

# Overview

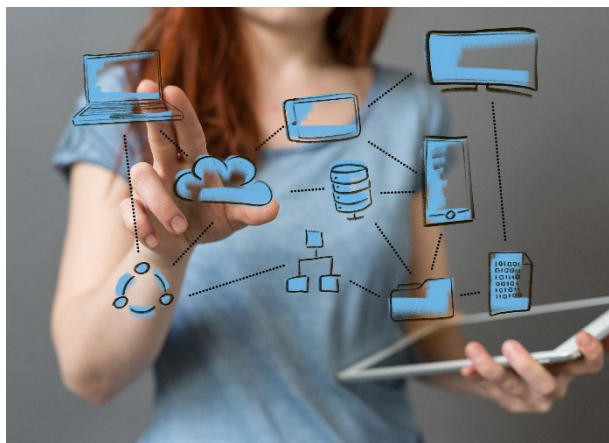
## Digitalisation and Natural Resources (DigiRes)

Project No. (FKZ) 3720 31 101 0

Digitalisation is increasingly affecting our personal lives as well as the economy. However, its impact on the natural resource demand, for example rare earths, the energy demand, but also on greenhouse gas emissions, has not been robustly examined, yet. For that reason, the research project *Digitalisation and Natural Resources (DigiRes)* is investigating the resource intensity of the digital transformation in Germany on behalf of the German Environment Agency (Umweltbundesamt – UBA).

*DigiRes* develops and applies simulation models to estimate the resource intensity of digitalisation. For this purpose, resource requirements and greenhouse gas emissions are projected using a macroeconomic input-output model. Both the current situation and scenarios for potential future developments of digitalisation are examined. In additional steps, *DigiRes* examines life cycle data of selected digital products and services and their resource requirements.

With the gained insights, *DigiRes* will identify potential policies to shape digitalisation in a sustainable, environment-friendly and resource-conserving way.



# Imprint

## Project team:

- Ramboll Germany GmbH
- Institute of Economic Structures Research (GWS)
- Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS
- German Institute for Standardization e. V. (DIN)

RAMBOLL

GWS

Fraunhofer  
IAIS





DIN

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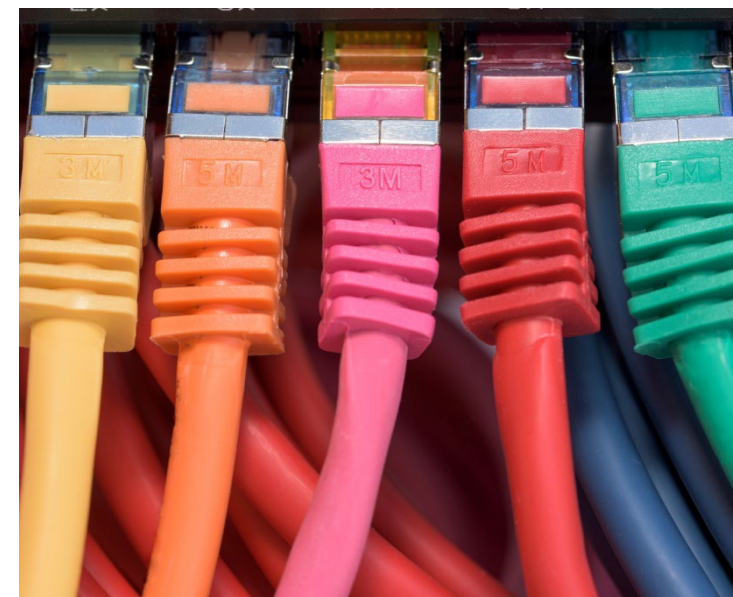
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As at: February 2021



Research project  
**Digitalisation and Natural Resources**  
Analysis of the resource intensity of  
the digital transformation in Germany

German Environment Agency

**Umwelt  
Bundesamt**

## The impact of digitalisation on natural resources

Many aspects of our private lives and work environments are being digitised more and more, bringing opportunities to produce and operate existing products and services more efficiently, as well as to offer whole new classes of products and services. However, whether and to what extent the digital transformation affects the environment has hardly been considered or discussed so far.

In order to enable decision-makers to shape the digital transformation in a way that conserves resources as much as possible, they need scientifically sound, evidence-based assessments on the impact each individual option for shaping digitalisation – and their combinations – would have. To get to these assessments, various questions need to be answered: To what extent does digitalisation increase the demand for natural resources? In what areas does digitalisation cause new or elevated needs for resources – for example, regarding end-user devices and network infrastructures? What effects does digitalisation have on the consumer behaviour of the general population? And, politically, how can mostly national legislators ensure that globally distributed digital services are operated in an environmentally friendly way?

## The research project

The German Environment Agency investigates these and other questions with the research project *Digitalisation and Natural Resources (DigiRess)* and analyses the impact of digitalisation on natural resources in Germany. *DigiRess* is being carried out by a team from Ramboll Germany GmbH, the Institute of Economic Structures Research (GWS), the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS and the German Institute for Standardization e.V. (DIN). The research project started in fall of 2020 and will run until 2023.

## The approach

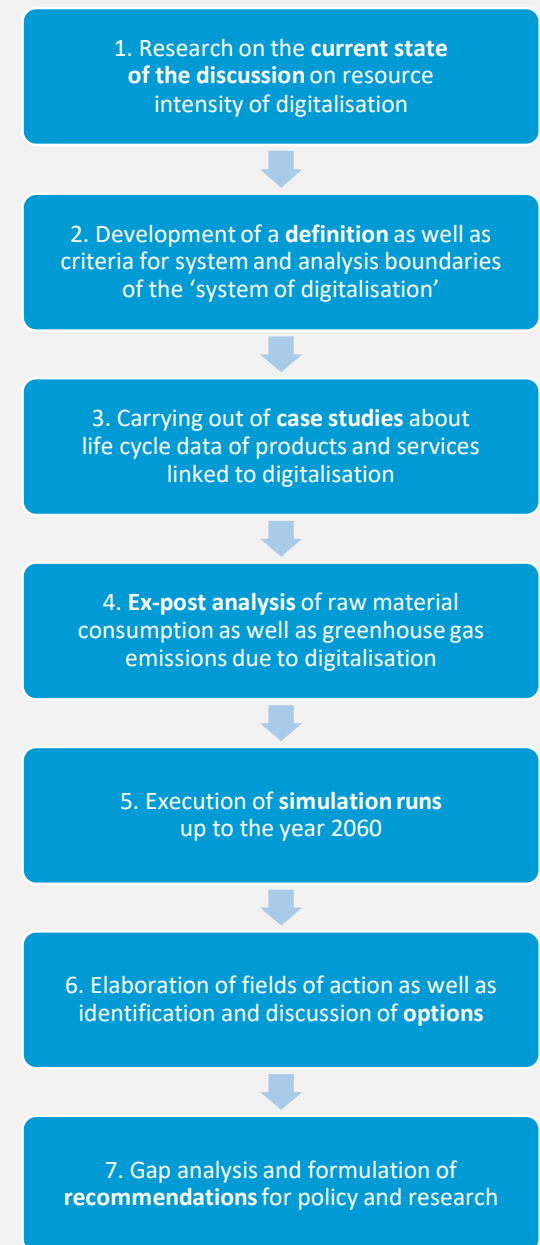
*DigiRess* begins with a systematic review of the state of knowledge in the field of resource consumption triggered by the digital transformation. In the next step, precise definitions and boundaries of the ‘system of digitalisation’ and its components are developed. This allows further and detailed investigations of the system in subsequent steps.

One of these steps is to carry out ten case studies. Here, the resource intensity of emerging products and services are projected over their entire life cycle through the use of life cycle assessment methods. Examples of such products and services may include smartphones, internet routers or servers for online trading platforms.

Subsequently, the central activities of the research project start: With the help of a macroeconomic input-output model, which incorporates the interconnections of all sectors of the German economy, the current, ‘as-is’ raw material intensity of the digital transformation is examined. Based upon that, the model is used to simulate potential development pathways of the digital transformation up to the year 2060. These ‘potential futures’ differ, for example, in terms of the development of production processes, consumer demand or energy sources used. The results obtained from both the simulations and the case studies are then used by the *DigiRess* team to identify and quantify options to shape digitalisation in a resource-conserving way.

## The results

The results of the project are – in addition to the knowledge gained about the resource intensity of digitalisation – direct and tangible recommendations for decision makers in policy and research. Furthermore, the German Environment Agency will be provided with simulation tools to project the resource demand of digitalisation now and in the future.



Steps of the research project *DigiRess*