



OVERVIEW ON STRATEGIC PLAN FOR MALAYSIAN REACTOR INTEREST GROUP (RIG)

PRESENTED AT
IAEA TECHNICAL ON STRATEGIC PLANNING
FOR RESEARCH REACTORS
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PREPARED BY
REACTOR INTEREST GROUP (RIG)
MALAYSIAN INSTITUTE FOR NUCLEAR TECHNOLOGY
RESEARCH (MINT)

IAEA TECHNICAL ON STRATEGIC PLANNING FOR RESEARCH REACTORS

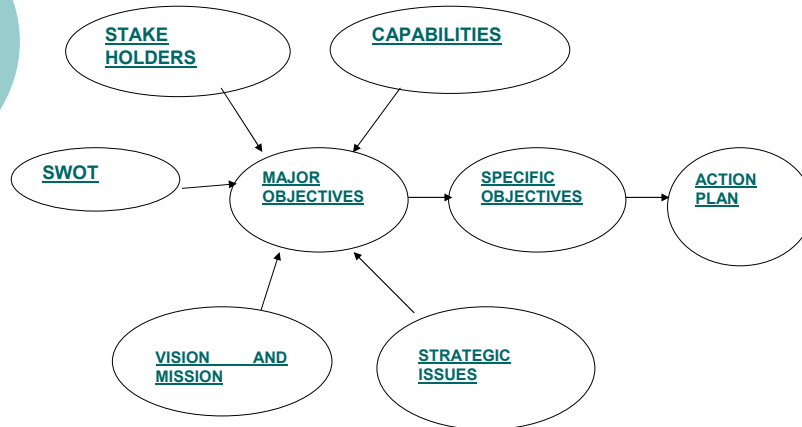


Reactor Interest Group (RIG)

- After 3 years, this group serves as useful channel for ideas and suggestions to the management of MINT to improve the usage of the reactor and upgrade its system, and other related activities

○ **SP HAS PLAY THE IMPORTANT GUIDE TO
THIS ACHIEVEMENT**

STRATEGIC PLANNING FRAMEWORK



- The outline of the strategic planning methodology used in this document is shown below – refer to IAEA-TECDOC-1212; APRIL 2002 Strategic Planning For Research Reactors: Guidance For Reactor Managers.

SP- VISION AND MISSION

OUR VISION

V1- Creation of a well verse society in neutron (reactor) science and technology, and related disciplines

V2- Capitalization of Rx based technologies to achieve vision 2020

V3- Capitalization of neutron science to achieve vision 2020

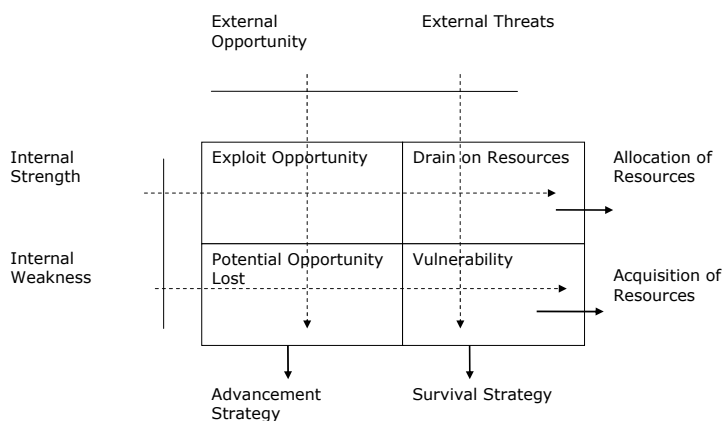
SP- VISION AND MISSION

OUR MISSION

- M1- To be the leader among developing countries in TRIGA Research and key player in Rx utilization**
- M2- We are dedicating to promote and to introduce our Reaktor TRIGA PUSPATI among the researchers in various disciplines of R&D and academia at national level to full utilize the usage of RTP at maximum capability as to generate knowledge amongst people in the community.**
- M3- To enhance the reactor utilization and operate safely and reliably**



SP- SWOT Insights



SP-STRENGTHS, WEAKNESSES, OPPORTUNITIES & THREATS (SWOT)

SWOT on the following areas:

- **Reactor Utilization**
- **Reactor Support Service**

SP-SWOT - Reactor Utilization

Strength: ☒

- *The only working/operating research reactor in the country.*
- *Management commitment and Financial support both Physical and R&D.*
- *Availability of working of research facilities e.g. SANS, NAA, NR.*
- *Out of core engineering and instrumentation are support by PI, ISG, UME and UK,UPPA.*
- *Radiation safety support service and radioactive waste management by UKSI & PPS, UPPA.*

SP-SWOT - Reactor Utilization

Strength: ☺ (continued)

- Existence of MINT/RIG active and core members to enhance reactor utilization activities.
- Research project focus toward enhancing academic excellence and technology development .
- Spin-off expertise for MINT present channel to other areas.
- Availability of new staff members.

SP-SWOT - Reactor Utilization

Weakness: ☹

- Low utilization of irradiation facilities in specific areas e.g.: isotope production, DNAA.
- Low flux for bigger radioisotope production and other beam applications.
- Inadequacy of infrastructure to promote external user participation e.g.: accommodation, public transport, training facility, working hours etc.
- Lack of interest on the part of MINT researchers.
- Existence of MINT/RIG as a structure to enhance reactor utilization activities.
- Retirement of senior researcher.
- Lack of identification of local players in nuclear grade components.

SP-SWOT - Reactor Utilization

Weakness : ☹ (continued)

- *Dedicated / Skilled Researchers and Supporting staff insufficient- i.e. in physics, nuclear/reactor engineering, nuclear safety, nuclear instrumentation and advance support engineering (theoretical and experimental knowledge).*
- *Internal advance engineering support is inadequate for Reactor applications.*
- *No specific procurement's documentations for R&D project's collaborations.*
- *Inadequate and low remunerated supporting staffs.*
- *Not fully recognise by ministerial, national and international.*

SP-SWOT - Reactor Utilization

Opportunity: ☺

- *Readiness of government to provide fund (e.g. in 5 years National Plan i.e. RMK9 -9th for 2005-2010 and so forth).*
- *Availability of national R&D Funds e.g. IRPA, IGS, MTDC, CIDB.*
- *Potential application in emerging technologies e.g. nanotechnology, biotechnology, advanced material, medical, aerospace etc*
- *New market in nuclear medicine and industrial application.*
- *High flux reactor in neighbouring countries for acquiring quality data.*
- *Attracting external expertise to work in Malaysia.*

SP-SWOT - Reactor Utilization

Opportunity: ☺ (continued)

- *Smart partnership and training opportunities with universities, private sectors and other research institutes (local & overseas).*
- *Multilateral and bilateral linkages e.g. IAEA, FNCA, Korea, Vietnam, Indonesia etc.*
- *Government policy on security and safety of the country.*
- *New global trend towards reactor development and utilization*
- *Commercialisation spin-off technologies*
- *Local advanced engineering support is available for reactor applications.*

SP-SWOT - Reactor Utilization

Threats: ☹

- *The aging of research reactor and auxiliary systems*
- *Retirement of senior collaborators.*
- *Difficulty in getting spare-part locally due to international control.*
- *Lack of interest among students in nuclear science and engineering*
- *Declining of the application of nuclear technique in industry due to regulatory requirements.*
- *No certain government policy on reactor technology both for R&D and power generation.*

SP-SWOT - Reactor Utilization

Threats: ☒ (continued)

- Lack of skilled manpower from higher learning institutions.
- Non-reactor based competing facilities and related/relevant activities e.g. cyclotron, electron beam, irradiator.
- Mismatch of knowledge on the part of academia.
- Lack of local engineering/industrial support in nuclear grade components and installations.
- Tedious and longer bureaucracy in government procurements/procedures.
- High flux reactor in neighbouring countries being used for strategic project.

SP-SWOT - Reactor Support Services

Strength: ☒☒☒

- Availability of experienced staff members in operation and maintenance.
- Availability of Fund.
- Existence of research facilities e.g. SANS, NAA, NR
- Out of core engineering and instrumentation are support by PI, ISG, UME and UK.
- Radiation safety support service and radioactive waste management by UKSI & PPS.
- Reactor activities are supported by RIG.

SP-SWOT - Reactor Support Services

Weakness: ☁

- *Inadequate in-core ISI, QAP.*
- *Nuclear core safety, radiological safety infrastructure is at minimum (not licensed).*
- *Organizational structure of reactor unit is not well designed.*
- *Advance engineering support is not available*
- *Ageing of plant and instruments.*

SP-SWOT - Reactor Support Services

Weakness: ☁ *(continued)*

- *Lack of knowledge in local players capability in nuclear grade components supply and fabrication.*
- *Limited reactor power requiring long operational hours in order to produce high specific activity radioisotope and high quality neutron beam works.*
- *Inadequate staffing.*

SP-SWOT - Reactor Support Services

Opportunities: ➔

- *Readiness and continued commitment by the government to provide fund (RMK9, RMK10 etc).*
- *New market in nuclear medicine and industrial application.*
- *Brain gain of MINT present expertise channel towards Reactor activities.*

SP-SWOT - Reactor Support Services

Opportunities: ➔ (continued)

- *Availability of support from universities.*
- *Linkage with IAEA, FNCA, etc.*
- *Outsourcing mechanism for expert service/ specialist is established through consultancy.*
- *Indication of the government commitment towards security and safety.*
- *Training opportunities in other IPTAs, RI (local & overseas).*

SP-SWOT - Reactor Support Services

Opportunities: ↗ (continued)

- *New global trend towards research reactor development and utilization.*
- *Commercialisation spin off /R&D facilities technologies.*
- *Availability of new staff members (in MINT).*
- *Availability of expertise in inspection & maintenance in MINT.*

SP-SWOT - Reactor Support Services

Threat: ↘

- *Advanced reactor technologies in neighbouring countries.*
- *Failure on the part of government to recognise reactor as advanced R&D tool.*
- *Lack of supply of required man power skill from universities.*
- *Non-reactor based competing facilities and related/relevant activities.*

SP-SWOT - Reactor Support Services

Threat: ▼ (continued)

- *International control on procurement of reactor related components (Difficult in getting spare-part locally).*
- *Reactor operation and maintenance perceived as non prospective.*
- *Lack of local players in nuclear grade components, supply and fabrication.*



SP-STAKEHOLDERS

The existing stakeholder of the reactor are:

- *The government of Malaysia (i.e. MOSTI)*
- *MINT management and reactor operators/ Other MINT Staff*
- *Research institutions*
- *Universities (National types)*
- *Commercial customers*
- *Industries (tracer, NAA, NR,)*
- *Hospitals (RI)*
- *RI Importers*
- *Regulatory body*
- *Local public*
- *IAEA*

SP-STAKEHOLDERS

Government takes a lead in forming strategic role by:

- (i) Engaging in strategic energy planning, including consideration of education, manpower and infrastructure.*
- (ii) Contributing to, if not take responsibility for integrated planning (national master plan) to ensure that human resources are available to meet necessary obligations and address outstanding issues.*

SP-STAKEHOLDERS

Government takes a lead in forming strategic role by (cont.):

- (iii) Supporting, on competitive basis, young students and provide adequate resources for vibrant nuclear research and development programmes including modernization of facilities.*
- (iv) Providing support by developing 'educational networks or bridges' between university, industry and research institute.*

SP-STAKEHOLDERS

Universities As Stakeholders:

- a). *Take-up the challenges of revitalizing nuclear education by:*
- *Providing basic and interactive educational programmes*
 - *Interacting early and often with potential students and provide adequate information*
- b). *Participate in vigorous basic research and maintaining high-quality training are needed:*
- *Rigorous training programs should be provided to meet specific needs*

SP-STAKEHOLDERS

New stakeholders will trigger :

- *New budget allocation from the government funds*
- *Improve in operational efficiency e.g. increase of reactor power and operating hours, by the reactor management*
- *Demand new experimental facilities by the academic sectors for their new research and development as well as education purposes*
- *New isotopes delivery at a different time or place by its commercial users*
- *New technologies to be generated*

SP-STAKEHOLDERS

Potential new stakeholders:

- *Research institutions (Neutron Beam Applications (NBA) and Utilization)*
- *Commercial customers Industries (Neutron Beam Applications –NBA)*
- *Hospitals (Boron Neutron Capture Therapy (BNCT); Prompt Gamma Neutron Activation Analysis (PGNAA))*



SP-CAPABILITIES

23 current basics research works:

- *Neutron Activation Analysis (NAA) - 4*
- *Neutron Radiography (NR) - 4*
- *Small Angle Neutron Scatt. (SANS) - 4*
- *Neutron Capture (BNCT) - 1*
- *Radioisotope production*
 - *Medical - 2*
 - *Tracer - 2*
- *Others - 5*

SP-CAPABILITIES

Potential basics research works:

- *Powder Diffractometer*
- *Reflectometer*
- *Triple Axis Spectrometer*
- *Time of Flight Spectrometer*
- *Prompt Gamma Neutron Activation Analysis (PGNAA) - Cold Neutrons??*
- *Materials Testing Loops, etc*



SP-STRATEGIC ISSUES

Infrastructure

Human Resource

Capacity & Capability

Image & Communication

Linkages / Networking

Commercialization (Economic Impact) (???)

SP - ISSUES 1

Infrastructure:

- ***Fiscal infra. To be reviewed taking account of the required planning, both Development and IRPA. Disbursement mechanism to be revamped***
- ***Physical Infra. To be enhanced in RMke 9, taking account of the present lacking, new needs and sustainability***
- ***Existing Rx Limitations Vs. Researchers Demand***
- ***Rx D&D and the need for new Rx (siting, etc)***

SP- ISSUES 2

Human Resources:

- ***Limited skilled and knowledgeable in neutron related (MINT & National)***
- ***Limited of expertise/skill***
- ***Marginal advanced engineering and physics for Nuclear/Radiation Application, Nuclear Reactor, etc.***
- ***Basic nuclear Instrumentation & control***
- ***Bottom line Nuclear Safety***
- ***Limited Dedicated "Crown Prince" ??***

SP- ISSUES 3

Capacity & Capability:

- **Lack of capacity & capability**
- **Nuclear and Reactor Physics (Neutron Science)**
- **Instrumentation and Engineering to Support Physics Experiments**
- **Modeling (Monte Carlo, Super Computing,....)**
- **In-core in-service insp. (ISI)**
- **In-core safety**

SP – ISSUES 3 (cont.)

Capacity & Capability: (cont.)

- **Condition- based monitoring (CBM)**
- **Aging management**
- **Local engineering/industrial support**
 - **nuclear grade components and installations**
 - **Lack of focus and direction in planning**
 - **Lack of global perspectives**
 - **Subject to control of nuclear/reactor related components**
 - **Lack of national policy**

SP – ISSUES 4

Image & Communication:

- **Misconception on nuclear reactor**
- **Reactor for advance S&T infrastructure**
- **Reactor as tool for national capacity & capability development**
- **Socio-economic development**
- **Lack of effective communication**
 - **Public**
 - **Policy makers**
 - **Other Stakeholders**

SP – ISSUES 5

Linkages / Networking:

- **We have lost good opportunity linkage with IAEA when we abandoned the first reactor upgrading project**
- **IAEA is still pressing for Licensing**
- **Our linkage with other good regional players (Indonesia, Australia, Japan, Korea, China)**
- **MINT-University/RI linkages to be enhanced**
- **MINT-Stakeholder linkages to be reviewed and enhanced**

SP – ISSUES 6

Commercialization (Economic Impact) ??

- ***We have to show some products that are commercializable, some are fundamental-non commercializable, but necessary for S&T Infra.***
- ***A good balancing must be made to accommodate our stakeholders needs***



SP-MAJOR OBJECTIVES

- ⊗ ***Science Driven Reactor Utilization***
- ⊗ ***Indigenous With International Standards Reactor Support Service***



SP-SPECIFIC OBJECTIVES

Reactor Utilization:

- *To continue rebuild our lost capacity and capabilities in reactor science and technology (S&T)*
- *To enrich and sustain the group in preparation for the new reactor/other options as an essential/indispensable R&D infrastructure*

Reactor Support Service:

- *To sustain the RTP Safety, Reliability and Availability to support the above objectives*



SP-SPECIFIC ACTIONS PLAN

Reactor Utilization: (beyond TRIGA)

2005-2010

- ❖ *Strategic planning for new reactor*
 - ❖ *To formulate a 5 years plan*
- ❖ *Methods*
 - ❖ *enhancement of reactor utilization and reactor support service for capacity and capability building*
 - ❖ *Training of post graduate student using KAIST/Trieste/BARC model*
 - ❖ *Upgrading the reactor support facilities*
 - ❖ *Initiate the acquisition of the new high-flux research reactor (20-30MW)*



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MEASUREMENT OF KEY PERFORMANCE INDEX (KPI)

SCIENCE DRIVEN REACTOR UTILISATIONS					
ACTION PLANS	OBJECTIVES / TARGETS	CRITICAL SUCCESS FACTORS	PERIOD MONTH	ACTION BY	KPI
Pemantauan kemajuan Pelan Korporat dan R&D	Perlaksanaan mengikut jadual	Pengurusan masa, Kepakaran, peralatan & bajet	5	BPHL, RMC	4 kali/thn
2. Program sangkut pegawai MINT di institusi luar Negara dan pakar antarabangsa di MINT.	Pengetahuan & pengalaman dalam teknologi yang berkeutamaan	Penaja, bajet dan tempat latihan yang baik	5	BPSML, RMC dan BPHL	25 RO /thn 20 Pakar a/bangsa
3. Melaksanakan program kerjasama R&D	Hasil R&D yang <i>market-driven</i>	Mekanisma dan bajet	5	BPHL, RMC, UPP	50 prog/thn
4. Pertukaran maklumat penyelidikan	Pengkalan data maklumat penyelidikan	Kepakaran, bajet, metodologi & pengurusan IP	5	BPM, RMC	30 unit/thn
5. Memasarkan melalui seminar, persidangan, pameran, kursus, aktiviti promosi dan lain-lain	Memasarkan hasil R&D	Bajet, pengurusan masa, kepakaran dan modal insan	5	UPP, Pusat Latihan (MTC)	Seminar-5 pameran-5 kursus-100 promosi-60 Setahun
6. Survei kepada kumpulan sasaran	Maklumat dari pelanggan	Pengurusan masa, metodologi	5	UPP	2 kali/thn
7. Memperkemaskan kajian 'feasibility' berhubung opsyen tenaga nuklear	Mendapatkan laporan	Pengurusan masa	2	BPHL & BPT	2 kali/thn

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MEASUREMENT OF KEY PERFORMANCE INDEX (KPI)

<i>Indigenous With International Standards Reactor Support Service</i>					
ACTION PLANS	OBJECTIVES / TARGETS	CRITICAL SUCCESS FACTORS	PERIOD MONTH	ACTION BY	KPI
Pemantauan kemajuan Pelan Korporat dan R&D	Perlaksanaan mengikut jadual	Pengurusan masa, Kepakaran, peralatan & bajet	5	BPHL, RMC	4 kali/thn
Program sangkut pegawai MINT di institusi luar Negara dan pakar antarabangsa di MINT.	Pengetahuan & pengalaman dalam teknologi yang berkeutamaan	Penaja, bajet dan tempat latihan yang baik	5	BPSML, RMC dan BPHL	25 RO /thn 20 Pakar a/bangsa
Melaksanakan program kerjasama R&D	Hasil R&D yang <i>market-driven</i>	Mekanisma dan bajet	5	BPHL, RMC, UPP	50 prog/thn
Pertukaran maklumat penyelidikan	Pengkalan data maklumat penyelidikan	Kepakaran, bajet, metodologi & pengurusan IP	5	BPM, RMC	30 unit/thn
Memasarkan melalui seminar, persidangan, pameran, kursus, aktiviti promosi dan lain-lain	Memasarkan hasil R&D	Bajet, pengurusan masa, kepakaran dan modal insan	5	UPP, Pusat Latihan (MTC)	Seminar-5 pameran-5 kursus-100 promosi-60 Setahun
Survei kepada kumpulan sasaran	Maklumat dari pelanggan	Pengurusan masa, metodologi	5	UPP	2 kali/thn
Memperkemaskan kajian 'feasibility' berhubung opsyen tenaga nuklear	Mendapatkan laporan	Pengurusan masa	2	BPHL & BPT	2 kali/thn

SP-CONCLUSION

The SP proposed will trigger:

- ***Current strategies and activities seem offer sustainability aspects in current reactor utilizations and strengthen critical baseline knowledge and know-how.***
- ***New Strategic Plan for a New High Flux Research Reactor for advancing related research works and social economic related demands.***
- ***Development program for the next 10-15 years necessary.***

SP-CONCLUSION

The SP proposed will trigger: (cont.)

- ***Refocus direction, Clear policy, visioning.***
- ***National agenda S&T Infrastructure..***
- ***Enrichment and sustainability.***
- ***Good communication/public relation.***
- ***Consolidation from all parties at national and international levels.***

SP-CONCLUSION

- **We Have Done Fine in RMk 8, Though Not As Good.....We Need to Do Better in RMk 9**
- **Budget Constrains May Look the Main Obstacle to Continue Our Struggle, However, We Should be Creative Enough to Overcome This Issue**
- **See Neutron Science and Reactor Technology Be in the Forefront and Indispensable Impact To MINT Image and National Development**
- **We Need Brilliant Ideas! All these must be seen in Strategic Planning Document.**

ACKNOWLEDGEMENT

**MALAYSIAN GOVERNMENT – MOSTI,
MINT, LPTA**

**UNIVERSITIES – UTM, USM, UM,
UiTM, UKM**

**RESEARCH INSTITUTES – AMREC,
MRB, MRI**

ALL MEMBERS OF RIG

**ALL COMPANIES USING NEUTRON
TECHNIQUES**