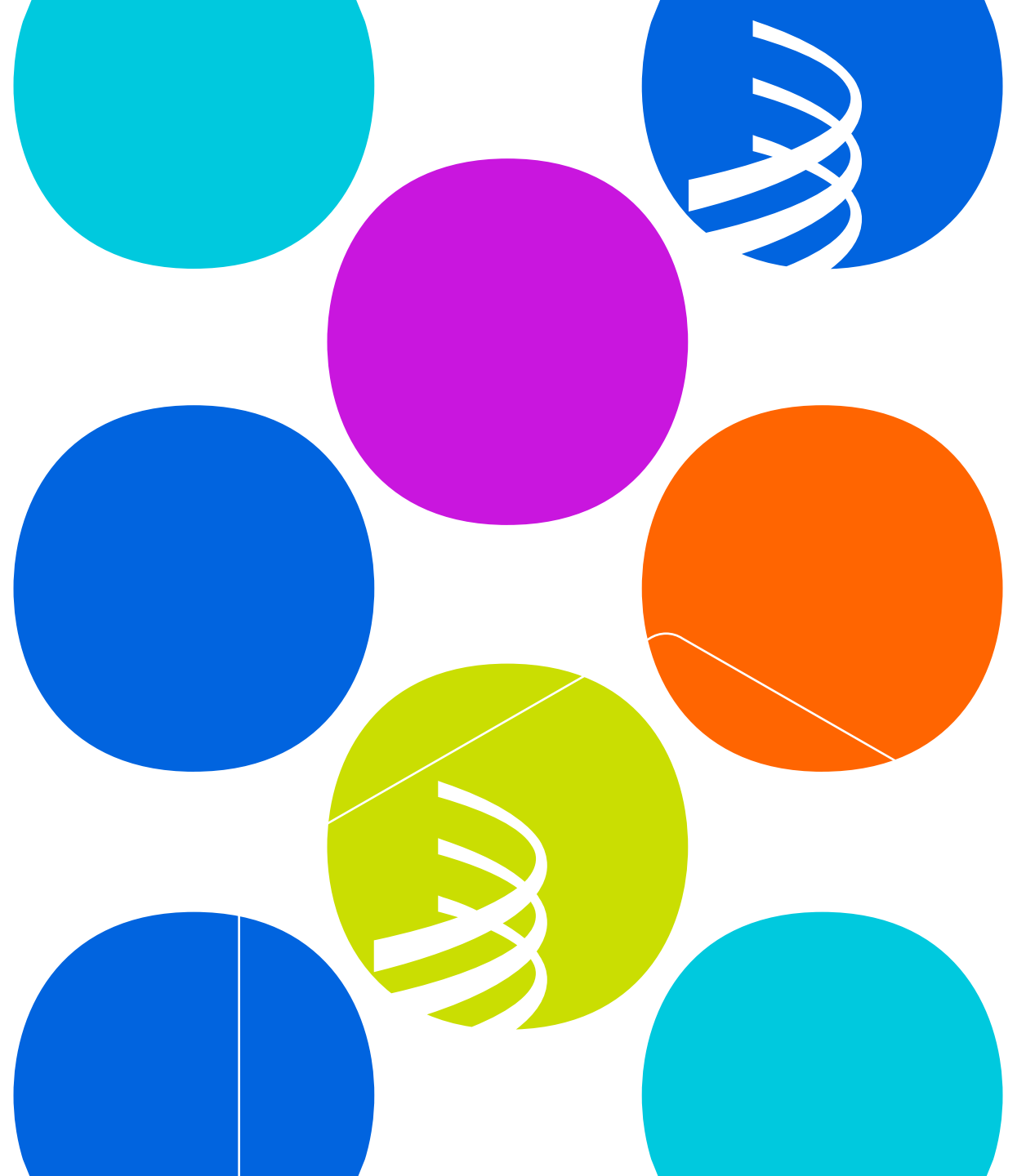


WIPO

Module 2: Innovation Ecosystems

Clement Sternberger, Carlotta Nani

Innovation Economy Section - WIPO



Why do economists care about intellectual property?

Innovation drives economic growth through a variety of mechanisms...

- **Capital** intensification.
- Improving **human capital**.
- Increased **business productivity**.
- Changes in the **productive structure**.

“The invention of all those machines that so facilitate and shorten work seems to have originally been due to the division of labor.”

Source: Adam Smith, Wealth of Nations, 1776



Questions:

Who is part of the Bhutanese Innovation Ecosystem?

Why do we call it Ecosystem?



Innovation Ecosystems



Innovation ecosystems



Government



A community of interconnected actors that facilitate the generation, acquisition, and dissemination of new knowledge



Academia



Companies

Innovation Ecosystems



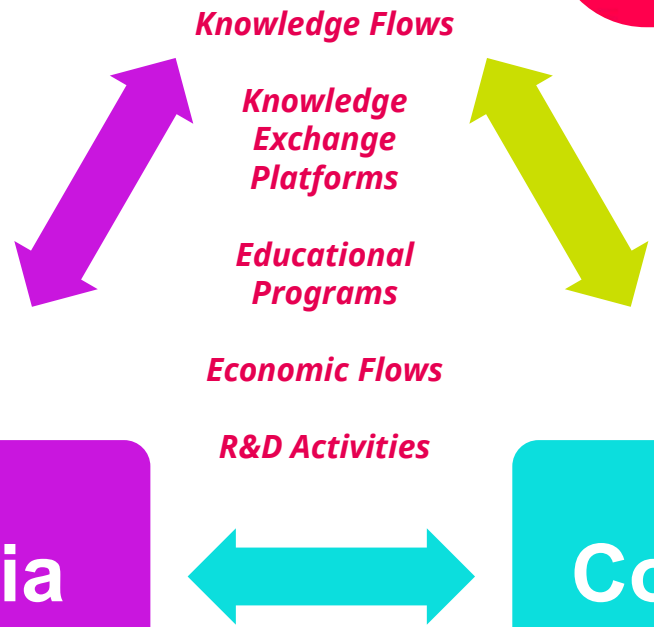
Academia



Government



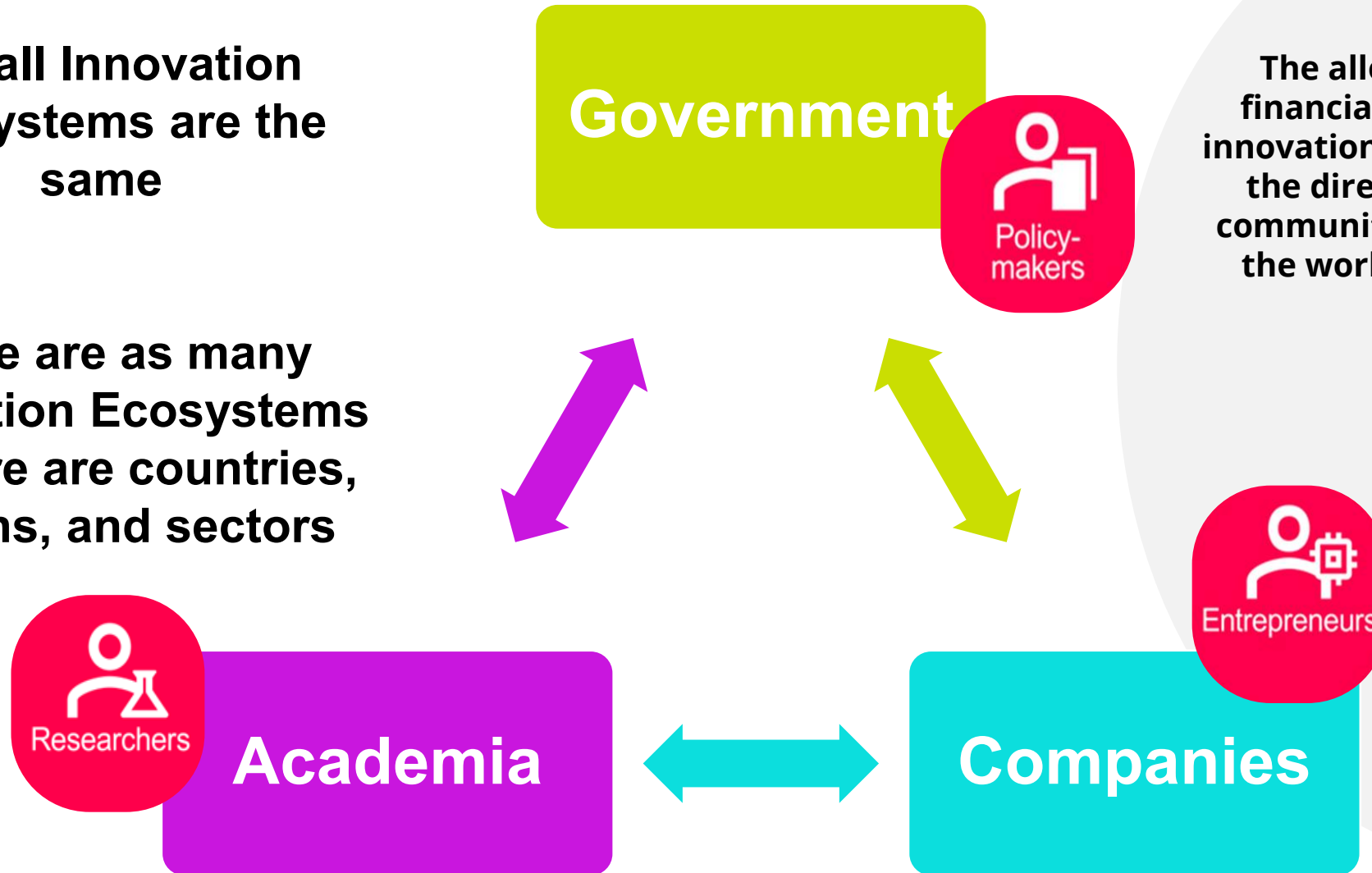
Companies



Innovation Ecosystems

Not all Innovation Ecosystems are the same

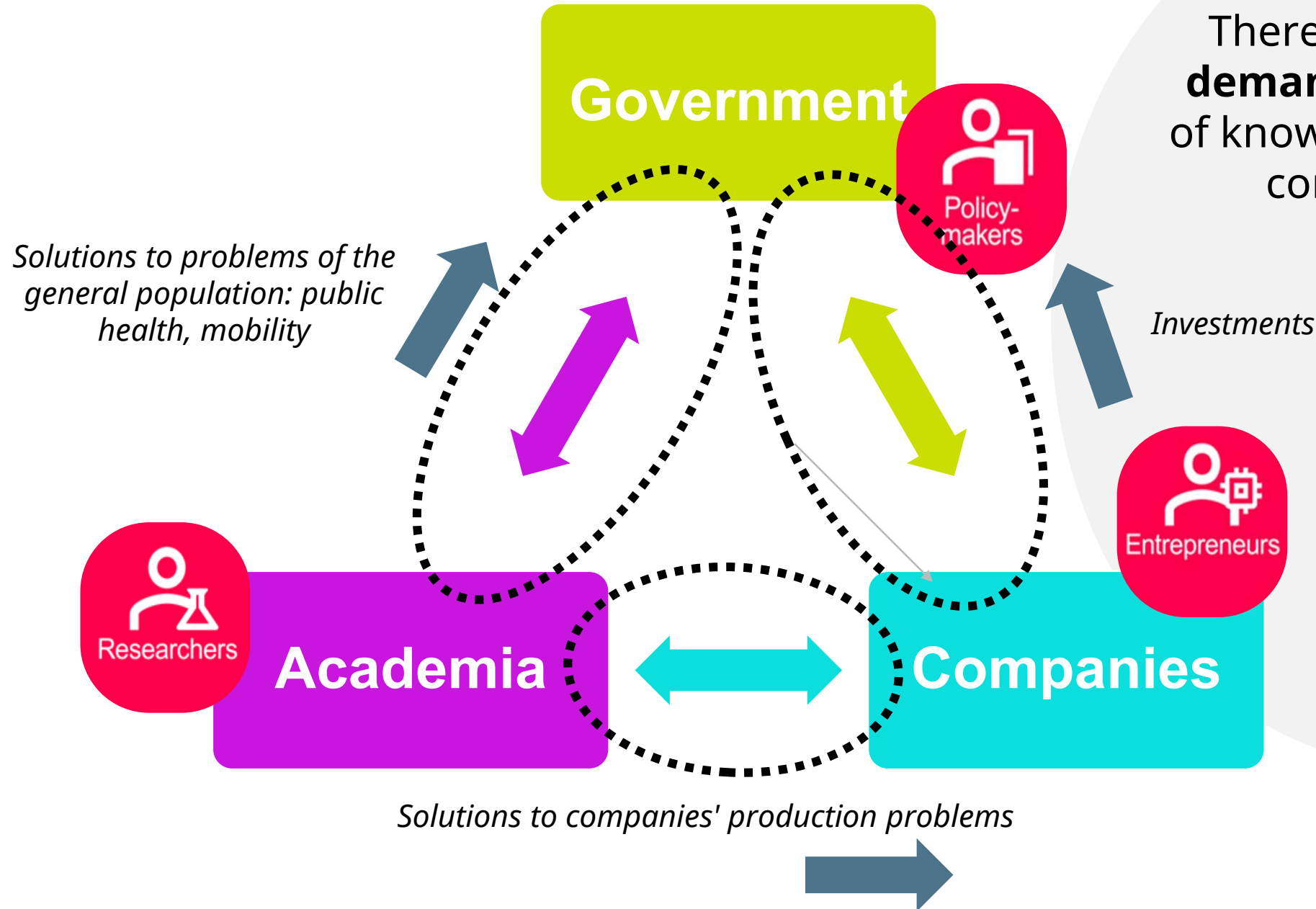
There are as many Innovation Ecosystems as there are countries, regions, and sectors



The allocation of human and financial resources to different innovation activities can determine the direction of innovation for communities, countries, and even the world for decades to come.

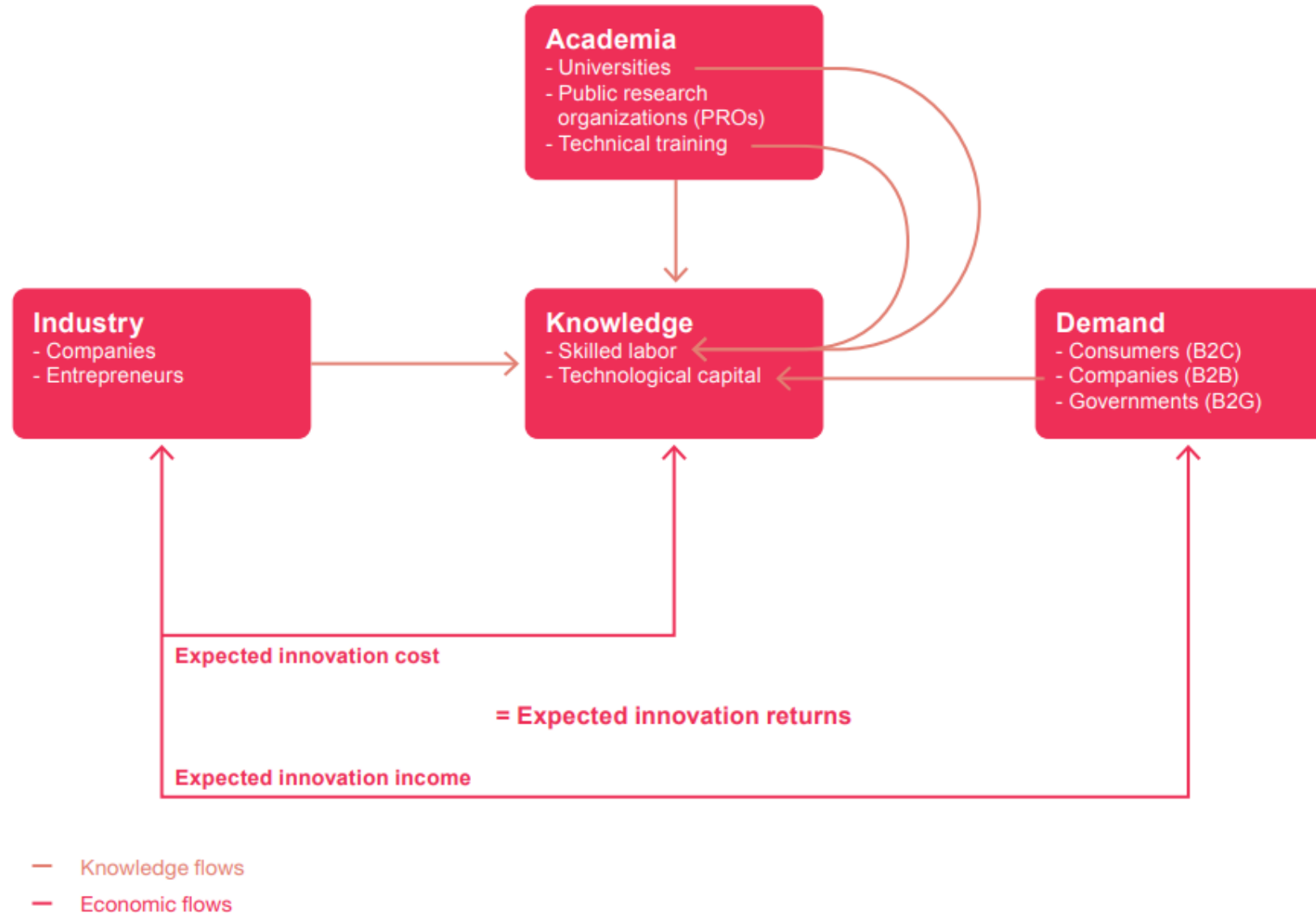
Innovation Ecosystems

There are different **demands and offers** of knowledge from the components.



Innovation ecosystem stakeholders interact to achieve innovation

Figure 1.2 Conceptual summary of innovation stakeholders' interactions



Source: WIPR 2022

Source: Adapted from (Schmookler, 1962a) and (Kline and Rosenberg, 1986).
Note: B2C, business-to-consumer; B2B, business-to-business; B2G, business-to-government.

Innovation Ecosystems

Airplanes

- Interaction among inventors.
- Evolution of aeronautical advances
- Government interest in aircraft development

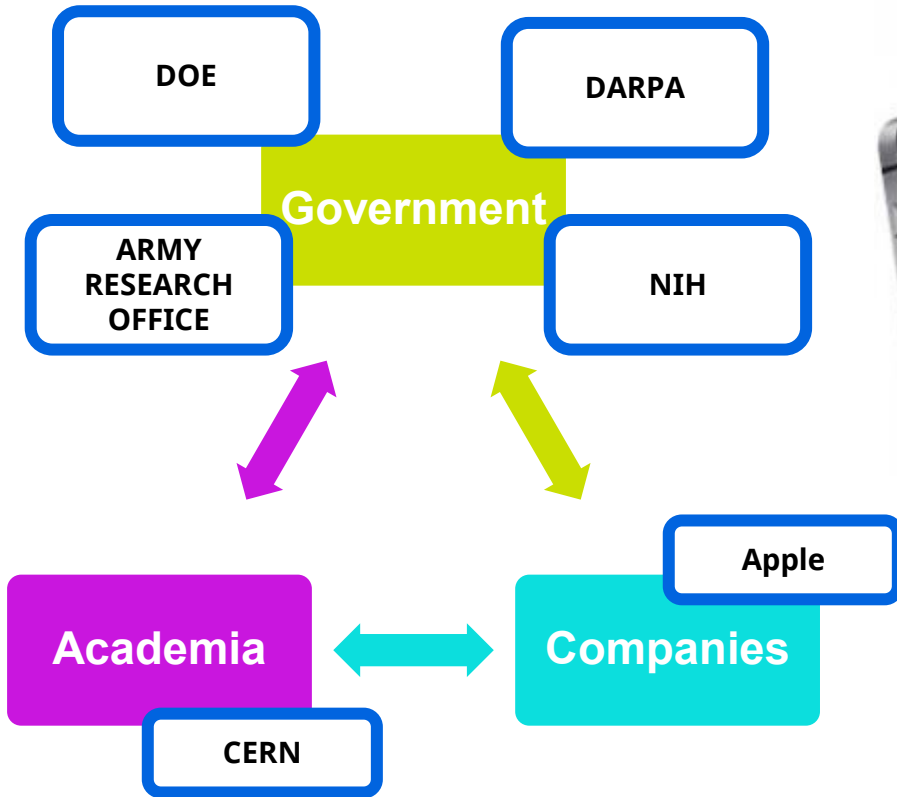
Antibiotics

- Public academic institutions
- Public and private incentives

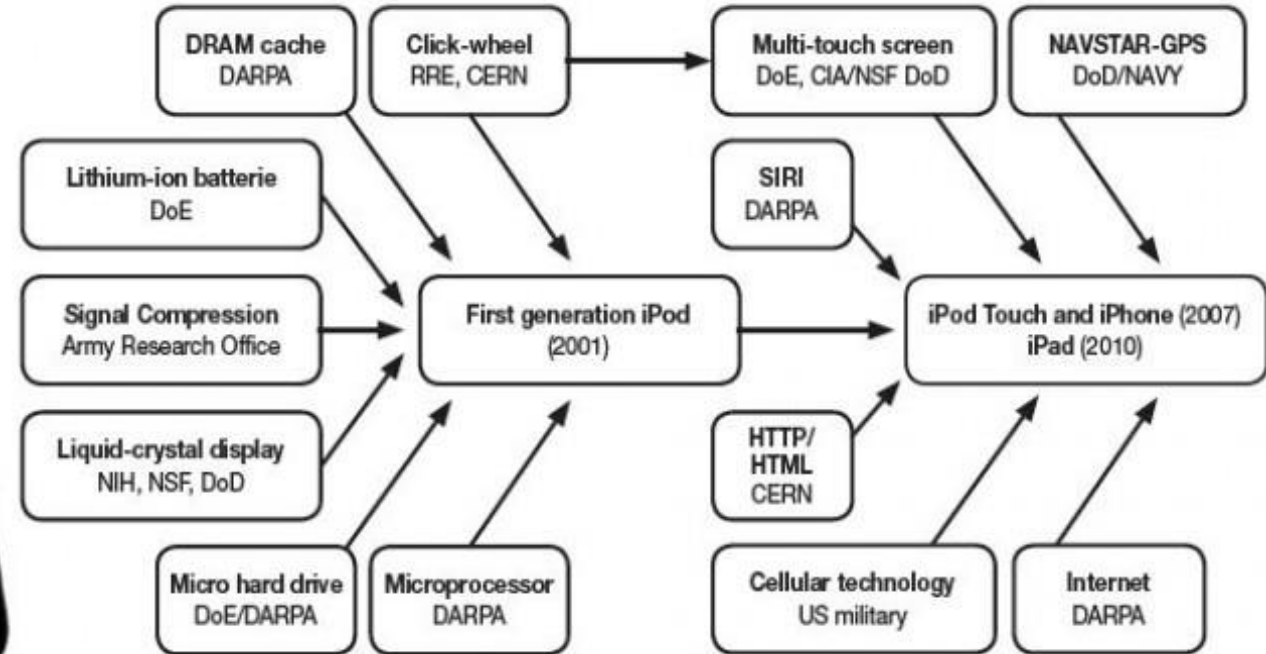
Semiconductors

- Contributions of basic science and its links with public and university research
- Support and state policies

Example: Iphone

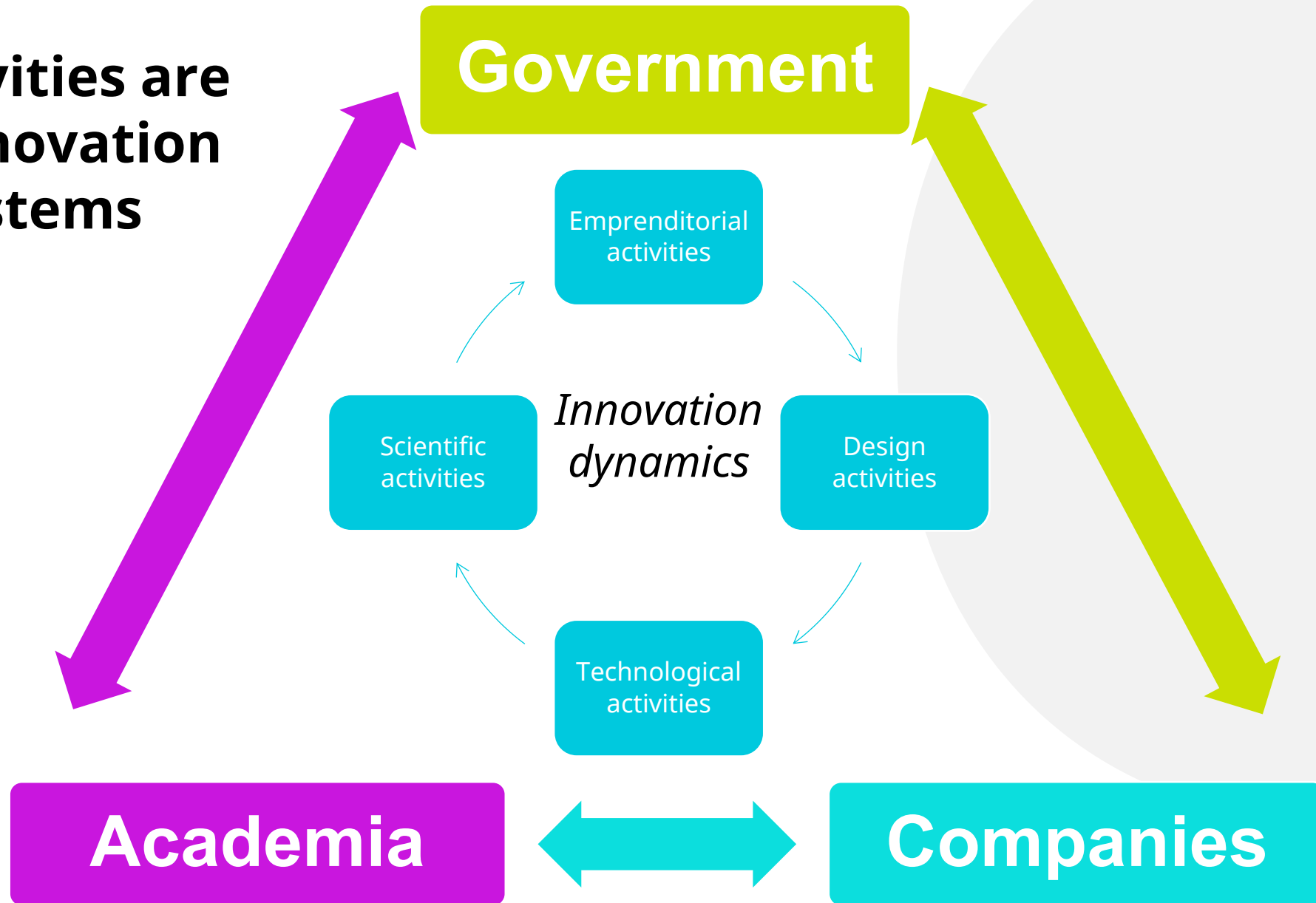


What Makes the iPhone so Smart?

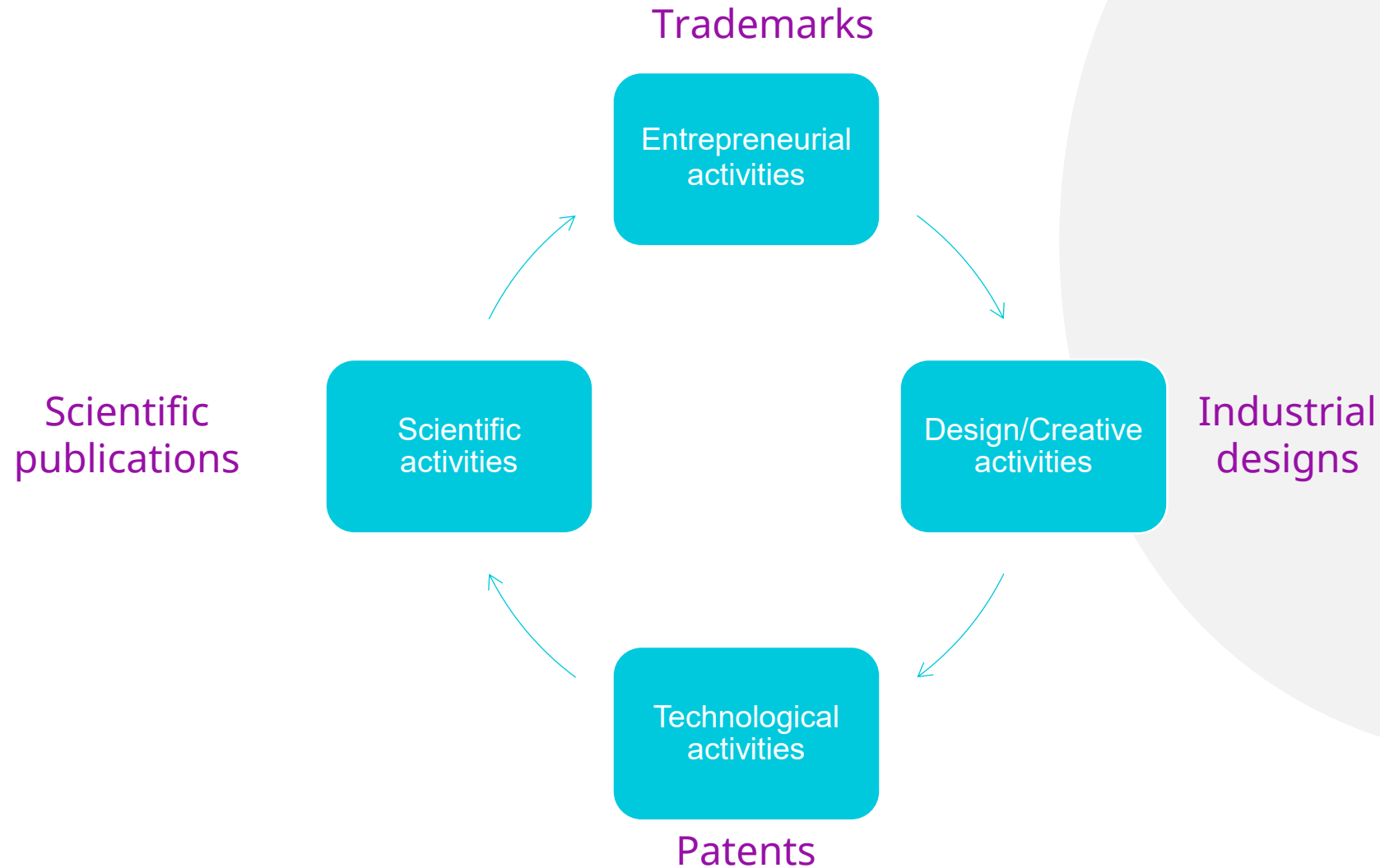


Source: *The Entrepreneurial State: debunking public vs. private sector myths* (Mazzucato, 2013), p109. Fig 13

Four activities are key in innovation ecosystems



How do we measure scientific, technological, creative and entrepreneurial activities?



Characterizing innovation ecosystems through data

The different types of agents in innovation ecosystems can be identified through data:

- Patents
- Trademarks
- Designs
- Scientific publications

- Inventors vs. Applicants
- Applicant Name
- Categories
- Sector Classifications
- International vs. Domestic IP
- Diversification vs. Specialization

Applicants and inventors in the functioning of innovation ecosystems



Inventors

- Individual creators who develop real innovation
- Scientists, engineers, researchers, entrepreneurs
- Provide the creative and technical foundation
- Often employed by larger organizations

Applicants

- Legal entities seeking patent protection
- Typically corporations, universities, or research institutions
- Own intellectual property rights
- Control marketing decisions

What is a resident Patent application?



→ A national company working with a national inventor

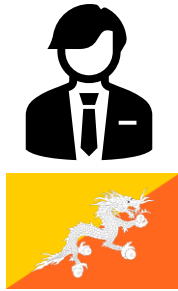


→ A national company hiring with a foreign inventor

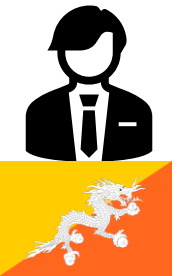


→ A foreign company working with a national inventor

What is a resident design application?



→ A national company working with a national designer



→ A national company hiring with a foreign designer

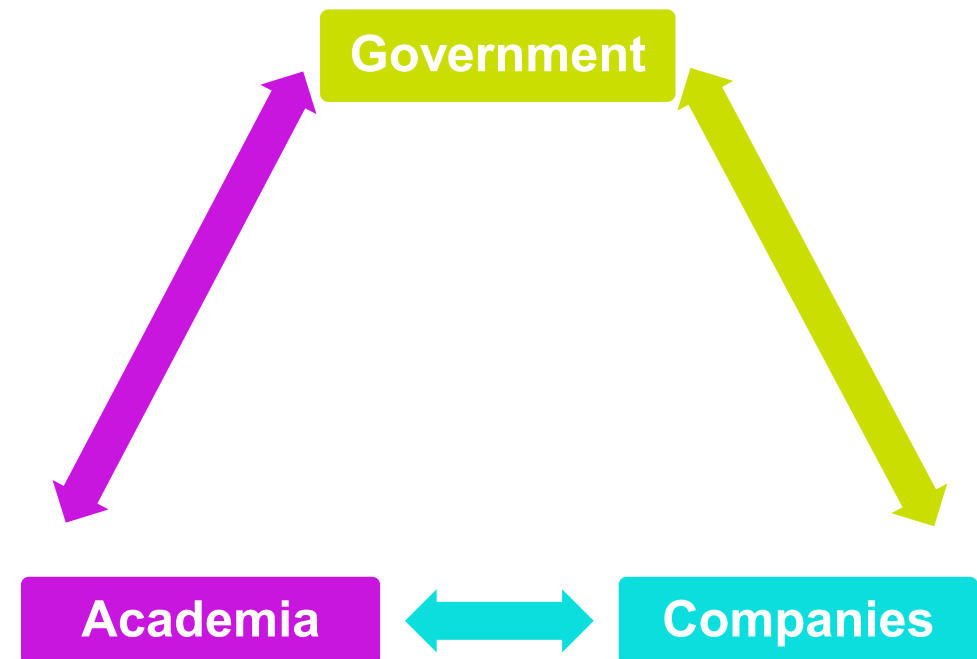


→ A foreign company working hiring a national designer

Applicants and inventors in the functioning of innovation ecosystems

Knowledge flow patterns

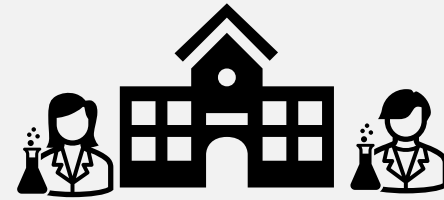
- University-Industry: Professors (inventors) → Universities (applicants)
- Corporate R&D: Employee inventors → Company applicants
- Startup ecosystem: Founder-inventors often play both roles



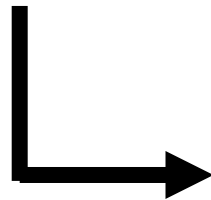
Type of applicants

Based on the keyword of the names:

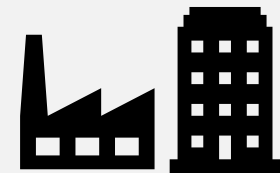
University,
campus,
Departments



Academics



company,
corporation,
startup,
ltd, inc...



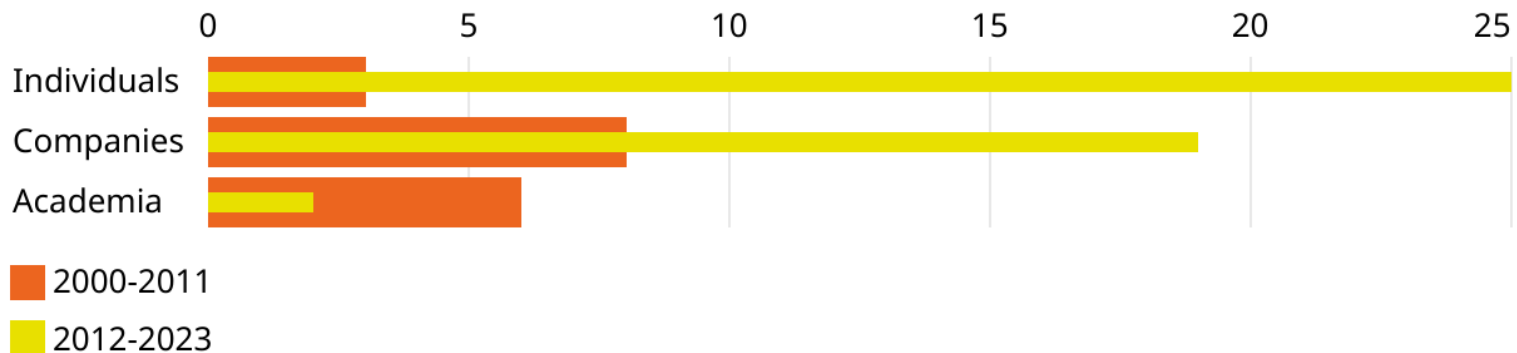
Companies



Individuals

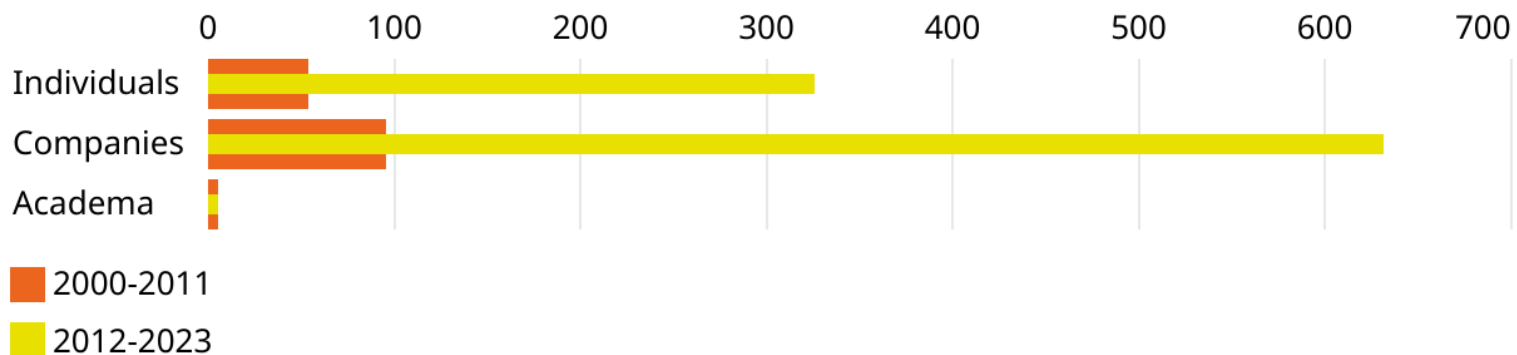
Patent applications count per applicant type

Most patents are applied by individual inventors



Trademarks applications count per applicant type

All categories of applicants demonstrate consistent upward trends

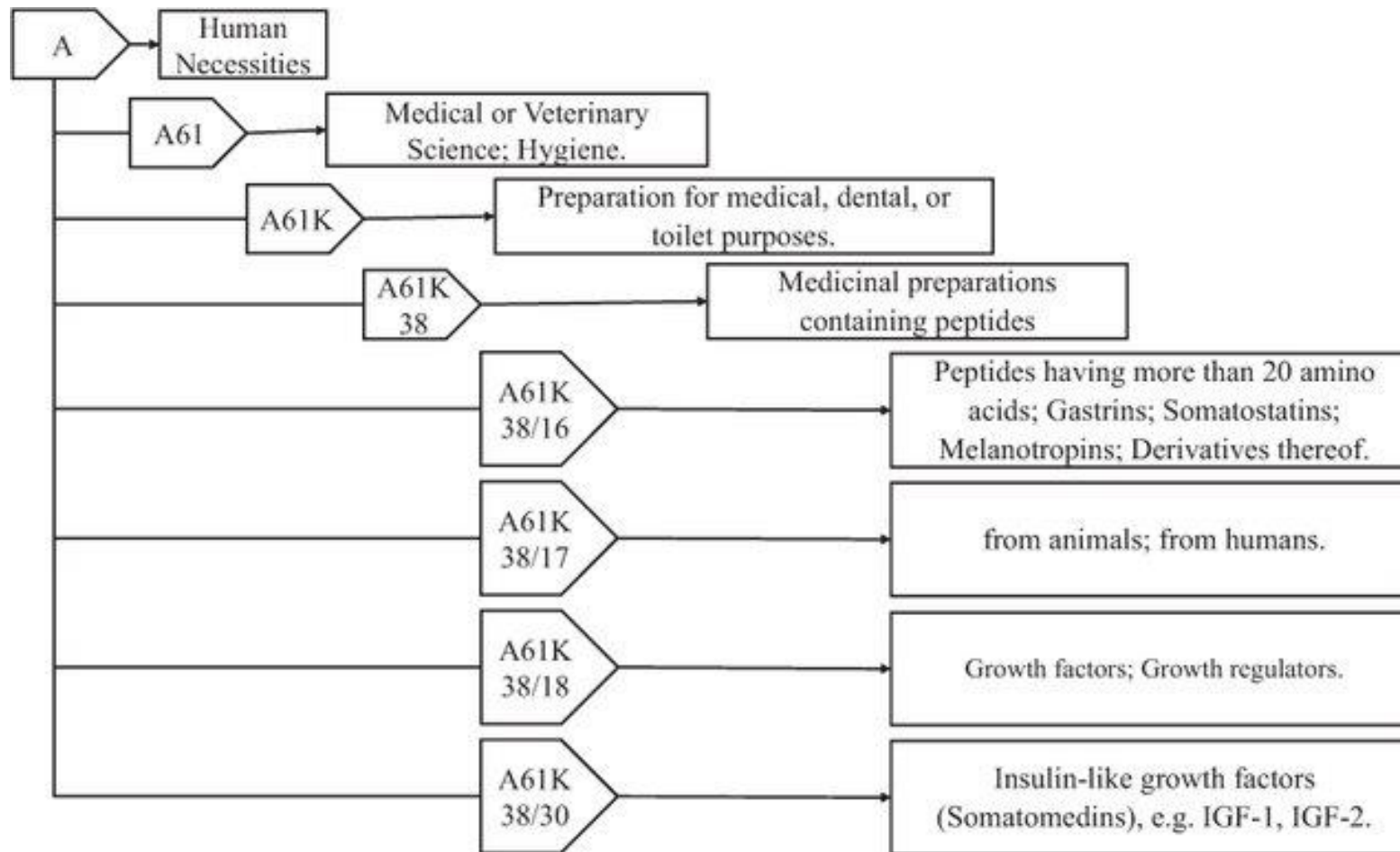


Sectorial categories based on classifications

Using technology categories to track innovation

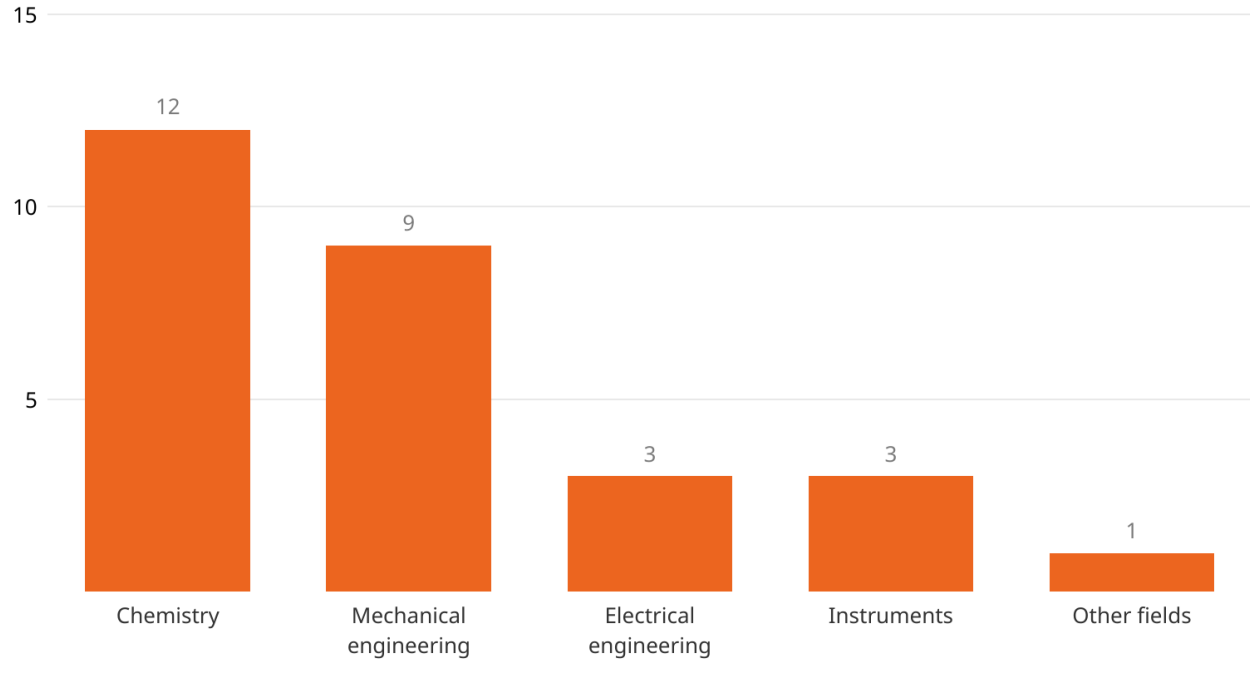
- Technology categories reveal where innovation is moving.
- They allow comparison across fields and time.
- Mapping categories shows clusters of activity and emerging areas.
- This helps assess innovation strategies and guide policy or investment.

Sectorial categories based on classifications



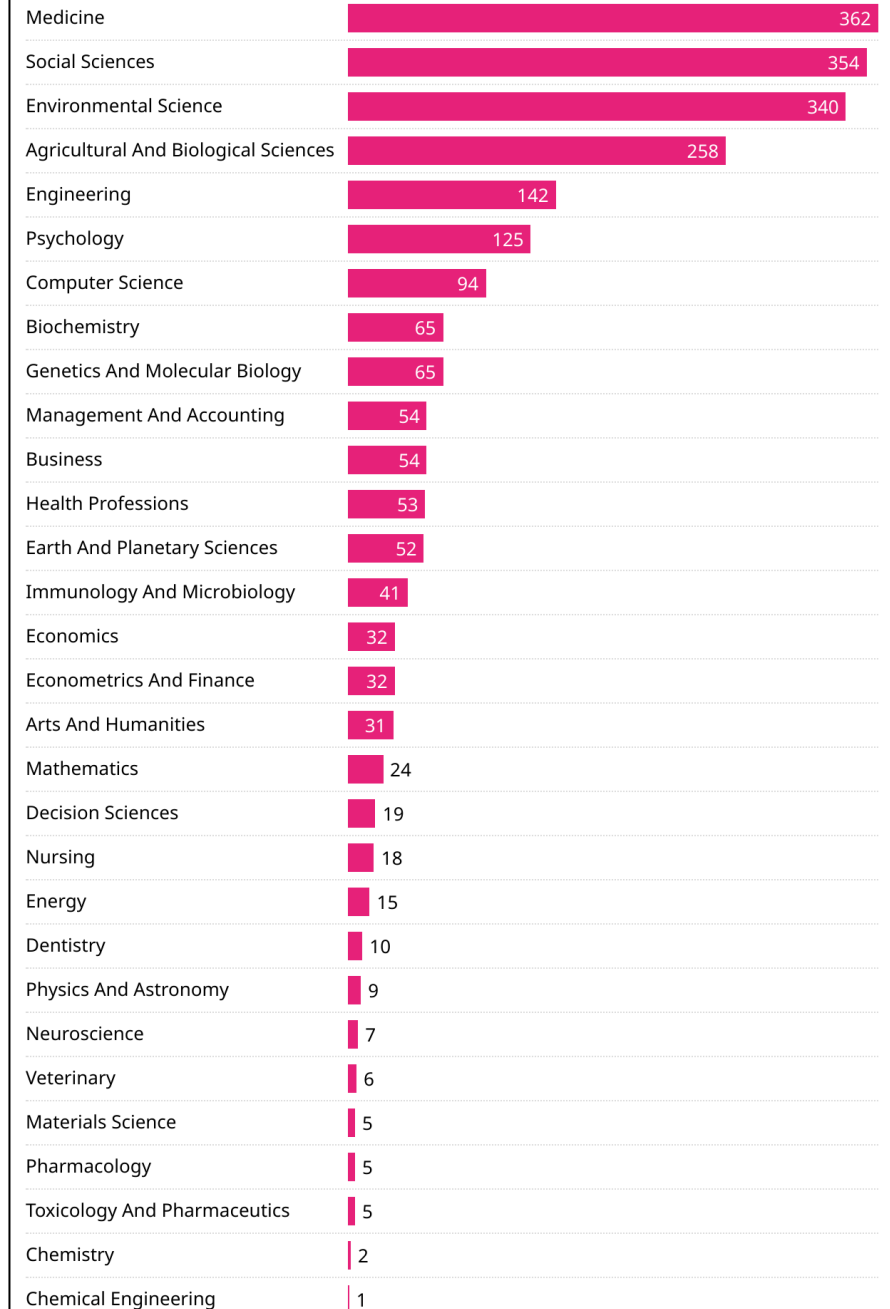
Patent applications count per Technological Sector (2012-2023)

Bhutanese technological activity is mostly oriented toward engineering

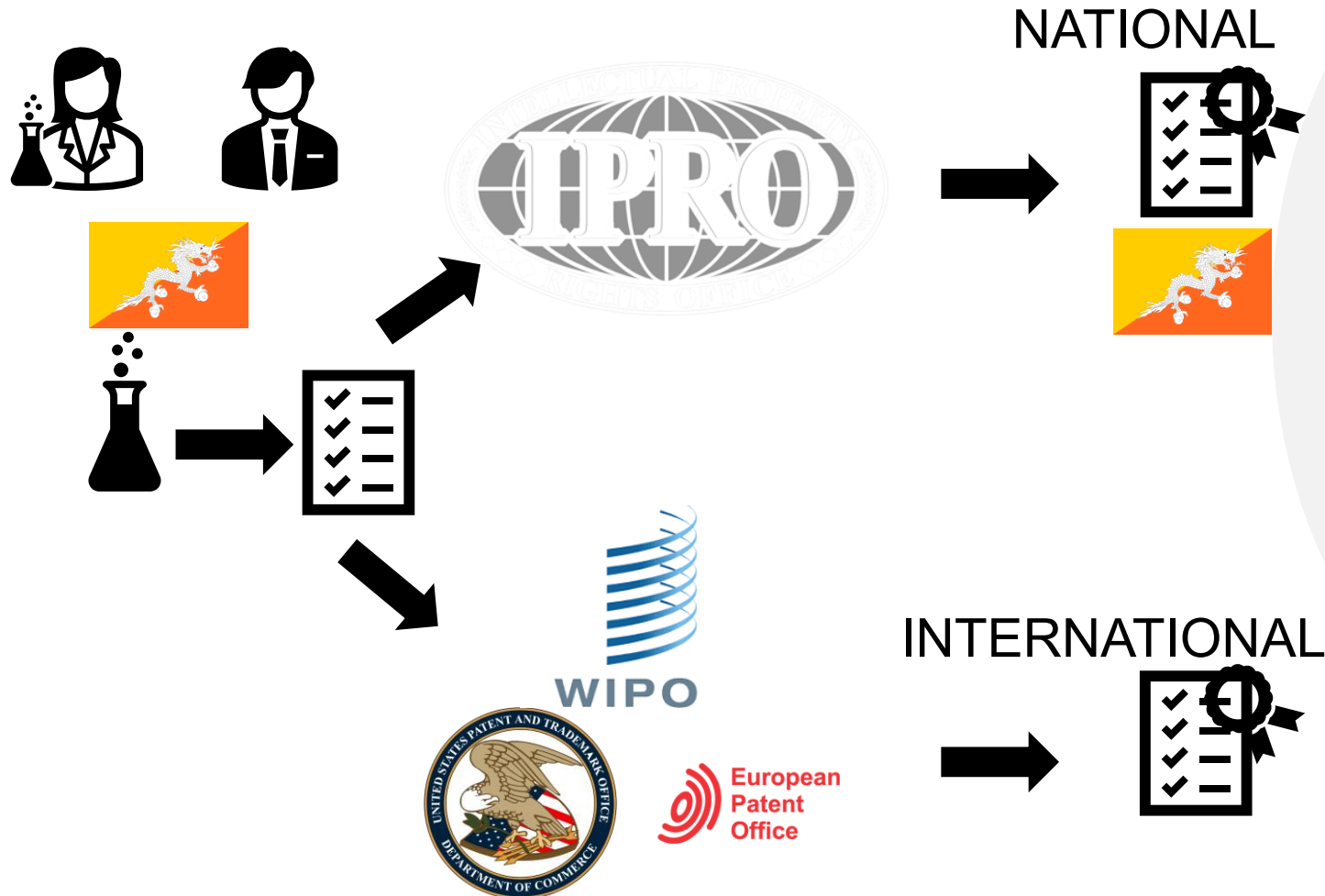


Scientific publications count per fields (2012-2023)

Scientific publications are mostly happening in 3 fields



The role of foreign IP applications in international market selection

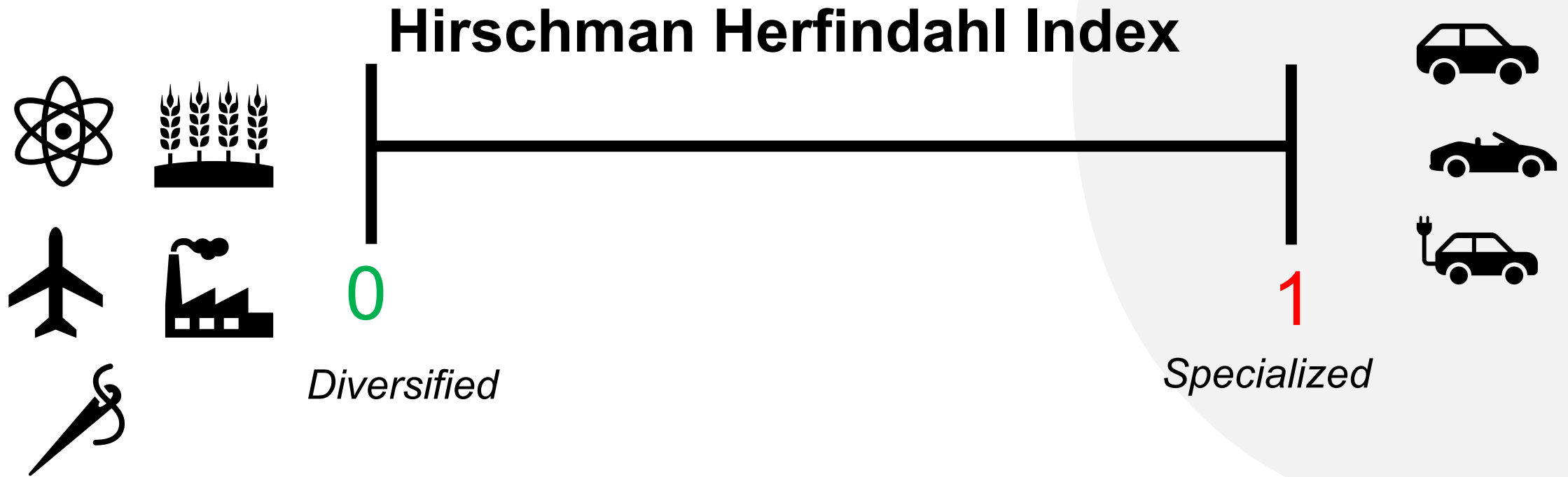


IP applications abroad act as tools that shape knowledge flows and competitive dynamics within interconnected innovation ecosystems.

Patent applications per applications offices (2012-2023)



A diversified ecosystem vs. a specialized innovation ecosystem



Hirschman Herfindahl Index between international and domestic patents

International applications are more diverse, when resident ones are concentrated



Thank you!

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