

**10 - 10 STIE Framework:  
Can Universities and  
Academia Rise to the  
Challenge**

**by Datuk Wira Prof Raha**

- Through the establishment of higher TVET institutions, the MTUN are expected to produce sufficient Engineering Technologists, through practical oriented and hands-on curriculum design (60% practical, 40% applied theory), the teaching concept based on student - centered, action and experiential learning.
- MTUN's programs are relevant and **aligned with S&T Drivers** –programs are offered in technology advancements, engineering, engineering technology and technopreneurship.
  - The presence of scholars and experts in S&T from the **industries**, actively drives STEM education in HE.
- **Value added programs** – Professional Certificate, Teaching Factory, 2U2i, Lifelong Learning, etc.
- Impact of COVID-19 : utilization of technology has been enhanced in T&L e.g. Digitization, Virtual Reality, MOOCs, Open Courseware, blended learning.

# CHALLENGES

## 1. MINDSET

- The government has taken the effort to promote technical and vocational education and training, however the response remains slow, owing to traditional mindsets – **TVET Education is second tier.**
- Percentage of MTUN GE remains among the highest in Malaysia. However, graduate unemployment and under-employment is still an issue because of unsatisfactory wages, and brain drain, reducing Malaysia's competitiveness in high-tech, high-value industrial productions.

## 2. LACK OF INNOVATIONS

- The lack of innovation may also be attributable to the higher interest costs compared with those in developed nations, which reduce business risk appetite, shortage of STEM talent, investment infrastructure and business ecosystem, limited local economies of scale and continued reliance on unskilled and semi-skilled foreign workers despite tightened work visa policies.

# SUGGESTIONS

1. Emphasis on STEM education, digital literacy and roles of HIGHER TVET institutions to complement the STEM education ecosystem.
  - Universities and industries should join forces to identify and highlight the relevant talent needs more enthusiastically. Engagement with relevant entities must be strengthened.
2. Enhance human resource programs through collaboration with the local universities and government agencies to provide a semi-skilled and skilled workforce that is able to meet the requirements of the industry. Example : Matching research grants, industry labs, industry attachment.
3. Put all the pieces together: overcoming the political and economic uncertainties, containing the rising cost, and building a vast pool of reliable workforce and talent that meets the requirements of industry players.

# T.U.N.A.I

Technology@University Advancing Industry and Society - Inclusivity

## IMPACTS

### INDUSTRY

Practice-based and highly skilled technologists and relevant workforce

### SOCIETY

Solution providers to the industries and community

### ENVIRONMENT

Technology related solutions

### UNIVERSITY

Vibrant Academia-Industry-Society ecosystem

### GLOBALIZATION

Visibility - UTeM Melaka



## FOCUS

- Advanced Manufacturing (Engineering)
- Computing Technology – AI and IoT
- Trans-disciplinary & inter-institutional research
- Technology-based program

## DELIVERABLES

- Highly skilled talent and relevant workforce
- Accomplished technologists and professionals (technology scholars)
- Industry-driven academic programs
- Dynamic Publications and Industrial IPs

## APPROACH

# TECHNOLOGY SCHOLAR

Cambridge Dictionary

**Scholar** - A person with great knowledge, usually of a particular subject.

**Technology** – Utilization of knowledge and organization of that knowledge for the achievement of practical purposes

**Leveraging technology to solve complex problems – of the industries and society.**

**Disseminating knowledge gained through teaching & learning, publications & IP, services and consultation.**

# UTeM's Seven (7) Strategic Goals (SSG) 2021-2025

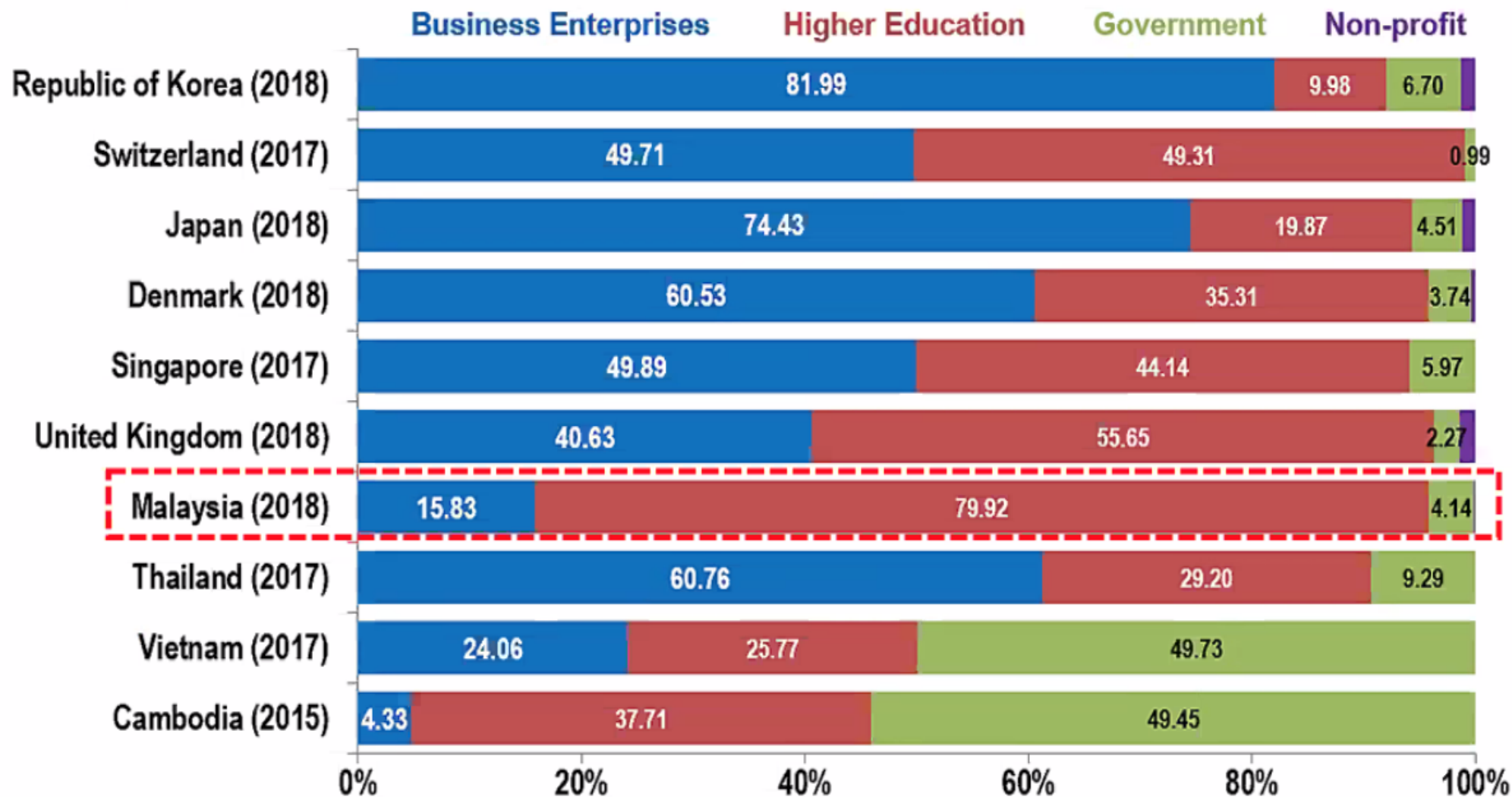


**10 - 10 STIE Framework:  
Can Universities and  
Academia Rise to the  
Challenge**

**by Prof Datuk Dr Asma**



# Reality Check 3: Malaysia's researchers are mainly in Higher Learning Institutions limiting innovation capability of industry



## Percentage of Researchers (in full-time equivalent)

Source: Updated based on Science Outlook 2017 (ASM, 2019), data source: UNESCO Institute of Statistics Database retrieved in November 2019,

MASTIC National R&D Survey 2019 (embargoed)

# Innovation Chasm

Since the 6<sup>th</sup> Malaysia Plan, the government has recognised that the largest source of R&D wealth came from the public sector and that there is a need to transfer the indigenous technologies discovered by the public sector to the private sector

**Knowledge  
Generators (R&D )**

Innovation chasm resulted in economic disparities and lack of impact .

- Need more engagement between academia and industry in a collaborative manner.
- The need for **policy** from HE to link academia with Industry and academia with society.
- There is a need to create seamlessness between R&D priorities and economic development
- In short, a **policy** that links R&D priorities to Economy.

**Users of  
knowledge  
(socio-economic  
development)**

**Collaborative Network**



# Impact-driven research

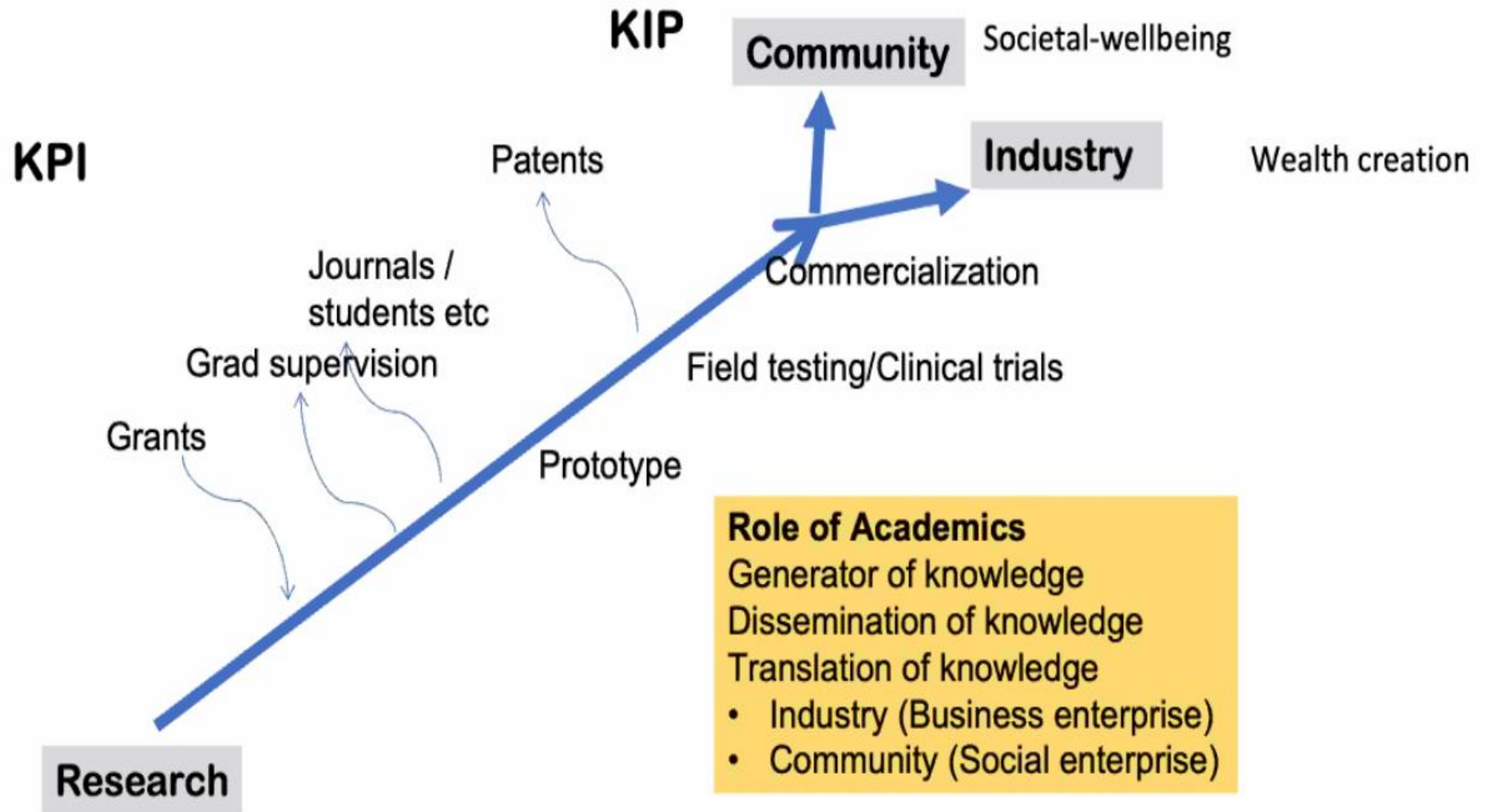
- To connect academia to industry and move knowledge and innovation-based economy we need to do research with outputs (publications, no of graduates etc) but more importantly with the creation of outcomes or impact.
- COVID 19 has taught us that for the economy to survive and recover, it has to be powered by technology, need to work in a collaborative ecosystems, with new business models and constant foresighting to remain competitive.
- Hence **impact-driven research is the way forward** to move Malaysia's high-tech industries and enhance the quality of the life of the *rakyat*.
- Impact-driven is research results that have **beyond academia** and it must be demonstrable (evidence-based) .
- Example: Impact is not about **how** to develop the vaccine or **finding/discovery** the biomarkers to make the vaccine but its about whether the newly developed vaccine was able to reduce the spread of the disease among the population (**results-driven**).
- **Impact is not about the process but about the results.**
- **2 kinds of impact: Academic and societal impact**

# MOVING FORWARD POST COVID-19

- We cannot do the same thing over and over again and expect different results
- We need to rise to the challenge of creating a fast economic recovery plan and creating impact to the nation
- Time for *systemic* change (fundamental change that affects the whole ecosystem) and not done piecemeal
- Time for universities and academia rise to the challenges



# Career path of academics/researchers of 21<sup>st</sup> Century



# Dasar Sains Teknologi Inovasi Negara (DSTIN 2021-2030) (National STI Policy)

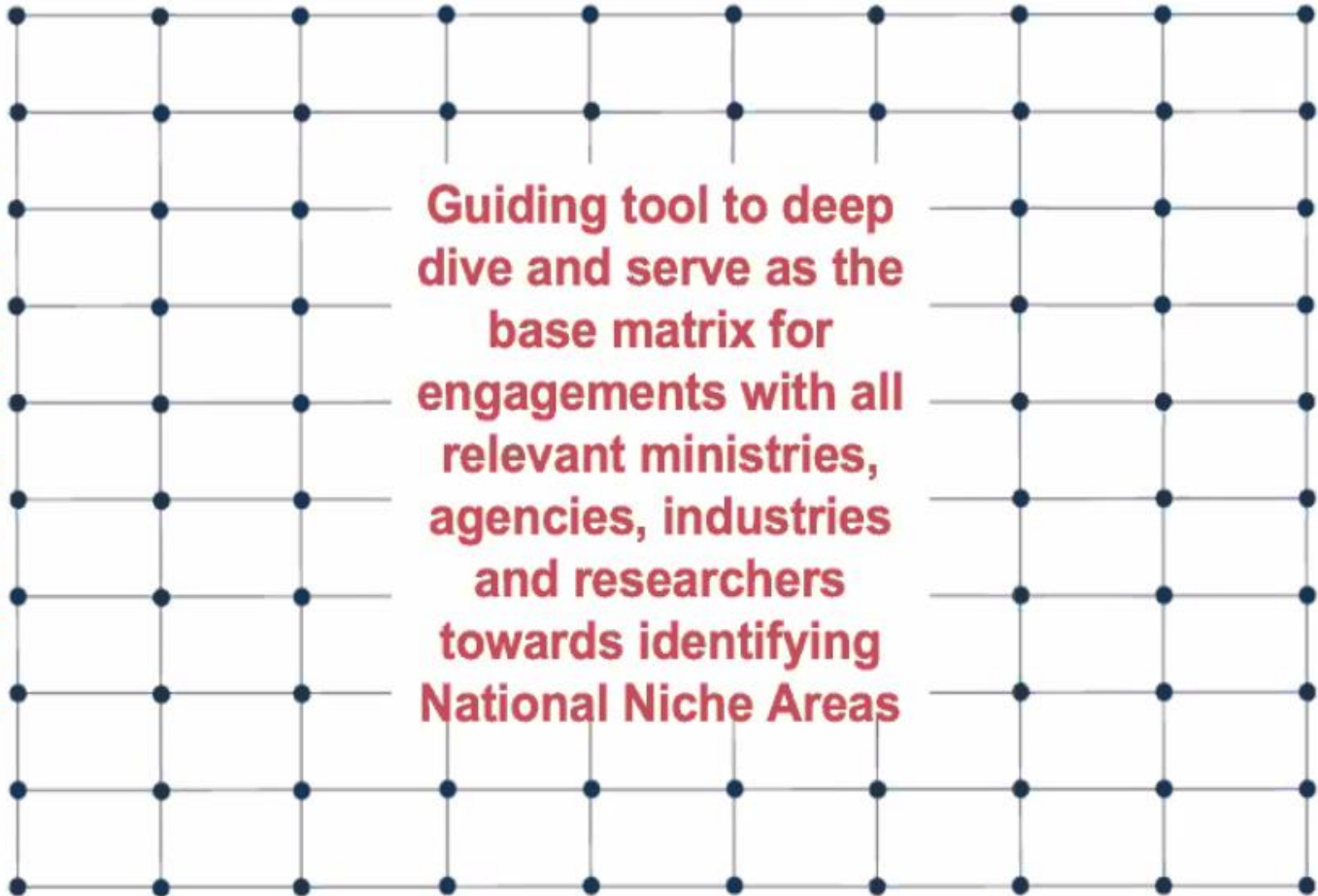
- With the advent of Industry 4.0, it is technology that will boost the quality of life of the *rakyat*, realise our full economic potential, embrace sustainability, conserve our environment and bio-diversity and increase productivity and develop Malaysia's future-ready talent.
- To create change we need to have a policy that will link between STI and the Economy in order to create innovation to move productivity
- To become a high-income nation we need to be a high-tech nation with industries using local/indigenous technologies or the ability to adopt and adapt the foreign technologies (buy some make some).
- DSTIN is the catalyst for Malaysia to start its journey from a consumer of technology to be the producer of technology and leap-frog the country to become a **high-tech nation**.
- DSTIN also aims to improve STI governance and enhance innovative ecosystem with emphasis on impact or outcomes.
- In short, DSTIN will strengthen the R (from fundamental to applied)-D-C-I landscape in the country and move impact-driven research
- This is a NATIONAL policy. Imperative that we have a **total government approach** to implement the policy across ministries .
- Must translate as KPI to IHLs as well.



## 10 STI-BASED INITIATIVES

10 PROGRAM LONJAKAN  
STIE





**Guiding tool to deep dive and serve as the base matrix for engagements with all relevant ministries, agencies, industries and researchers towards identifying National Niche Areas**

Each Science & Technology Driver should explore core technologies & applications for the 10 Malaysian Socio-economic Drivers

*Driving Fundamental & Translational Research*

Each Malaysian Socio-economic Driver should explore how the 10 Science & Technology Drivers will value-add and enhance their global competitiveness



# 10-10 STIE Framework: Technology view of the world mapped against Malaysia's Socio-economic Drivers: **Horizontal Analysis**

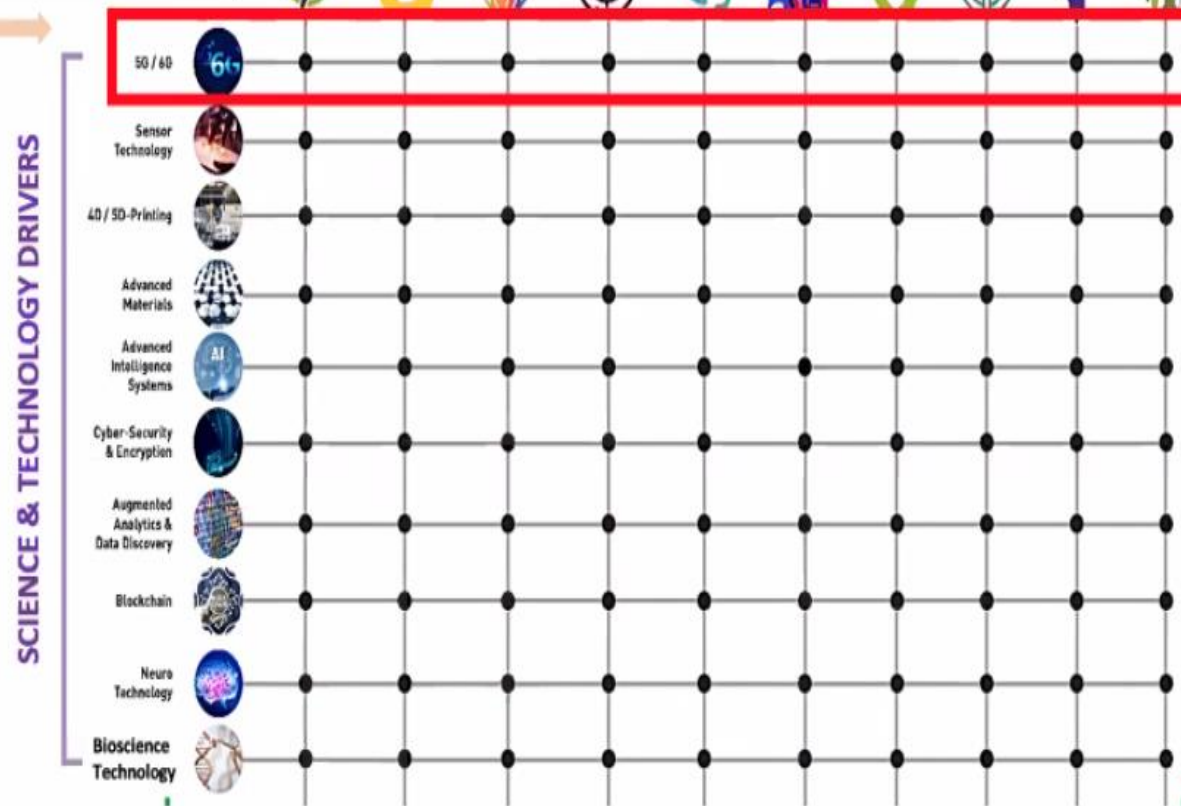
**10** Technology Drivers  
on  
**10** Socioeconomic Drivers  
*Building the Horizontal & Enabling the Verticals in the Ecosystem*

## SOCIOECONOMIC DRIVERS



**Multi-stakeholder partnership model:** Fundamental R&D in 5G/6G is done by a CoE involving partnership between research universities, non-research universities as well as public and private research institutes. These institutions will undertake R&D in the applications of 5G/6G technology in all ten socio-economic drivers with industries, government-linked companies (GLCs) as commercial research partners. **This partnership will also include community organisations.**

*Example: A\*STAR Model in Singapore*



# National Niche Areas for 10 Socio-economic Drivers



Energy



Business  
Financial  
Services



Culture Arts  
& Tourism



Medical &  
Healthcare



Smart Technology  
& Systems (Next-Generation  
Engineering &  
Manufacturing)



Smart Cities &  
Transportation



Water  
& Food



Agriculture  
& Forestry



Education



Environment &  
Biodiversity



Diversified  
Renewable  
Energy



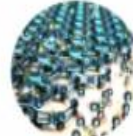
Subscription  
Business Models and  
Sharing Platforms



Creative Content  
and Heritage



Digital Health



Advanced Materials for  
Circular Economy &  
Sustainable Society



Integrated Urban  
Infrastructure and  
Infostructure Management



Premium  
Halal Food



High-Value Seafood



Personalised and  
Experiential  
Learning



Precision Biodiversity



Energy Storage  
System



Digitalised &  
Autonomous  
Services



Digitalised  
Tourism



Precision  
Medicine



Next-Gen Smart Factories



Smart Systems for  
Connected Rural-  
Urban Communities



Local  
Superfood



Premium  
Tropical Fruits



Microcredentials



Innovative  
Eco-Products from  
Waste



Microgrid



Fintech  
in Islamic Finance



High-Value Tourism



Clinical Trials  
Hub for Developing  
Countries



Manufacturing of Smart  
Devices & Technology  
Development



Human-Centred Design  
& Analytics



Integrated Water  
Resources  
Management



Local Agricultural  
Input



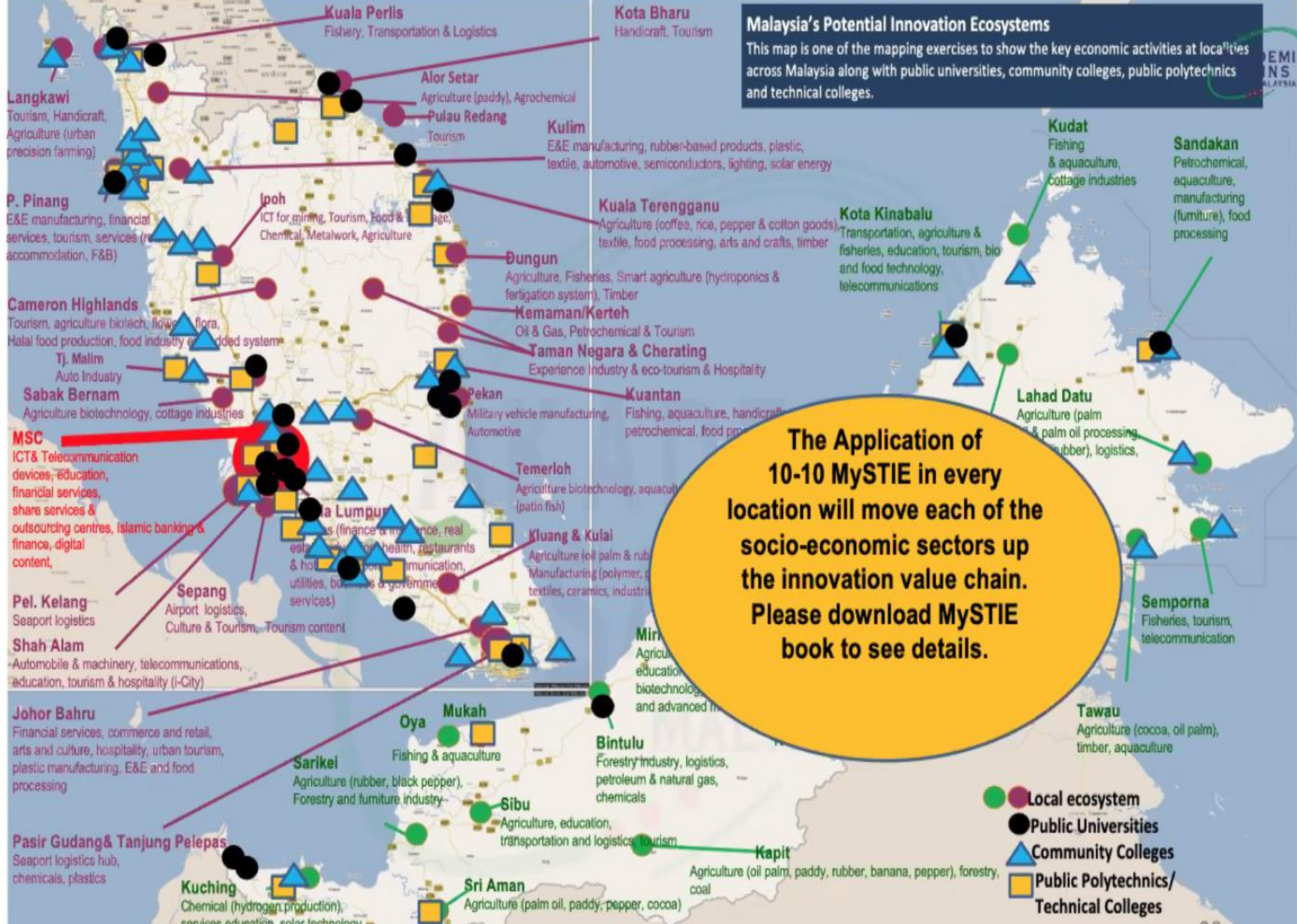
Global Online Learning:  
Promoting Local  
Content

Smart Supply Chain Management  
for Sustainable Forest Products

**30 National STIE Niche Areas were endorsed by the National Science Council on 14 July 2020**  
**These niche areas are to be reviewed every 2-3 years**

## Malaysia's Potential Innovation Ecosystems

This map is one of the mapping exercises to show the key economic activities at localities across Malaysia along with public universities, community colleges, public polytechnics and technical colleges.



**The Application of 10-10 MySTIE in every location will move each of the socio-economic sectors up the innovation value chain. Please download MySTIE book to see details.**

Source: Nair, M. (2011), "Inclusive innovation and sustainable development: leap-frogging strategies to a high income economy," in editor Ramachandran, Ramasamy, *ICT Strategic Review 2011/2012*, PIKOM and MOSTI, Malaysia, Chapter 11, 225-257. Information was updated 13 February 2020

TLR = Tech Readiness level

# R&D&C&I FUNDING FRAMEWORK

## DANA R&D MOSTI

Strategic Research Fund TRL 3-9

### TOP-DOWN



#### MOSTI SRF

**Kumpulan Sasar**  
Start-up/ PKS/  
MNC/IHL/GRI/Agensi STI  
(Termasuk Bukan Warganegara)

**Kuantum**  
RM15,000,000

**Tempoh**  
36 bulan

Applied Innovation fund TRL 2-4



#### MOSTI AIF

**Kumpulan Sasar**  
Individu/Persatuan/Koperasi/NGO  
yang berdaftar

**Kuantum**  
RM500,000

**Tempoh**  
12 - 18 bulan

Technology Development Fund  
1 TRL 2-4



#### MOSTI TeD1

**Kumpulan Sasar**  
Start-up/PKS/IHL/GRI/Agensi STI

**Kuantum**  
RM1,000,000

**Tempoh**  
24 bulan



#### MOSTI TeD2

**Kumpulan Sasar**  
Start-up/PKS/IHL/GRI/Agensi STI  
(Termasuk Bukan Warganegara)

**Kuantum**  
RM3,000,000

**Tempoh**  
36 bulan



#### MOSTI BGF

**Kumpulan Sasar**  
Start-up/PKS/IHL/GRI/Agensi STI

**Kuantum**  
RM4,000,000

**Tempoh**  
36 bulan

Technology Development Fund 2 TRL 4-7

Bridging Fund TRL 7-9



# Is your Project a “WOW” Project?

Moving from KPI to Impact

## WOW Project!

**World-Class**  
(Global Challenges)

- Novel
- Innovative
- Solves a major problem or challenge

**Outstanding**

- Quality of the Proposal*
- Clear – objective, significance & impact
  - Sound & Rigorous Methodology
  - Easy to understand by non-specialist

**Winnable**

(Win the hearts and mind of the community/stakeholders)

**IMPACT)**

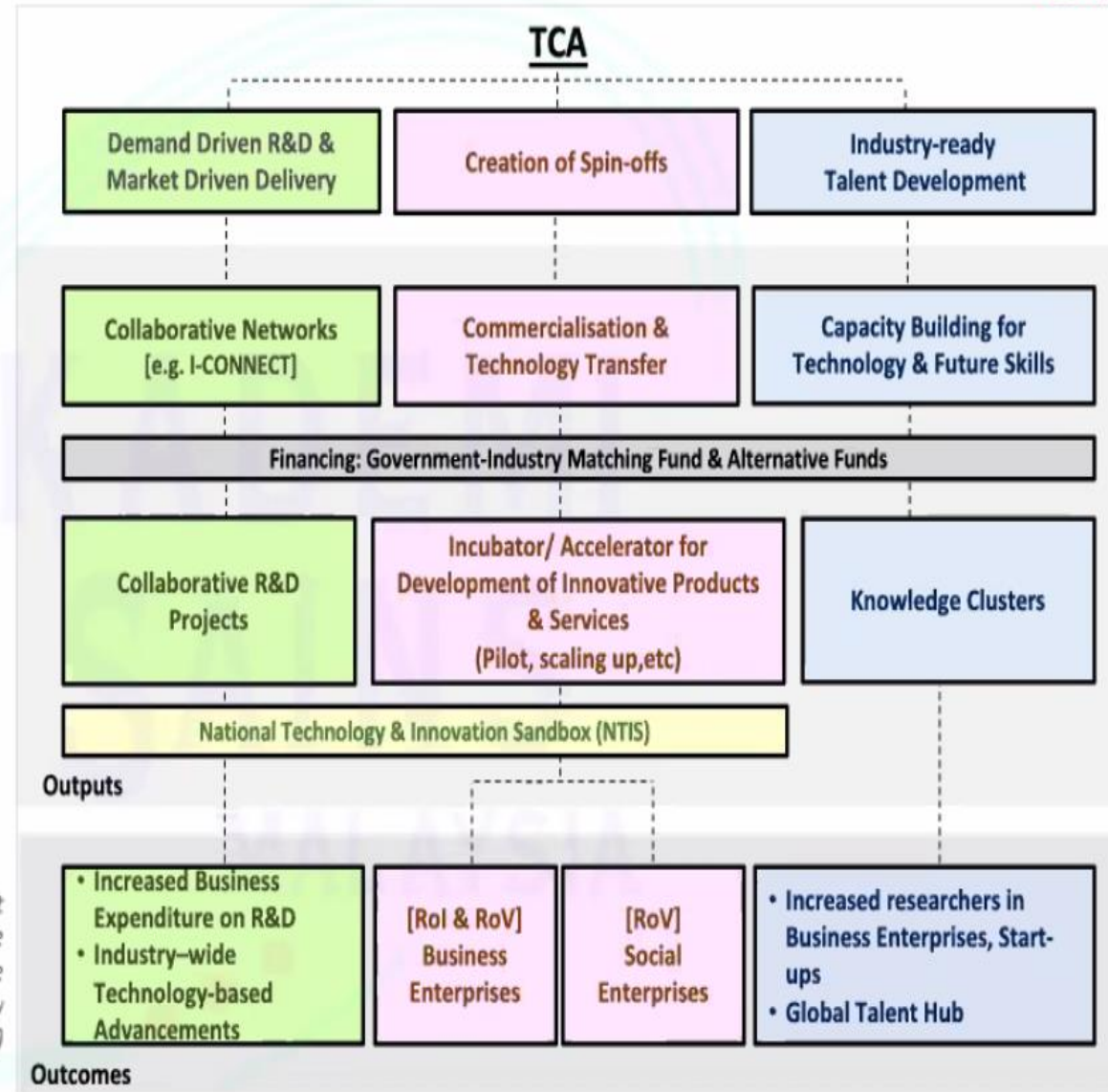
# Technology Commercialization Accelerator (TCA) to move economic-oriented research

## Function:

TCA to play the role as a catalyst, enabler & convener of innovation to spearhead economic-oriented research (demand-driven R&D & market-driven delivery system), bridge research & technology commercialisation as well as nurture industry-ready talent

Approved by Cabinet

Source: Adapted from ASM Proposal to the Council of Eminent Persons for A Revamped Governance Framework & the Establishment of the Malaysian Research, Innovation & Enterprise Agency (MyRIE) to Drive Innovation, 27 Aug 2018 & Malaysia Policy & Master Plan on STI 2021-2030 Study (ASM, 2019)



# Future challenges

- Future research agenda is about **impact** but the **policies must be clear** and consistent as it cascades to the University management and researchers.
- The journey towards quality, excellence and impact requires both the **implementation of KPI and KIP** (key intangible performance). The universities need to undergo **impact evaluation** as well and its no longer just about the number game. The promotional exercise also needs to reflect similar requirements
- Universities must review their research agenda. Need to perform **integrated and collaborative research** with **sustainable long-term funding** to show impact.
- For impact to happen the mindset of the researchers need to go towards thinking big and **shift from KPI based to WOW** .
- There is a need to build new capabilities and skills among staff and students, and upgrade infrastructure and infostructure to become enablers of economic transformation for society and industry.
- Roadmap, policy and funding are clear for researchers to move the 10 socio-economic sectors of the country. **Its success at implementation is dependent on total government approach and successful implementation by TCA.**
- For Talent development we need to **make innovation as part of curriculum** including for life-long learning for the current workforce
- Foundational and 21<sup>st</sup> Century technical future skills (creativity, problem solving and learning agility ) are critical for innovation.



Create new generation of academics that can rise to the challenges by being not only thinkers but also values-based doers

# 10|MySTIE 10| FRAMEWORK

Trailblazing the Way for Prosperity,  
Societal Well-Being & Global Competitiveness



Download the 10-10 MySTIE  
Transformation Book at this  
link:

<http://www.akademisains.gov.my/10-10-mystie/>

## Thank You

For more information on  
The Academy of Sciences Malaysia:



@AkademiSains



Akademi Sains Malaysia



akademisainsmalaysia



Akademi Sains Malaysia ASM

[www.akademisains.gov.my](http://www.akademisains.gov.my)