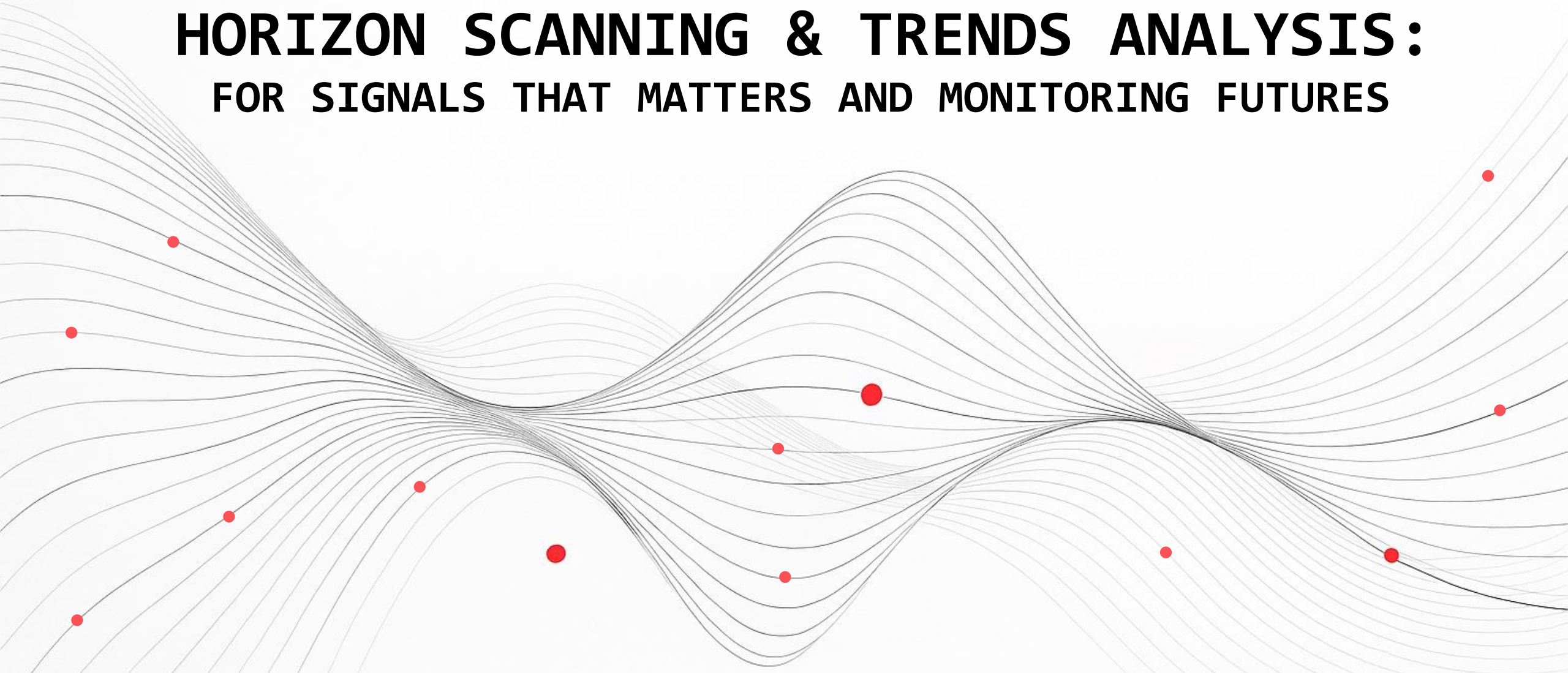
HORIZON SCANNING & TRENDS ANALYSIS:

FOR SIGNALS THAT MATTERS AND MONITORING FUTURES



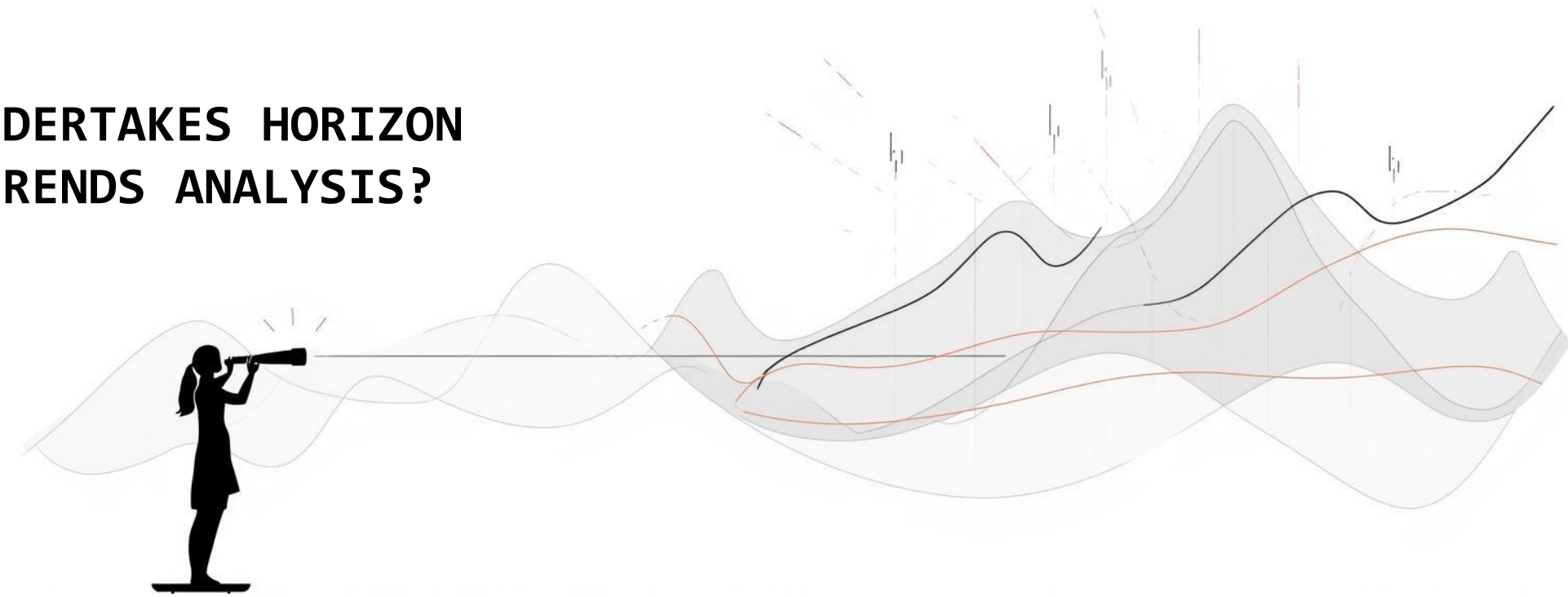
MiGHT
Malaysian Industry-Government Group for High Technology

myForesight®

1. WHAT IS HORIZON SCANNING & TRENDS ANALYSIS?

2. HOW IT CAN BE USED AND WHY IT MATTERS?

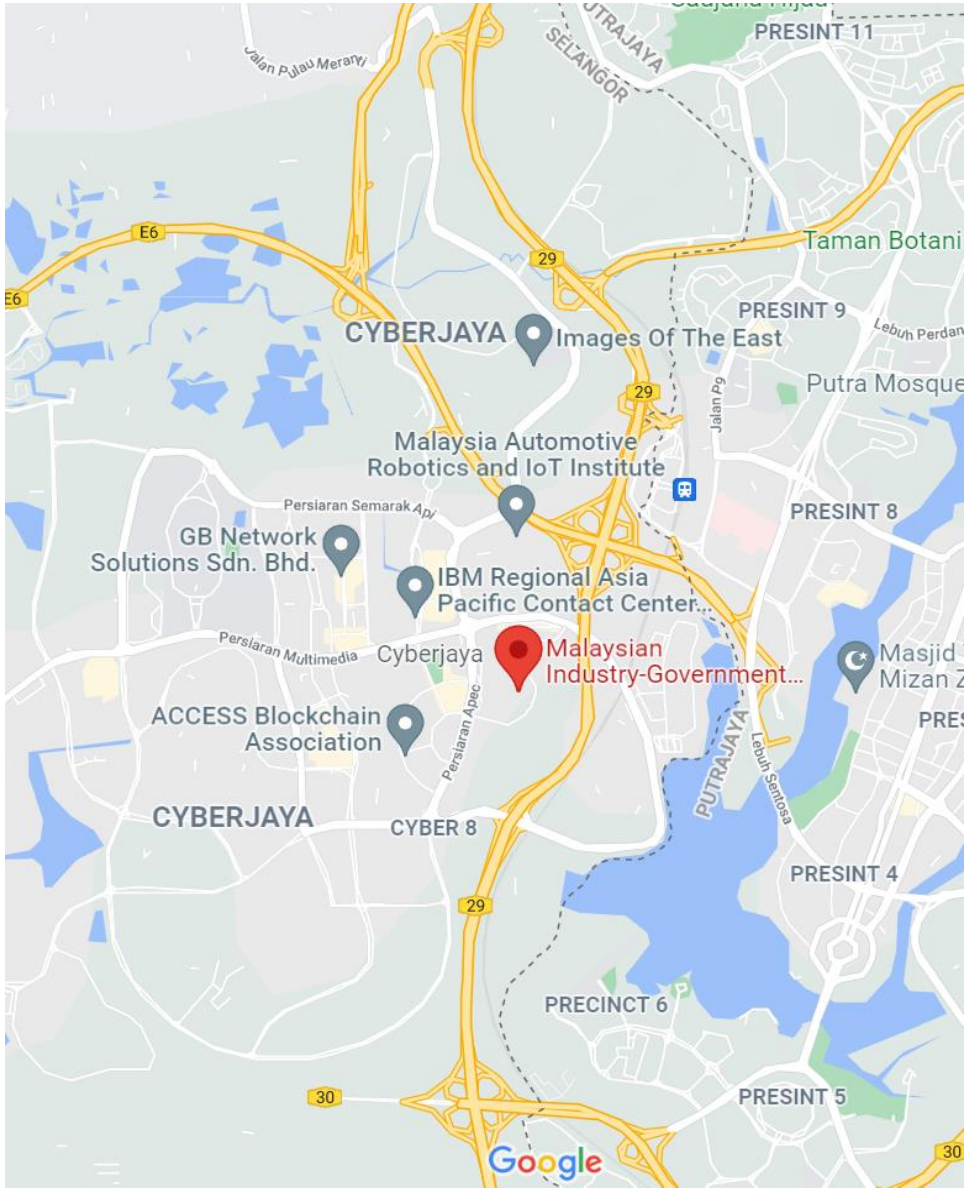
3. HOW MIGHT UNDERTAKES HORIZON SCANNING & TRENDS ANALYSIS?



MiGHT
Malaysian Industry-Government Group for High Technology

A partnership technology think tank established in 1993 to undertake foresight & future studies.

A government agency at present under the purview of the Ministry of Science, Technology & Innovation



myForesight® | Malaysian Foresight Institute

est.2012

"…to be a renowned foresight centre that integrates ideas and promotes networking across a broad spectrum of individual futurists, private think tanks and academic establishments"

STRATEGIC THRUST 1: Exploration of future possibilities for better decision making

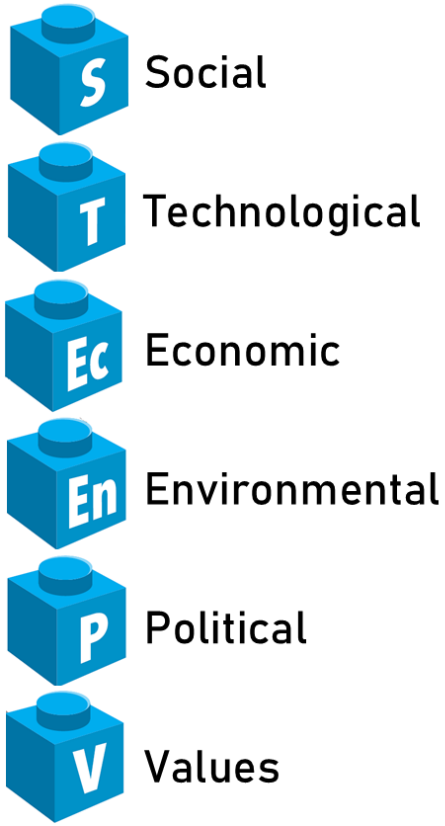
Undertake foresight projects to guide policy decisions

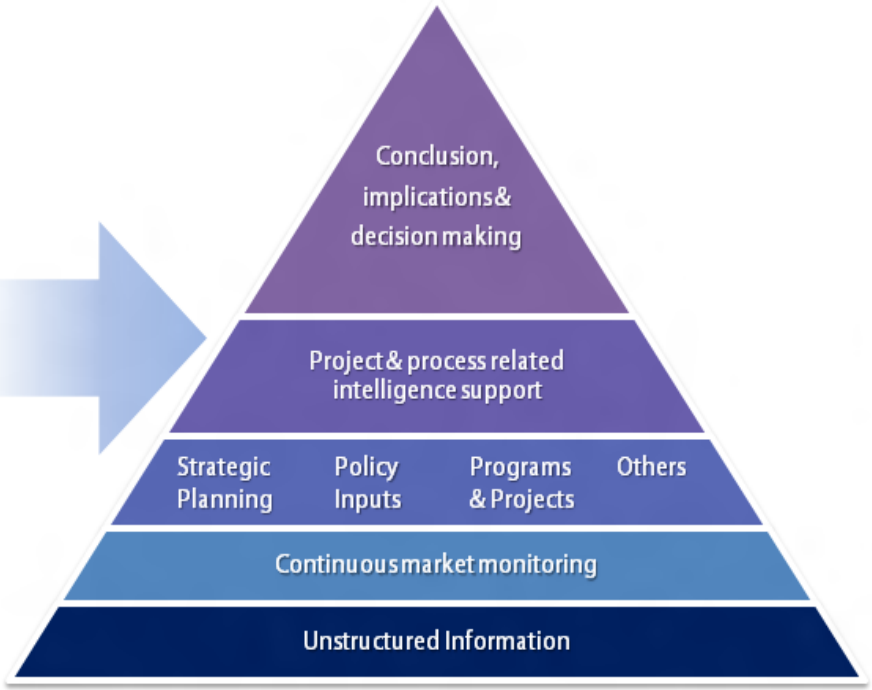
STRATEGIC THRUST 2: Building national capacity in foresight & futures thinking

Mainstream foresight & futures thinking

myForesight® harnesses its knowledge on foresight methodologies and its networks to enhance future planning in the country through its initiatives by aligning with 2 strategic thrusts

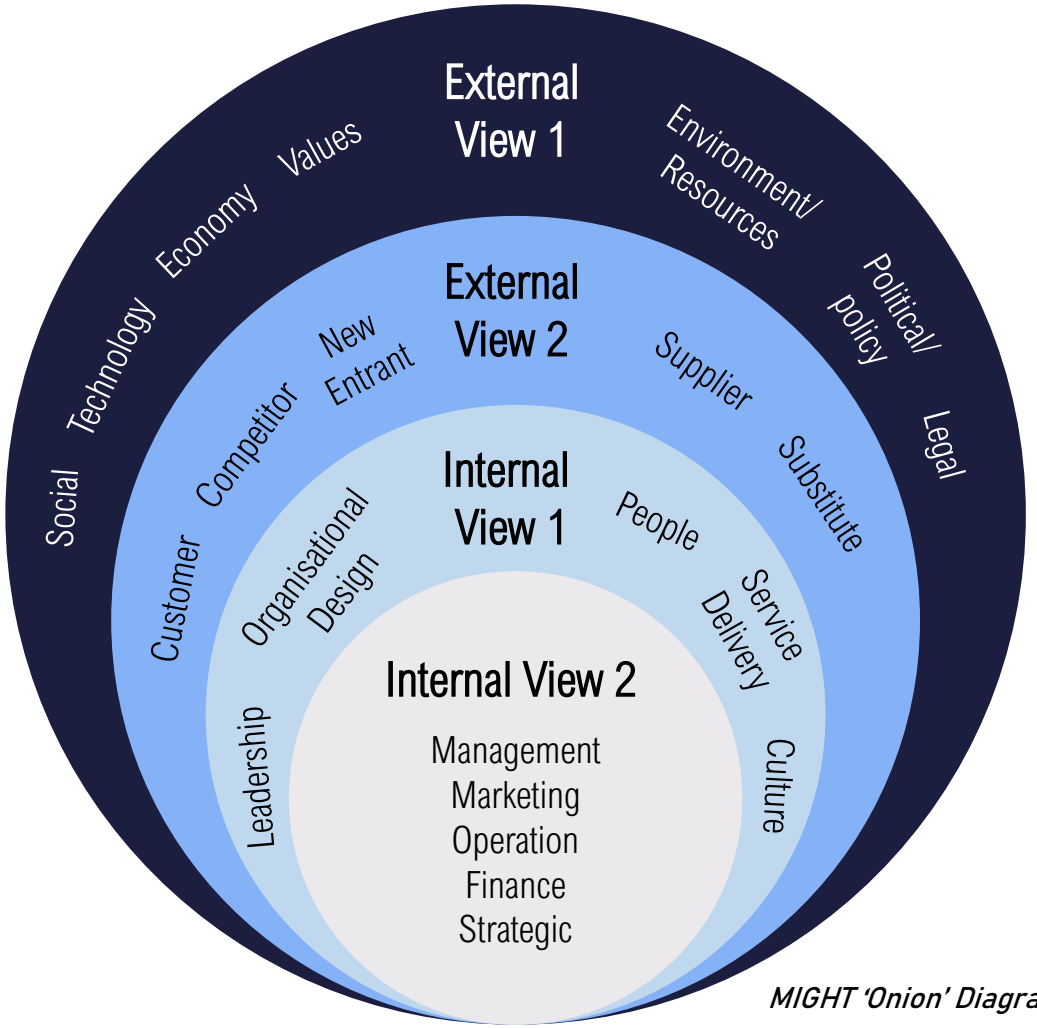
Systematic tool to **gather a broad range of information**, about emerging **issues and trends**. Examines potential threats, opportunities and likely future developments. It forms a part of the foresight process and activities that aim to **build resilience and adaptability in strategy** to deal better with an uncertain and complex future.





myForesight ® General Data Gathering Process

Understanding the present & future

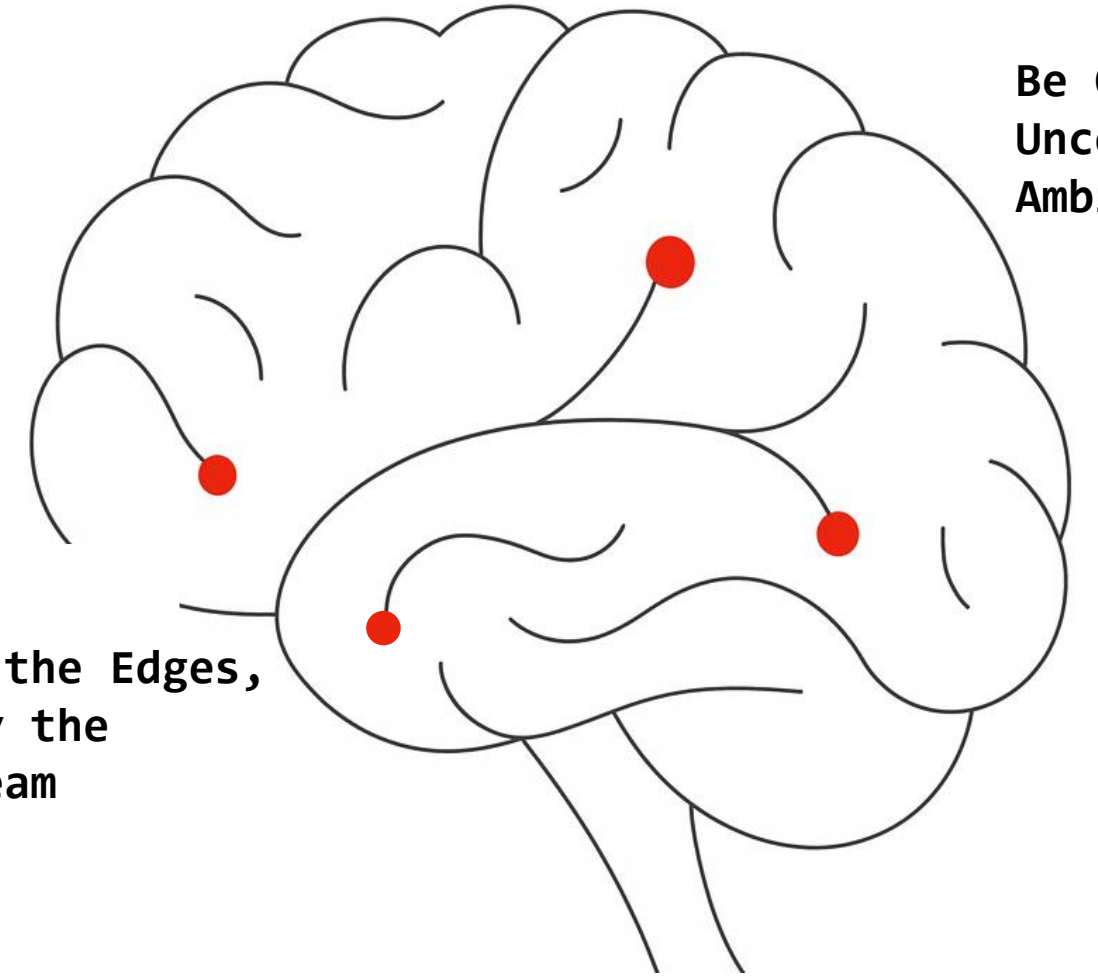


MIGHT 'Onion' Diagram

Gathered from…

- Databases
- Reports
- Books & Publications
- Journals
- Websites
- News
- Interviews
- Unpublished materials

MINDSET!



Future is Not Necessarily a Continuation of the Past

Be Comfortable with Uncertainty and Ambiguity

Look at the Edges, Not Only the Mainstream

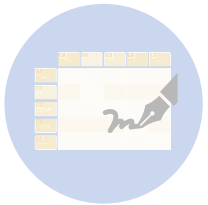
Think of what is New, Shifted and Discontinued.

Things that are no longer the same…

FORESIGHT TOOLS

Horizon Scanning

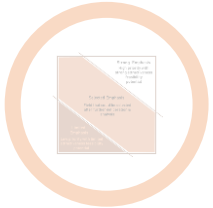
Wind Tunnelling



MIGHT F.I.R.S.T® Matrix

Future Wheels

Benchmark



MCDM Prioritization

Workshops

Scenarios

Expert Panels

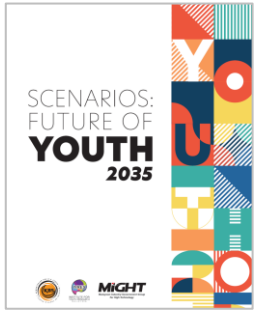
Delphi

STEEP Analysis

Patent Analysis

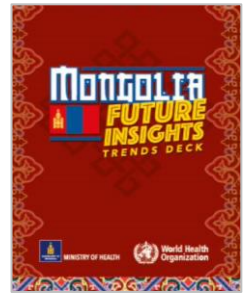
MIGHT'S USE OF HORIZON SCANNING & TRENDS ANALYSIS

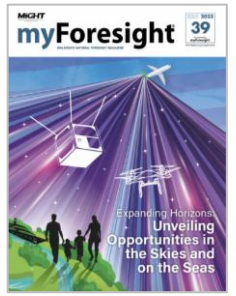
ADVISORY

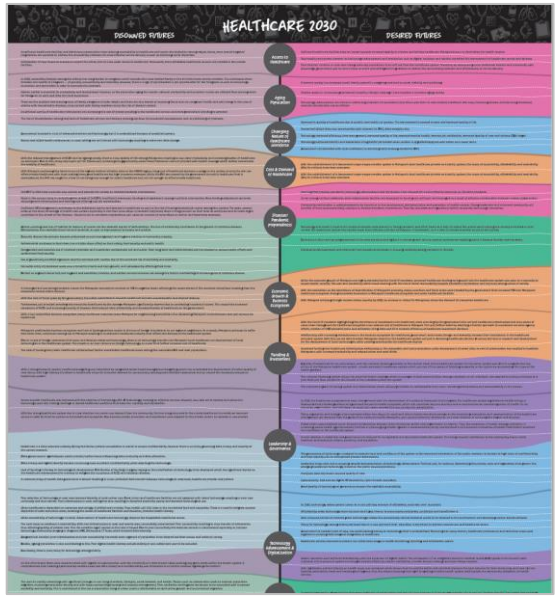


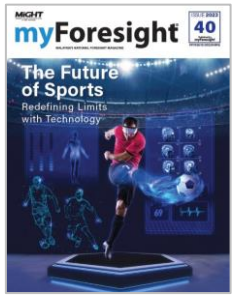
OUTLOOK

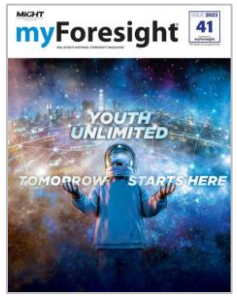
COMMUNICATION

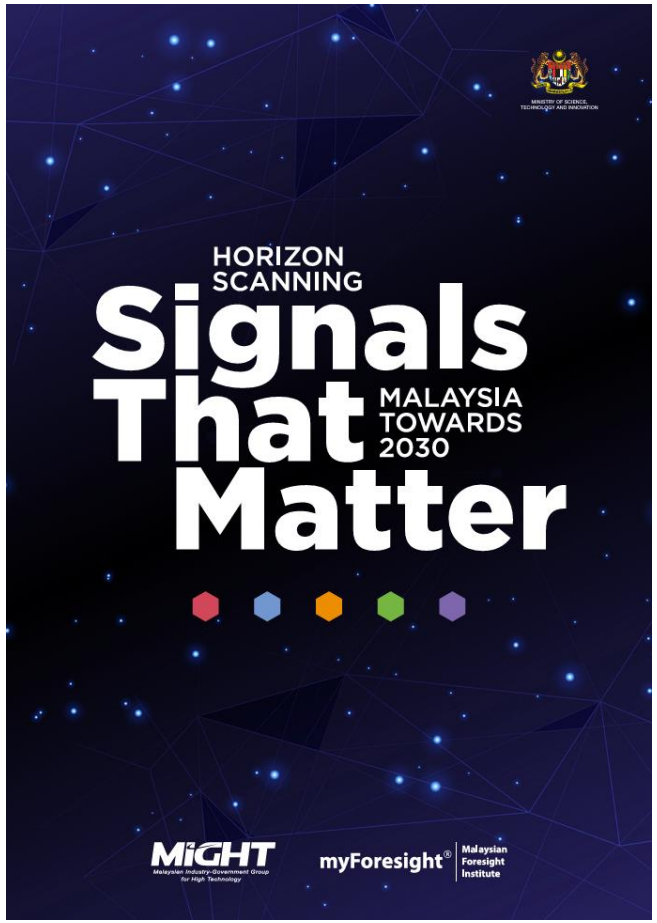












Signals That Matter: Horizon Scanning Malaysia Towards 2030

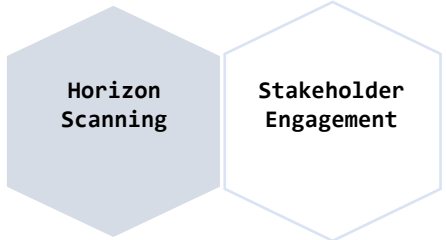
Outlook

Domain coverage: Socio-economic from three perspectives of government, industry and society.

Objectives:

- To identify signals before they become widely known in the mainstream.
- To proactively plan actions and responses that need to be taken.

Tools & Methods:



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Perspective
The signals are grouped and colour coded under the Social, Technological, Environmental, Economic, and Policy & Regulations (S.T.E.E.P) perspectives.

List of signals
The top ten signals from each perspective are ordered alphabetically.

Direction towards the future
Signals that matter can provide directions to help navigate an uncertain future with greater confidence and resilience.

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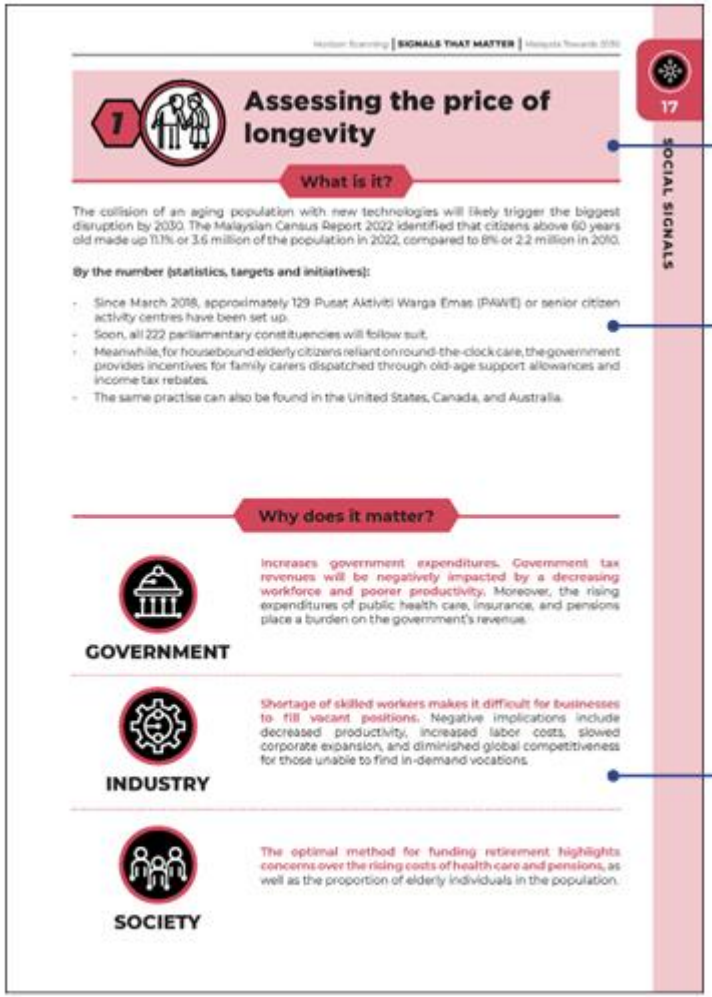

Horizon Scanning | SIGNALS THAT MATTER | Malaysia Towards 2030

17

SOCIAL SIGNALS

1

Assessing the price of longevity

What is it?

The collision of an aging population with new technologies will likely trigger the biggest disruption by 2030. The Malaysian Census Report 2022 identified that citizens above 60 years old made up 11.1% or 3.6 million of the population in 2022, compared to 8% or 2.2 million in 2010.

By the number (statistics, targets and initiatives):

- Since March 2018, approximately 129 Pusat Aktiviti Warga Emas (PAWE) or senior citizen activity centres have been set up.
- Soon, all 222 parliamentary constituencies will follow suit.
- Meanwhile, for housebound elderly citizens reliant on round-the-clock care, the government provides incentives for family carers dispatched through old-age support allowances and income tax rebates.
- The same practise can also be found in the United States, Canada, and Australia.

Why does it matter?

GOVERNMENT

Increases government expenditures. Government tax revenues will be negatively impacted by a decreasing workforce and poorer productivity. Moreover, the rising expenditures of public health care, insurance, and pensions place a burden on the government's revenue.

INDUSTRY

Shortage of skilled workers makes it difficult for businesses to fill vacant positions. Negative implications include decreased productivity, increased labor costs, slowed corporate expansion, and diminished global competitiveness for those unable to find in-demand vocations.

SOCIETY

The optimal method for funding retirement highlights concerns over the rising costs of health care and pensions, as well as the proportion of elderly individuals in the population.

The signal
It is self-explanatory and shall give you an idea of the important thing going on today.

What is it?
This part will describe the gist of the signal and be supported with facts and figures.

Why does it matter?
Each signal may have a different impact on its stakeholders. This part will explain how the future might look like influenced by the respective signal.

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Transitioning Futures, Anticipating Change: Socio-Economic Futures of Malaysia's Climate and Demographic Transition

Advisory Report

Domain coverage: Economic structures & labour markets, Well-being of elderly & their families

Objectives:

- Increase awareness of foresight & confluence of climate & demographic changes
- Envision the future of Malaysia's climate & demographic transition towards 2050
- Assess climate & demographic transition preparedness

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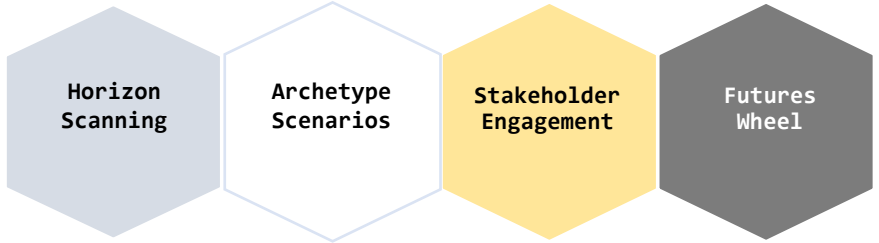
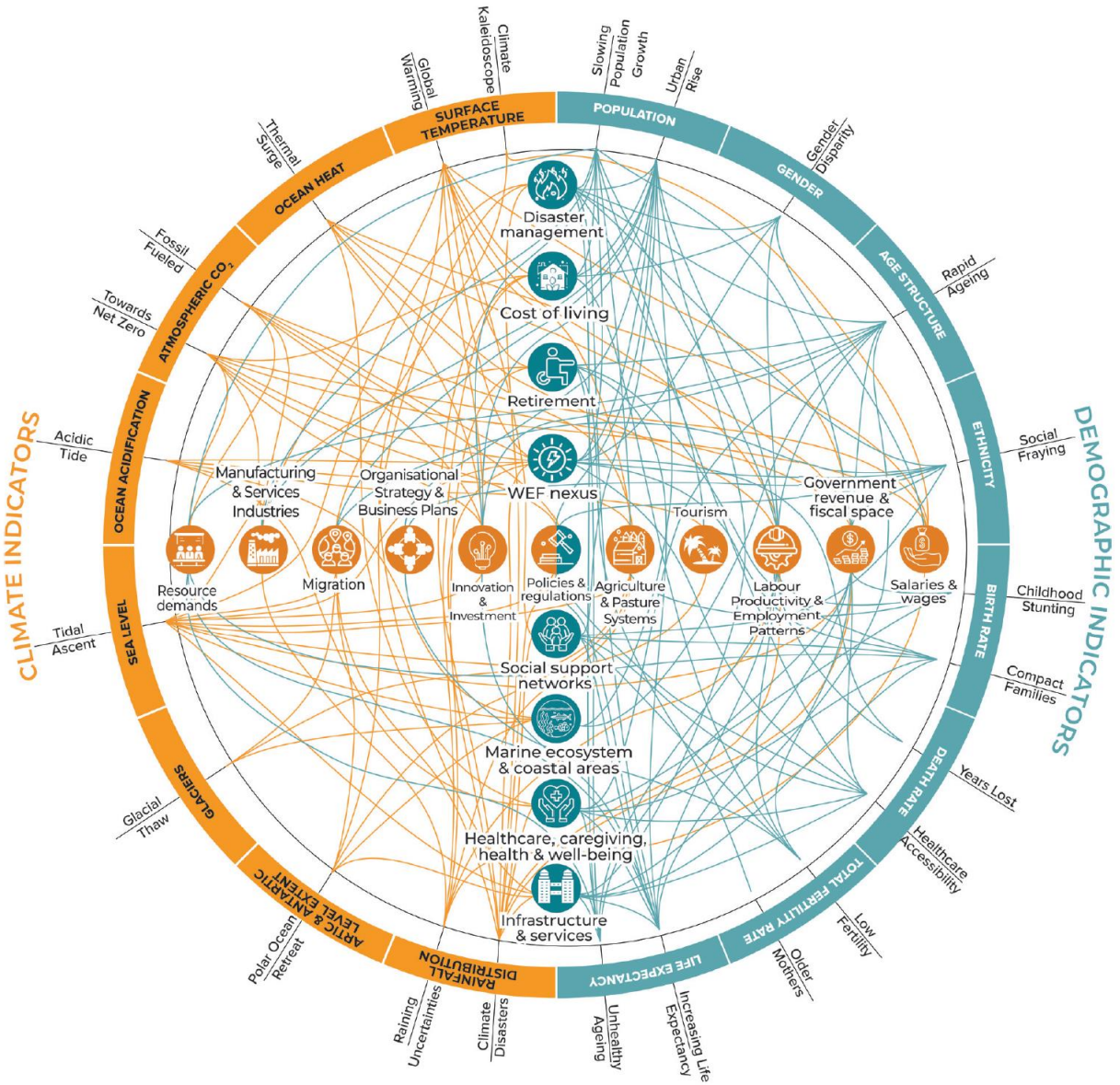
Tools & Methods:



IDENTIFYING AREAS OF FOCUS

19 AREAS OF CONFLUENCES WHERE CLIMATE AND DEMOGRAPHIC CHANGES INTERSECTS



READ MORE IN CHAPTER 1

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IDENTIFYING OPPORTUNITIES AND RISKS

IN ECONOMIC STRUCTURE & LABOUR MARKETS:

IN WELL-BEING OF ELDERLY & THEIR FAMILIES:

SOCIO-ECONOMIC IMPLICATION	ECONOMIC SHIFTS: GREENING & VULNERABILITIES	LABOUR MARKET RESTRUCTURING: TRANSFORMATION & DISPLACEMENT	FISCAL SUSTAINABILITY: RESILIENCE & PRESSURES	HEALTHCARE SYSTEM: WELLNESS & COST	QUALITY OF LIFE: SUFFICIENCY & INEQUALITIES	CLIMATE DISASTERS: ADAPTATIONS & FRAGILITY
OPPORTUNITIES	1. Green Economy Growth 2. High-Skilled Jobs 3. International Investment	1. Reskilling Programs 2. Increased Productivity 3. Inclusive Workforce	1. Reallocation of Public Spending 2. Green Investments 3. Enhanced Revenue Generation	1. Healthcare Innovations 2. Improved Access 3. Preventive Healthcare	1. Social Programs 2. Financial Literacy 3. Job Training	1. Resilient Infrastructure 2. Community-Based Adaptation 3. Disaster Preparedness
RISKS	1. Market Losses 2. Economic Instability 3. Over-Reliance on Green Sectors	1. Job Displacement 2. Brain Drain 3. Underemployment	1. Fiscal Deficit 2. Economic Downturn 3. Austerity Measures	1. Healthcare Inequities 2. Medical Inflation 3. Healthcare Professionals Retention	1. Increased Cost of Living 2. Social Unrest 3. Emigration	1. High Economic Losses 2. Environmental Degradation 3. Displacement
BENEFICIARIES	1. Renewable Energy Companies 2. Tech-Savvy Workers 3. Green Tech	1. Skilled Workers 2. Tech Companies 3. States with Reskilling Initiatives	1. Public Services 2. Green Investors 3. Tax Authorities	1. Healthcare Providers 2. Patients 3. Tech Companies	1. Underserved Areas 2. Educated Workforce 3. Financially Literate Citizens	1. Construction Sector 2. Local Communities 3. Public Health Systems
IMPACTED	1. Workers in Traditional Industries 2. Hard-to-Abate Industries	1. Low-Skilled Workers 2. Traditional Sector Workers 3. Workers Slow to Reskill	1. Government Finances 2. Low-Income Populations 3. Traditional Export Sectors	1. Rural Communities 2. Low-Income Populations 3. Public Health Systems	1. Low-Income Families 2. Unemployed Individuals 3. Vulnerable Population	1. Climate Vulnerable Localities 2. Environmental Conservation 3. Vulnerable Populations

READ MORE IN CHAPTER 3

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IDENTIFYING SYSTEMIC CHANGES

WHAT COULD BE NEW?

- AI Healthcare Revolution
- Carbon as a Currency
- Climate-Resilient X
- Digital Nomadism
- Green Economy Boom
- Human-Machine Integration
- Intergenerational Fairness
- Planetary Health
- Rise of Silver Economy and Solo Economy
- Youthquake

WHAT SHIFTS WILL ARISE?

- From Baby Daycare to Elderly Daycare
- From Centralised to Decentralised Energy Systems
- From Government-Led to Community-Partnered Development
- From High-Carbon to Low-Carbon Economy
- From Inequality to Social Equity
- From Industry 4.0 to 5.0 to 6.0
- From Mass Consumerism to Conscious Consumerism
- From Reactive to Proactive Policies
- From Short-Term Fiscal Planning to Long-Term Fiscal Health
- From Traditional to Green Jobs

WHAT COULD BE DISCONTINUED?

- 3D ("Dirty, dangerous, and demeaning") Work
- Extractive Economy
- Fossil Fuel Dominance
- Health Inequities
- Indigenous Stewardship Practices
- Landfills
- Mandatory Retirement Age
- Non-Compliance with Environmental Standards
- Single-Use Plastic
- Subsidies
- Traditional Export Reliance

READ MORE IN CHAPTER 3

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STI Foresight Report: Future of STEM Talent in Malaysia

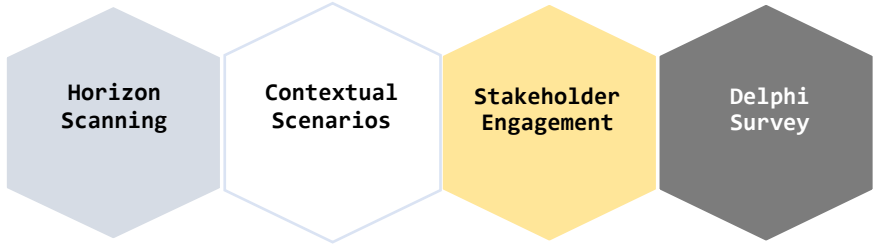
Advisory Report

Domain coverage: Science, Technology, Engineering & Mathematics

Objectives:

- To explore the potential of STEM in Malaysia.
- To analyse and identify STEM priority areas that could offer future economic value to Malaysia.

Tools & Methods:



IDENTIFYING NEW & EMERGING TECHNOLOGIES

Technology push and demand pull for Malaysia's technological needs resulted in…

- **147 new and emerging technology candidates** were categorised using the Malaysian Research & Development Classification System (MRDCS)-7th Edition.

ENGINEERING

Aerospace, Aeronautics, and Astronautics Engineering
- Electric Vertical Takeoff and Landing (eVTOL) Aircraft
- Small Satellites (Smallsats) and Cubesats
- Low Earth Orbit Satellites
- Obital Launch Site (Spaceport or Sea Launch)

Biomedical Engineering
- Artificial Implantable Organs

Chemical Engineering
- Supercritical Fluid Technology

Civil Engineering
- 3D Printed Architecture
- Building Information Modelling
- Urban Irrigation

Computer Engineering
- Additive Manufacturing
- 4D Printing
- Holographic 3D Printing
- Industrial 3D Printing
- Chiplet
- Neuromorphic Chip

Electrical and Electronics Engineering
- On-body and Off-body Sensors
- Optical Sensors Arrays

Environmental Engineering
- Carbon Capture, Utilisation and Storage (CCUS)
- Direct Air Capture
- Adaptive Processing of Recycled Materials
- Green Cement
- Green Steel
- Decentralised Wastewater Treatment

Manufacturing and Industrial Engineering
- Manufacturing Data Space
- Distributed Manufacturing
- Machinery as a Service (MaaS)
- Antimicrobial Packaging

Interdisciplinary Engineering
- Biomimicry
- Graphene Cytobot
- Human-robot Collaboration / COBOTs
- Autonomous Mobile Robots
- Humanoid General Purpose Robot
- Autonomous Unmanned Aerial Vehicles
- Self-Driving Bus
- Low-code / No-code Robot
- Robot Caregiver
- Robotic Swarm
- Soft Robot
- Exoskeleton

Energy Resources and Engineering
- Long Duration Energy Storage Systems (Mechanical, Thermal, Electrochemical, and Chemical Storage Systems)
- Decentralised Energy Grid
- Sewage Harvested Energy
- Integrated Autonomous Energy Grid
- Long-Range Wireless Energy Transmission
- Piezoelectric Nanogenerator
- Small Modular Reactors (SMRs)
- Perovskite Solar Cell
- Onshore and Offshore Wind Turbines
- Clean Hydrogen
- Ocean Wave Energy Technology

APPLIED SCIENCES AND TECHNOLOGY

Bioinformatics
- DNA Data Storage
- Portable DNA Sequencer

Biotechnology
- Alternative-protein Production (e.g. Cultivated Meats)
- Bioremediation
- Wastewater Bioplastic
- Genomic Vaccines
- Cell Therapy 2.0 (Innate Immune Cells, Precision Control of Cell Therapy, in Vivo Cell Therapy)
- Programmable Cells
- Cytotoxic Therapeutic
- Stabilized mRNA
- Therapeutics

Food Technology
- Edible Packaging
- Active Packaging

Geoinformation
- Geospatial Artificial Intelligence

Geomatics
- Hyperspectral Imaging

Material Sciences and Technology
- Self-Healing Materials
- Elastocalorics
- Solar Glass
- Biobased Materials
- Quantum Compass
- Circular Batteries
- Carbon-Cement Supercapacitor
- Solid State Lithium-Ion Battery
- Biosensor
- Metamaterials
- Mycological Biopolymers
- Graphyne
- Carbon Nanotube
- Advanced Composite Materials
- High Performance Thermoplastics
- Superhydrophobic Coatings
- Auxetic Material

Medical Technology
- Health Monitoring Skin Patch
- Implantable Sensor
- Medical Nanobot
- Medical Tricorder
- Brain Chip Implant

Information and Communication Technology (ICT)
- Generative AI
- Federated Machine Learning
- Responsible AI
- AI Mentor
- Machine Vision
- Edge Cloud Computing
- Neuromorphic Computing
- Quantum Computing
- Quantum Communication
- Quantum Key Distribution / Quantum Security
- Quantum Sensing
- Edge Computing
- Spatial Computing
- Predictive Maintenance (PDM)
- Synthetic Data
- Metro edge / High Performance Data Storage and Data Centers
- Zero-trust Architecture
- Cybersecurity Mesh Infrastructure
- IoT Device Edge
- Wi-Fi 6 and 7
- 6th-Generation Wireless
- High-altitude Platform Systems (HAPS)
- Direct-to-handset Satellite Connectivity
- Industrial Internet of Things
- Mobility as a Service (MaaS)
- Low- and No-code Platforms
- Microservices and APIs (Application Programming Interfaces)
- Blockchain of Things (BoT)
- Web 3.0
- Middleware
- Proof-of-Stake Blockchain
- Augmented Reality
- Virtual Reality
- Mixed Reality
- Digital Twins
- AR Workforce Assistance
- Industrial Metaverse
- Cognitive Twin

LIFE SCIENCES

Agriculture Science
- Advanced Urban Farming
- Advanced Alternative Animal Feed (e.g. Algae Feedstock)
- Engineered Livestocks
- Drought-Resistant Crop
- Precision Agriculture
- Plant Biostimulants
- Nano Silica Fertilizer
- Germplasm Bank
- Nanobiopesticides

Biological Science
- Sustainable Fuels (e.g. e-Biomass, e-Ammonia, e-Methanol Based Fuels, Sustainable Aviation Fuel)
- Next-generation Gene Therapies (RNA-Based Modalities and Editing, Novel Nucleases, Non-nuclease Editing and Modulation)
- Engineered Bacteriophage

MEDICAL AND HEALTH SCIENCES

Pharmacy
- Biosimilar
- Adult Stem Cell Generation
- Machine Learning-enabled Drug Discovery
- Precision Medicine (Early Disease Detection, Biomarker Discovery, Precision Population Health)
- Anti-ageing Drugs

Specialist Topics in Medical and Health Sciences
- Telehealth and Remote Patient Monitoring

EARTH SCIENCES

Environmental Sciences and Management
- Autonomous Sustainability Monitoring
- Carbon Dioxide Extractor Array

SOCIAL SCIENCES

Education
- Sensing Classroom
- Smart Classroom

IDENTIFYING NEW & EMERGING STEM SKILLS

58 STEM skills within the 10 prioritised STEM skill areas were identified:

- These were then subjected to a two-round Delphi survey to prioritise the skills needed to enhance Malaysia's economic value towards 2040

Artificial Intelligence & Data Technologies

1. Artificial Intelligence & Machine Learning Modelling
2. Applied Data Science
3. Cloud Computing
4. Data Analytics & Visualisation
5. Data Engineering
6. Generative AI & LLMs

Computational & Physical Sciences

7. Aerospace Systems Maintenance & Integration
8. Computational Modelling & Simulation
9. Kinematic Modelling
10. Mathematical & Statistical Modelling
11. Quantum Science & Engineering
12. Space Systems Engineering

Digital Security & Cyber Defense

13. AI Governance
14. Cybersecurity
15. Data Governance
16. Network & Computer Systems Administration

Energy & Engineering Infrastructure

17. Advanced Installation, Maintenance & Reliability Engineering
18. Civil & Structural Engineering Management
19. Digital & Control Systems Engineering
20. Electrical & Electronics Systems
21. Marine & Offshore Engineering
22. Mechatronic Systems Integration & Design
23. Process & Automation Control
24. Renewable Energy Systems Engineering

Environmental & Sustainability

25. Environmental Management
26. Geospatial Analytics
27. Green Chemistry & Sustainability
28. Life Cycle Assessment (LCA)
29. Waste & Hazardous Material Management

Food Security & Agriculture Systems

30. Agriculture Management
31. Food Engineering & Processing
32. One Health & Zoonotic Disease Management
33. Precision Agriculture
34. Sustainable Farming

Healthcare & Biomedical Sciences

35. Biomedical Product Development & Engineering
36. Clinical & Medical Practice
37. Diagnostic & Imaging Expertise
38. Good Laboratory Practice Management
39. Multi-omics Integrated Analysis
40. Patient-Centered Services
41. Pharmaceutical Sciences
42. Synthetic Biology

Materials Science & Advanced Manufacturing

43. Advanced Materials Engineering
44. Material Science
45. Surface & Packaging Engineering

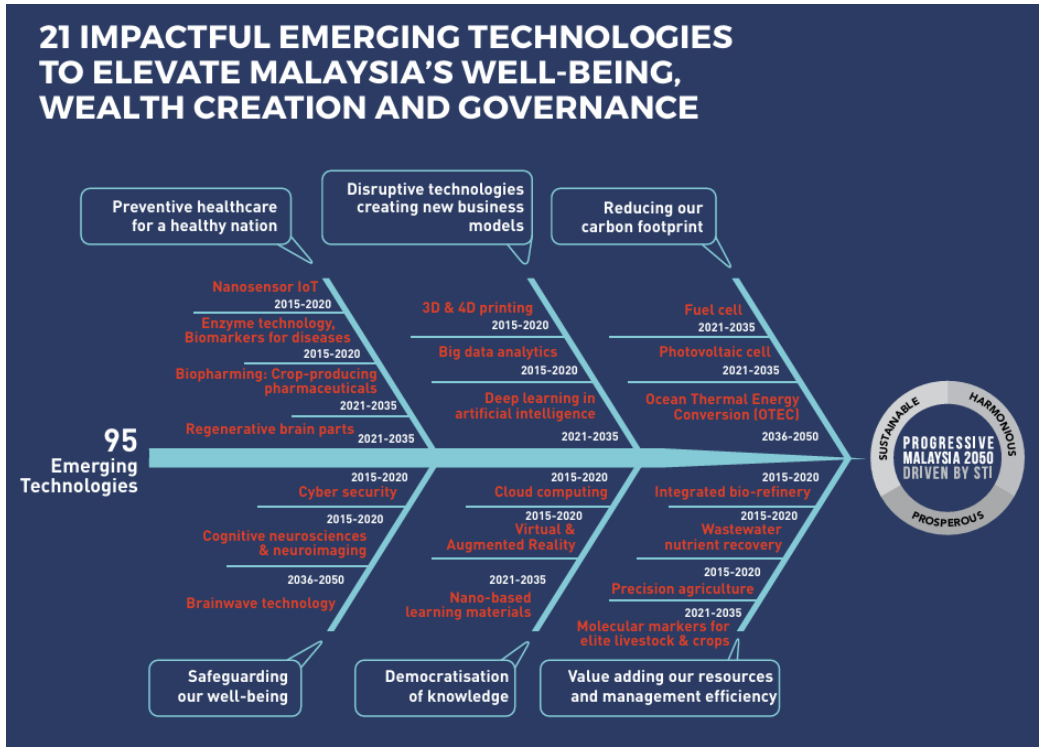
Smart Systems & Digital Transformation

46. Embedded Systems Development
47. IoT Systems & Applications
48. Programming & Coding
49. Software Development & Testing
50. System Architecture & Design
51. UX Engineering

Strategic Planning & Risk Management

52. Applied Research & Development Management
53. Emergency & Disaster Preparedness
54. Energy Trading & Hedging Strategies
55. Quality, Health, Safety & Environment Compliance
56. Strategic Technology Planning
57. Technology Risk Management
58. Workplace Safety & Health Management

IDENTIFYING NEW & EMERGING SCIENCE & TECHNOLOGIES



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DONE RIGHT

1

Future Preparedness

Supports anticipation and resilience for future disruptions.

2

Connect the Dots

Connect individual signals into patterns for sense-making.

3

Identify Future Opportunities & Risks

Surfaces opportunities, risks and vulnerabilities earlier.

4

Informed Decision Making

Inform policies, strategies, and investment priorities for the future.

THANK YOU

#letscollaborate for #betterfutures

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MIGHT

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