

Agenda

1. About Denmark
2. Purpose and objectives
3. Approach to the Self-Assessment
4. Present innovation performance
5. Governance and policy context
6. Review focus areas and key challenges

1. About Denmark

Denmark in numbers

Inhabitants: 5.8 million

GDP : €298.3 billion

GDP/capita: €51,700

Exports: €164 billion

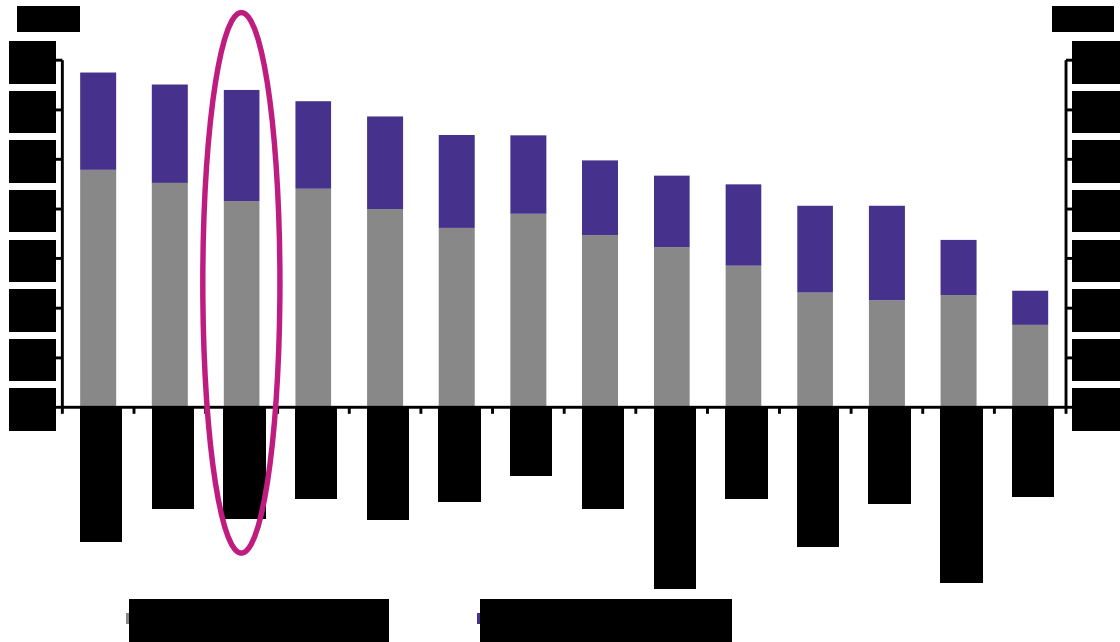
Universities: 8

Other HEI with a research budget: 23



Denmark is a knowledge society

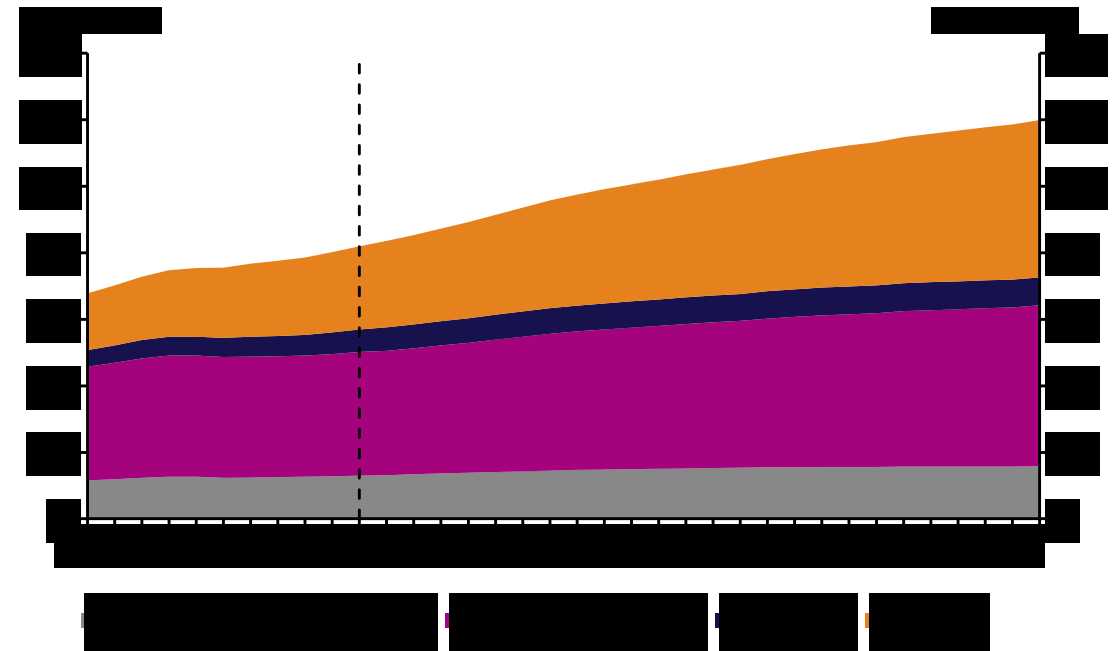
Total R&D investments in the public and private sectors, pct., 2016



Note: Data for Switzerland is from 2015. Pct. of GDP.

Source: OECD (2018), "Main Science and Technology Indicators", OECD Science, Technology and R&D Statistics (database), "BERD as a percentage of GDP", "GERD as a percentage of GDP" and Statistics Denmark

Number of persons with a tertiary education in the Danish labour market, 2005 to 2040

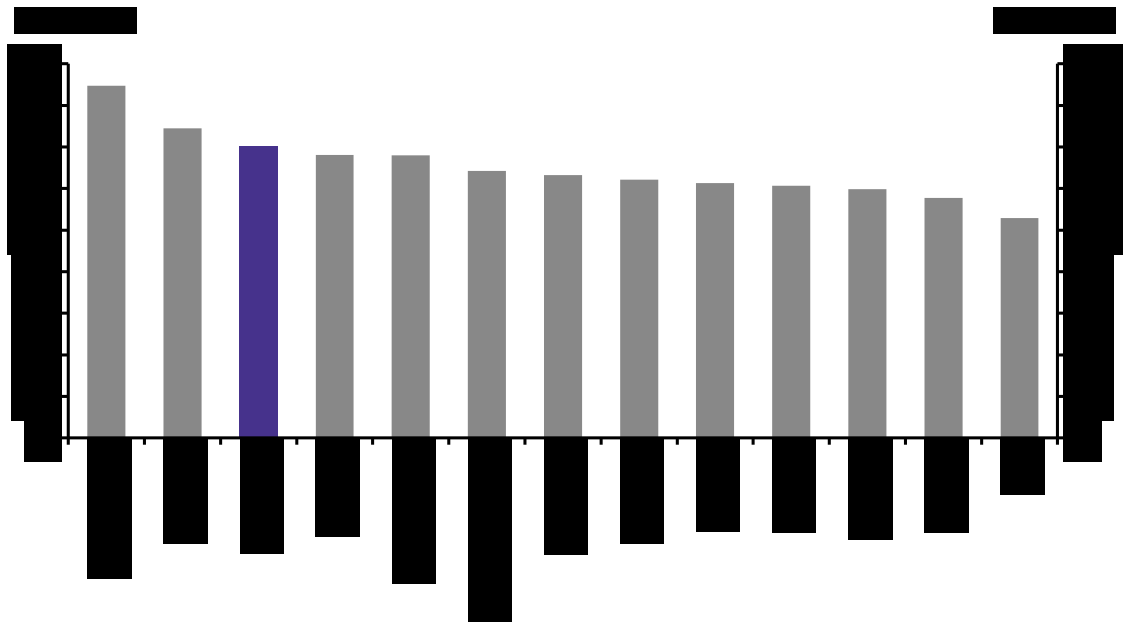


Note: 2005-2015 historical data. 2016-2040 is a projection.

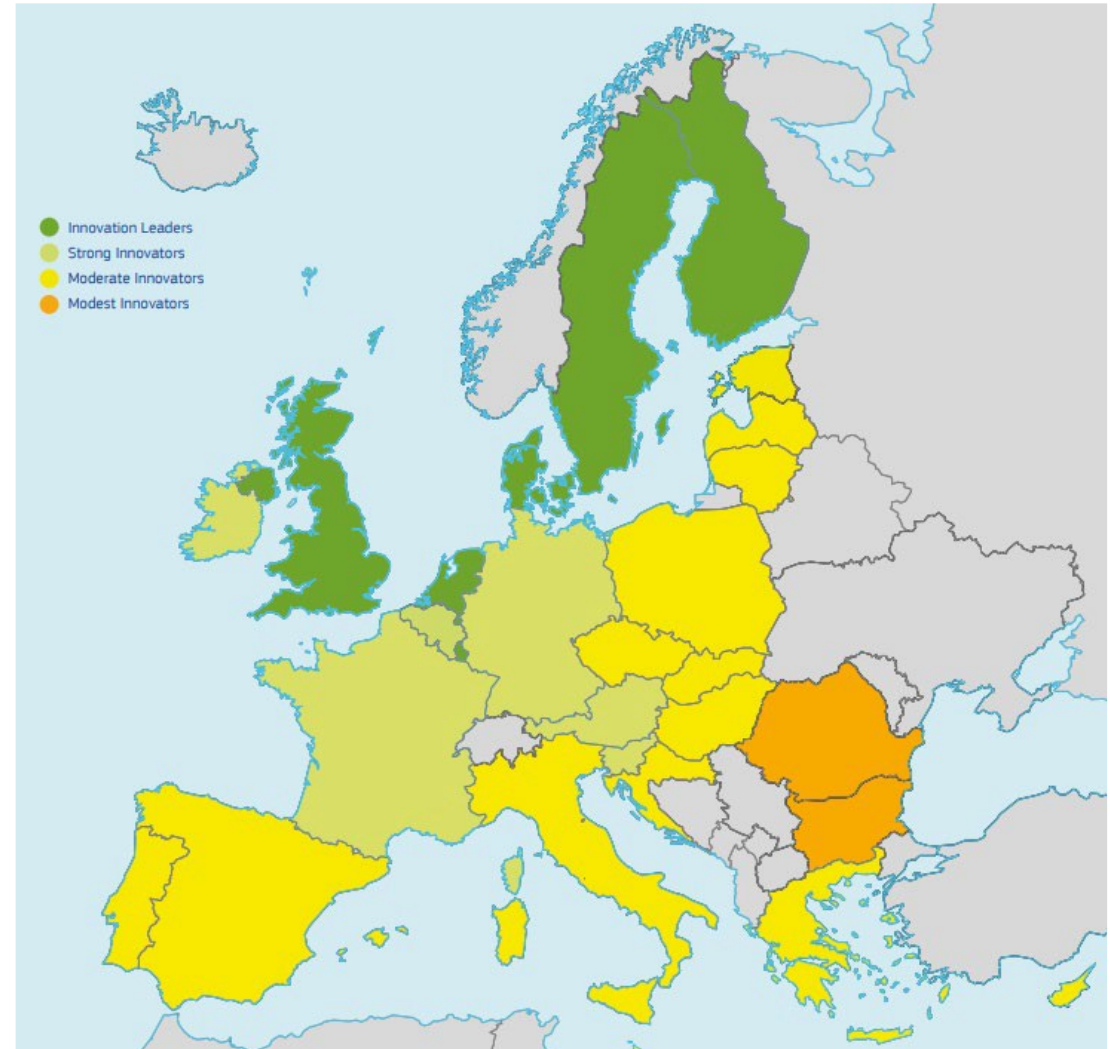
Source: UFM (2017)

Denmark is an Innovation Leader

European innovation scoreboard, 2018



*Note: Data are not available for the USA.
Source: European Innovation Scoreboard*



2. Purpose and objectives



Danmark

- Ready to seize future opportunities'

The Government's political research and innovation strategy

1

Danish research must be of the highest international quality

2

Research must provide the best possible benefit for society

Underlying objectives for future R&I

Objective 1: Danish research must be of the highest international quality	Objective 2: Research must provide the best possible benefit for society
The top level of Danish research must be of a Nobel Prize-level	Research and innovation must promote the development and use of new technologies
Quality of research must be boosted across the whole scientific spectrum	Knowledge and innovation must create more value in businesses
Talented researchers must have attractive career opportunities	More research must translate to practice in the public sector
DK must be at the forefront of international research infrastructure	The evaluation of qualification criteria for researchers should promote research, education and knowledge dissemination
Participation in international research and innovation collaboration must be boosted	Building bridges between research and the public
	A stronger Danish research and innovation system with close collaboration and better cohesion

World-class knowledge-based innovation

“The Ministry of Higher Education and Science is setting up an international expert group that by 2019, will provide recommendations for how Denmark’s efforts in knowledge-based innovation can rank among the global elite, and support stakeholders working effectively and in close cooperation towards common overall objectives”

Purpose of the review

“... to create a world-class knowledge-based innovation system with effective bridges between research-based knowledge production and the application of this knowledge in businesses and society.

The goal is to create more value in new and established companies based on research and new knowledge.”

Objectives of the review

1. To assess how Denmark can adjust public policy efforts on knowledge-based innovation based on international best practices
2. To provide concrete recommendations on further developing the Danish public policy efforts on knowledge-based innovation.

3. Approach to the Self-Assessment

Approach to the Self-Assessment & Background report

Self-Assessment of the Danish knowledge-based innovation system

Background report

1. Literature review and assessment of the knowledge-based innovation system,
2. Indicator report
3. Historical development paper

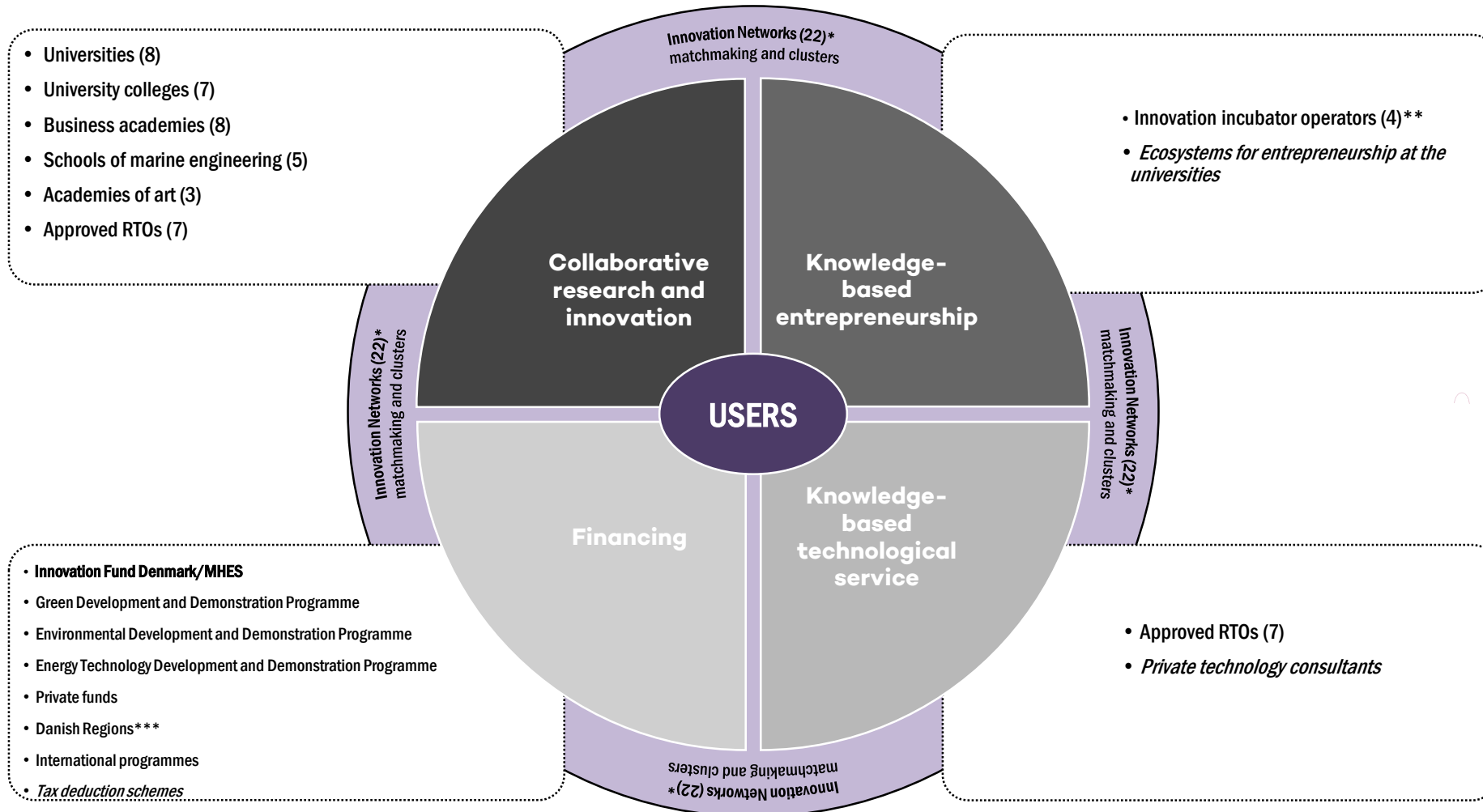
Preparation and qualification

- The Self-Assessment and the Background report has been authored by the MHES in accordance with the Horizon 2020 Policy Support Facility (PSF) framework
- Appointment of a Danish advisory group
- Open and inclusive process with Danish stakeholders
- Data from Innovation Scoreboard, OECD and Statistics Denmark

Literature review and assessment

- Examines current knowledge and assessments of the Danish knowledge-based innovation system
- A broad picture of findings across existing literature on the system
- Part I provides an overview of the system covering focal areas, key institutions, and programs and user profiles of the different programs
- Part II presents conclusions from recent analyses and publications examining the trends, strengths, weaknesses and links in the system.

The knowledge-based innovation system



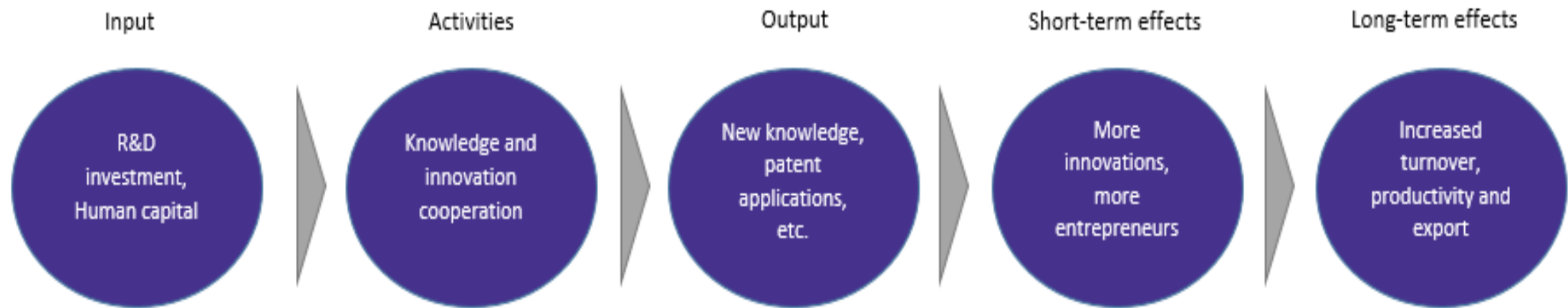
* The number of Innovation Networks will be reduced from 22 to 17 in 2019.

** The Innovation incubator operators will be phased out from 2019. Tasks will be transferred to the Innovation Fund Denmark and the Growth Fund.

*** The role of the Danish Regions will be modified as a consequence of the political agreement to reform the public business promotion system (see Section 1.1.).

Indicator report

- The indicator report presents 30 key quantitative indicators of the performance of the Danish innovation system.
- Categorization of the indicators:



Historical development

- Description of the development of Danish innovation policy during recent 4-5 decades
- Elaboration on how Danish policy has moved from
 - a linear innovation model in the research and industrial policies of the 1980s,
 - to a policy with more focus on the interdependencies of research, innovation and business from the 2000s.

Outline of the Self-Assessment

1. Introduction

2. Review focus

3. Approach to the Self-Assessment

4. Innovation performance and policy agenda

5. Governance

6. International activities

7. Focus areas and key challenges

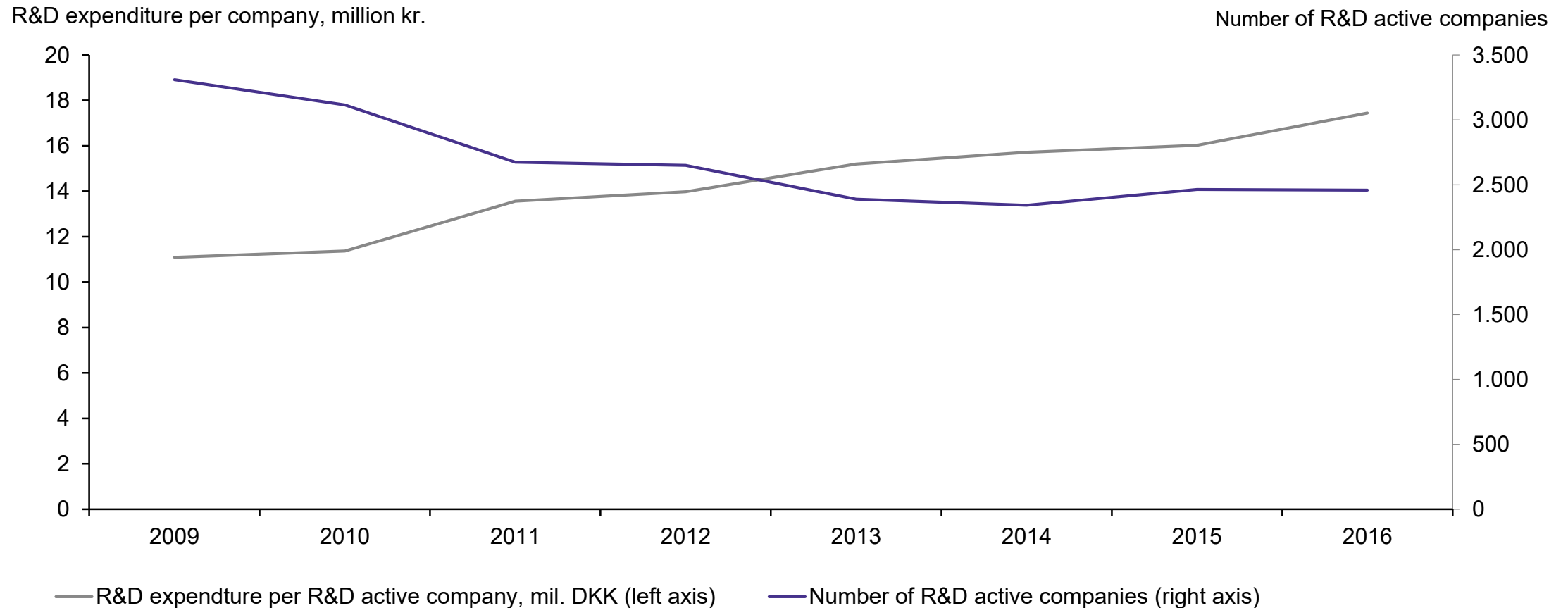
4. Present innovation performance

Is the Danish knowledge-based innovation system world-class today?

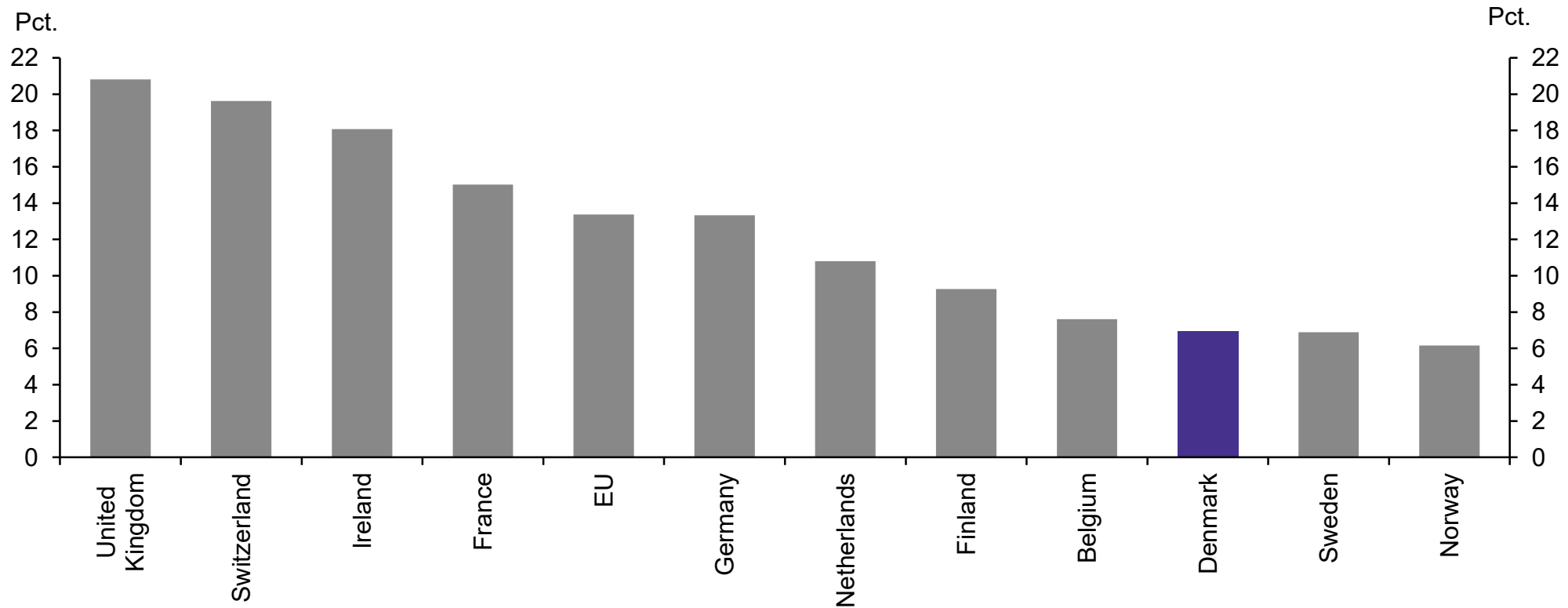
Denmark is ranked highly in international comparisons of innovation performance, e.g. third in the latest European Innovation Scoreboard (EIS), **but**

- Decrease in **the number of R&D active companies** in Denmark by 25 percent from 2009 to 2016
- Young Danish businesses' **scale-up ability often flattens** off after the first three years of growth
- **The share of sales of new-to-market and new-to firm innovations** as a percentage of total turnover is below EU-average
- The Danish **export levels for medium and high technology-products** remains below EU-average
- Danish companies are lagging behind in **technology adaptation and implementation**, which is challenging in a future where new knowledge and technology is central to companies' productivity.

Number of active R&D companies and their average R&D expenditures, 2009-2016.

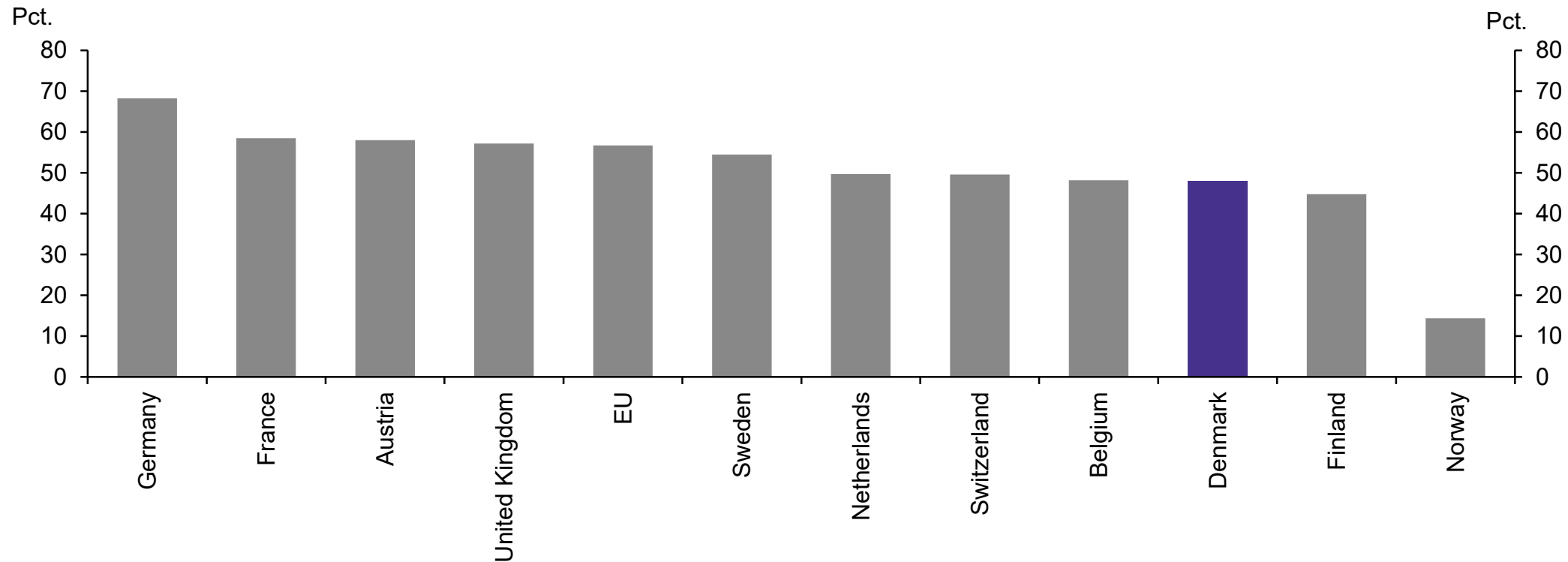


Sales of new-to-market and new-to-firm innovation, pct. of total turnover, 2014



Note: This indicator measures the turnover of new or significantly improved products and includes only innovative product enterprises.
Source: *European Innovation Scoreboard, Community Innovation Survey 2014*

Exports of medium and high technology products, share of total product exports, 2017



Note: See the European Innovation Scoreboard Methodology Report 2018 for a definition of medium and high technology products.

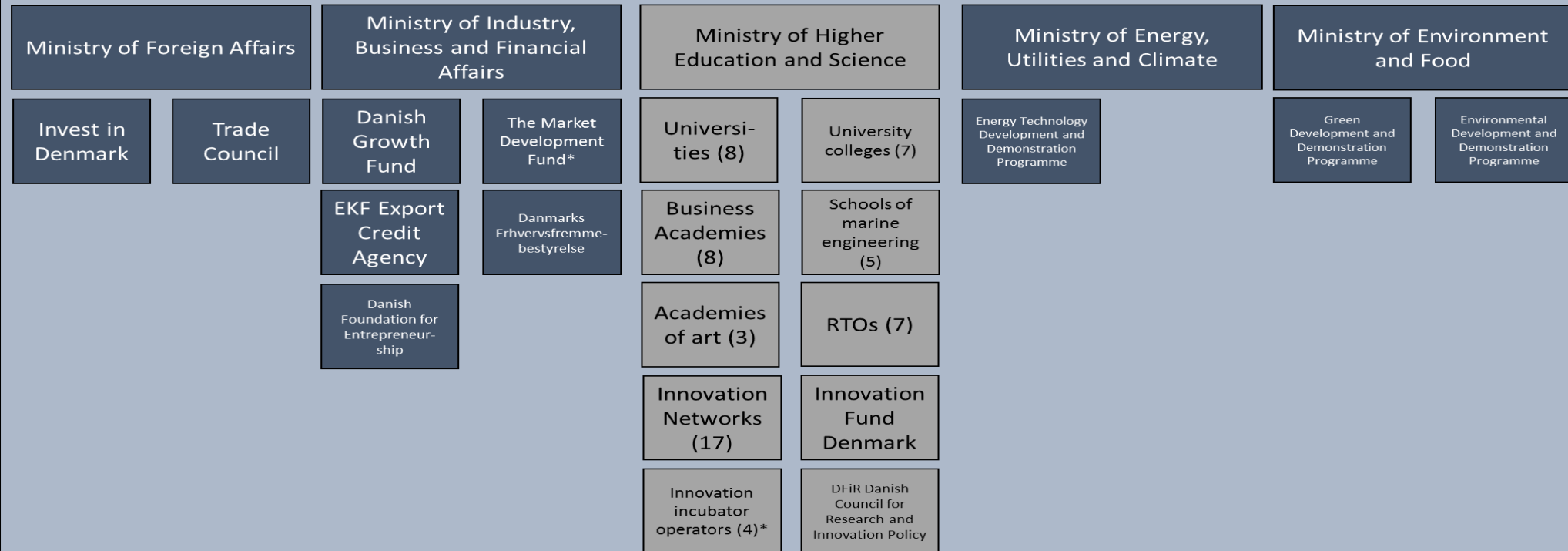
Source: European Innovation Scoreboard, 2018

5. Governance & policy context

International level



National level



Subnational level



MHES: Financing research, innovation and education

	Universities	Other HEI	Public Foundations	Innovation infrastructure	Private foundations	EU and other international
Research	Basic research funding. (≈ 8,9 billion DDK)	Funding for research and development activities (≈ 0,3 billion DDK)	2 foundations provide competitive research funding (≈ 1,7 billion DDK)		7 to 10 private foundations provide competitive funding to thematic areas (≈ 2,7 billion DDK)	Horizon 2020, including, ERC, etc. (≈ 1,9 billion DDK)
Innovation	No specific funding	No specific funding	Innovation Foundation Denmark: <ul style="list-style-type: none"> • Strategic and collaborative research • SME Projects • Entrepreneurship • Industrial Researcher (≈ 1,3 billion DDK)	RTO-contracts Innovation networks and clusters Including collaborative research and development (≈ 0,4 billion DDK)	1-2 private foundations provide competitive funding	Horizon 2020, including EIC, SME-instrument, etc.
Education	Activity based + basic funding, no cap (≈ 7,9 billion DDK)	Activity based + basic funding, no cap (≈ 6 billion DDK)			(specific investments e.g. in STEM or facilities)	Erasmus Mundus etc.

Governance of HEI and innovation operators

- Universities and other higher education institutions are state-funded, autonomous institutions governed by boards with external majority
- Four year strategic framework contract with MHES. All contain goals for increased collaboration with businesses and society in general.
- RTOs are non-profit institutions managed as private companies. The RTO's are approved for a period of up to three year.
- Current 17 innovation networks are managed mostly by cluster organisations but also universities and an RTO. Funding is allocated through competition for multiannual grants.

Ongoing evaluations of relevance to the review

- Evaluation of Innovation Fund Denmark
- Review of technology transfer from universities
- Council for better recognition and rewards of academics

Findings will be included in the work of the peer review.

Evaluation of the Innovation Fund Denmark

- IFD established in 2013. Review part of the political agreement
- Evaluation of structure, functioning and results
- International expert panel, Mark Ferguson as chair
- Recommendations is also expected to address IFDs role in the innovation system
- The evaluation is expected to be published mid-March
- Jackie Hunter is also member of the IFD-evaluation panel

Review of technology transfer from universities

- Aims to increase transfer of knowledge and technology to SMEs and entrepreneurs should be increased.
- Transfer of knowledge and technology should become more agile, and the terms in negotiation of IP agreements should be simplified and standardized
- Inspection carried out by MHES and the universities
- Encompass also the overall legislation



Council for better recognition and rewards of academics

- The council aims to create a better practice for evaluating, recognising and rewarding academics in terms of quality in both research, education and knowledge dissemination.
- The panel is expected to deliver their recommendations in April 2019.



6. Review focus areas and key challenges

Review focus areas and transversal challenges

Review focus areas

1. Innovation capacity and research priorities
2. Roles and collaborative
3. Knowledge-based entrepreneurship
4. Knowledge and technology adoption by businesses

Transversal challenges within the focus areas

- ❖ Creating common goals and effective collaboration between actors
- ❖ A diverse a complex target group
- ❖ Internationalisation
- ❖ Innovation culture

Innovation capacity and research priorities

Key challenges

- Balancing priorities for innovation: There is currently no central coordination or strategic choices of public research priorities that aim to increase innovation. There may be an uneven balance between the accumulated public research priorities and the needs of companies – and maybe an uneven balance between research and innovation priorities that promote existing industrial strengths vs. new emerging industries.
- Systemic bias towards traditional users: Actors in the knowledge-based innovation system may be biased toward supporting research fields, where there is already an established tradition for innovation and collaboration with companies.

Innovation capacity and research priorities

Key challenges

- High investments in medical and health sciences: A large share of the public R&D and private foundations investments are spend on research carried out within the medical and health sciences. New innovations within these fields have a long development period from basic research to market introduction and may have **limited spillover** effects to other sectors.
- Science and Technology: Denmark is not leading in the OECD in terms of public R&D expenditures within the **natural sciences or engineering** and Technology. Research within these fields may be particular relevant for a broad spectrum of companies, especially SME's within manufacturing, construction as well as the ICT sector.

Roles and collaboration

Key challenges

- Collaboration between companies and research institutions: The level of cooperation between innovative companies and research institutions in Denmark is lower than in a majority of other comparison countries.
- Collaboration between companies and other HEIs: The Danish university colleges, business academies, HEIs in the arts and culture and maritime academies may have an unrealised potential as contributors to collaborative innovation projects.
- Unclear division of labour: While it is a benefit that both RTO's, universities, and other higher education institutions collaborate with companies, it can also lead to an unclear division of labour.

Roles and collaboration

Key challenges

- Integration of innovation networks activities: Potential to strengthen collaboration and integration of activities in context of innovation networks and cluster initiatives with related activities that take place at the research institutions. This includes network activities, matchmaking and knowledge dissemination of major strategic research and innovation projects.
- Participation in innovation networks: Participation of junior scientists and students in the national innovation networks is low. In addition, there is a high level of participation in the innovation networks by some universities, while others are less represented.
- Facilitation: Efforts to prepare, mature and follow-up on collaborative projects are often as important for value creation – especially for SMEs.

Knowledge-based entrepreneurship

Key challenges

- Few spinout companies become scale-ups: The number of IP-based spinout companies has not been increasing significantly. The number of non-IP-based spinout companies has increased. Still, only a few spinout companies have enjoyed high growth rates and become scale-ups.
- Supporting the entire innovation journey: Most Danish TTOs, central innovation offices, and financial support programs only support entrepreneurs in their early development stages. There may be a potential to strengthen continual support throughout the entire innovation journey from idea and until market introduction.
- Interdisciplinary entrepreneurship: Current support services tend to focus on researchers and students from technical and mercantile sciences. However, there may be a potential to strengthen support to researchers and students from other scientific fields, interdisciplinary entrepreneurial activities and intrapreneurial projects.

Knowledge and technology adoption by businesses

Key challenges

- Cooperation between RTO's and universities: There may be potential for further cooperation with the universities in order to create better research and development projects, supply more advanced technology services, and facilitate more knowledge dissemination to companies.
- Sharing of facilities: The cost and complexity of technological facilities is increasing. RTOs may be able to supply access to even more technological infrastructure if they increase their collaboration with national and foreign research institutions.
- Target group and effects: Companies that are already advanced technology users experience greater value creation from using RTO's than companies that consider themselves as technological "followers".

