Toward an Efficient and Sustainable National Innovation System

Challenges to the Innovation System and Technology Transfer in the Sultanate of Oman

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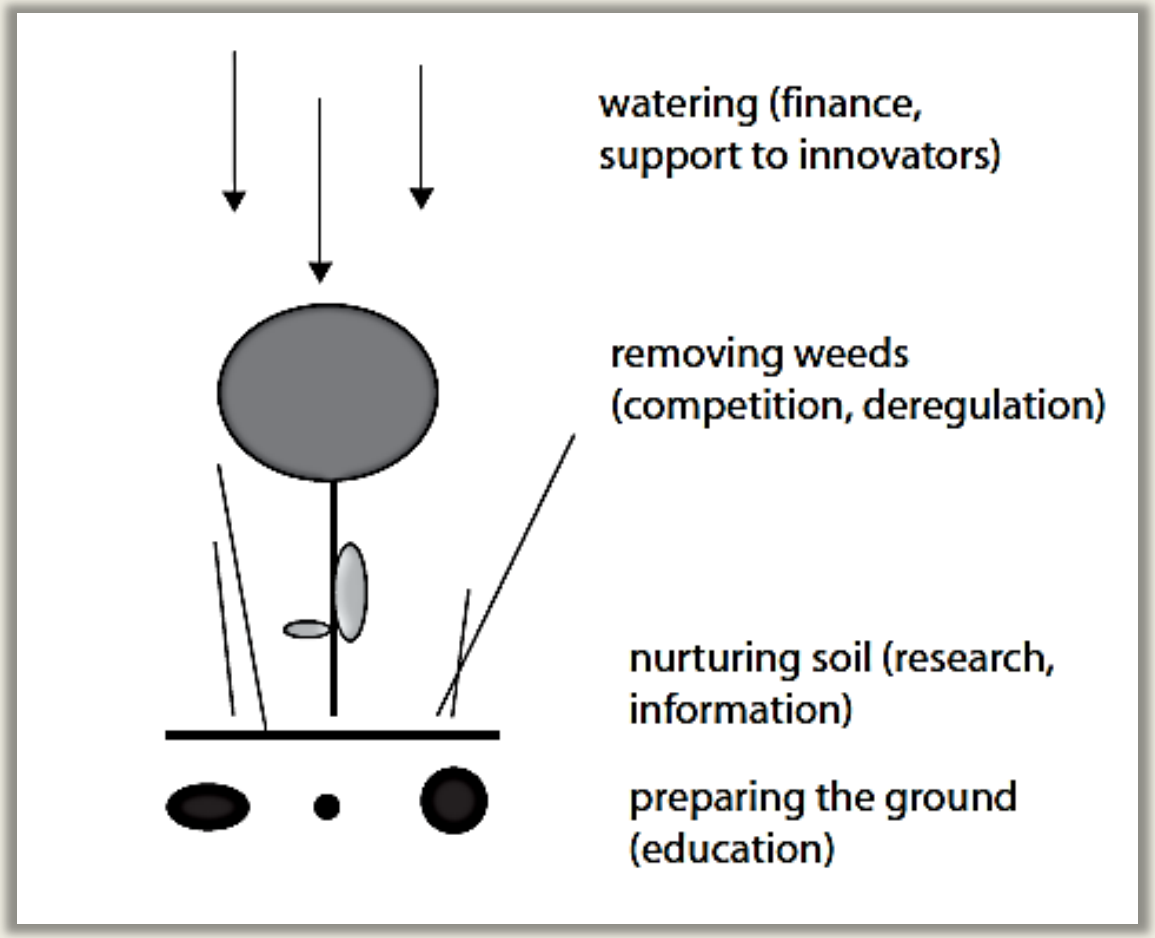
What is Innovation?

innovation means technologies or practices that are new to a given society. They are not necessarily new in absolute terms. These technologies or practices are being diffused in that economy or society.

Gardening Innovation



Source: Innovation Policy by World Bank (2010)

The importance of relationship between:

- Technology transfer strategies;
- Organization structure; and
- New firm creation in research universities.

Innovation in Oman

- Innovation efforts are scattered and mostly based on personal relations (UNCTAD 2012).

- Most TT happened in ITC sector which require less efforts to commercialize (less cost, short-life incubation, quick result).

School Education

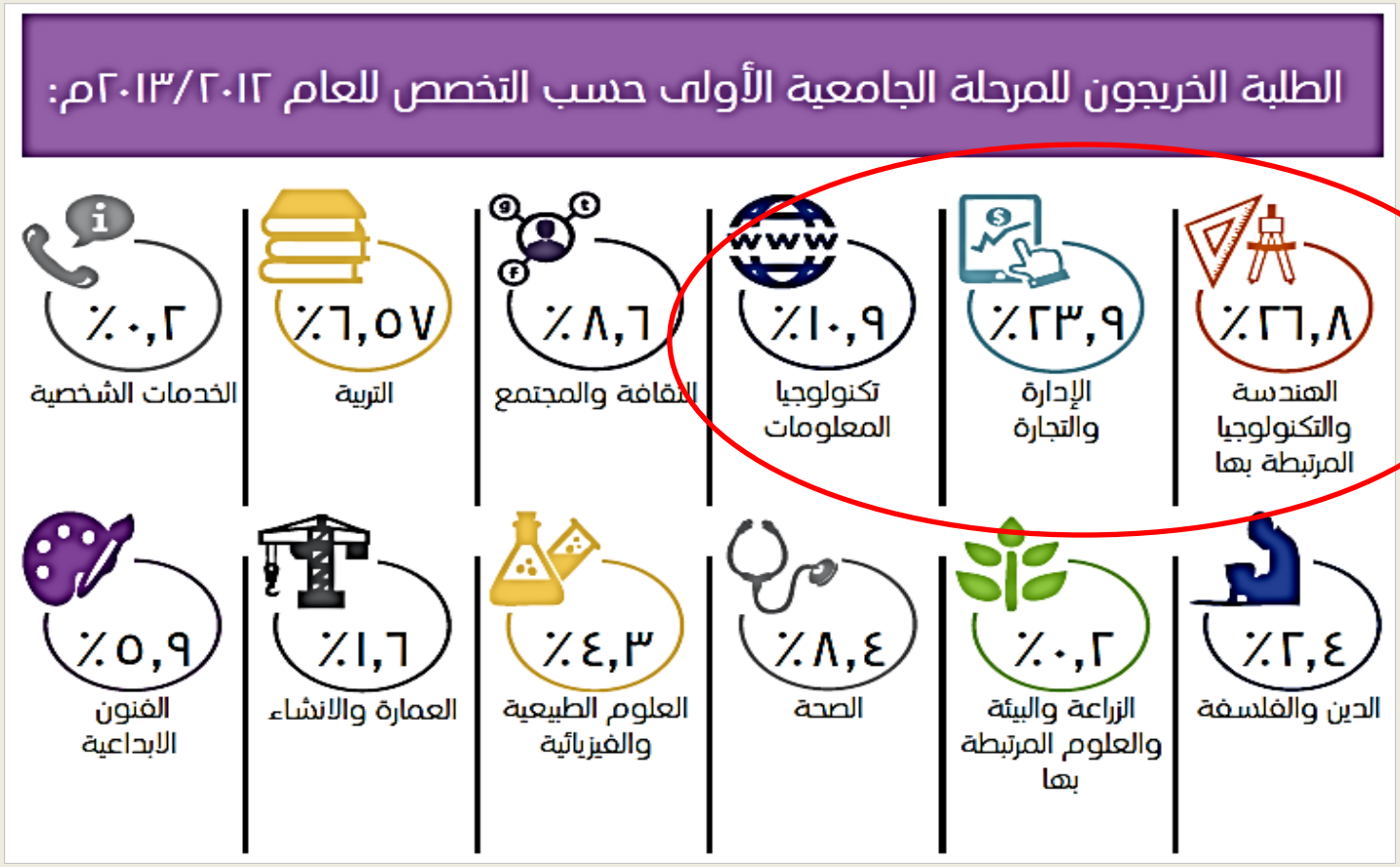
- In Education Policy: Focus should be on developing ***Human Capital*** as important tool to overcome innovation obstacles in developing countries (GII2015).
- Education is ***first stage*** in Innovation cycle to recognize the talents.
- Challenge in ***accommodating innovation principles*** in the curriculum.
- ***Teaching methods*** should be based on projects/experiments and team works.

Higher Education

GII 2016 Ranking Oman in:

- Tertiary Education 5th place.
- Science &Engineering Graduates 1st place.
- Oman is strong in input but weak in output.

Higher Education Graduates 2012/2013



Innovation Support Institutions

1. Knowledge Generator (Universities & Research Institutions).
2. Knowledge Diffuser (Science Parks, Incubations).
3. Knowledge Regulator (IP office).

1. Knowledge Generator

- Universities and Research Institutions Public and Private.

- **Role of TTO:** The bridge between Academia and Industry to bring the technology from the Lab to the Market.

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Challenges in Universities

- Difficulty of ***aligning the Bylaws*** of government research institutions to the technology transfer needs (joint venture, shares in startups).
- ***Innovation policy*** should be independent from research policy.
- ***Foundation year*** for students is a must in math, IT and English before 1st academic year.
- Lack of ***incentives for researchers*** to do research. Losing the investment spent on preparing researchers who leave and move to admin job.
- Lack of ***incentives for researchers to patent*** their inventions.
- Research is more academic not aligning it with industrial needs. ***Gap between research and commercial feasibility***.

Cont.

- ***Academic Promotion*** Policies incentivize researchers to publish not to patent.
- Not having ***provisional application*** filing procedure in IP office to allow researchers to quick file and publish without destroying the novelty of their patent application later.
- ***Weak linkages*** between specialized agencies (public and private) in strategic research to support or create national industries.
- Need to strengthen ***Public Private Partnership*** (PPP) in applied research.

2. Knowledge Diffuser

Support Technology Readiness Level through Incubations and prototype support.

- Innovation Park Muscat (IPM).
- Oman Science Club.
- Knowledge Oasis Muscat (KOM).
- SAS Entrepreneurship Center in ITA.
- Industrial Innovation Centre (IIC).

Challenges

- Lack of Support to existing innovation agencies exp. Oman Science Club (fund, facilities)
- Lack of support to tech-based incubation in engineering, chemistry..etc.
- Lack of competencies in innovation and IP as mentors for innovators.

3. Knowledge Regulator

Intellectual Property Office in the MOCE.

- Receiving and examining patent applications.
- Receiving and examining trademarks, industrial designs and other IPs.
- Reply to the IP infringement cases.
- Administer the IP laws in Oman.

The Research Council:

- Research Funding Programs
- Research Support Systems
- National Innovation Strategy

Information Technology Authority:

- National Strategy for Digital Oman Society
- IT Infrastructure projects
- IT as enabler for Innovation

Office of Science, Knowledge & Technology (MOFA).

Important Note

- Carefully select the suitable Support programs to **fill the industry gap *by Omanis***.

- Big firms R&D Centers or international new high tech startups should ***enable Omanis to innovate*** and enter the market not to block the new local industry to flourish by bringing competitors.
- **Incubations** should not be renting spaces.

Patent System in Oman

IP Office

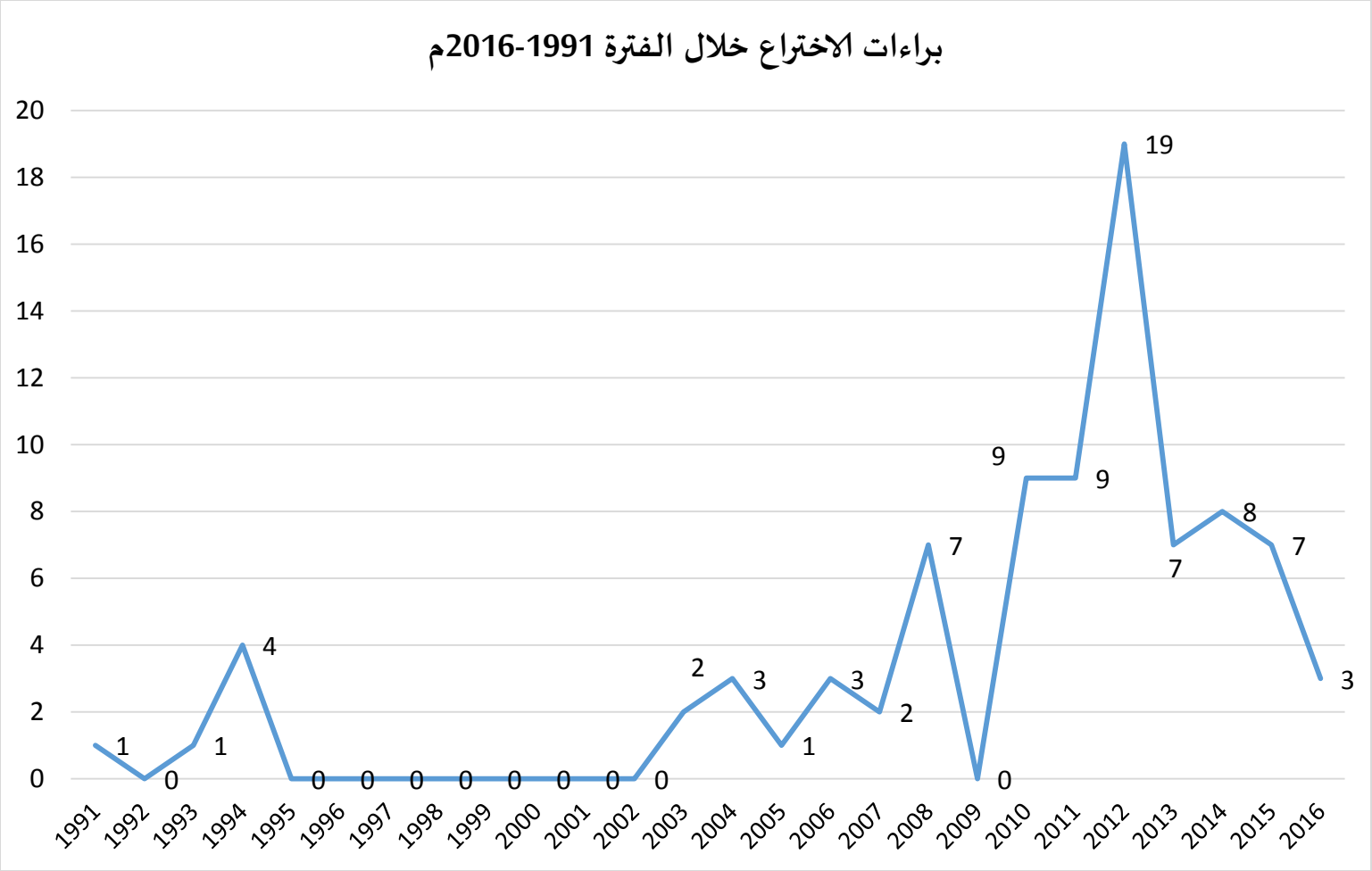
Has to make the IP system **efficient** and **more affordable** to foster local innovation.

- IP Office should activate the in-house technical examination and speedup the patent process (In Progress).

Currently Patent examination in the Egyptian Office.

- Oman is an international receiving office for the international applications PCT.

Number of patents filed in different countries for inventors residing in Oman



- **86** patent filed from Oman in Foreign countries (EP/US/DE/PCT).
- **4 only for academic** institution (SQU).
- 82 for foreign inventors working in Shlumberger and Shell or sole inventor.

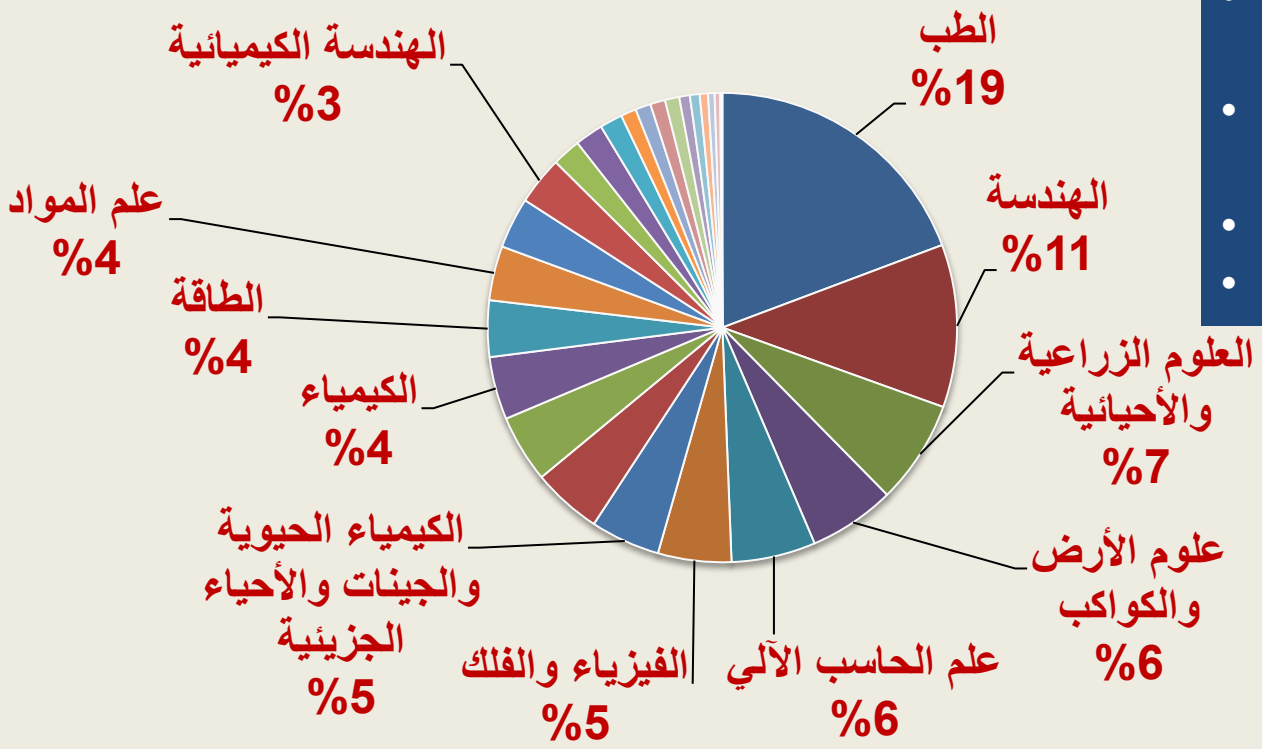
What to Do?

- National Policy to oblige the international companies and institutions ***to file first in Oman*** for inventions produced in Oman (exp. India).
- Institutional policies to oblige the researcher to ***disclose any invention to his institution*** related to his scope of work or involve significant use of resources and file it through his institution.

Potential Omani Technologies for Patenting

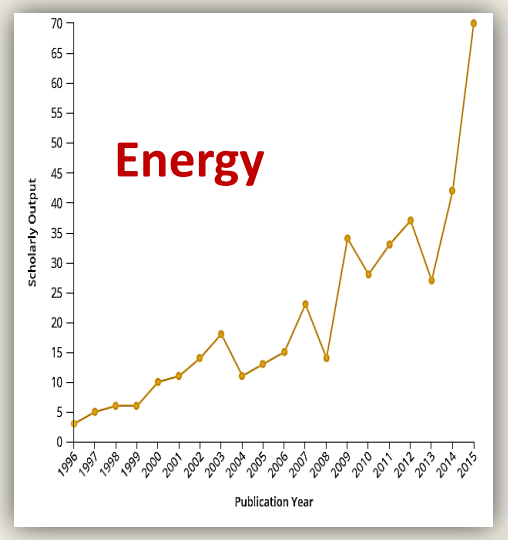
Oman Publications (1967-2016)

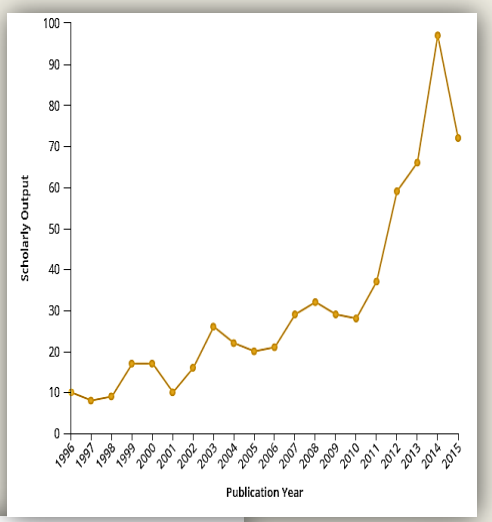
Scopus 2016



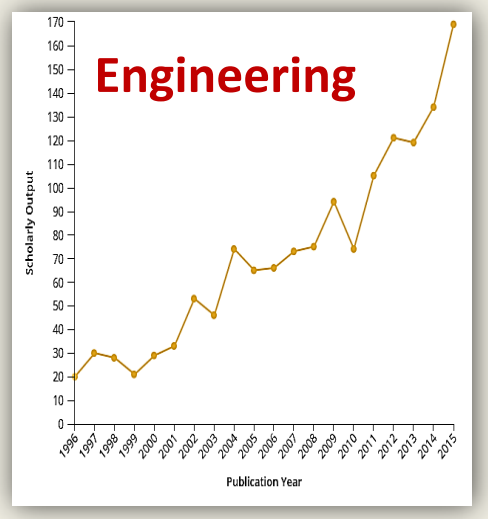
- 19% Medicine
- 14% Chemistry, BioChem, Genetic, MolecBio, Physics
- 13% Energy, material, Environment
- 11% Engineering
- 7% Agriculture& Biology

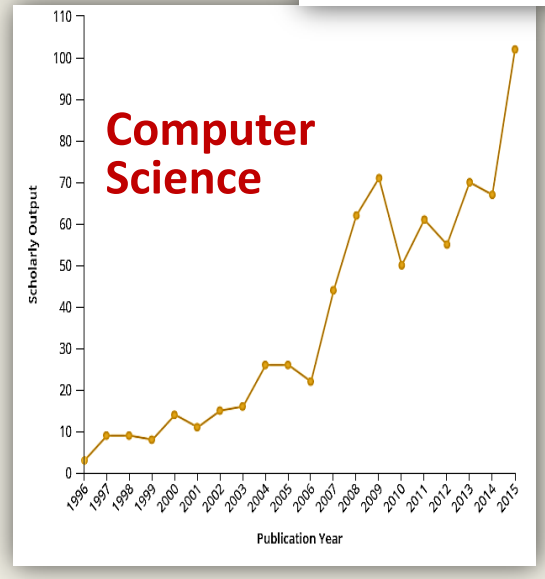
Trend in Applied Science Output

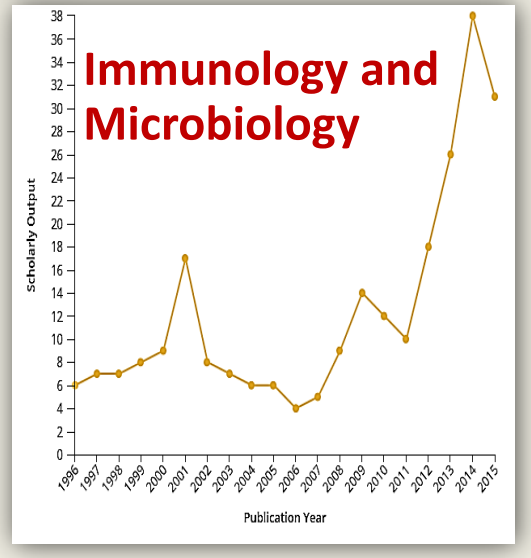




Biochemistry, Genetics and Molecular Biology

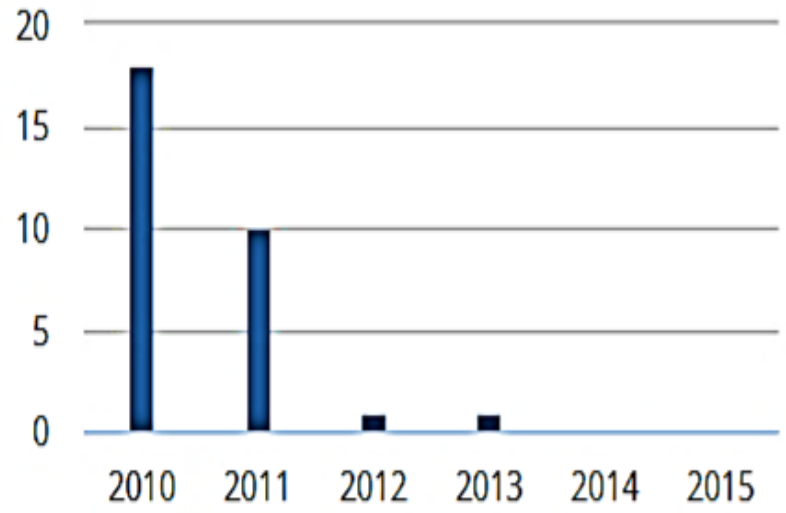






Patent Citation of Omani Publications

Citing-Patents Count



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count of patents citing the scholarly output published by Oman

Technology Transfer

In the context of UN and other multilateral agreements, technology transfer has often been viewed as a "transfer in" process by which developing countries seek to gain access to technical goods and know-how imported from the developed world.

Tech Transfer Definition

The process of transferring scientific findings from one organization to another for the purpose of further development and commercialization. The process typically includes:

- Identifying new technologies.
- Protecting technologies through patents and copyrights
- Forming development and commercialization strategies such as marketing and licensing to existing private sector companies or creating new startup companies based on the technology

Source: AUTM

Technology Transfer

- Three elements “Triple Helix”:

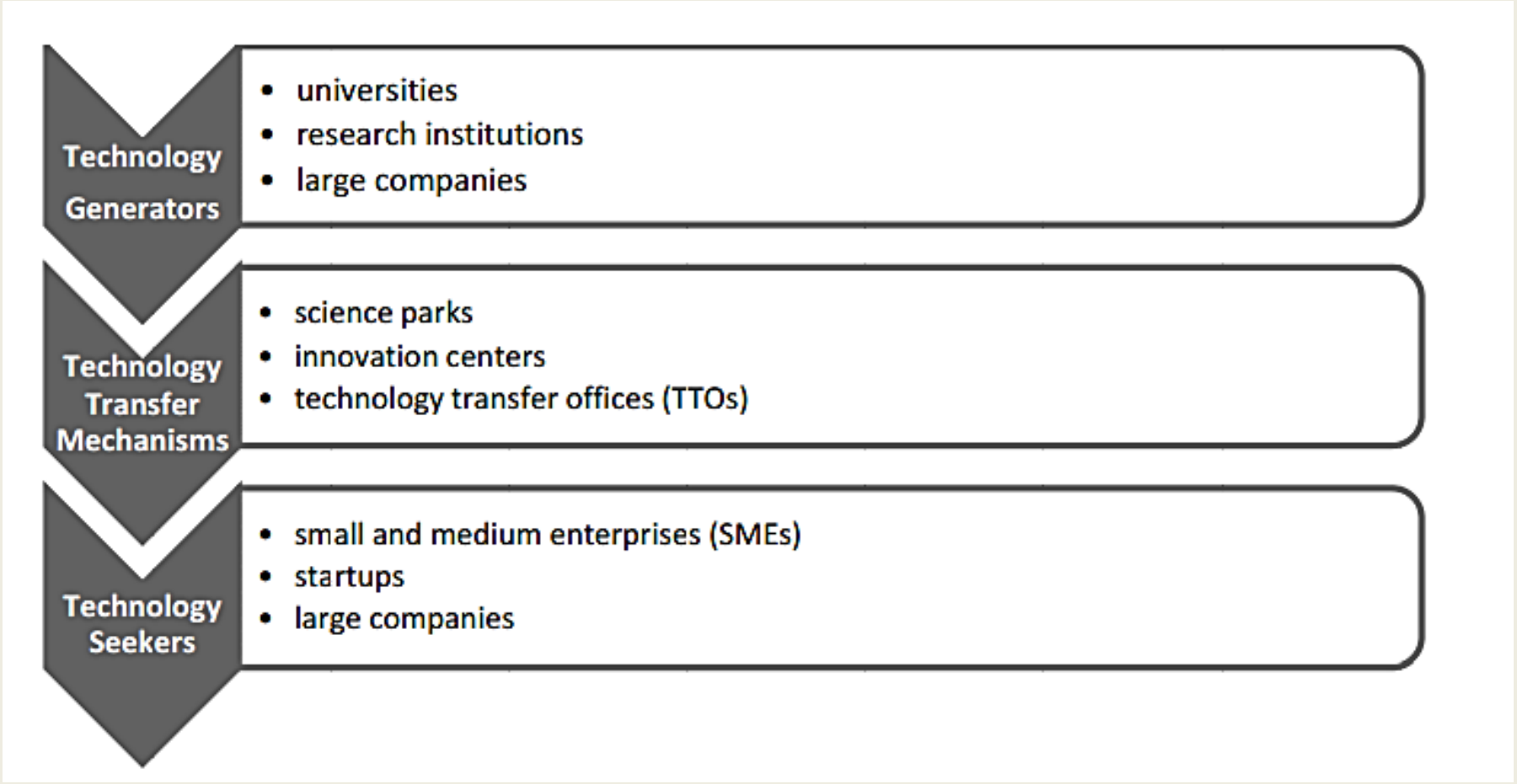
Universities, Government and Industry.

- fourth element “four-leaf clover” model:

Catalysts of innovative activities as technology transfer offices (TTOs), research parks.

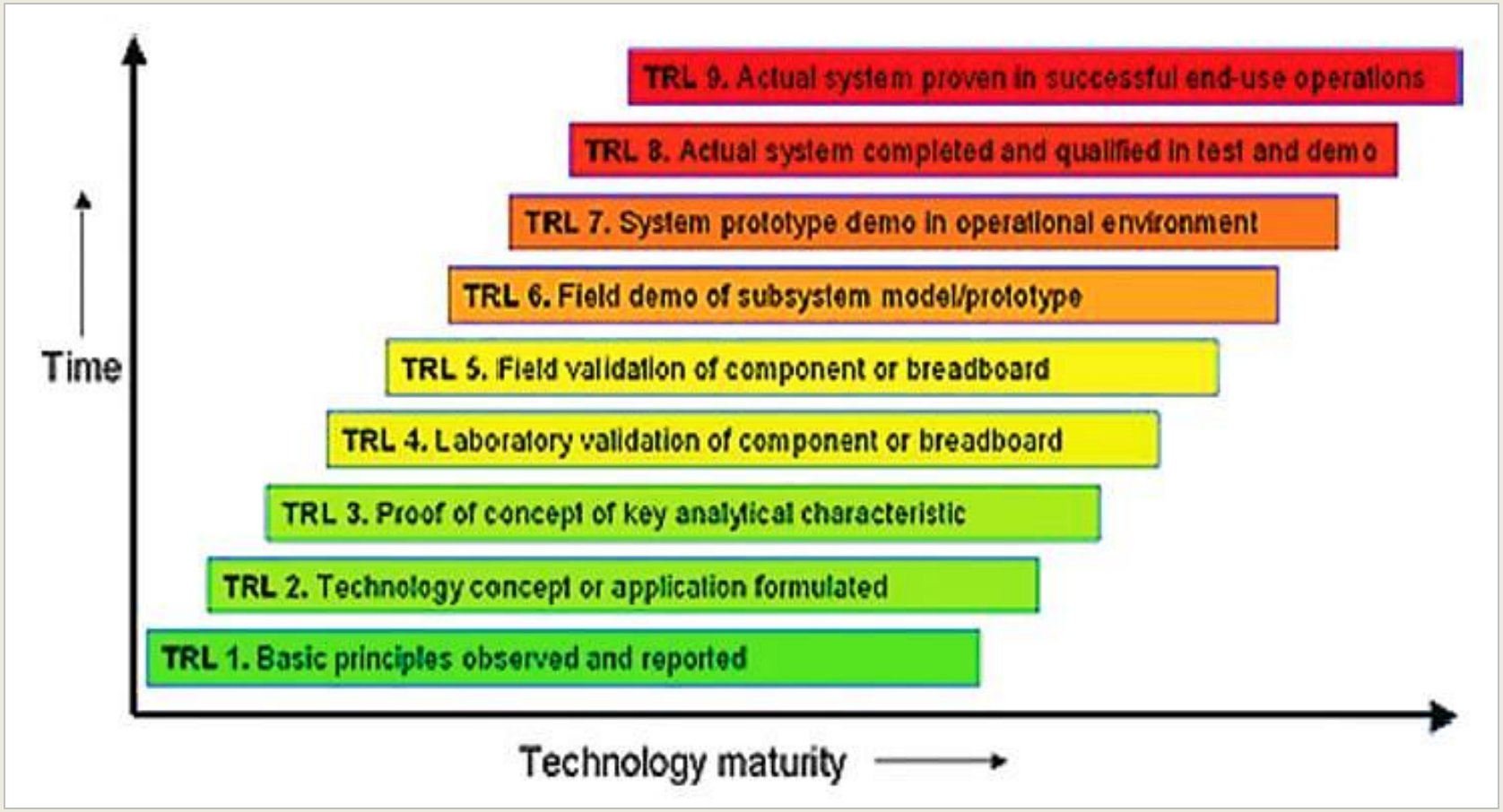
Source: Guth &Cosnita, 2010

Technology Transfer Model



Source: Abdurazzakof, 2015

Technology Readiness Level (TRL)



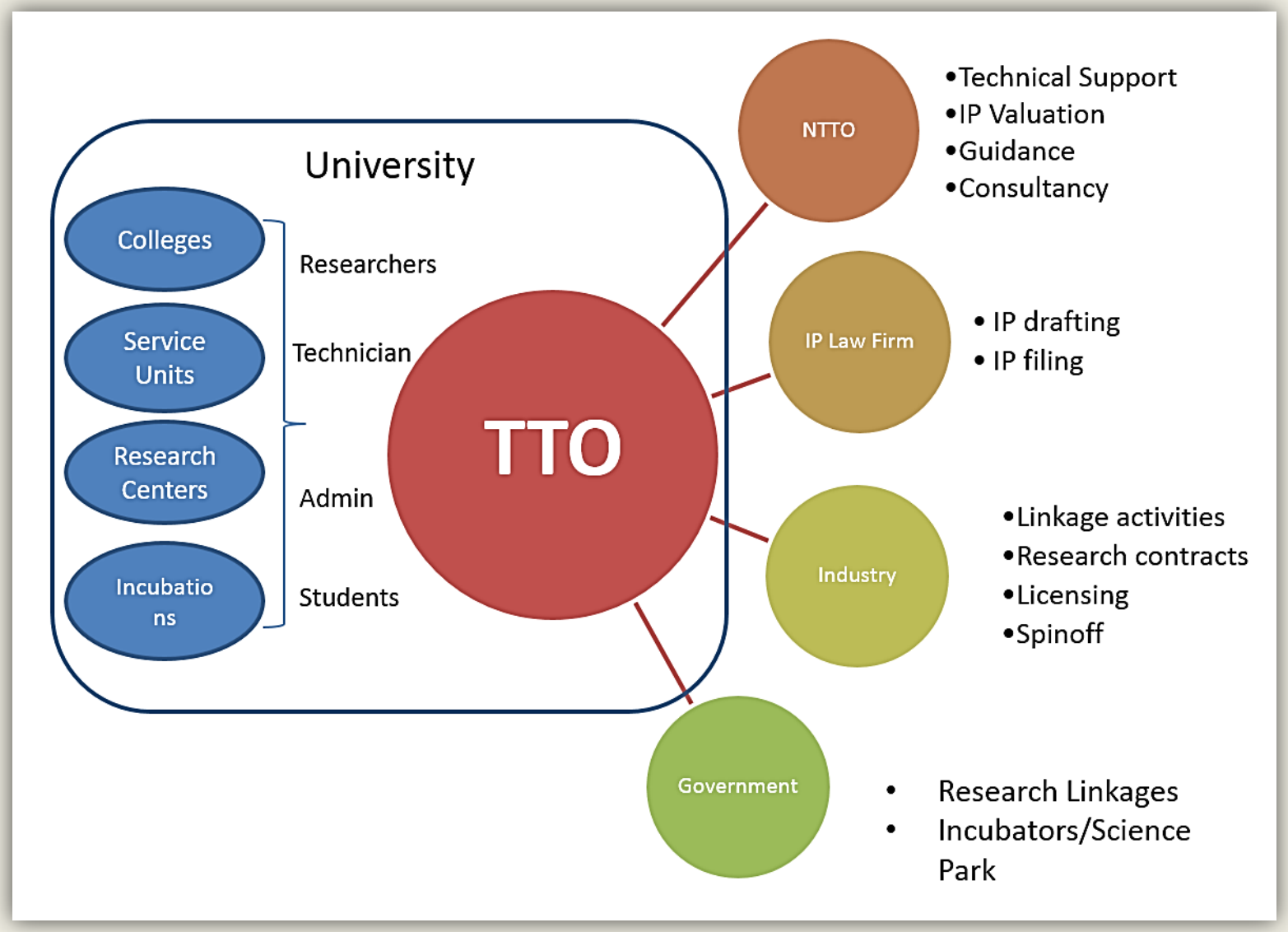
Source: NASA

Types of TT at Academia

1. Direct: Technology transfer offices (TTOs) of universities which take the results of research conducted at the university and take steps to commercialize.

2. Indirect: IP brokerage companies that facilitate an interaction between technology generators (universities and research institutions) and technology seekers (companies and SMEs). *Not recommended*!

TTO Working System

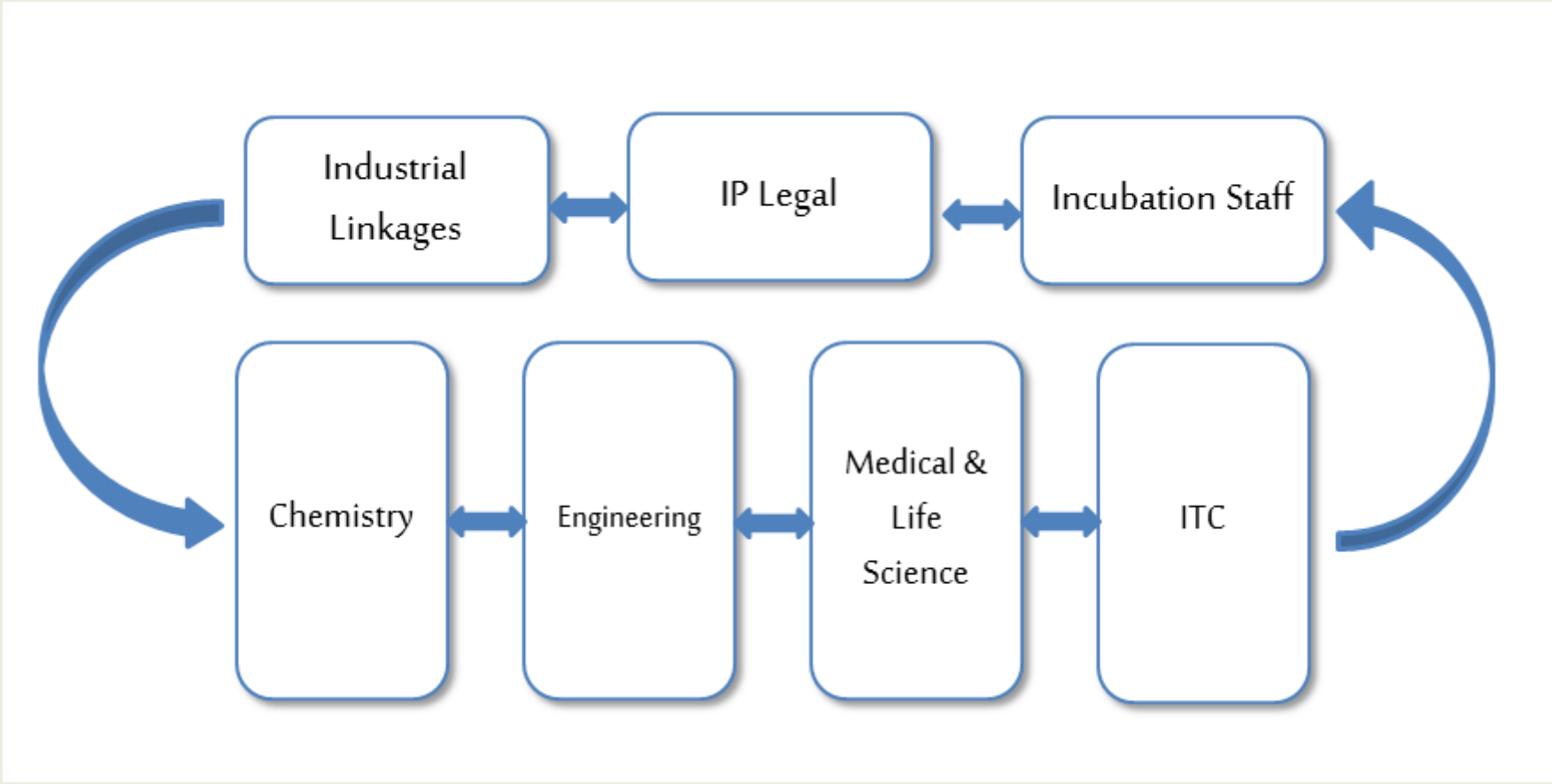


TTO Main Tasks

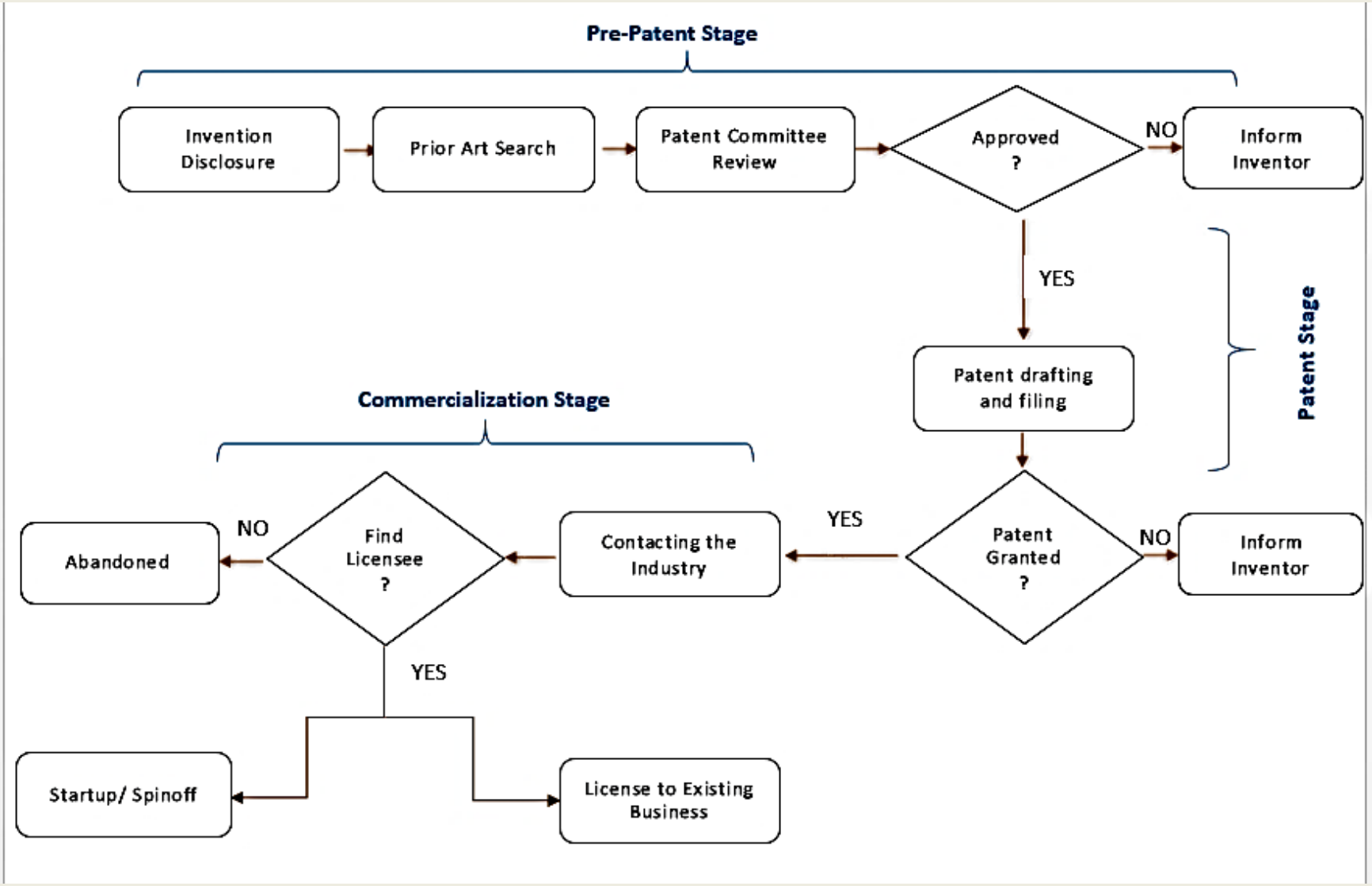
OTT personnel are responsible to:

1. Evaluate and valuate disclosures of new discoveries.
2. Seek legal protection for the technology, primarily through patenting.
3. Sell licensing agreements to industry.
4. collect royalty.
5. Enforce contractual agreements with licensees.
6. Build and maintain industrial linkages.

TTO Specialists & Working Flow



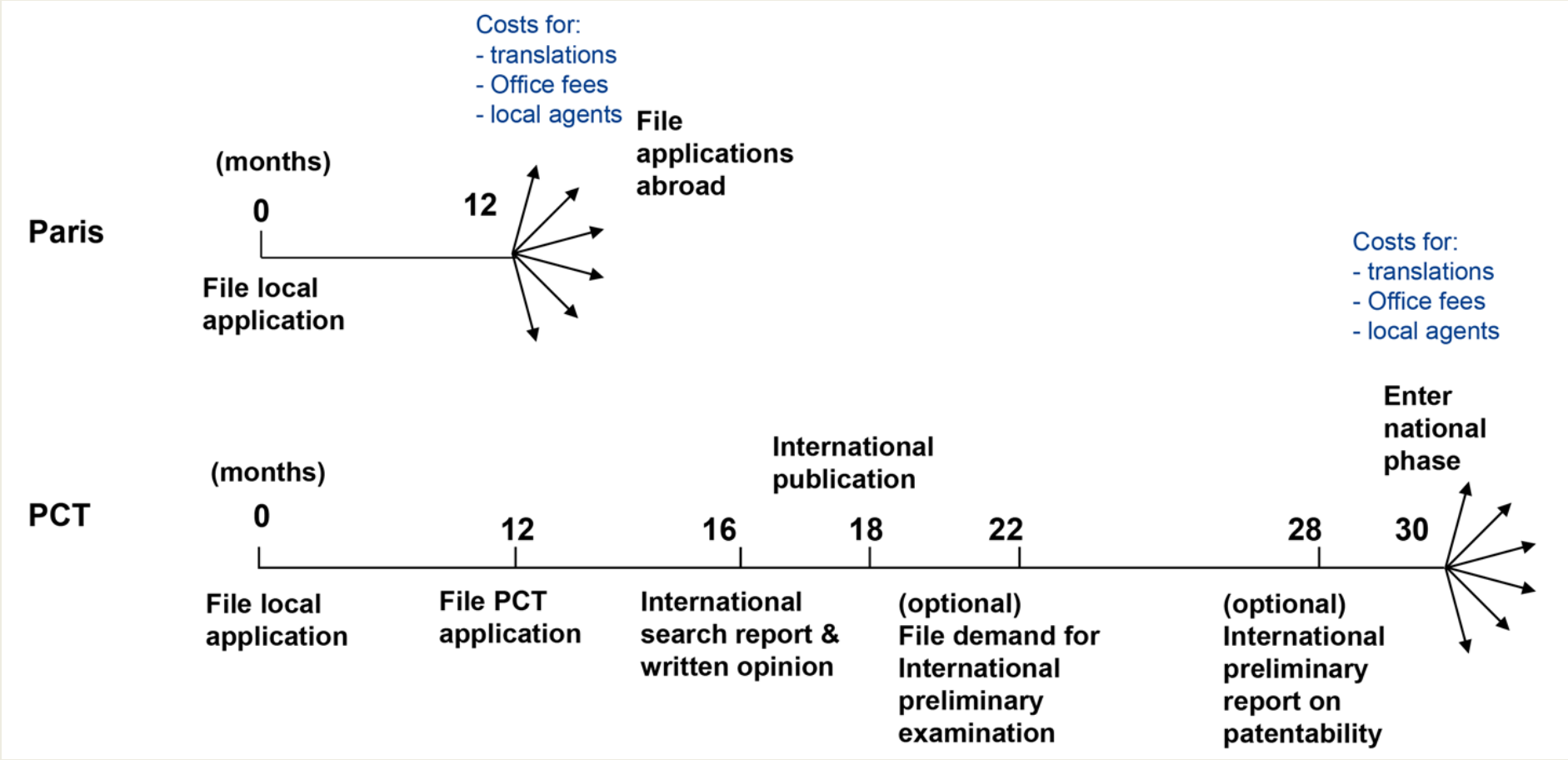
TT Stages


Pre-Patent Stage
Invention Disclosure
Prior Art Search
Patent Committee Review
Approved ?
NO
Inform Inventor
YES
Patent drafting and filing
Patent Stage
Commercialization Stage
Patent Granted ?
NO
Inform Inventor
YES
Contacting the Industry
Find Licensee ?
NO
Abandoned
YES
Startup/ Spinoff
License to Existing Business

Disclosure of IP

- ***Provide sufficient technical information*** on the novelty of technology supported by drawings, pictures..etc.
- Enough disclosure will assist in ***patentability search*** and ***drafting*** process.
- ***Disclose all personnel involved*** (FYP previous year or MSc project) except contract based job.
- Disclose if a result from ***sponsored research***.
- Disclose the ***commercial applications*** and potential licensees.
- Disclose the ***market potential*** and segment.

Patent Filing Options



TTO Infrastructure

- **Institutional Resources**:

Offices, IP policy, authorization to speedup the formalities.

- **Human Resources**:

Science, Legal and Business staff.

Senior staff with experience to deal with researchers and industry.

- **Financial Resources**:

To cover the patent filing, pre-incubation, prototyping.

Key Tech Transfer Organizations

الموقع الإلكتروني	الاسم باللغة الانجليزية	الاسم بالغة العربية
www.wipo.int	World Intellectual Property Organization	المنظمة العالمية للملكية الفكرية
www.autm.net	Association of University Technology Managers (AUTM)	جمعية مديري التكنولوجيا بالجامعات
www.acctcanada.ca	Alliance for Commercialization of Canadian Technologies	التحالف من أجل تتجير التكنولوجيا الكندية
www.lesusacanada.org	Licensing Executive Society (LES)	مجتمع مرخصي التكنولوجيا
www.praxisunico.org.uk	Praxis Unico	براكسيس يونيكو
http://attp.info	Alliance of Technology Transfer Professionals (ATTP)	تحالف خبراء نقل التكنولوجيا

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Thank you