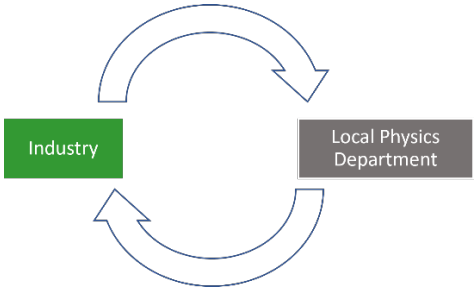
Industry Connection Roadmap (ICR)



1. Background

1.1. Aim

The overriding aim of this ICR is to foster sustainable research programmes by fostering the required connections between industry and academia.

1.2. Definitions

Sustainable research is defined as research programmes that are sustainable both financially and in terms of their ability to attract and retain good students and human capital.

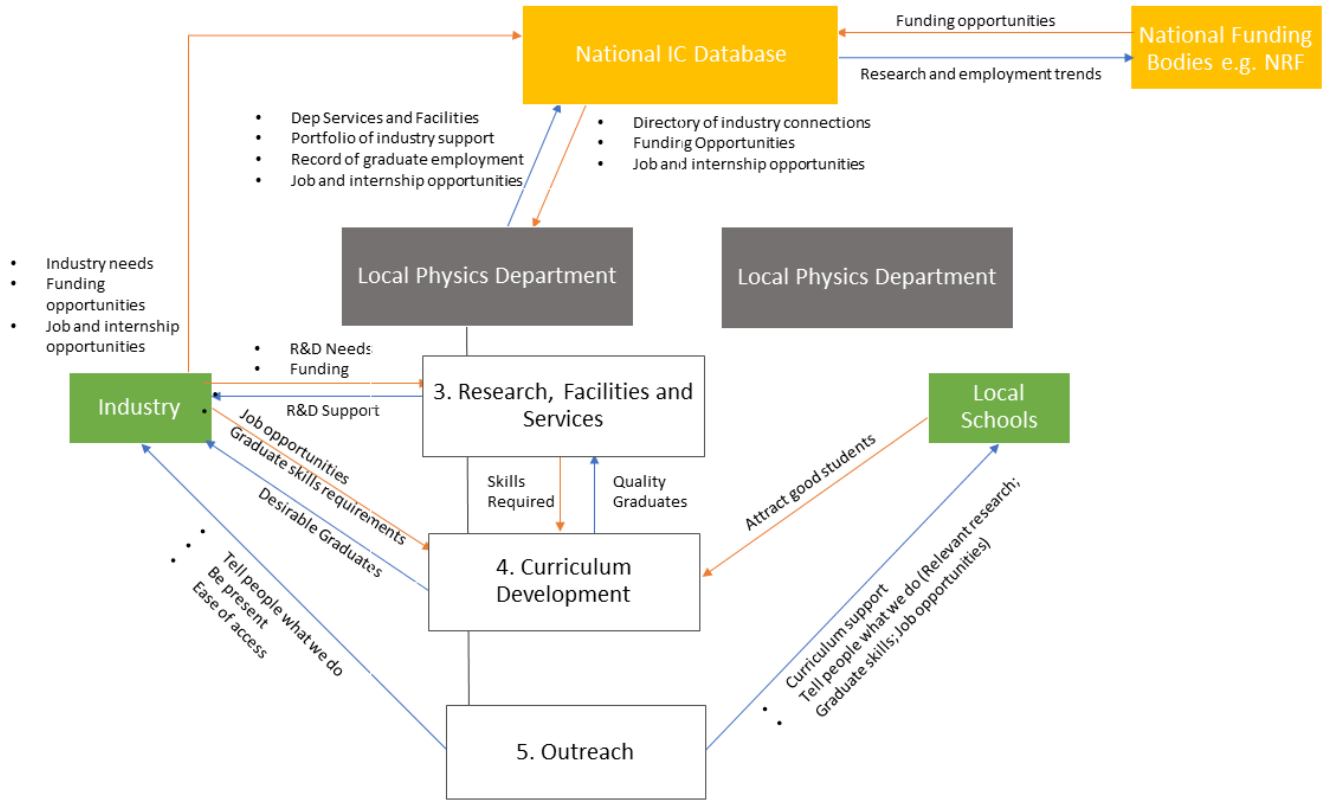
Industry is defined broadly to include parastatals (e.g. Eskom), the private sector and government agencies (e.g. CSIR and NIMISA).

1.3. Premise

The premise of this ICR is that sustainable research programmes are the natural result of quality research that serves a need in industry and/or society. The underlying assumptions are that financial support and job opportunities will follow industry-directed research, and that good students and researchers will be attracted by these financial and graduate career opportunities.

1.4. Connections

This ICR focuses on fostering the local, national and international industry connections necessary to cultivate sustainable research programmes at local physics departments across South Africa. An overview of the envisioned connections is shown in the figure below. The three main focus areas of local physics departments are research, curriculum development and outreach (engagement). This ICR will focus on developing industry connection strategies within each of these focus areas as expanded on in Sections 3, 4 and 5, respectively.



1.5. Approach

The approach laid out in this ICR to establish the above connections is summarised below:

Stage 1: Situation Analysis

Section 2 – Situation Analysis: This section aims to gather the information necessary to develop industry-alignment and outreach strategies. Topics include:

2.1. Overview of job market trends
2.2. Current and emerging research trends
2.3. Facilities and skills audit
2.4. Overview of key networking and funding bodies
2.5. Overview of funding models
2.6. Overview of potential international partners

Stage 2: Strategize

This stage encourages local physics departments to develop strategies aimed at aligning their activities with the industry needs and opportunities identified in Stage 1:

Section 3 – Research, Facilities and Services Strategy: Each local physics department is to revise their research strategy and financial model based on a gap analysis between emerging trends and existing research expertise, instrument facilities, and services.

Section 4 – Curriculum Development Framework: Each local physics department is to revise their curriculum based on a gap analysis between emerging graduate skills requirements and their existing curriculum.

Section 5 – Outreach Strategy: Each local physics department is to decide on industry sectors to target and develop outreach strategies accordingly.

Stage 3: Implement

Here, strategies are rolled out with the support of the National IC Database and Services:

Section 6 – Communication Platforms: It is anticipated that outreach strategies will be facilitated through up-to-date web directories and Industry Liaisons. The latter to fall under the banner of the *National IC Database and Services*.

Stage 4: Monitor and Adapt

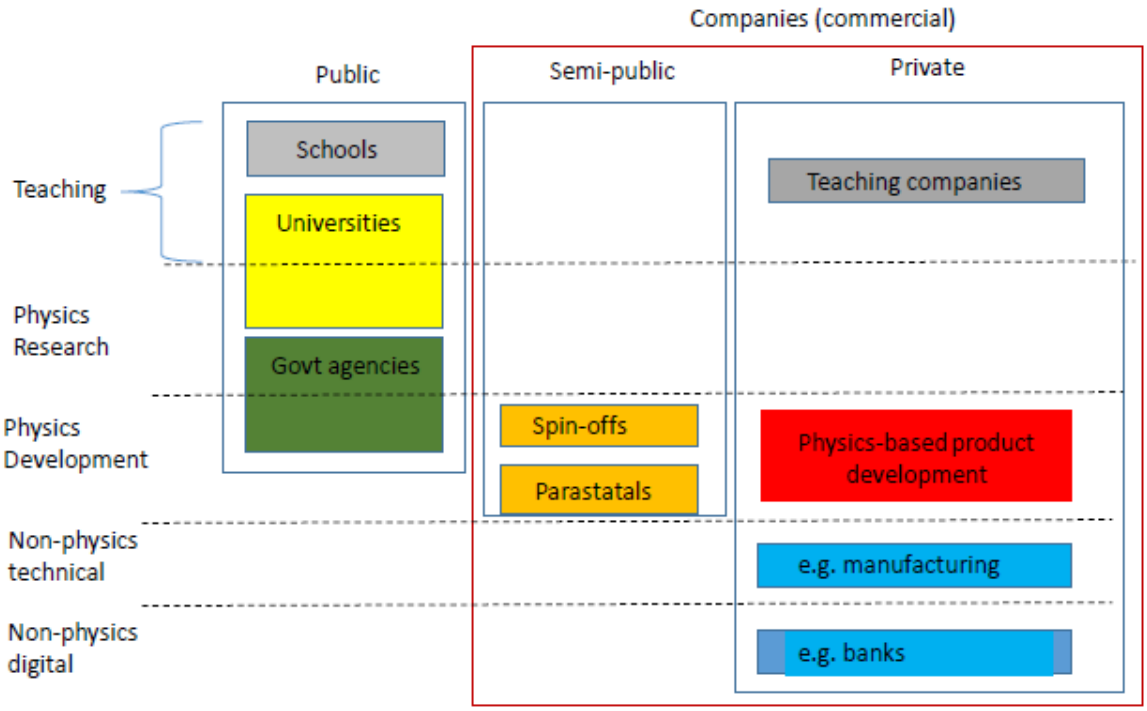
Section 7 – Monitor and Adapt: Monitor employment records and research trends for changes in skills requirements and funding opportunities. Adapt accordingly.

The anticipated **ICR Timeline and Budget** is provided in **Section 8**.

2. Situation Analysis

The organisational unit of the below analysis needs to be carefully considered as to prevent data deluge and ensure the usability of the information gathered in informing the activities of local physics departments.

Topic	Content	Source of information
2.1. Overview of job market trends	The aim here is to survey the SA and international job markets and provide an overview of key areas that can absorb SA Physics graduates. A useful delineation of key areas of engagement is given in the figure below (Matthews, SAIP 2022). Data to include: • Current and emerging employment sectors • list of sectors that employ physicists including directory of companies and start-ups (local and international) • estimate of number of jobs per sector • list of graduates and where they are employed	• Outsource to market analyst? • Graduate tracking
2.2. Current and emerging research trends	List of research groups per department.	National audit (HoD interviews, web-based form)
	List of emerging research trends.	• Outsource to market analyst? • National audit
2.3. Facilities and skills audit	List of instrument and outreach facilities, and skills per department.	National audit
2.4. Overview of key networking and funding bodies	E.g. Directory of incubators; South African Basic Sciences Platform; NRF; DST; SAPNA; SACNASP; SAIP etc.	• National audit • Innovation Office interviews (Nationally and internationally)
2.5. Overview of funding models	Overview of different funding models: locally and internationally How do other countries facilitate industry-academic projects? What funding structures do they use? What models are there?	Innovation Office interviews (Nationally and internationally)
2.6. Overview of potential international partners	Trends in international collaborations. Which countries will pay for access to our instrumentation and expertise E.g. UAE	Outsource to market analyst?



3. Research, Facilities and Services Strategy

Each local physics department is to revise their research strategy and financial model based on a gap analysis between emerging trends and existing research expertise, instrument facilities, and services (e.g. consultancy, product development, and training). Instrument facilities and training services (SLPs) can be used as a means of steady income.

4. Curriculum Development Framework

Each local physics department is to revise their curriculum based on a gap analysis between emerging graduate skills requirements and the existing curriculum.

Topic	Content	Source of information

4.1. Skills requirements	Identify graduate skills requirements based on current and emerging employment and research trends.	Section 2
4.2. Physics Graduate Skills and Attributes Framework	Update Physics Graduate Skills and Attributes Framework accordingly. Then discuss how this can be integrated into current physics programmes.	Existing *Physics Graduate Skills and Attributes Framework*

5. Outreach Strategy

Outreach strategies should focus on developing long-term relationships (awareness, presence and trust) with industry. Academics and potential industry partners need to be well-acquainted with each other (mutual knowledge of services and needs) and means of access and collaboration need to be ever-present and clear. There are to be *no unmanned store fronts* a.k.a. unread websites. Rather, local departments to connect with industry at the ground level (e.g. play golf).

In addition to industry-directed outreach, schools and public outreach can also play a role in developing general awareness of a department, their services and skills.

Topic	Content	Source of information
5.1. Advisory committees	E.g., Physics Industry Forum / Advisory Panel	
5.2. Target sectors and regions	Which sectors to target and in which geographical regions	Section 2
5.3. Outreach strategy	*Public and schools:* Outreach facilities, school support programmes, events etc.	
	Industry: How will connections with industry (in the identified key areas) be created, strengthened and sustained? How will department leverage National IC Database and Services? Identify stages of development. Different institutions will be at different stages. E.g. make connection – consult – spinoff company	
5.4. Departmental portfolios	Department services and facilities; Portfolio of industry support; Product development etc.	

6. Communication Platforms (National IC Database and Services)

It is anticipated that communication and outreach strategies (see Section 5) will mainly be facilitated through up-to-date web directories and the Industry Liaison(s). The latter to fall under the banner of the National IC Database and Services.

6.1. Web Directories

- Use SAIP and/or Applied Physics websites
- Apply data visualisation tools and capabilities
- List of directories (National IC Database):
    - Job portal
    - Funding sources and instruments (including incubators)
    - Postgraduate industry projects and internships
    - Secondment and consultancy needs
    - Departmental research portfolios
    - Instrument facilities
    - Outreach info:
        - Outreach facilities
        - School support programmes
        - Department of Education connections
        - Annual school activities e.g. SciFest
        - Events
    - Alumni employment records (job description, company etc.)
    - Directory of Companies:
        - That employ physics graduates
        - Consultancies, spin offs, start-ups

6.2. Industry Liaison(s)

- One national person
- Each department also has a local industry liaison
- In charge of populating directories (visible to all)
- Available for consultation (directories are difficult to navigate):
    - Assist industries:
        - Advertising posts
        - Finding research partners
    - Assist academics:
        - Finding jobs
        - Finding research partners
        - Connect with in-house innovation office for funding model and legal support
- Create presence – with academics and industry:
    - To foster participation from both sides
    - Be the friendly, well-known, easily accessible face of physics locally and nationally
    - Implement outreach strategies
    - Market National IC Database and Services

7. Monitor and Adapt

- Monitor employment records and research trends for changes in skills requirements and funding opportunities. Adapt accordingly.
- Monitor success against KPIs?

8. ICR Timeline and Budget

Stage	Action Items	Outputs	Responsible Person	Budget	Deadline
Stage 1: Situation Analysis	Market analyst report	ICR Strategy Document: Section 2	Outsource	Required	TBC
	Graduate tracking	Data for National IC Database (Section 6)	APC	None	TBC
	National audit		APC	None	TBC
	Innovation Office interviews		APC	None	TBC
Stage 2: Strategize	Appoint advisory committees	Advisory committees (Sections 3-5)	APC Local dep.	None	TBC
	Research, Facilities and Services Strategies	ICR Strategy Document: Sections 3-5	Local dep.	None	TBC
	Curriculum Development Frameworks	SAIP Plenary talk	Local dep.	None	July 2023?
	Outreach Strategies		Local dep.	None	TBC
Stage 3: Implement	Develop and populate National IC Database website (Section 6)	National IC Database and Services	Outsource	Required	TBC
	Appoint Industry Liaisons (Section 6)		APC Local dep.	Required	TBC
Stage 4: Monitor and Adapt	Review strategy document (Section 7)	Revised Strategy Document	Industry Liaison	None	Every 5 years