.**

**We must work together to arrest the exponential growth of global energy supply that continues to deplete the dwindling resources of our Earth.**

# There are now **6.8 billion** people on the planet.

Together we consume  
**1.4 Earths'** worth of  
resources per year.



If everyone consumed like  
Americans, we'd need  
**5.4 Earths** to sustain us.



If Americans consumed like the:

3.1



South Africans

1.4



Argentines

1.2



Costa Ricans

1.1



Indians

.4



SOURCE: GLOBAL FOOTPRINT NETWORK





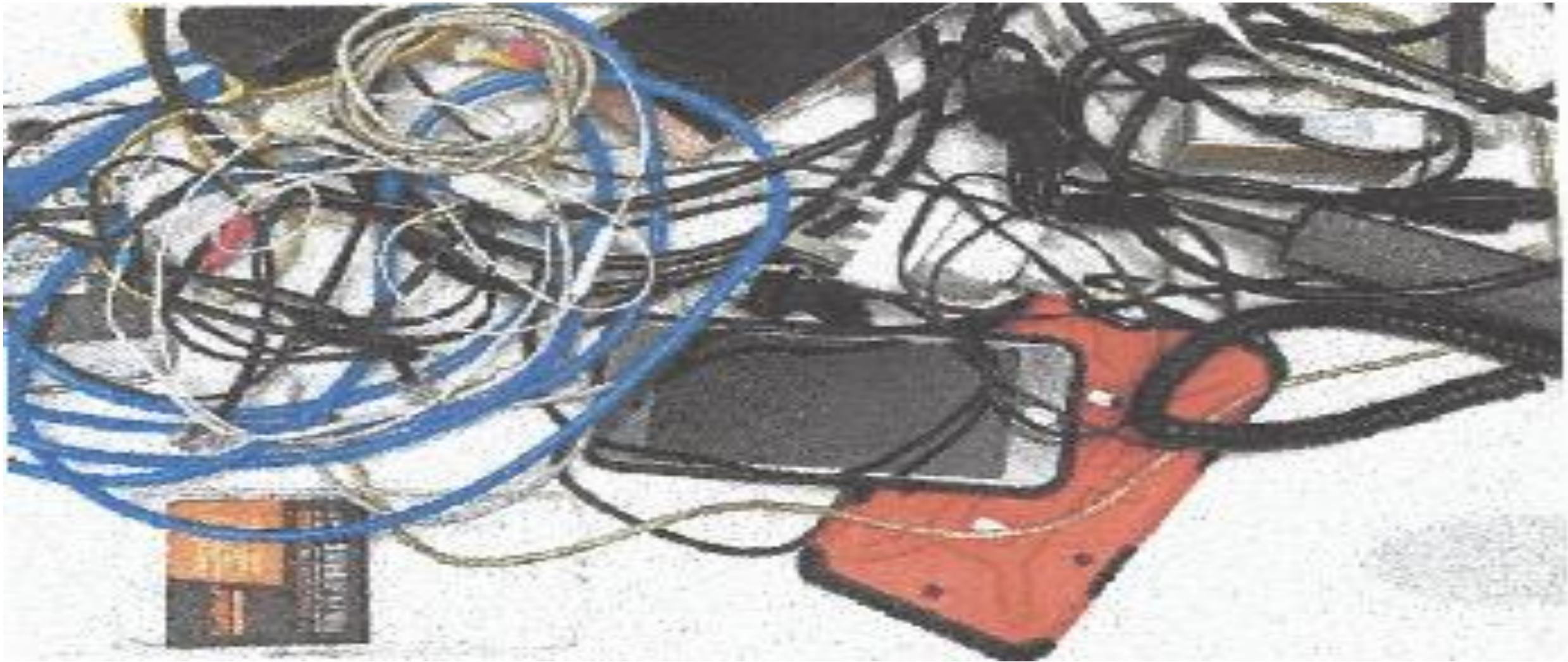
**Pope Francis twitted “the throwaway culture of today calls for a new lifestyle. The earth, our home, is beginning to look more and more like an immense pile of filth.”**



# Satellite Debris in Space







**According to Malaysian Communications and Multimedia Commission (MCMC) (The Star 11 July 2016) there are more than 66 million mobile phones in Malaysia – about twice the population. This means Malaysians are sitting on millions of unused, obsolete handphones at home. These are posing a danger to the environment.**



## **There is Hope in the South**

**In ASEAN, there is the Sufficiency Economy of Thailand as advocated by the late King “*This sufficiency means to have enough to live on. Sufficiency means to lead a reasonably comfortable life, without excess, or overindulgence in luxury, but enough. Some things may seem to be extravagant, but if it brings happiness, it is all right as long as it is within the means of the individual...*”**  
**The late Thai Monarch’s birthday speech on 4 December, 1998**

**China’s National Dream is “A Nation of Medium Income Families”.**

**Bhutan’s Gross National Happiness Index is Bhutan’s Development Philosophy based on Buddhist values that measures the quality of life based on the spiritual and mental well-being of its people.**

## **WFEO CIC and the UN**

**In 2000, I persuaded the International Council for Science (ICSU) to take WFEO as Partner in the “Science and Technology Community” Civil Society Major Group of the UN Commission for Sustainable Development (UNCSD). WFEO participated fully in the World Summit for Sustainable Development (WSSD) Jo’burg 2002.**

**Of more relevance, WFEO became the Leader of the “Science and Technology Community” Major Group in UN World Summit on Information Societies (WSIS) Geneva, 2003 and Tunis, 2005. CIC was the anchor for WFEO in WSIS. WFEO led NGOs in fighting for contents in the development of information societies for the benefit of humankind. In the UN Broadband Commission for Sustainable Development, Commissioners nominated by UNESCO like myself are still fighting for contents for solutions to the challenges of digital technologies.**

## **WFEO CIC and the UN**

**I am certain in this gathering of engineering experts on the Internet of Things, much deliberation and celebration will be devoted in successful IoT applications in cities with exciting prospects for development.**

**May I urge you to consider how to extend the benefits of digital technologies to rural communities in the developing world to slow down the rural urban migration and the influx of foreign workers. One of the ways will be the application of digital technologies in agriculture.**

**I look forward to receiving your recommendations to present to the UN Broadband Commission for Sustainable Development.**

**THANK YOU**