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ICT Standardisation Observatory and Support Facility in Europe

# Connection Between Research & Development and Standardisation

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## Module Objectives

After completing this module, you should be able to:

1. Define research and its interface to standardisation
2. Getting insights into the interdependencies between research and standardisation
3. Understanding how research and standardisation can benefit each other.
4. Understanding the relationships between research and standardisation, in particular, how standards and standardisation can be leveraged during the research process.

## About The Author

### Knut Blind



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Knut Blind studied economics, political science, and psychology at Freiburg University. During his studies, he spent one year at Brock University (Canada), where he was awarded a BA. Finally, he earned his Diploma in Economics and later his doctoral degree at Freiburg University. Between 1996 and 2010, he joined the Fraunhofer Institute for Systems and Innovation Research, Karlsruhe, Germany, as a senior researcher and, at last, as head of the Competence Center “Regulation and Innovation”. In April 2006, Knut Blind was appointed Professor of Innovation Economics at the Faculty of Economics and Management at the Berlin University of Technology. Between 2008 and 2016, he also held the endowed chair of standardization at the Rotterdam School of Management of Erasmus University. From April 2010 to September 2019, he was linked to the Fraunhofer Institute of Open Communication Systems in Berlin. Since October 2019, he has been head of the business unit “Innovation and Regulation” at the Fraunhofer Institute for Systems and Innovation Research. In 2012, he initiated both the Berlin Innovation Panel and the German Standardization Panel followed by a pilot of a European Standardization Panel launched in 2023. Besides numerous articles on patents, he published several contributions on standardization and further innovation aspects in refereed journals.

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## 1 Introduction

The webinar addresses the interaction between research and standardisation.

The learning objectives include the ability to define research and its interface to standardisation.

2. Getting insights into the interdependencies between research and standardisation
3. Understanding how research and standardisation can benefit each other.
4. Understanding the relationships between research and standardisation, in particular, how standards and standardisation can be leveraged during the research process.

Research and development (R&D) is the focus both of innovation strategy in business and consequently also of innovation policy measures by OECD countries. However, the commercial success and economic impact of R&D results will only be realised by an effective transfer of these results into innovative products and processes. Consequently, manifold support mechanisms for technology transfer have been implemented, but standardisation as an instrument of technology transfer has not been widely recognized..

## 2 Definitions

According to the Organisation for Economic Co-operation and Development (OECD):  
“Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge.” (Frascati Manual 2015, OECD, p. 44).

Furthermore, the OECD (2015) distinguishes between basic, and applied research, but also experimental development:

- Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.
- Pure basic research is carried out for the advancement of knowledge, without seeking economic or social benefits or making an active effort to apply the results to practical problems or to transfer the results to sectors responsible for their application.
- Oriented basic research is carried out with the expectation that it will produce a broad base of knowledge likely to form the basis of the solution to recognized or expected current or future problems or possibilities.
- Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective.
- Experimental development is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing or improving new products or processes

The five criteria for identifying R&D are according to the OECD (2015):

- To be aimed at new findings (novel)
- To be based on original, not obvious, concepts and hypotheses (creative)
- To be uncertain about the final outcome (uncertain)
- To be planned and budgeted (systematic)
- To lead to results that could be possibly reproduced (transferable and/or reproducible)



However, it is also defined what is not R&D (OECD 2002, 2015):

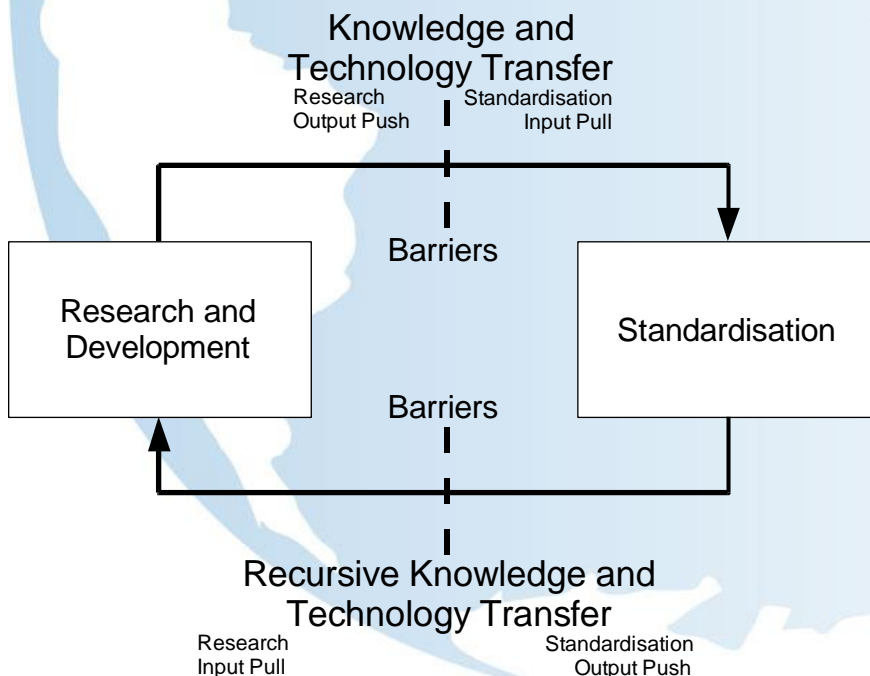
- Education and training
- Scientific and technical information services (e.g. Scientific conferences, Library services, Patent services, Dissemination of results)
- Administration (e.g. Purely R&D-financing activities)
- Specific “industrial activities” (e.g. implementation of new or improved products or services a.k.a. innovation)
- Big data projects for dissemination of data (OECD 2015)
- Space exploration (expenditures for satellites to perform routine activities) (OECD 2015)

Finally, testing and standardisation is not R&D. On the one hand, “this concerns the maintenance of national standards, the calibration of secondary standards and routine testing and analysis of materials, components, products, processes, soils, atmosphere, etc.” (OECD 2002). On the other hand, “public bodies and consumer organisations often operate laboratories that are intended mainly to test products and verify that standards are met. In addition to standard testing and benchmarking activities – which are not R&D – the staff of these laboratories may also spend time devising new or substantially improved testing methods. Such activities should be included in R&D.” (OECD 2015).

### 3 Interaction between Research and Standardisation

Blind and Gauch (2009) propose simple models that highlight how research outputs feed into standardisation processes and standards are the base for research.

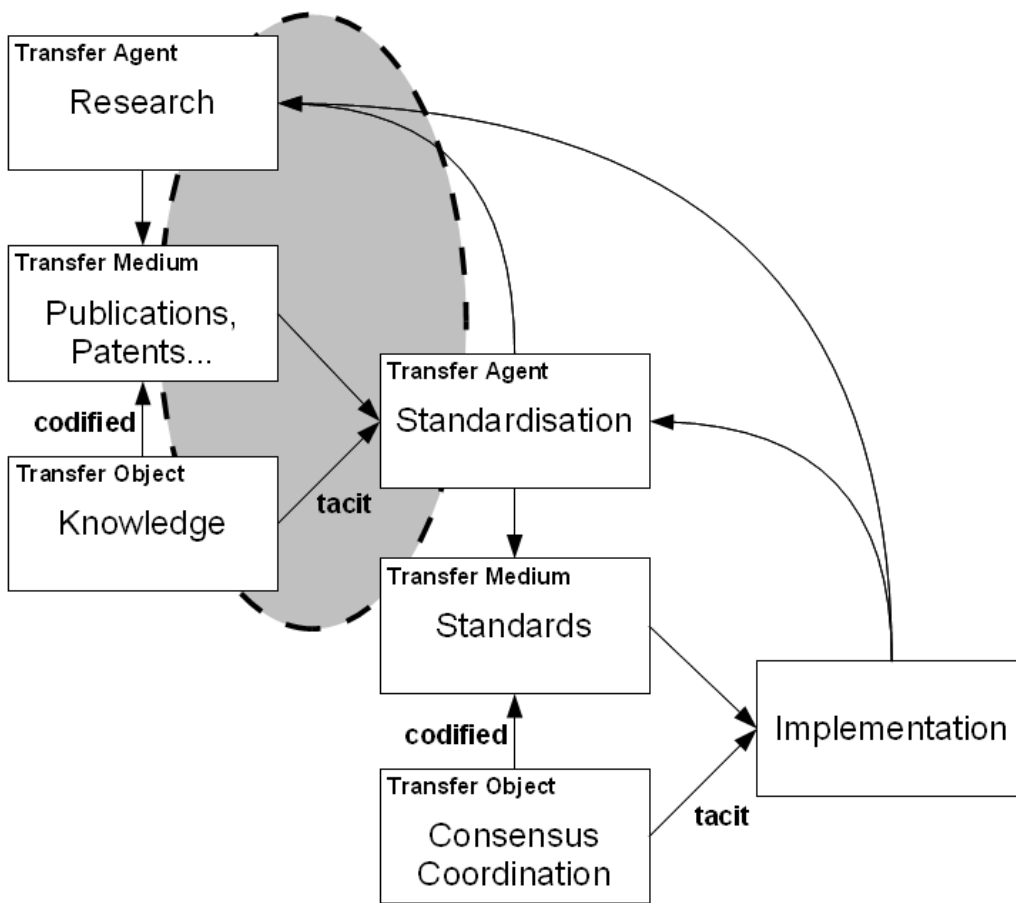
#### A Simple Model of Research and Standardisation



Source: Blind (2009)

In cascading model borrowed from knowledge and technology transfer, the simple model of the interaction between research and standardisation is further specified.

**A Cascading Model**

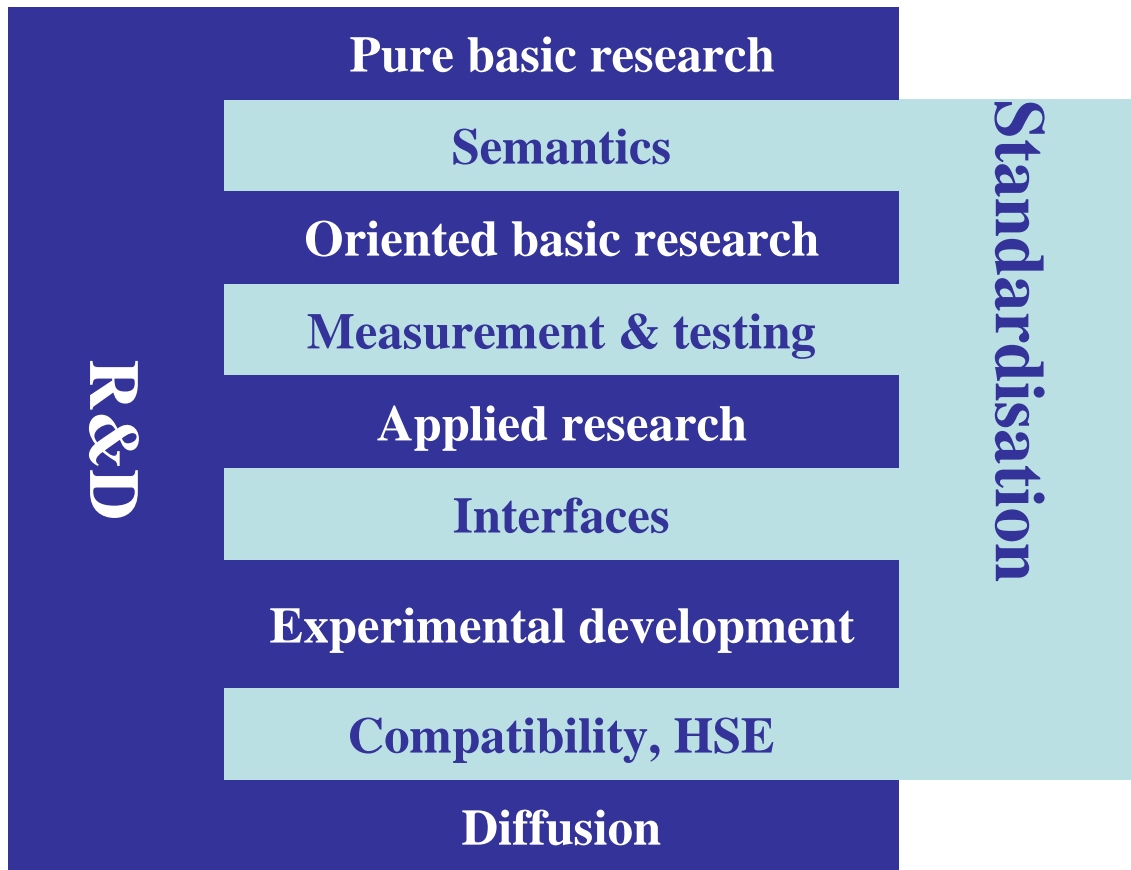


Source: based on Blind and Gauch (2009).

**4 Standard Categories and Implications for Research**

In addition to the transfer of knowledge from research to standardisation, standards themselves can serve as framework conditions for future research. This is especially the case for terminology and classification standards related to basic research, metrology, and measurement. Testing standards are crucial for applied research, quality, safety standards are relevant for market introduction and finally compatibility standards are elementary for the diffusion of technologies and products especially in network industries. Across all these dimensions, standards can supplement or complement governmental regulations. For example, in early stages of emerging research and technology fields, self regulation via standardisation allows stakeholders to set flexible framework conditions, which can later be transferred into governmental regulations.

**Various roles of different types of standards in the innovation process**



Source: Blind (2009).



## 5 Summary of Impacts of Standards on Research and Innovation

In the following table, the positive, but also negative impacts of standards on research and innovation are summarized. The positive impacts outweigh the negative impacts, if standardisation processes following the principles of the WTO criteria, particularly openness and transparency.

### Impacts of standards on research and innovation

General functions of standards	Positive impacts on research and innovation	Negative impacts on research and innovation
<b>Information</b>	Provide codified knowledge relevant for innovation Coordinate collaborative innovation activities	Generate cost for standards screening Allow unintended knowledge spillovers to competitors by implementation of standards
<b>Variety reduction</b>	Allow exploitation of economies of scale via standards Support critical mass via standards in emerging technologies and industries Create incentives for incremental innovation based on standards	Reduce choice Support market concentration Push premature selection of technologies Limit incentives for radical innovation
<b>Minimum quality</b>	Creating trust in innovative technologies and products at the demand side	Promote market concentration
<b>Compatibility</b>	Increase variety of system products Promote positive network externalities Avoid lock-in into old technologies	Push monopoly power Foster lock-in into old technologies in case of strong network externalities
<b>Insurance</b>	Serve as insurance against failure of radical innovation	Create incentives for incremental instead of radical innovation

Source: Blind (2022) <https://www.iso.org/publication/PUB100466.htm>

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