



Technology Foresight: Capturing the benefits from nuclear science technology and innovation in the Malaysian Nuclear Agency

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ABSTRACT

Nuclear technology has started in Malaysia since the establishment of the Malaysian Nuclear Agency (Nuclear Malaysia) in 1972. The agency was established to promote the peaceful application of nuclear science and technology for national development. Nuclear science and technology for peaceful purposes have effectively advanced in various sectors, including industry, healthcare, food and agriculture, natural resources, energy, and nuclear safety and security through research, development, commercialization and innovation (RDCI). Scientific advancements through RDI activities will have a substantial impact on the advancement of nuclear technology. New demands placed on the public R&D infrastructure are also influencing government research priorities. Many governments believe that establishing a definite longer-term science and technology policy is essential in a time of escalating economic competitiveness. Therefore, to focus resources and achieve the greatest economic and social benefits, the most promising research fields and new technologies should be determined. Technology foresight can be used as a method to evaluate the revolutionary influence of new emerging technologies on the economy and society over the coming years, given the sustainability of RDI in nuclear technology in Malaysian Nuclear Agency. Identifying the fields of strategic research and emerging technologies with the involvement of scientists, industrialists, government officials, and others will provide the greatest economic and social advantages is the goal of technology foresight. This study proposes a conceptual model framework of the technological foresight exercise and implementation stages to be implemented in Malaysian Nuclear Agency. Through a foresight exercise, the Malaysian Nuclear Agency could close the gap between the adoption and use of nuclear technology in social and economic sectors by working with relevant industries, communities, and government agencies to match products, technologies, and services.



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5. Foresight Initiatives in Malaysian Nuclear Agency
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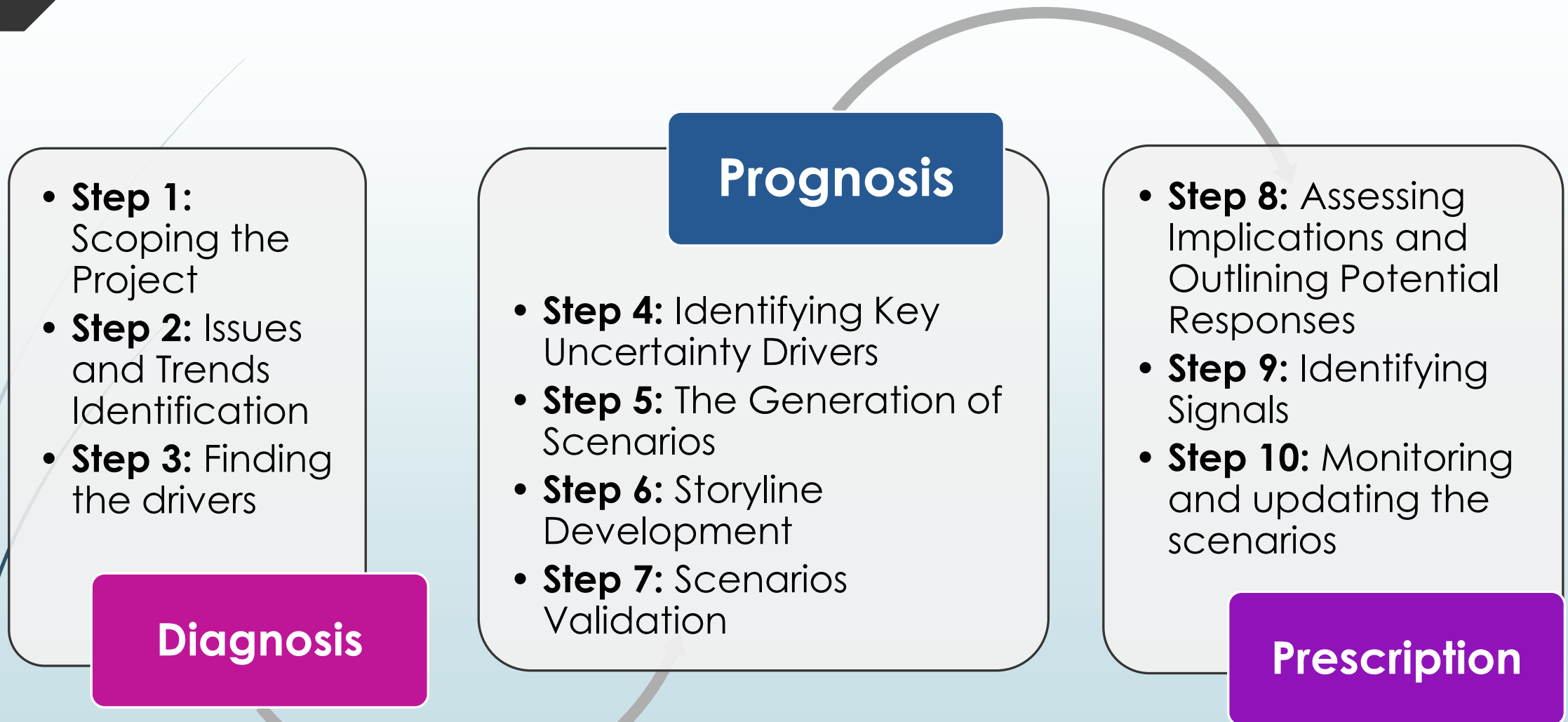
1. Introduction:

- Foresight is the process of trying to **predict the long-term future of science, technology, the economy, the environment, and society**. The goal is to find the areas of **strategic research and new emerging technologies** that are most likely to help the economy and society.
- The foresight initiative's impetus was driven by three main factors, which are **rising governmental spending pressure**, altered **knowledge production processes**, and increased **industrial and economic competition**.
- Foresight exercise will objectively **identify future opportunities, barriers, and risks**, as well as strategically place critical thinking into long-term development.
- Foresight is an umbrella term for **innovative ways to plan strategies**, make **policies**, and come up with **solutions** that do not predict or forecast the future but instead **work with different possible futures**.

2. Key features of technology foresight

Key features	Descriptions
Organizational characteristics	<ul style="list-style-type: none">• Governmental advisory committees and major policymaking• Independent advisory councils for the public sector• Academic funding institutions• Academies and professional scientific institutions at the national and international levels• Dedicated departments and organisations• Business associations• Businesses based on science
Specificity	<ul style="list-style-type: none">• Holistic/ Macro-level/ Meso-level/ Micro-level
Roles	<ul style="list-style-type: none">• Direction-setting• Choosing priorities• Predictive intelligence• Consensus invention• Advocacy• Education and Communication
Research orientation and structural characteristics	<ul style="list-style-type: none">• Degree of finalisation (Curiosity-oriented vs strategic vs applied)• Complexity and stability of the disciplinary structure• External integration with wider scientific and technological systems
Inherent pressures	<ul style="list-style-type: none">• Technology-push vs. demand-pull• Bottom-up vs. top-down• Third parties vs. interested parties
Time frame	<ul style="list-style-type: none">• Short-term / Medium-term / Long-term
Methodology	<ul style="list-style-type: none">• Formal vs. informal• Quantitative vs qualitative

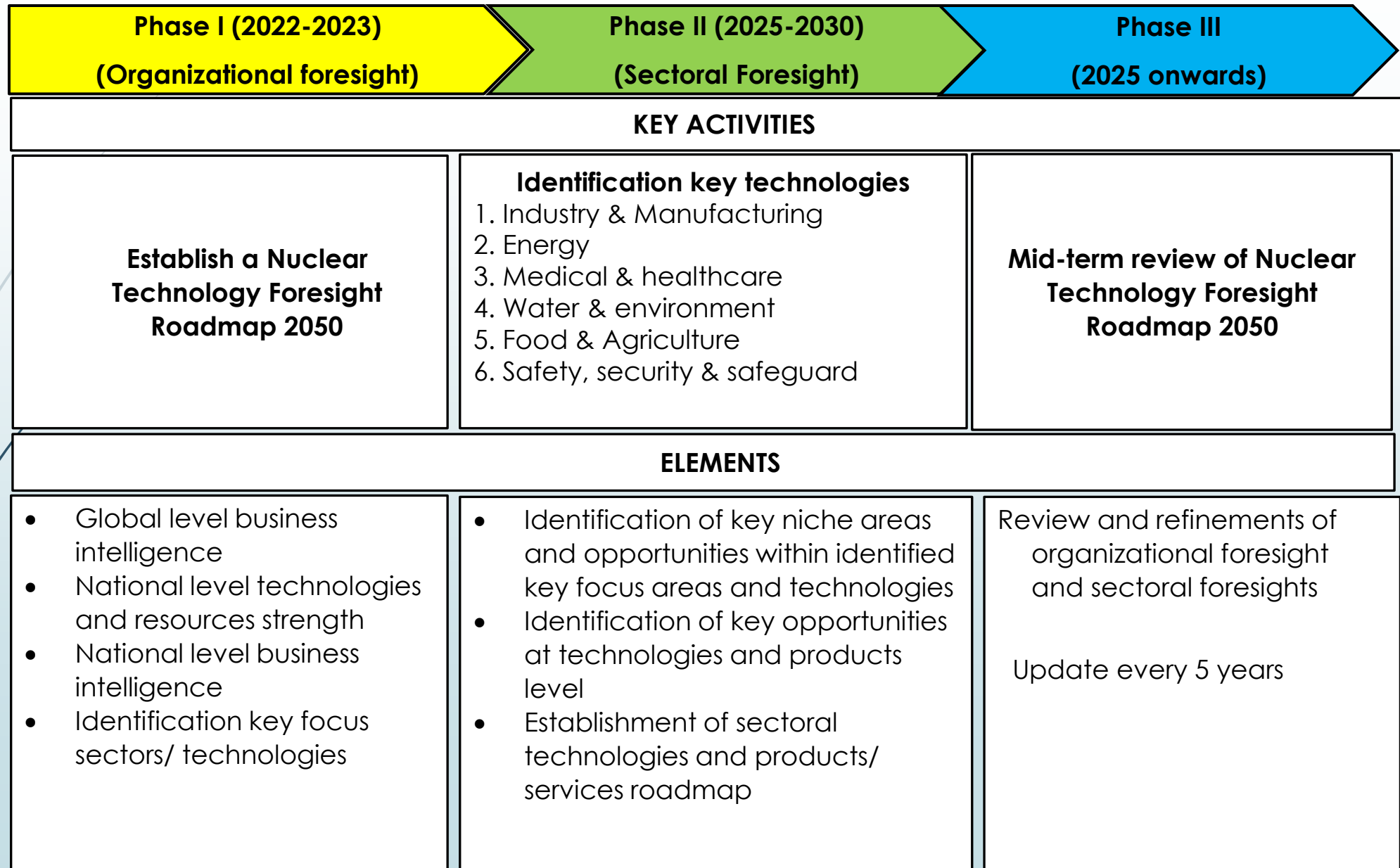
3. Ten-step of technology foresight methodology



4. Technology Foresight Initiatives in Malaysia

- ▶ MOSTI has included STI foresight as an important strategy in the **National Policy on Science, Technology, and Innovation (NPSTI) 2021-2030**
 - ▶ It is done to make sure that **local STI foresight expertise and capabilities** are **expanded and strengthened**.
- ▶ The **Emerging Science, Engineering and Technology (ESET) Study** conducted by the Academy of Sciences Malaysia (ASM) was the basis for the framework, which was developed to provide S&T Foresight as part of the ASM's flagship initiative, Envisioning Malaysia 2050
 - ▶ The ESET study yielded **284 products, services, technologies**, potential applications, and outcomes pertinent to Malaysia in 2050, **95 emerging technologies**, and **21 emerging technologies with significant impact**.

5. Foresight Initiatives in Malaysian Nuclear Agency



6. The role of foresight in leveraging technology and innovation revolution

- ▶ **Benefits from innovation and foresight procedures** must **involve and gain the commitment of all** those who are likely to be influenced by having a **specific client** with **well-defined needs** that are **considered at an early stage**.
- ▶ **Successful innovators** keep an eye on **shifting market demands** and build on current advantages. **Analyzing current strengths** together with **monitoring economic and social demands** is another factor in a successful foresight exercise. In addition, **enthusiastic persuasive people** frequently play a significant role in both innovation and foresight.
- ▶ **A wide scientific and technical knowledge**, as well as an **awareness** of the processes of **technological development and the innovation process**, are required skills for foresight.
- ▶ Other requirements include **knowledge of the sector** and the **needs of possible research customers**, **organizational and interpersonal management abilities**, **survey design**, **data-handling** and **analytic procedures**, and a **strong experience in forecasting and science-policy studies**.

7. Conclusions:

- ▶ Technology foresight can be used as a **method to evaluate the revolutionary influence of new emerging technologies** on the economy and society over the coming years, given the sustainability of RDI in nuclear technology in Malaysian Nuclear Agency.
- ▶ Identifying the fields of **strategic research and emerging technologies** with the **involvement of scientists, industrialists, government officials, and others** will provide the greatest economic and social advantages is the goal of technology foresight.
- ▶ Through a foresight exercise, the Malaysian Nuclear Agency could **close the gap between the adoption and use of nuclear technology** in social and economic sectors by **working with relevant industries, communities, and government agencies** to match **products, technologies, and services**.



Thank you.

Any questions? Please contact:

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