Innovation and Translational Research as Key Drivers of New Structural Economics – European Perspectives on China‘s Global Development Narrative

Alexander G. Welzl

The 28th International Development Forum, Peking University, China
April 3rd, 2019

FH University of Applied Sciences TECHNIKUM WIEN

China‘s and Asia‘s Industrial Transformation - Towards a Innovation-driven Development

Source: http://english.boaoforum.org/en/index.html

Premier Li Keqiang‘s keynote speech at Boao Forum for Asia 2019

Boao, Hainan Province, March 28, 2019 – a quote of his speech (source China Daily, March 30-31, 2019):

„*After years of fairly fast growth, Asian countries now face the challenge of shifting from old drivers of growth to new ones, and we must rely on innovation to foster the latter. (…) we (…) must tap into our advantages in human capital (…) to intensify cooperation on innovation. (…) We need to (…) clear the way for the unimpeded flow of factors of innovation resources and outcome, setting the stage for the steady progress of Asia‘s innovation-driven development*.“

China‘s Innovation Performance
- A Legacy of Millennia of Development

Black pottery
Hemudu culture
(5000 – 3000 BC)
Source: Wikipedia

Painted pottery
Western Han dynasty (202 BC – 9 AD)
Source: Wikipedia

- **A history of Innovation taking place in China (provincial region Zhejiang)**: ‘*Half of the history of Chinese ceramics took place in Zhejiang*’ (Chen Wenli). Exhibition at Zhejiang Provincial Museum at Westlake.
- The **first pottery** was made during the **Palaeolithic era**. Pottery dating from **20,000 years ago** was found at the **Xianrendong Cave** site in **Jiangxi province**, making it among the earliest pottery yet found.
- Porcelain was a Chinese invention and is so identified with China that it is still called "china" in everyday English usage. On some Chinese definitions, the **first porcelain was made in Zhejiang province** during the **Han dynasty (206 BC – 220 AD)**.

Part of the ‚Chinese Dream'
- The Dawn of the Quantum Era

Source: australasianscience.com.au

It was on **Monday, 16 August 2016** when a new era was ushered in:

Quantum satellite MICIUS was launched at 1:40 local China time from "the launch pad 603 located at LC43 complex at the Jiuquan space centre in Jiuquan, north-west China."

"The scientist who first proposed the idea to the European Space Agency (ESA in 2001 is University of Vienna physicist Anton Zeilinger."

Prof. Anton Zeilinger today is the President of the Austrian Academy of Sciences.

Source: https://www.bbc.com/news/world-asia-china-37091833

Geopolitics of Knowledge
- a ‘Long-run’ Game and the Big Picture

Article in ‘The Diplomat’, February 2018:

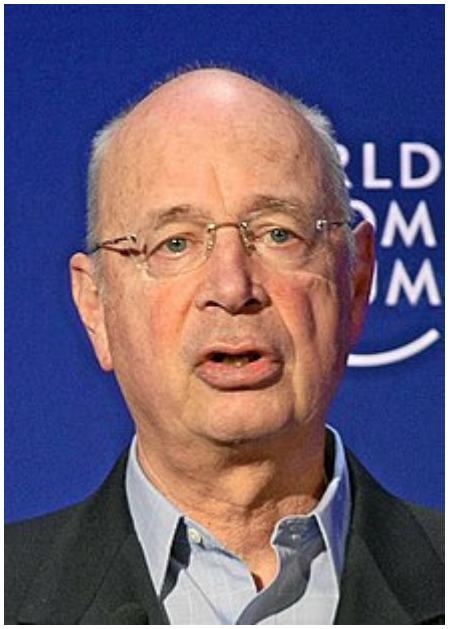
“**China’s bet on knowledge is already paying off; but this game, which requires lots of strategic thinking and stamina, is to be played in the long run**.

(…) China’s approach to knowledge is already bearing fruit in terms of making foreign policy. A collection of topics as cognitively sophisticated and even futuristic as the exploration and use of outer space, (…) information technology and connectivity, (…) quantum physics (…) and so on, have become the bread and butter of Chinese career diplomats, thus catering to the country’s most urgent present and future needs.”

Source: The Diplomat, February 27, 2018

National Innovation Systems, Translational Research and Innovation Performance

From Capitalism to Talentism - World Economic Forum 2012



Prof. Klaus Schwab

Source: Wikipedia

At the opening press conference of the World Economic Forum (WEF) 2012 Klaus Schwab – founder and President of WEF - claimed a shift from capitalism to talentism with human capital and innovation power becoming countries', cities' and companies' major competitive asset:

"***Capital is being superseded by creativity and the ability to innovate — and therefore by human talents — as the most important factors of production***."

Against Backdrop of Global Economic Crisis: New Model of Man in Economics

Macroeconomic Theories, their Main Ideas and Model of Man:

- **Neoclassic/Neoliberalism**

  homo-economicus (man follows economic goals only & in a fully rational manner), efficient markets (‚invisible hand of the market'), mathematically driven interpretation of (economic) reality, neglection of non-rational and intangible aspects of economic reality and value creation

- **Behavioural Economics**

  Man driven by ‚animal spirits' (trust, sense of fairness, ethical behaviour and corruption, money illusion, narrations), public rules and regulation for markets necessary (‚leavening hand of wise policy'), qualitative & quantitative elements of interpretation, integration of non-rational and intangible aspects of economic reality and value creation

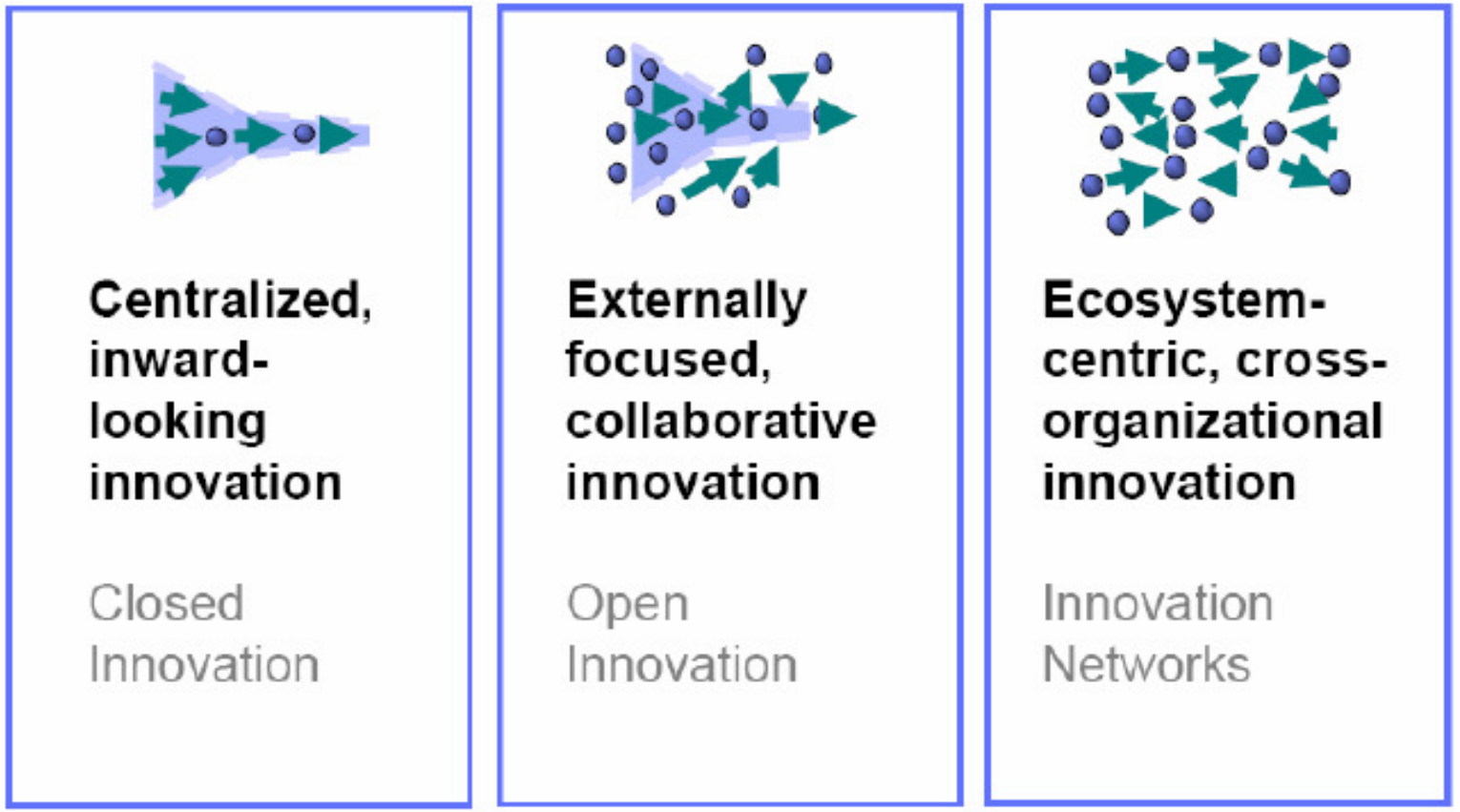
1st Lecture on China's NIS at Austrian University - started at UASTW in September 2018

- **Title „From ‚Made in China' to Created in China'**
- Lecturer: Alexander G. Welzl
- Focus on National Innovation System (NIS) of PR China, corporate management of innovation and creativity in Chinese firms/Chinese owned enterprises doing business in Austria and CEE, BRI
- Guest lectures from CEOs of Chinese companies & scholars

Collaboration with Chinese Academy of Social Sciences (CASS), Beijing: started June 2018

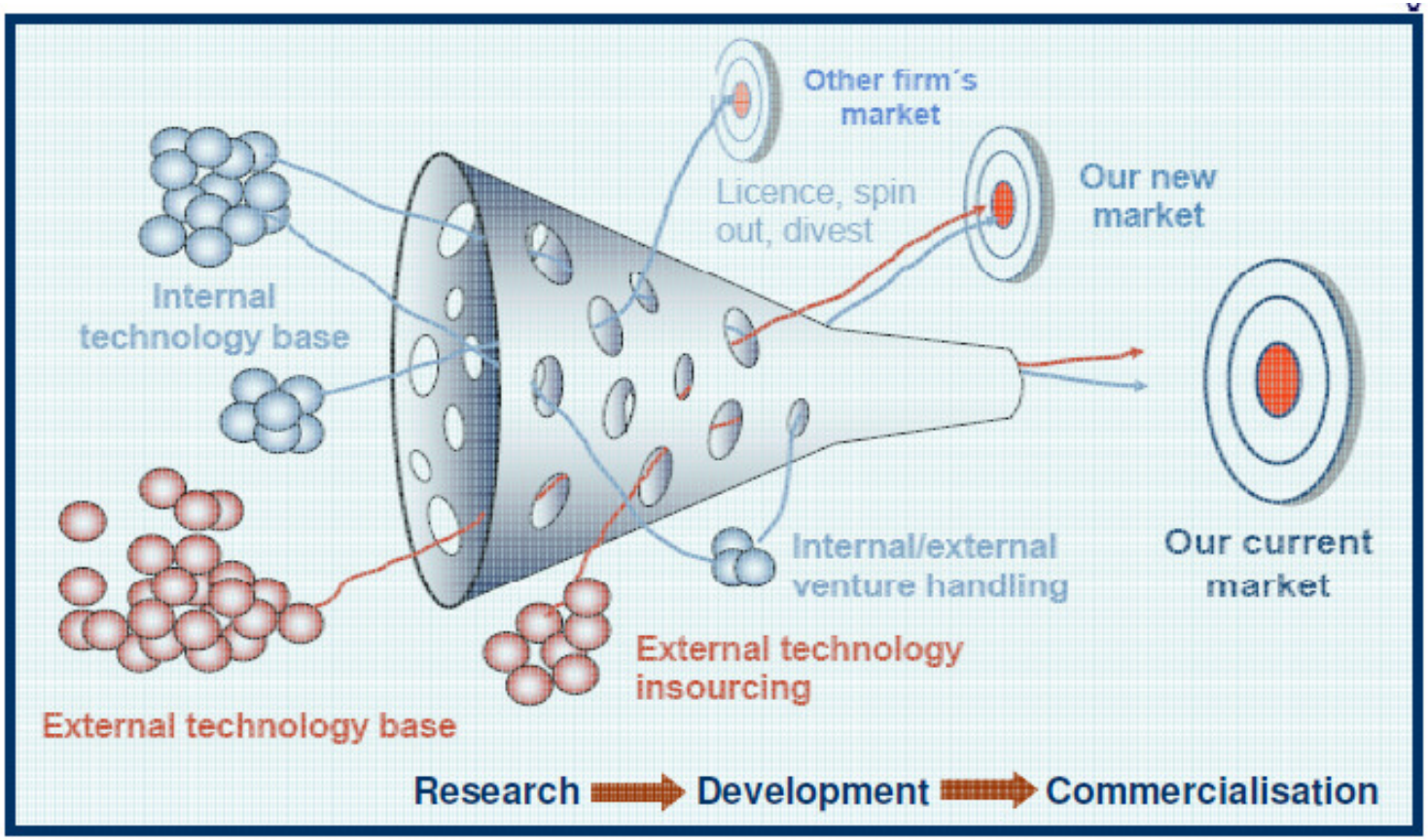
- Kick-off Meeting with Prof. Huang Ping (CASS, Beijing /China), UASTW Rector Schmöllebeck and Alexander G. Welzl at UASTW in Vienna/Austria on June 4, 2018
- start of a long-lasting cooperation of mutual interests

Evolution of Innovation Concepts I: from Closed Innovation to Ecosystems



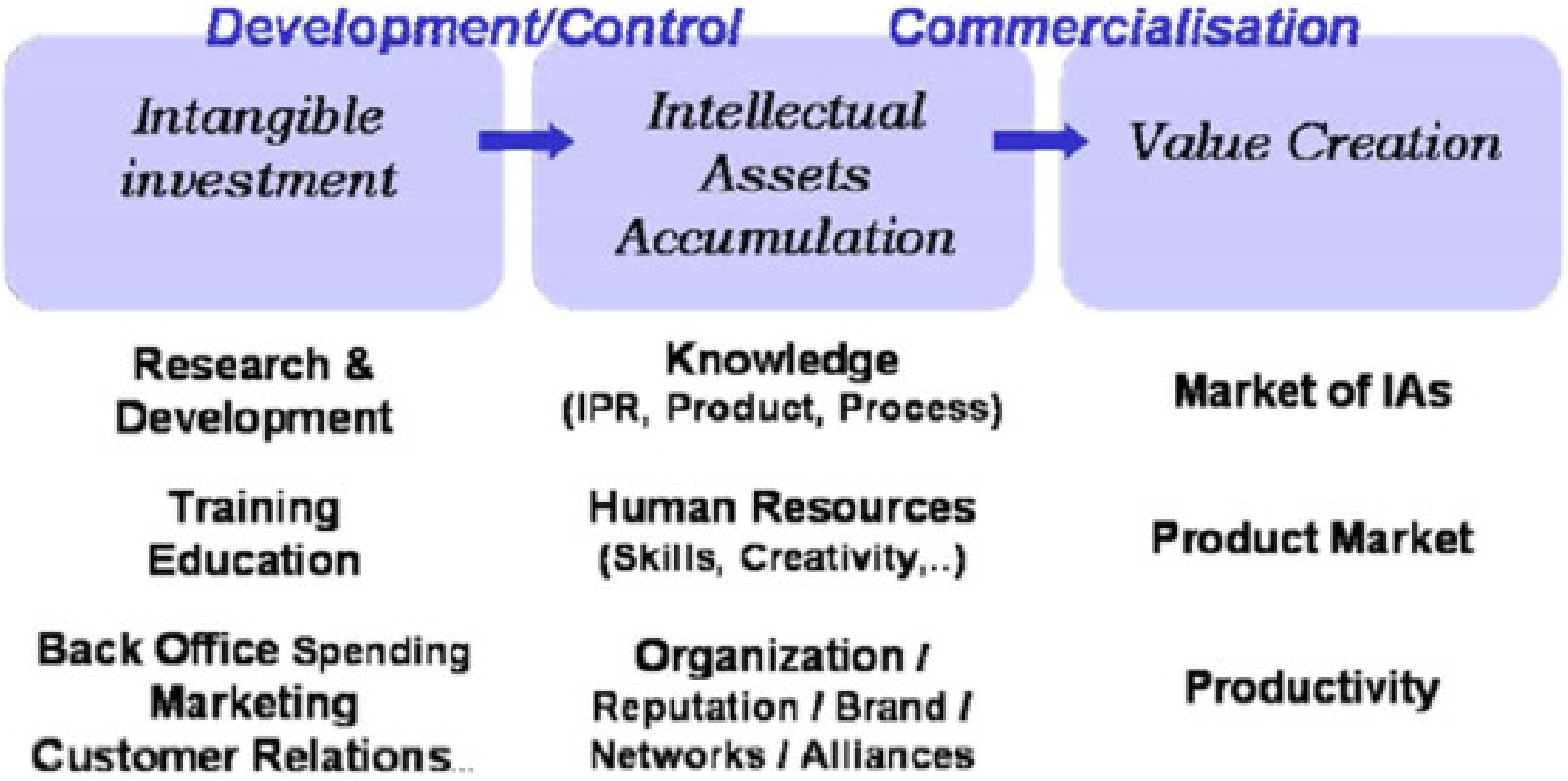
Sources: Chesbrough (2003), Forrester (2004), von Hippel (2005)

Evolution of Innovation Concepts II: from Gated Communities to Openness



Source: Chesbrough (2005), Tojo, OECD (2006, 2008)

Novel Value Creation in the Digital Age: Intangible Investment/Assets - Sources of Growth



Source: Tojo, OECD (2008)

Managing Curious Minds (HBS 2008)

Infineon's ‚Brainport' Approach - creating an innovative Environment for talented Knowledge Workers

HARVARD BUSINESS SCHOOL 100 YEARS 1908-2008

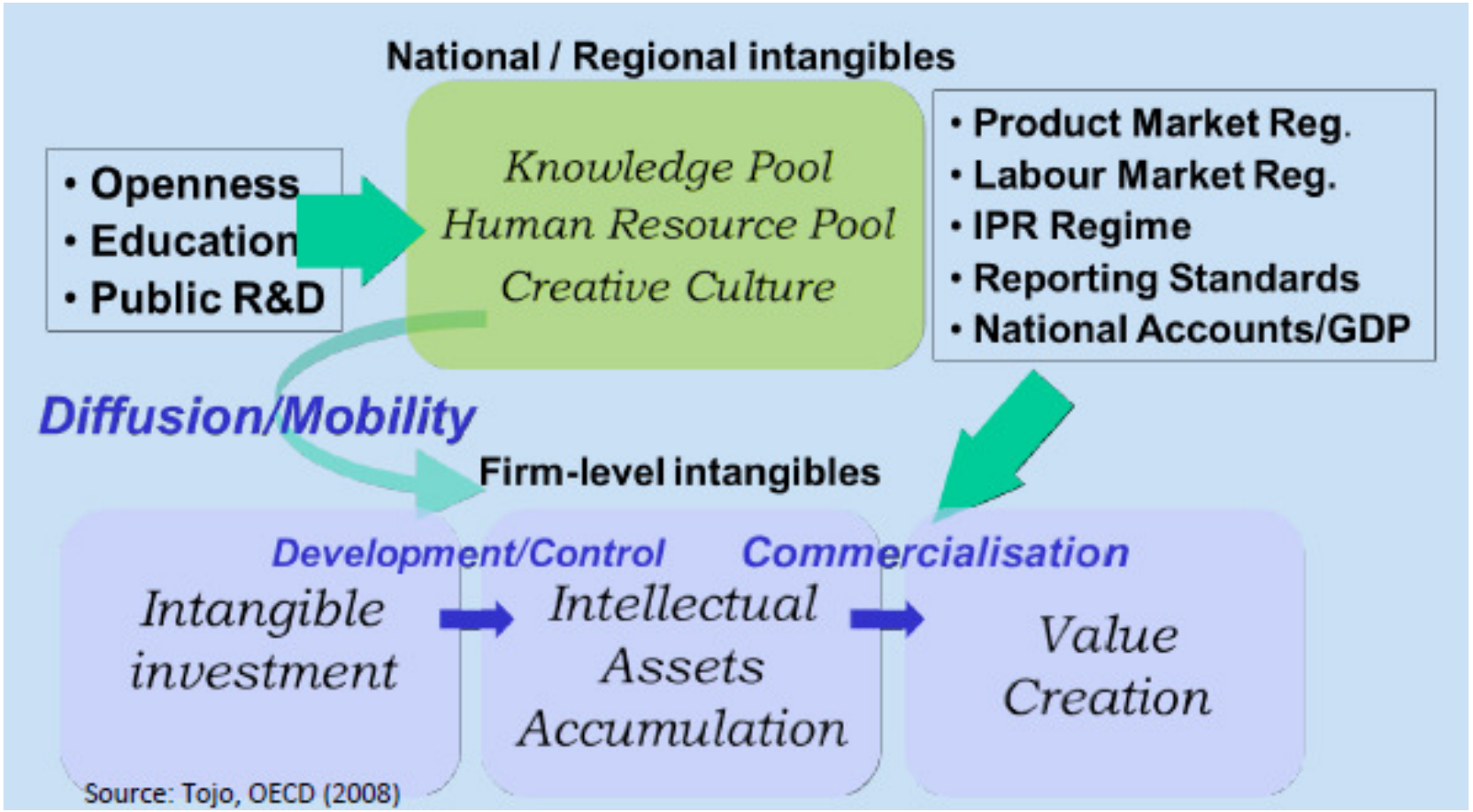
Only the combination of a sum of different, specific factors characterises a ‚Brainport' like Infineon Austria and creates its competitiveness!

Management Culture	Corporate Culture	Networks & Relations	R&D, Innovation, Organisational change	Interdisciplinary Problem solving	Lifelong learning & Learning Organisation
diversity management (nationalities, gender diversity, fields of knowledge), managers as sponsors of employees	of trust and respect	international, national and regional; between industry, academia & public sector; between company locations	R&D and innovation intensity; capacity for continuous change	based on a variety of technologies and fields of knowledge	put into practice as a part of corporate culture and management approach

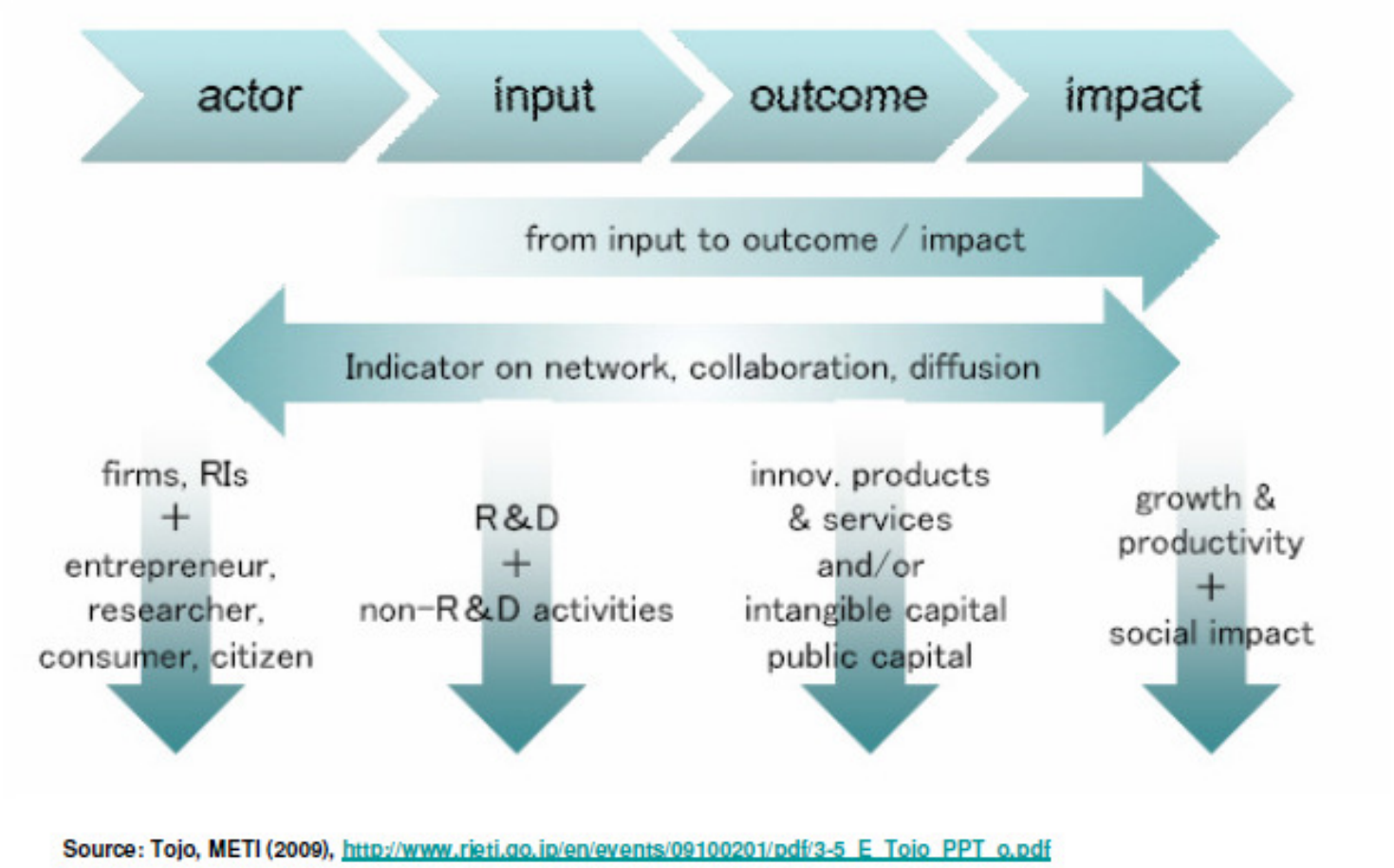
23

The Quest for a evidence-based, innovation-driven and systemic Governance Approach

Innovation-driven Governance: Requirements & Framework Conditions



New Value Creation Patterns Challenge Governments & Performance Cultures



Source: Tojo, METI (2009), http://www.rieti.go.jp/en/events/09100201/pdf/3-5_E_Tojo_PPT_o.pdf

Performance Management - the Austrian Approach

Outcome Orientation

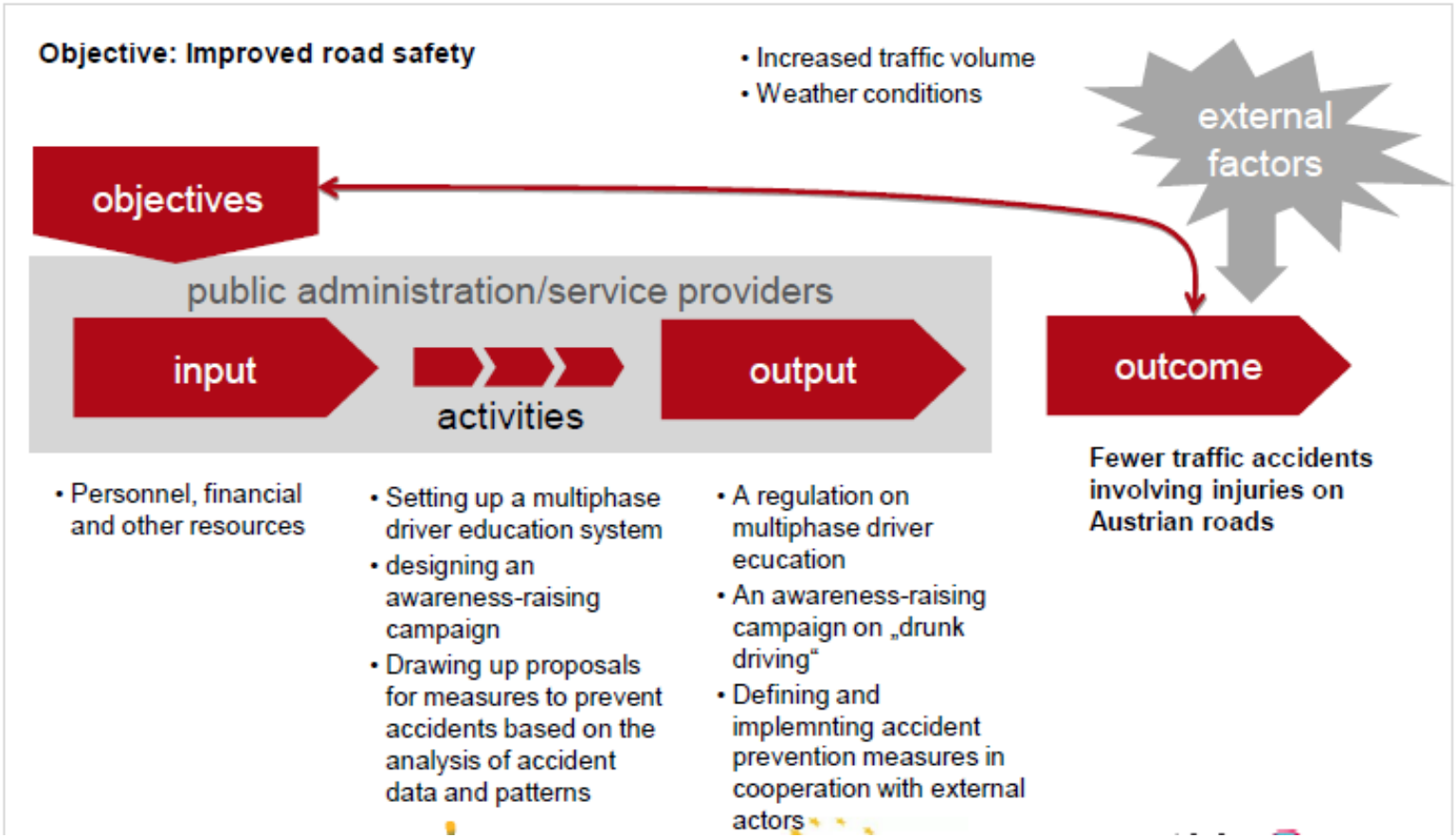
- Managing public administration based on its contribution towards achieving outcomes in society (performance management)

Key Pillars

- performance management: the budget presents the political goals and objectives, which are measured and reported
- Outcome orientated impact assessment
- Implemented in 2 steps (2009/2013) and laid down in the constitution

Source: Austrian Federal Chancellery, 2015

The Austrian Federal Performance Model

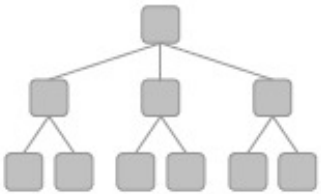


Source: Austrian Federal Chancellery, 2015

The Stakeholders and Adressees

… Parliament & the interested public

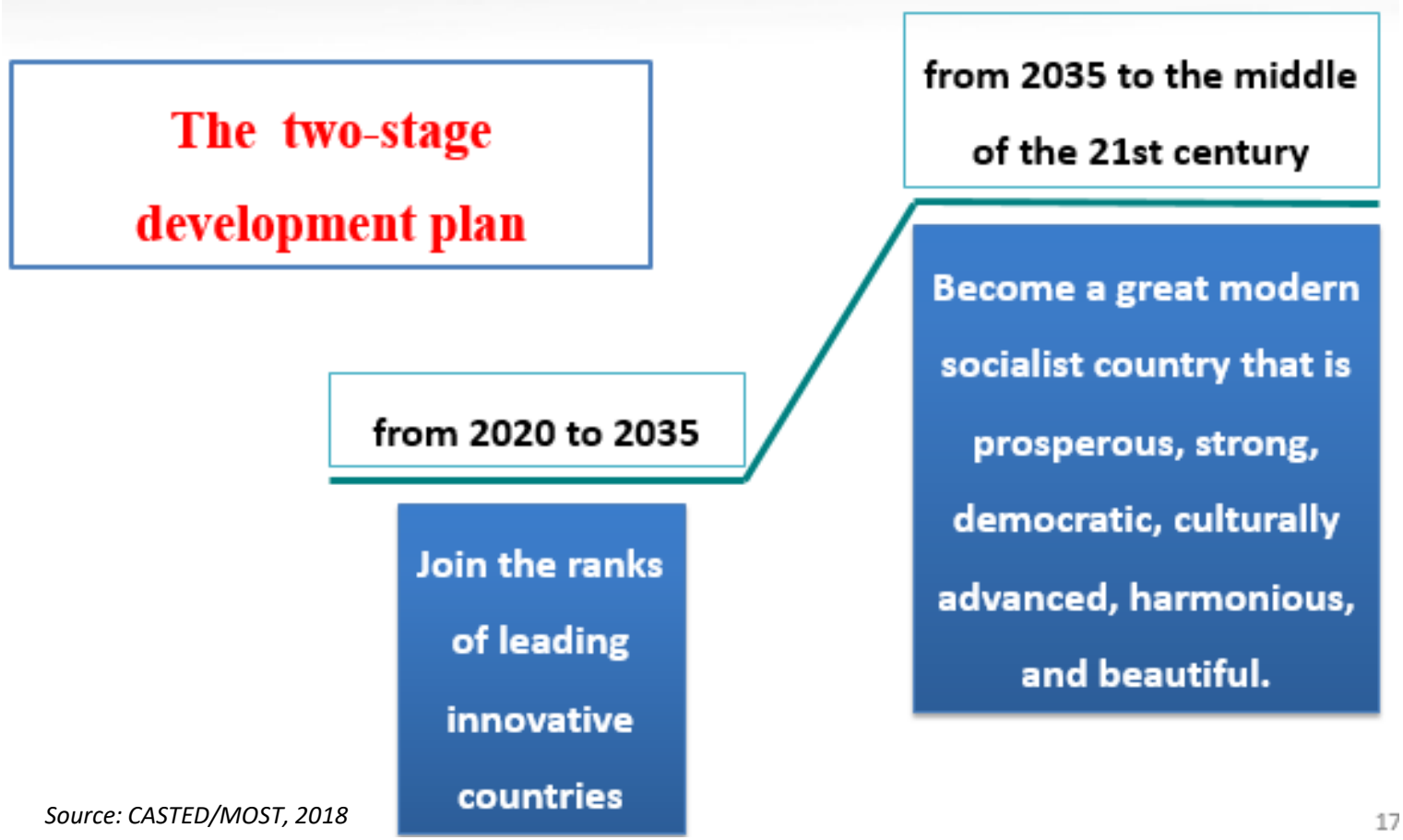
… government & ministers



… public administration

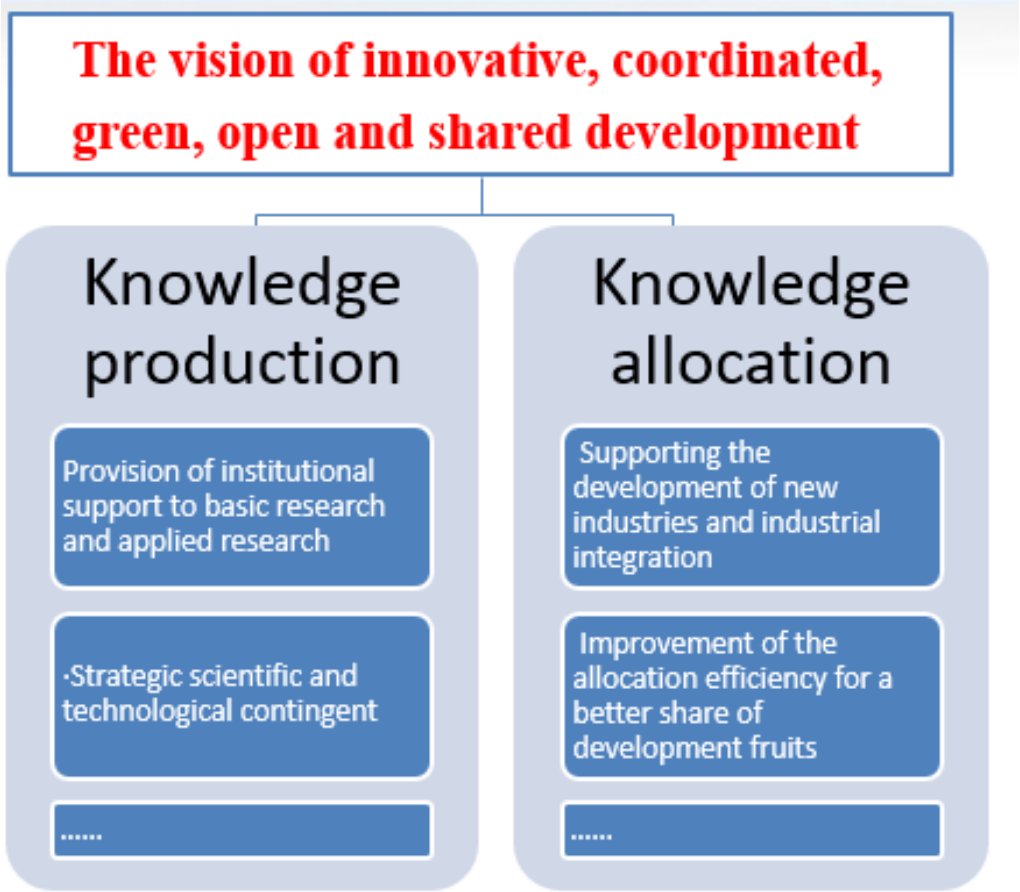
Source: Austrian Federal Chancellery, 2015

Chinese Government I: New Requirements for the Development of NIS in the New ERA



Source: CASTED/MOST, 2018

Chinese Government II: the Evolutionary Direction of China's National Innovation System



Source: CASTED/MOST, 2018

Decision Tools for Geoeconomics & Geopolitics – the Hyperglobe I

- Tactile hyperglobes: visualization of the digital image on a physical globe body in real space – spherical display for visualization of any big data over time!
- One is in front of a real (scale-downed) 3d-model of the earth. Like being an astronaut and looking from outer space on earth, or in other words: *"Oh, my God! Look at that picture over there! Here's the Earth coming up. Wow, is that pretty!"* (Frank Borman, commander Apollo 8)

Hyperglobe-Research-Group at the Department of Geography and Regional Research (University of Vienna, Austria)

Decision Tools for Geoeconomics & Geopolitics – the Hyperglobe I

‚Floating Tsunami Debris (2011-2012)', Category ‚Ecology'
http://globoccess.at/fr/showroom

China‘s Digital Silk Road in Space and on the Ground

Some Major New Silk Road Projects - a Spatial Overview (OeNB 2018)

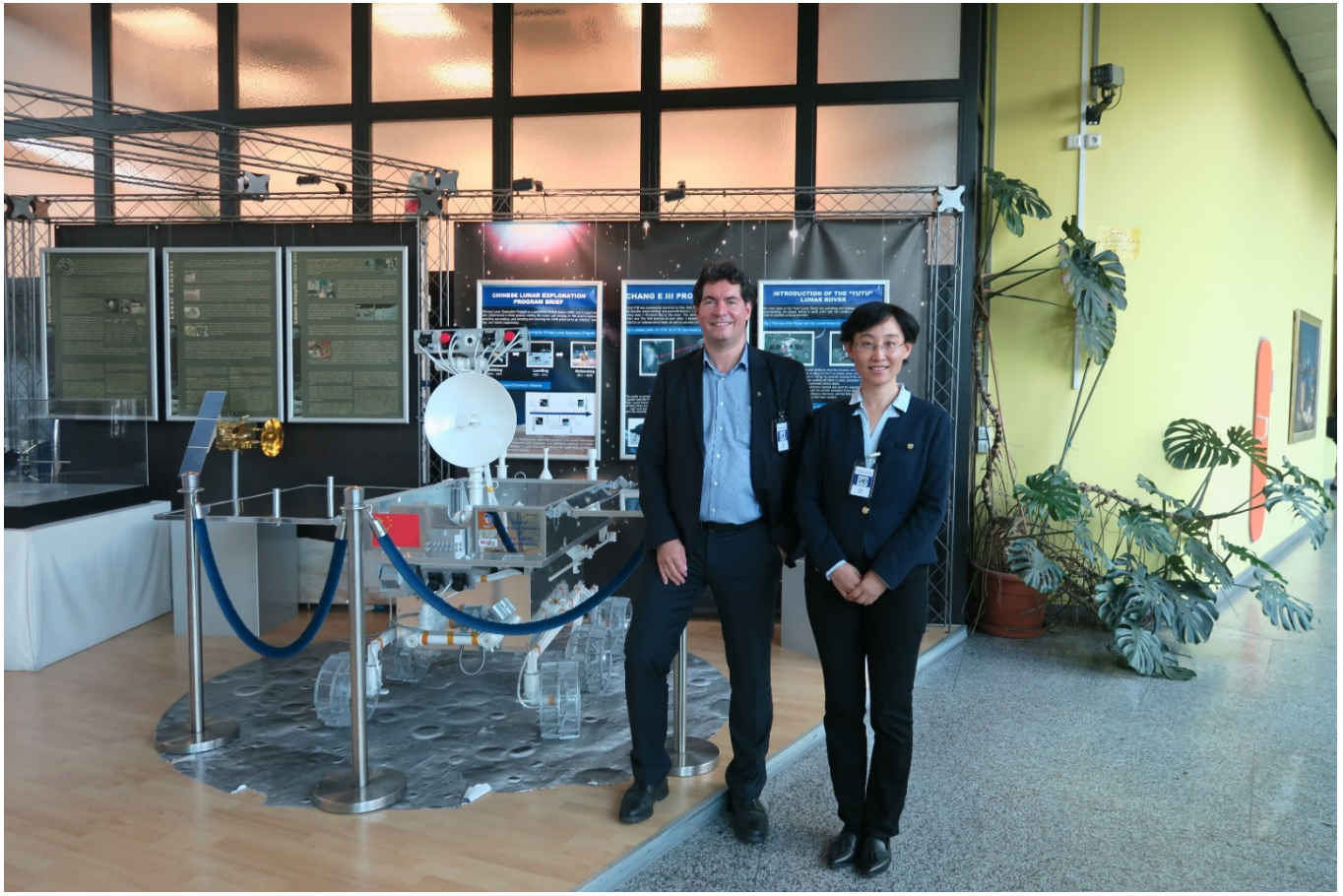
(Highspeed) railroad link
Highway or expressway
Oil or gas pipeline
Electricity transmission or distribution system
Major sea lanes (container shipping, MSR)
Northeast Passage and other sea lanes to be developed
Deep-sea ports (newly constructed/ modernized)
(US), (I), (J) Project supported by the U.S.A., by India, by Japan
North-South Transport Corridor (supported by India, Iran and Russia)
TRACECA (Transport Corridor Europe-Caucasus-Asia, supported by EU)
N.S. Kyrgyzstan North-South Highway
P.-H. Trans-Pamir-Highway (Tajikistan)
A. Angren (Uzbekistan)

AFG.	Afghanistan	L.	Laos
B.	Bangladesh	T.	Tajikistan
C.	Cambodia	TKM.	Turkmenistan
K.	Kyrgyzstan	UZB.	Uzbekistan

United Kingdom: in process of exiting the EU (following referendum in June 2016 and notification in March 2017)

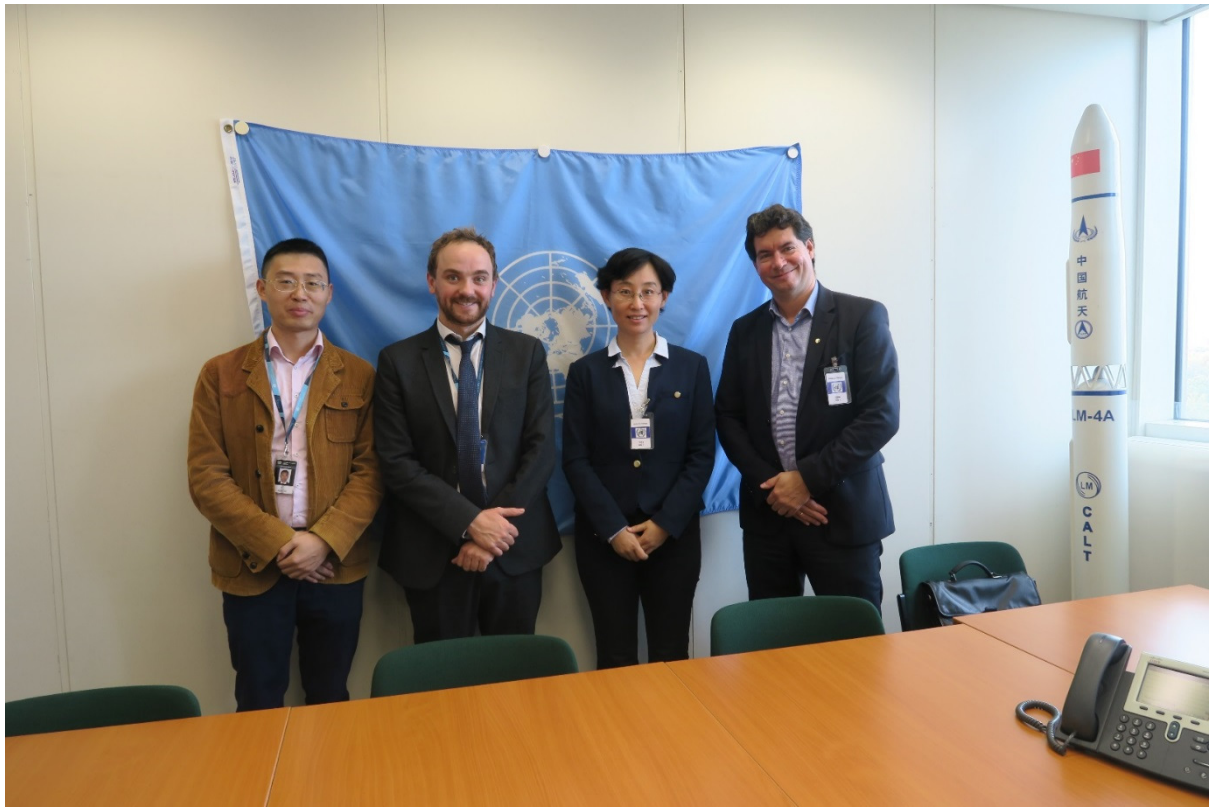
Source: Barisitz, Partl (OeNB) 2018

United Nations Office of Outer Space - UNOOSA, Vienna in October 2018 I



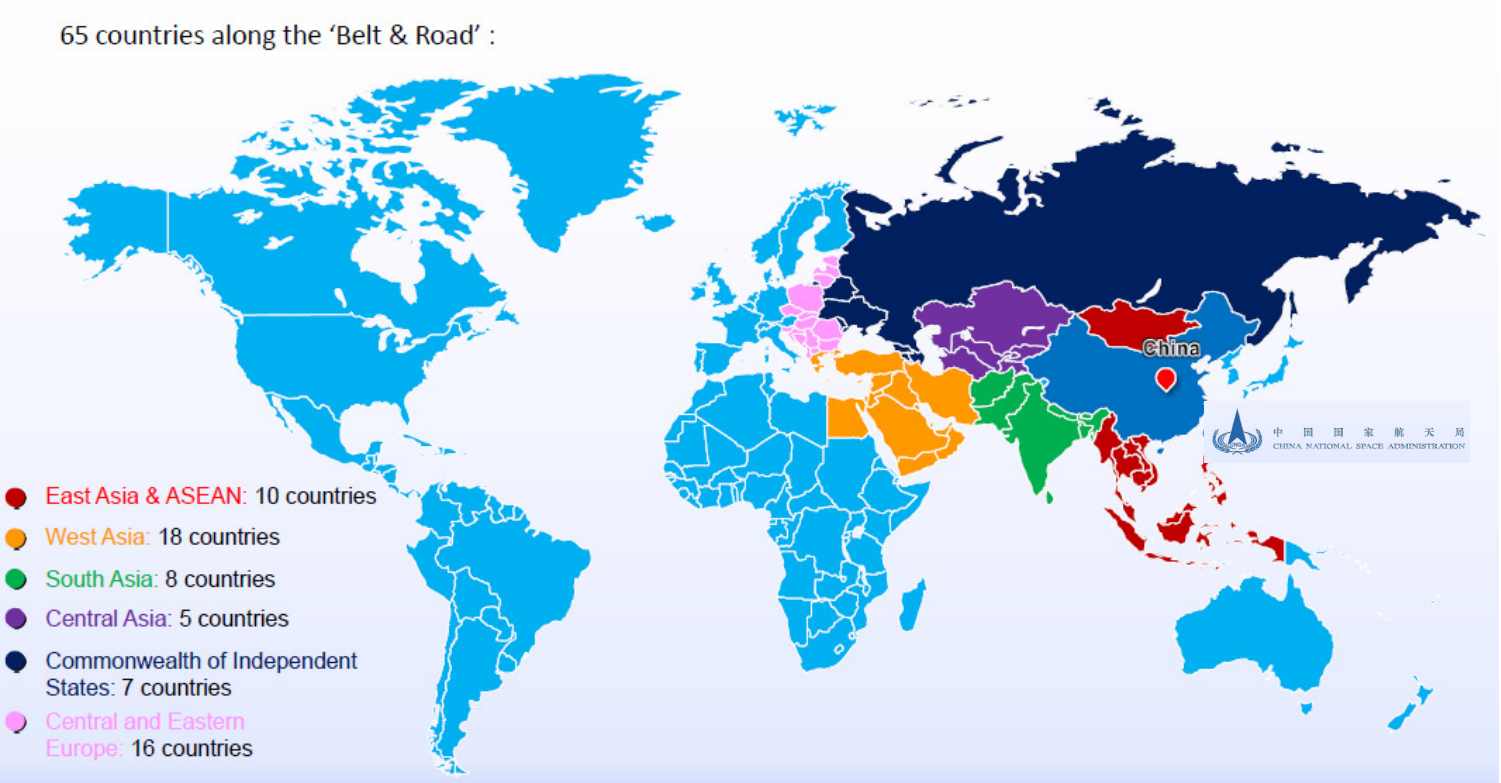
From right to left: **Prof. Aihua Qin** (CASS, Beijing & visiting scholar at UAS Technikum Wien), **Alexander G. Welzl**

United Nations Office of Outer Space - UNOOSA, Vienna in October 2018 II



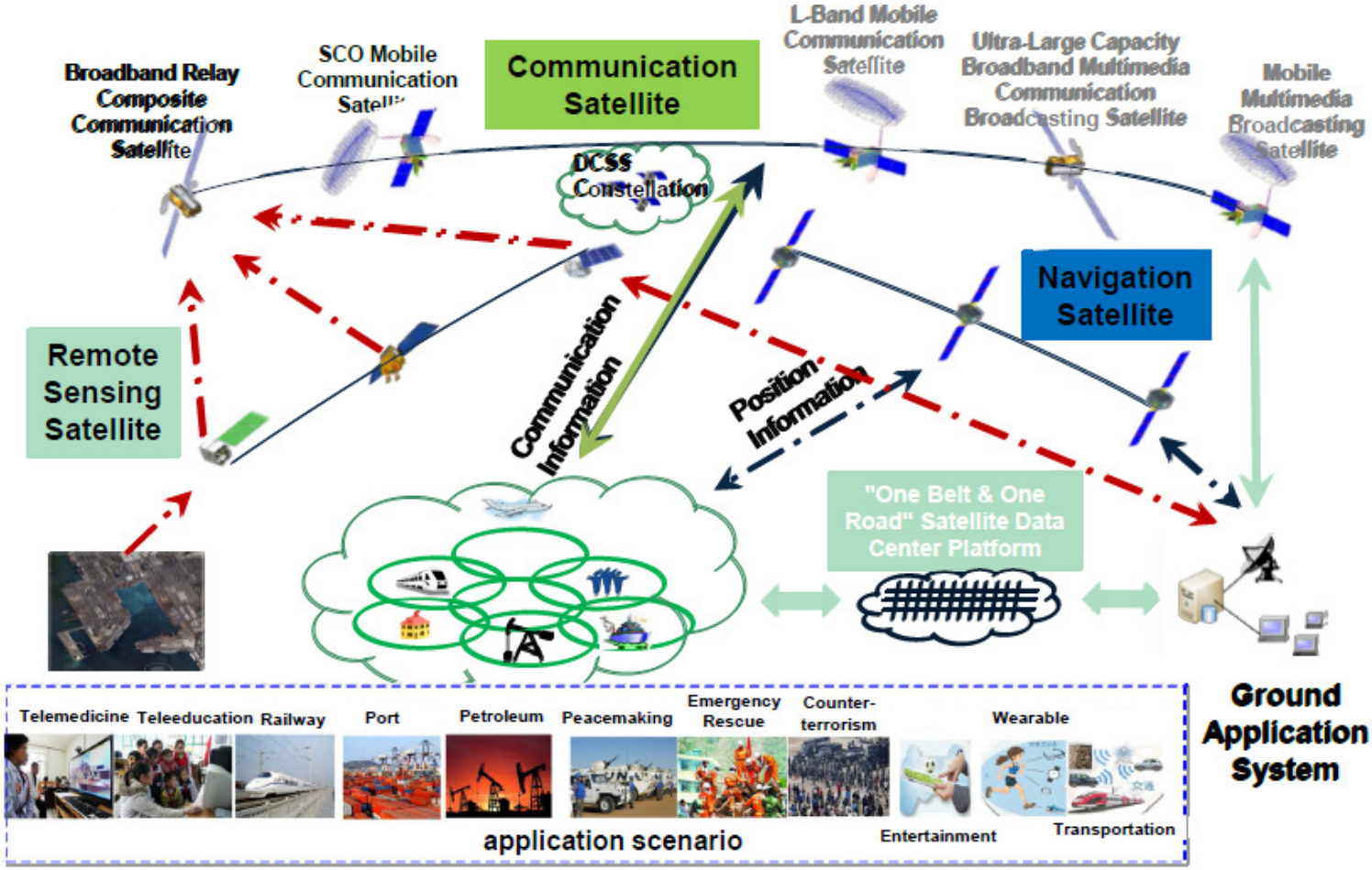
From left to right: **Hui Du** (UNOOSA & China National Space Administration/CNAS), **Ian Freeman** (UNOOSA, Head of Director's Office of Simonetta Di Pippo), **Prof. Aihua Qin** (CASS, Beijing), **Alexander G. Welzl**

Belt & Road Spatial Information Corridor - China National Space Administration



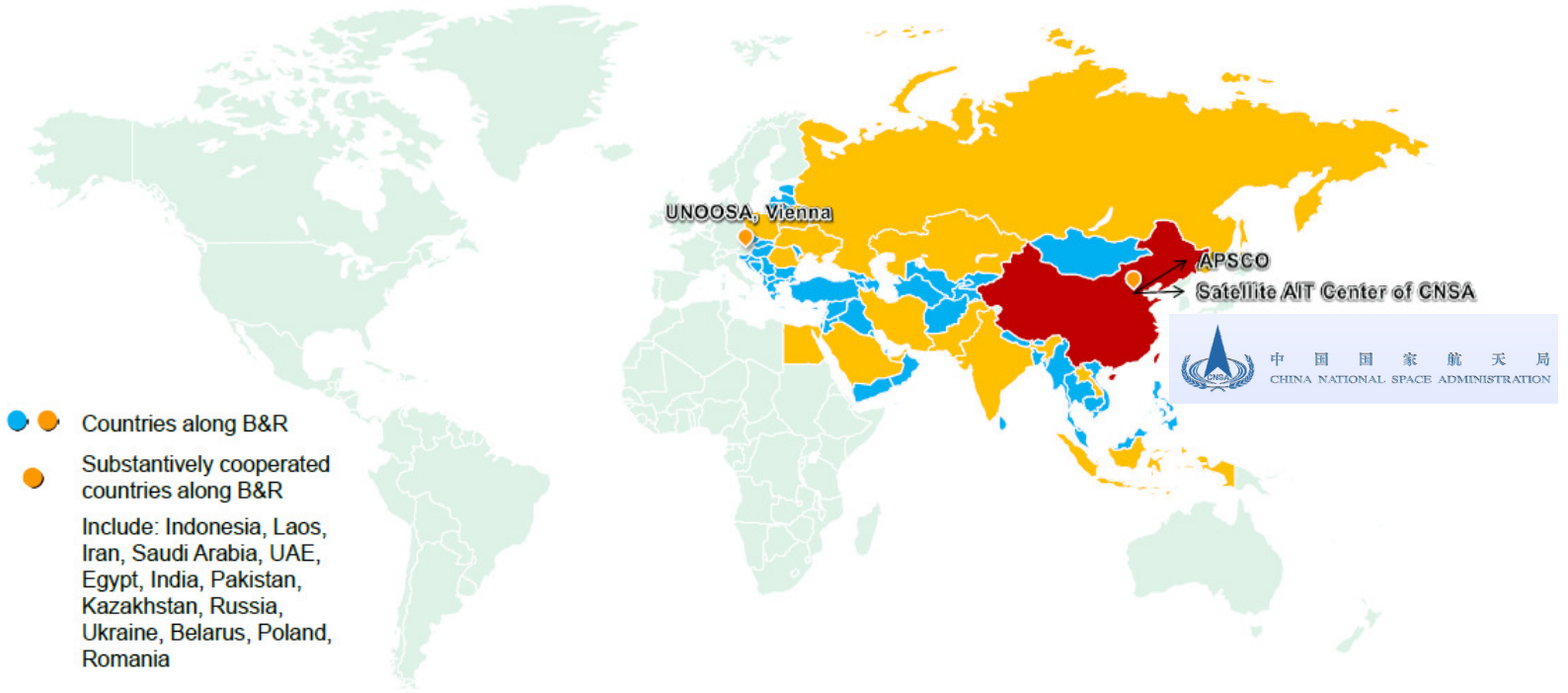
Source: CNSA 2018

Belt & Road Spatial Information Corridor - Components & Applications



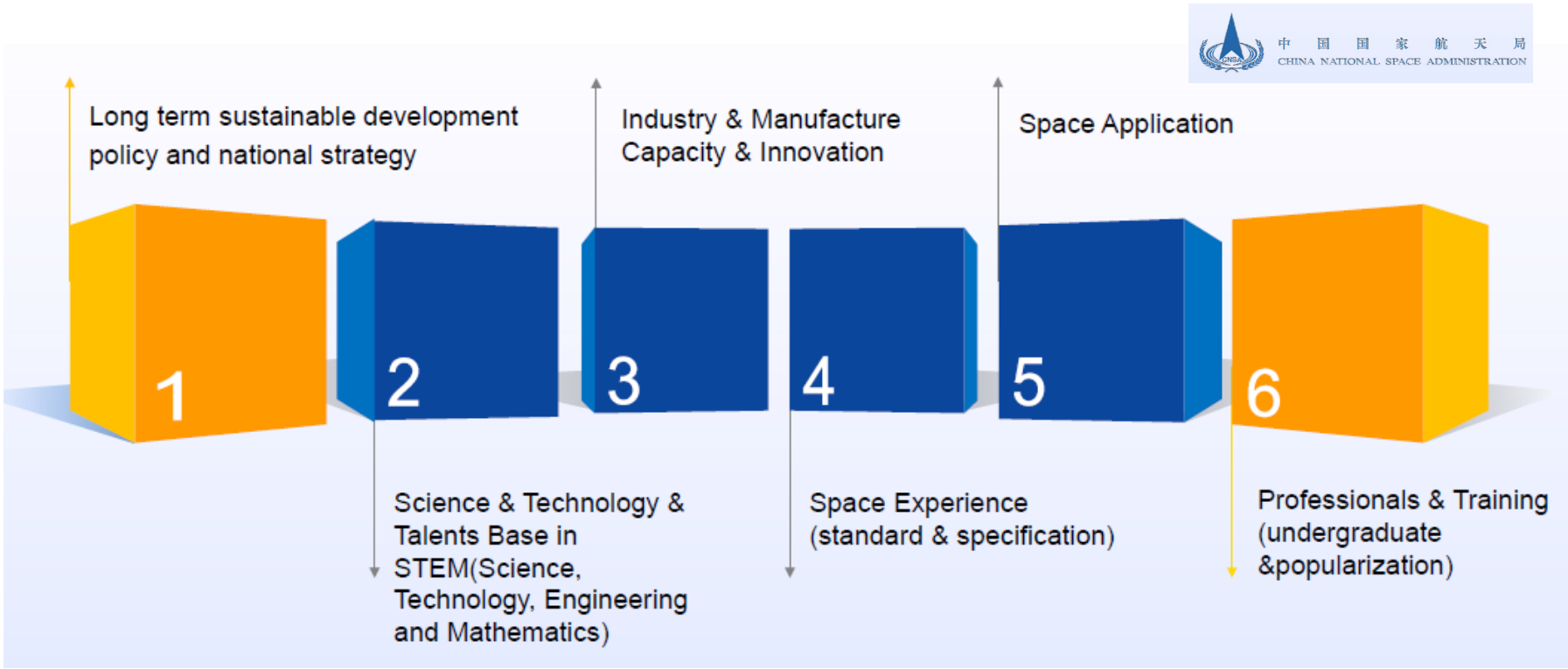
Source: CNSA 2018

Belt & Road Spatial Information Corridor - Current Cooperation with BRI-Countries



Source: CNSA 2018

Space Capacity Building in Developing Countries - Contribution by Spatial Information Corridor



Source: CNSA 2018

Contributions in Developing Countries - Major Tasks in the Coming 5 Years

- to enhance the basic capacities of its space industry,
- to strengthen research into key and cutting-edge technologies,
- to implement manned spaceflight, lunar exploration, the Beidou Navigation Satellite System, high-resolution earth observation system, new-generation launch vehicles and other important projects,
- to launch new key scientific and technological programs and major projects, complete, by and large, its space infrastructure system, expand its space applications in breadth and depth, and further conduct research into space science, promoting the integrated development of space science, technology and applications.

Source: CNSA 2018

From Space…. to the Ground - Evidence for Rising Quantum Business

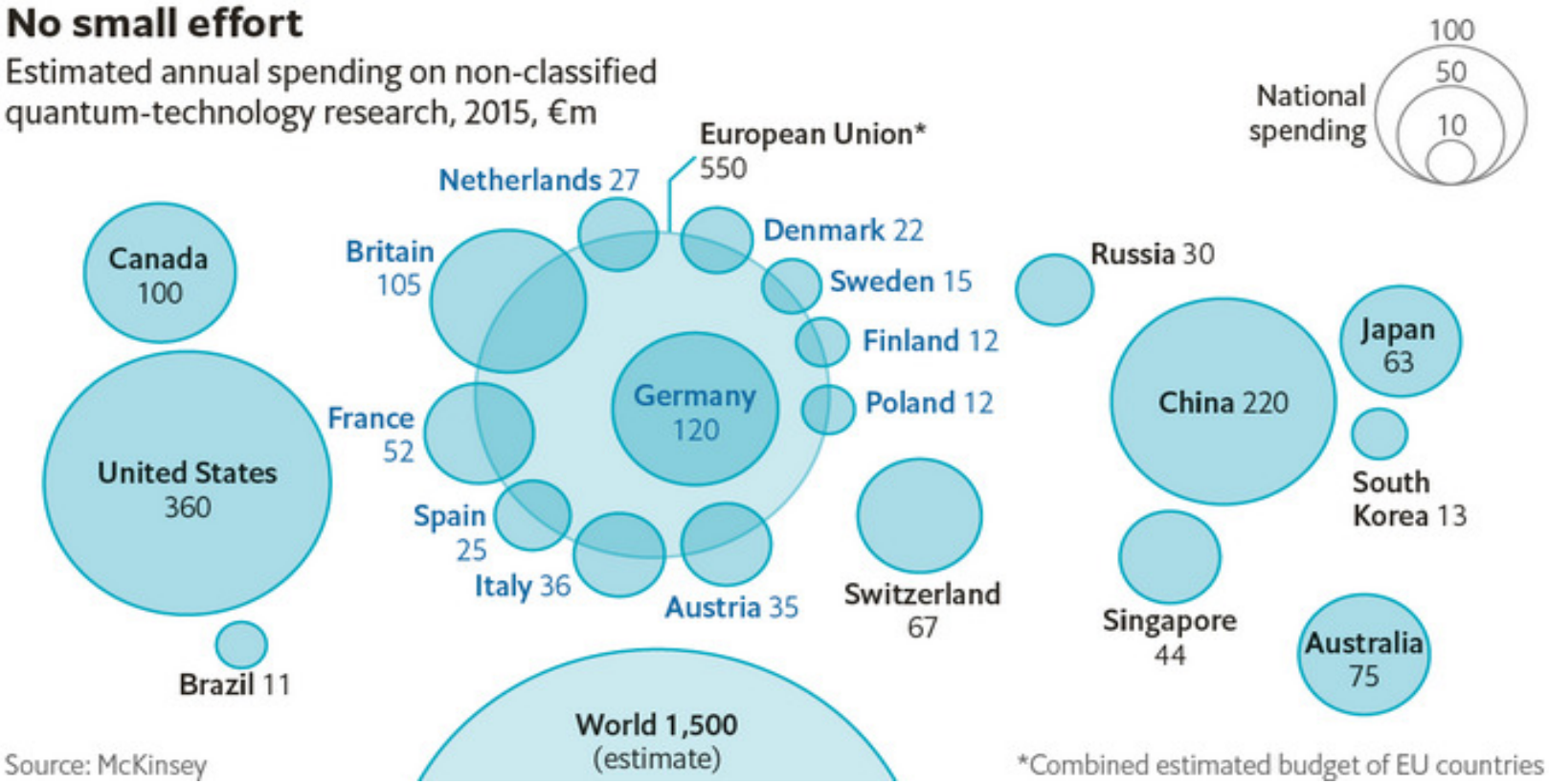
Some of the more recent headlines:

- **China Opens 2,000-km Quantum Communication Line**, Oct 09, 2017
- **Beijing-Shanghai Quantum Link a 'New Era'**, Sep 30, 2017
- **Huangzhou-Area - a hotspot of commercialisation of quantum communication**: with companies like Hangzhou Shenzhou Quantum Communication Technology Co.Ltd., China Quantum Communications Inc. etc.

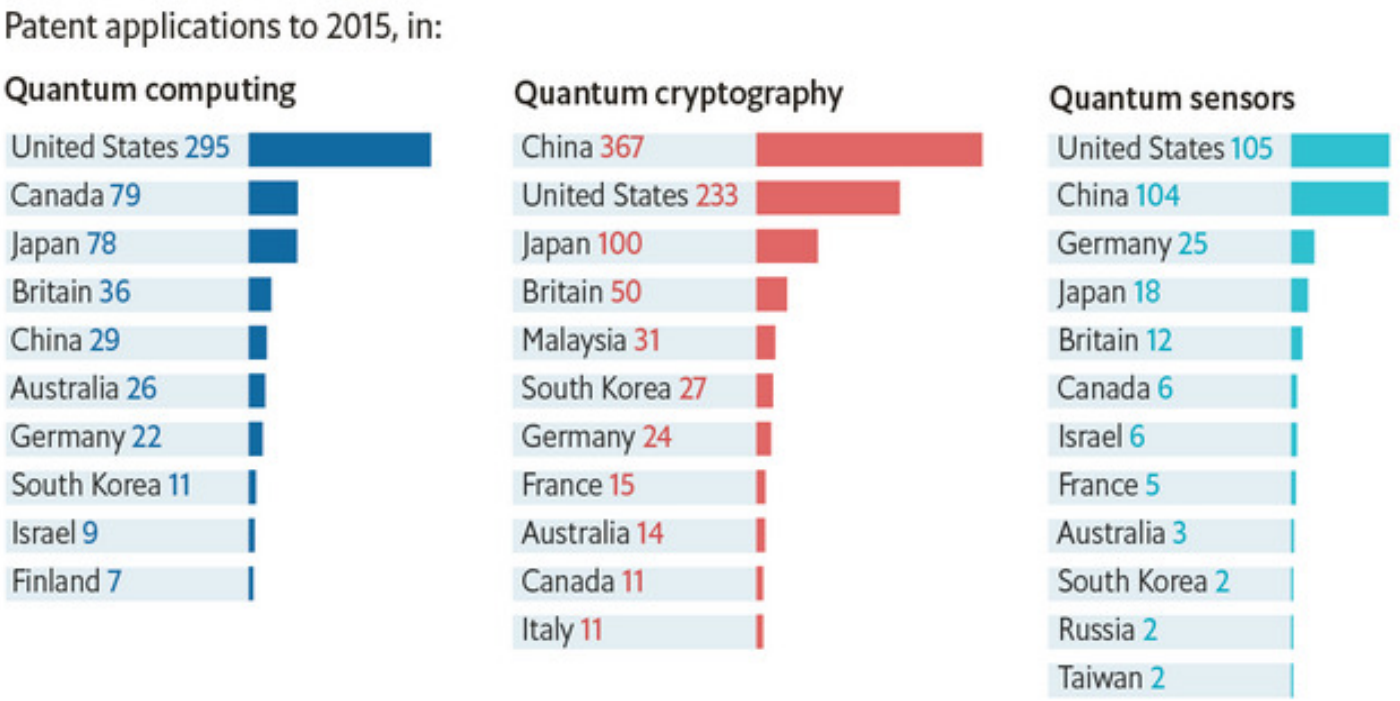
"In October 2015, **Zhejiang Shenzhou Quantum Communication Technology Co., Ltd. was founded in Tongxiang**. Taking this opportunity, Tongxiang is establishing the **Quantum Information Technology Industrial Park (QITIP)**, jointly with the Institute of Geology and Geophysics of Chinese Academy of Sciences (CAS), University of Science and Technology of China and Tongji University, to strengthen local quantum technology R&D capacities, aiming to lead the development of quantum industry in China."

Source: CAS (2017)

The Quantum Quest
- Spending Compared Globally (2015)

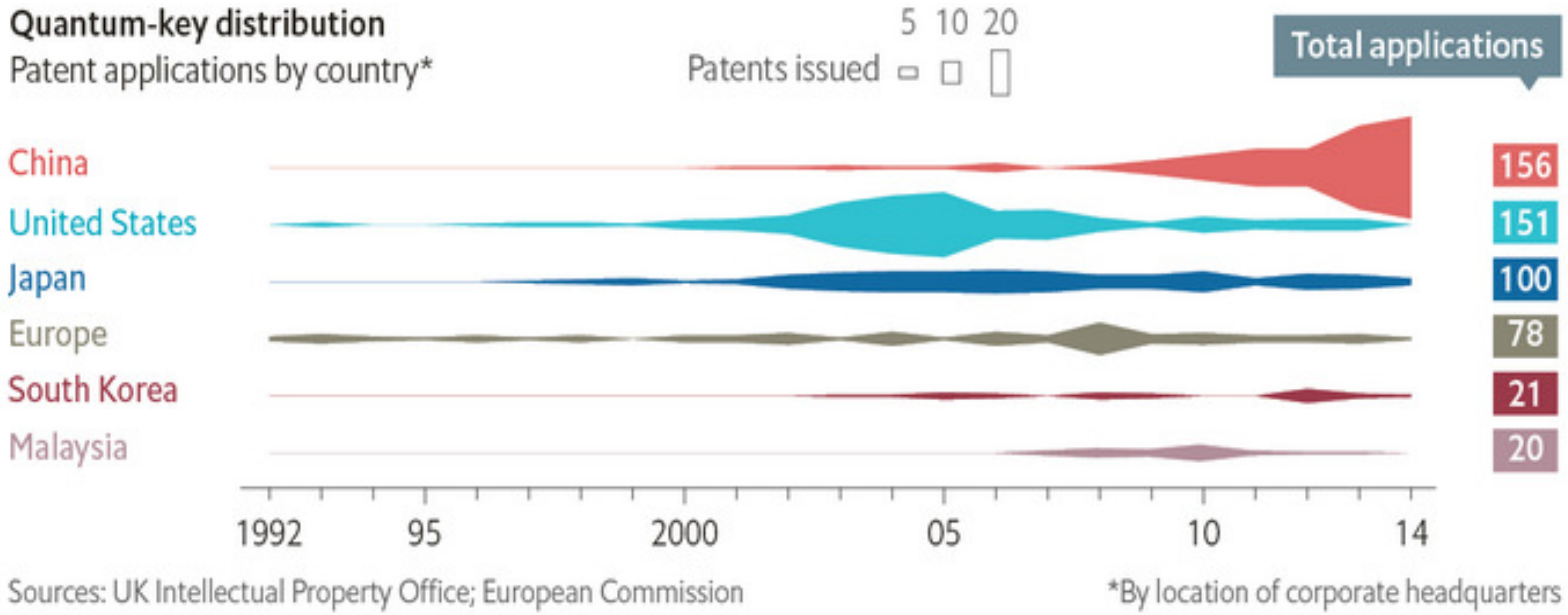


Translational Research & Innovation - China‘s Performance in Comparison



Source: The Economist - Technology Quarterly

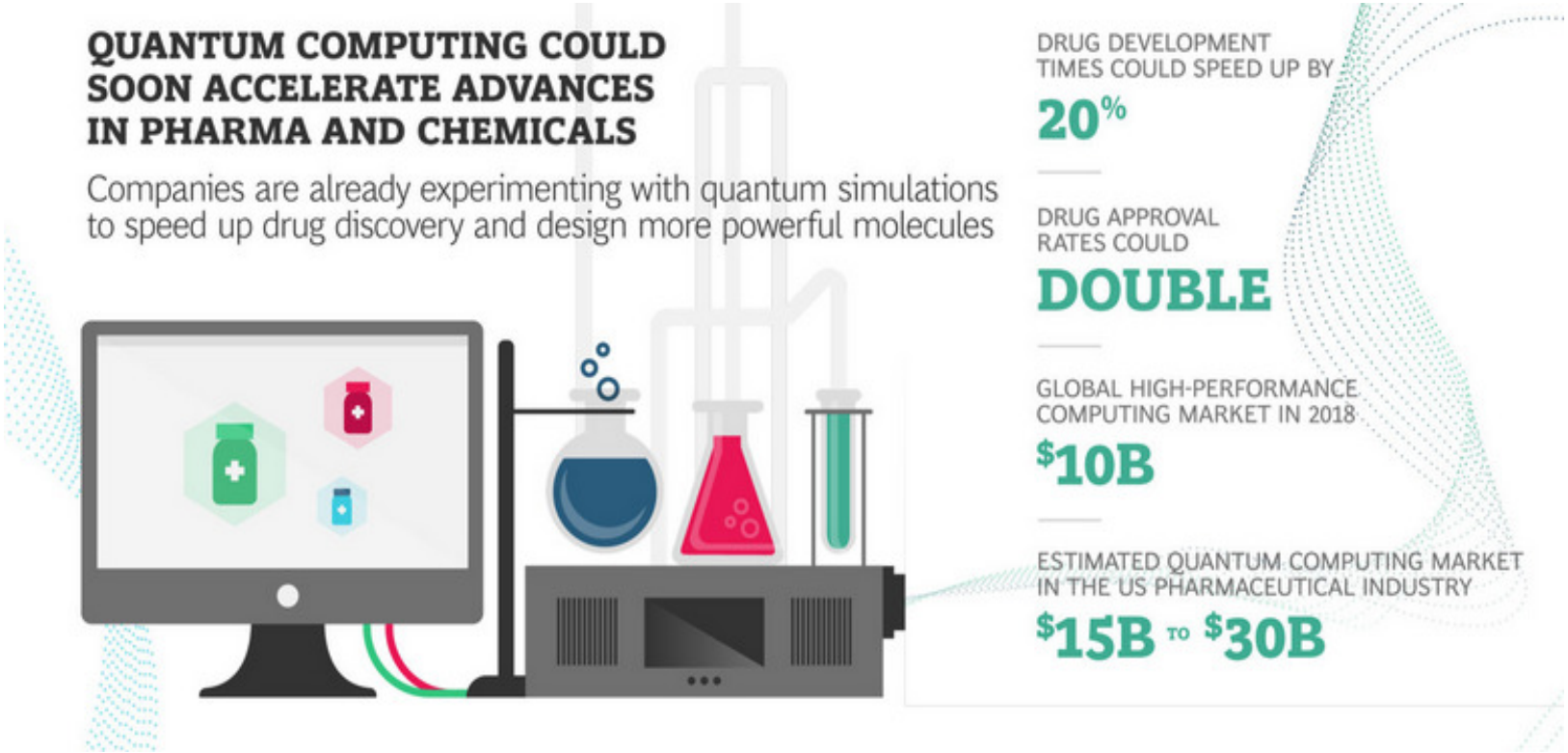
Translational Research & Innovation - China‘s Performance in QKD



FH University of Applied Sciences TECHNIKUM WIEN

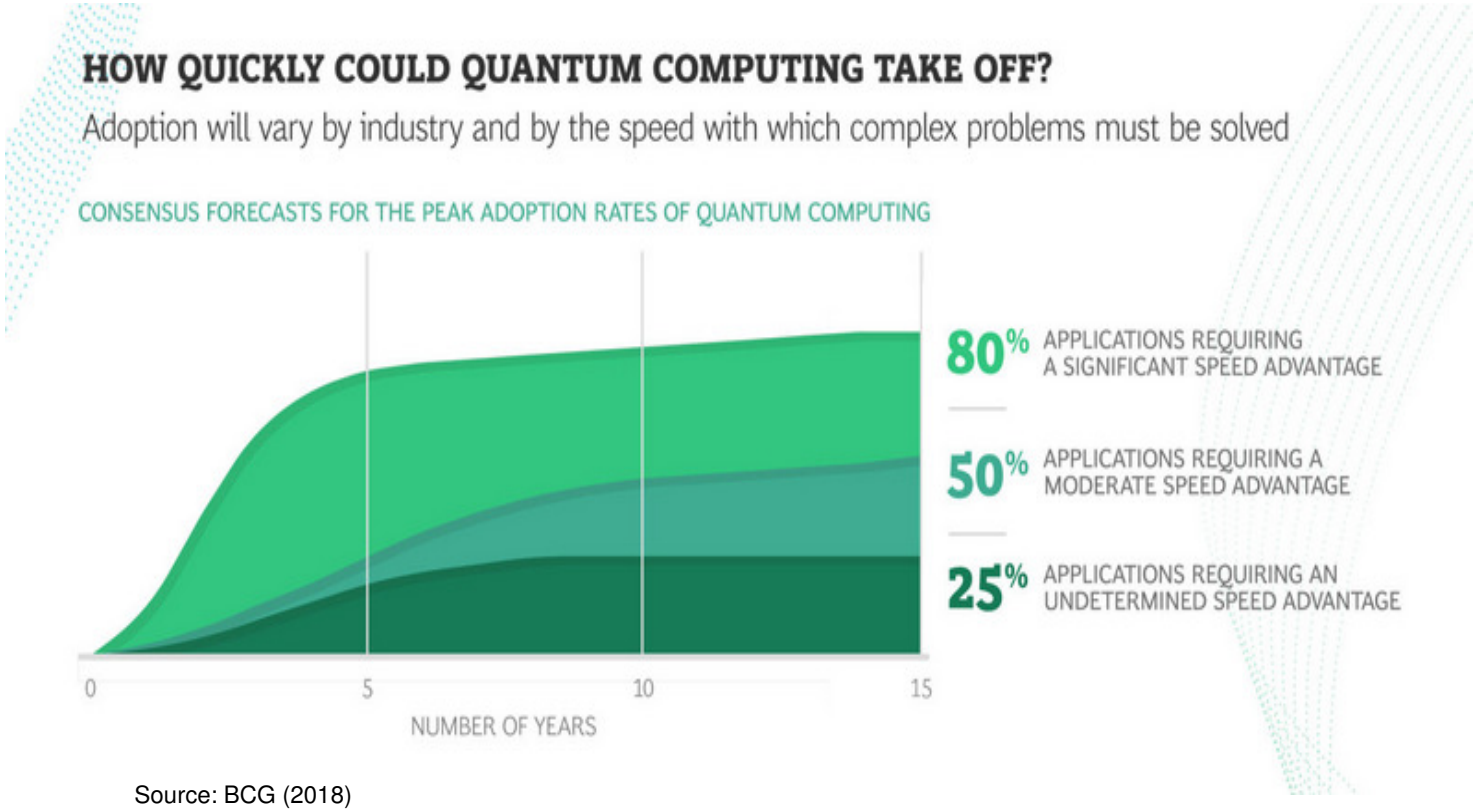
Towards Commerzialisation in Quantum Technologies

Translational Quantum Research and Quantum Technology Applications I



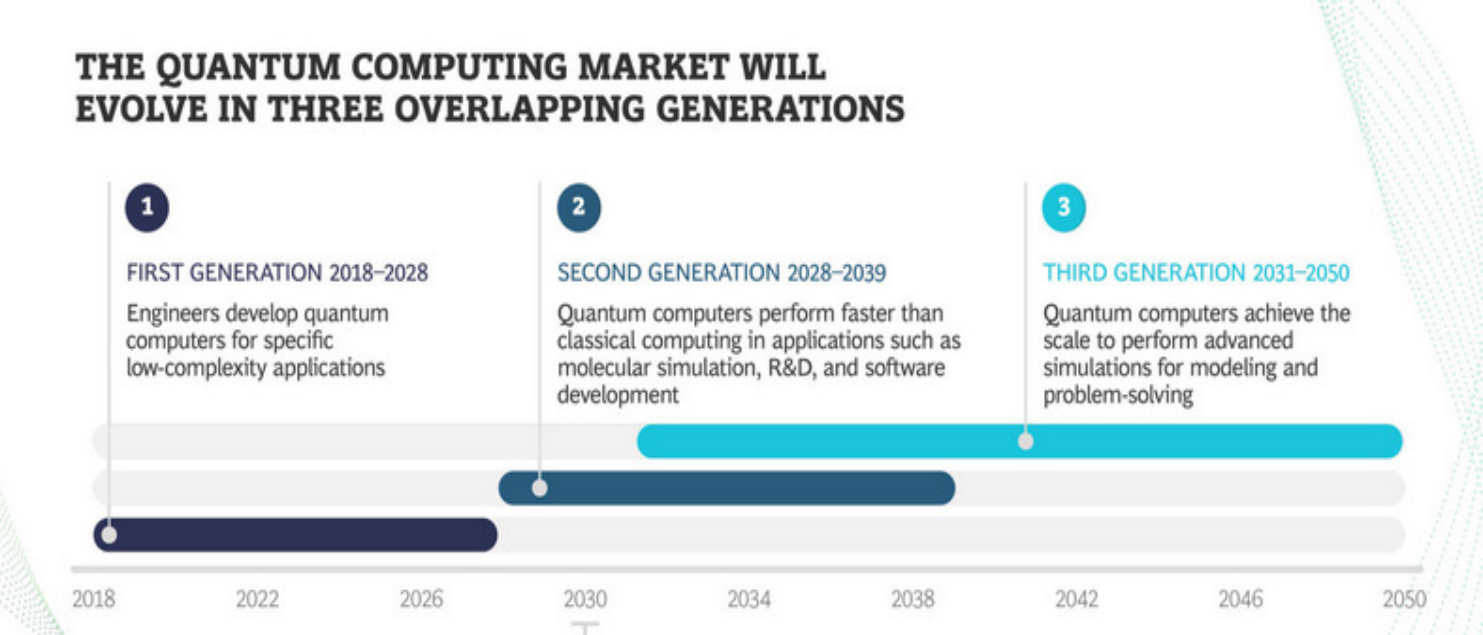
Source: BCG (2018)

Translational Quantum Research and Quantum Technology Applications II



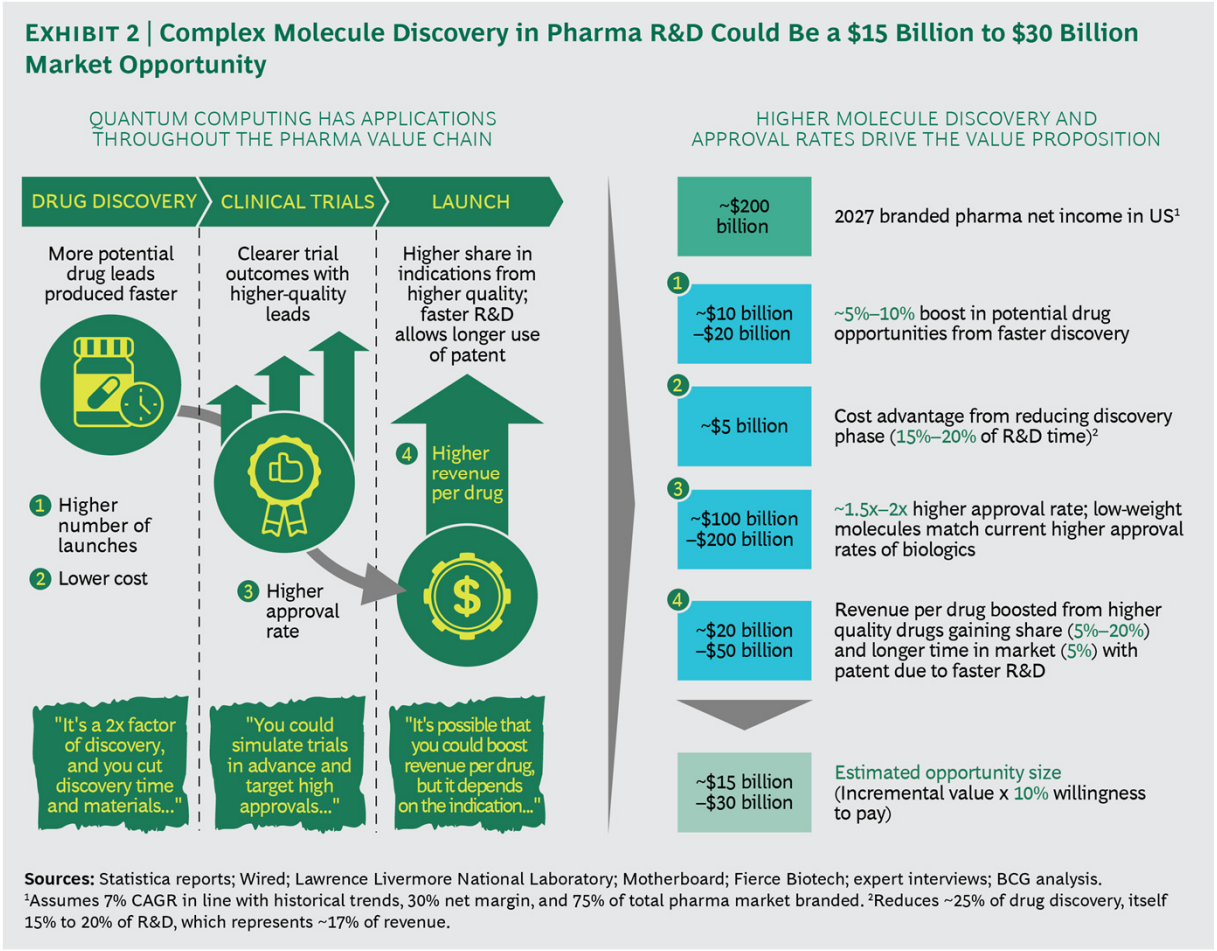
Source: BCG (2018)

Translational Quantum Research and Quantum Technology Applications III



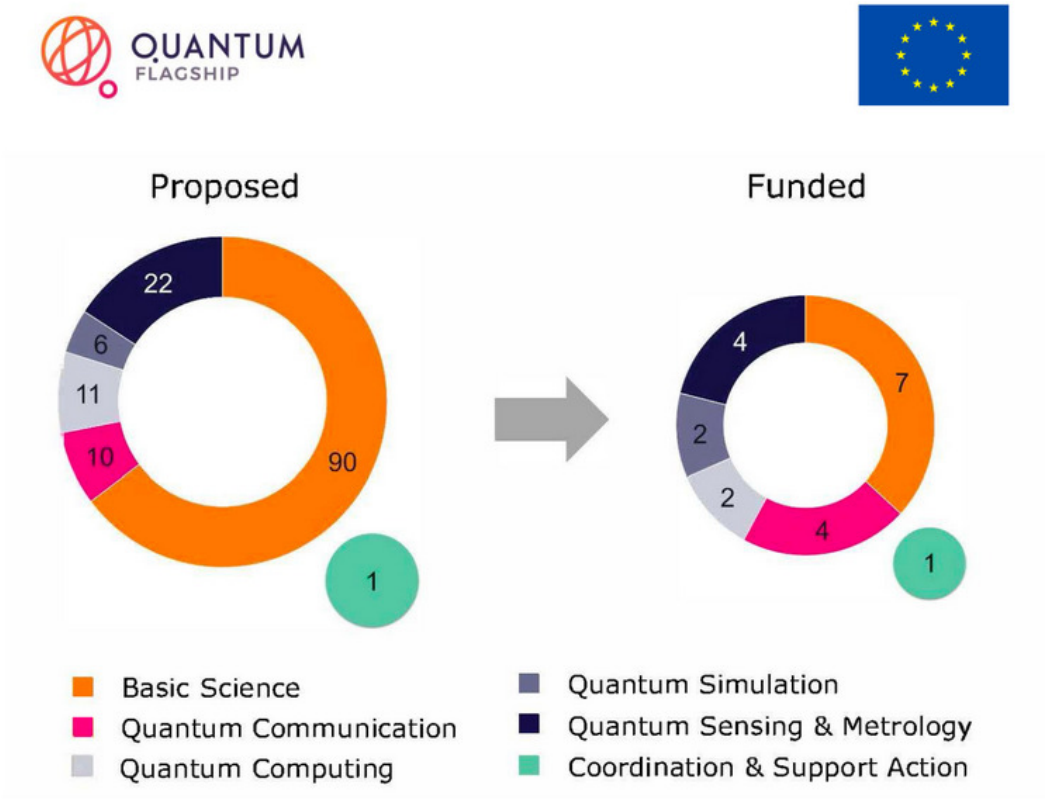
Source: BCG (2018)

Translational Quantum Research and Quantum Technology Applications IV



Source: BCG (2018)

Europe‘s Quantum Flagship
Embarked from Vienna in Dezember 2018



Number of project proposals (left) and accepted projects (right) per area in the first Quantum Flagship call

Source: European Commission (2018)

Powershift in the 21st Century

Source: en.wikivoyage.org

Not a question for an oracle:

Whoever controls quantum information technology in the coming decades will have hegemonial power in geoeconomics and geopolitics of the 21st century.

Peace is not everything

But without peace everything is nothing

Willy Brandt

Former German Chancellor

FH University of Applied Sciences TECHNIKUM WIEN

Q & A

Alexander G. Welzl

Lecturer

International Campus &

Master Program Innovation and Technology Management (MTM)

Fachhochschule Technikum Wien | University of Applied Sciences Technikum Wien

Hoechstaedtplatz 6, 1200 Wien, AUSTRIA/EUROPE

M: +43 660 2629020

E: alexander.welzl@technikum-wien.at

I: https://www.technikum-wien.at/en/

Thank you for your attention!

FH University of Applied Sciences TECHNIKUM WIEN

www.technikum-wien.at