



NFDI4Ing Conference 2022

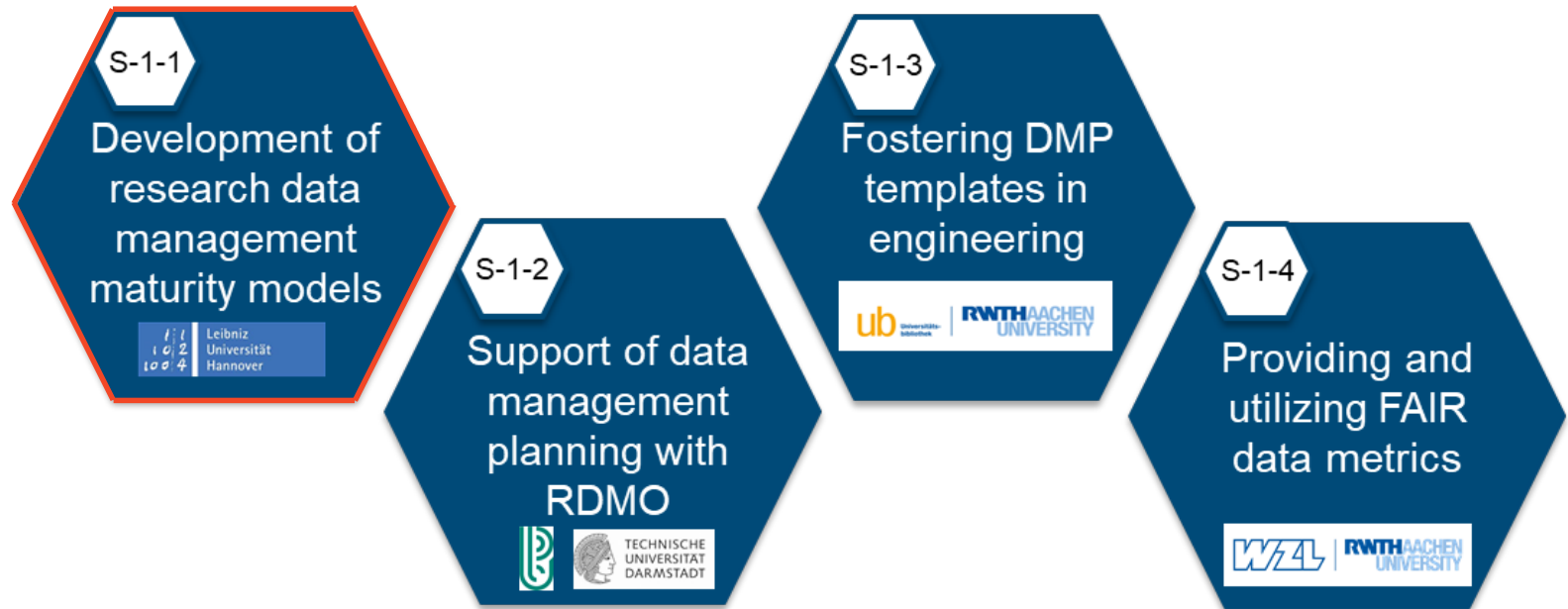
Maturity Models for RDM Processes – Data Access

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Base Services Measure S-1:

Quality assurance in RDM processes and metrics for FAIR data
(LUH, TUDA, RWTH)



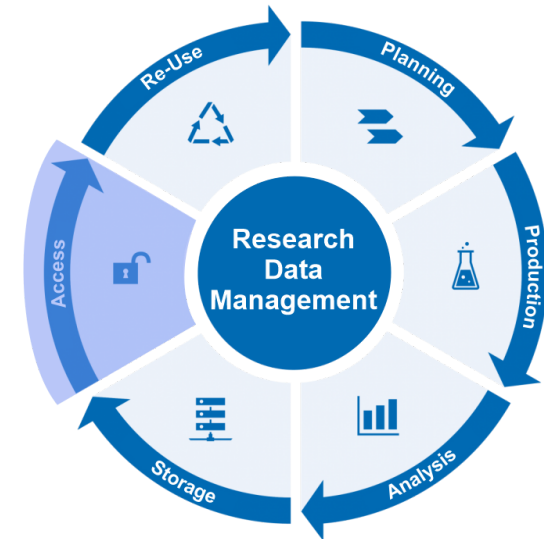
Agenda

- Data Access
- Maturity Model
- Maturity Model - Data Access Management

Data Access - Publication of Data

Making data accessible means making your data available so that other researchers can access and use it.

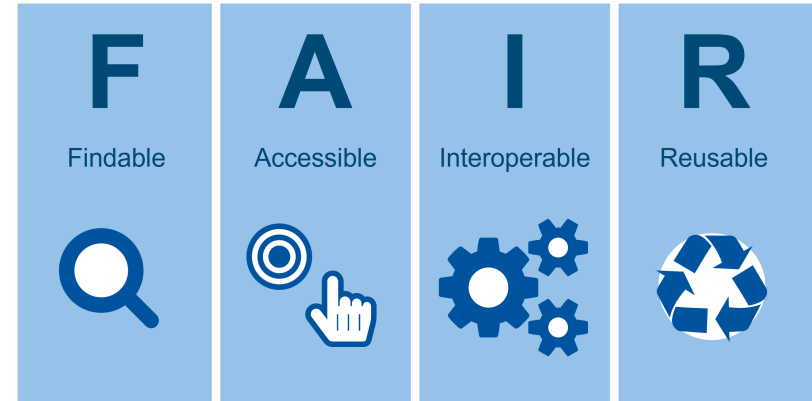
- Share data, making it available
- Data can be found by others
- Provide authorised users access to the data
- Interoperability is to be enabled
- Data can be re-used by others



FAIR Data

Making data access "FAIR"

- **Findable**
- The first step is to find data
- Data and metadata should be easy to find for computer and human
- **Accessible**
- Who and how can data be accessed
- **Interoperable**
- Data must be able to be integrated with other data
- Data must be interoperable with applications or workflows
- **Reusable**
- Data must be able to be replicated and combined



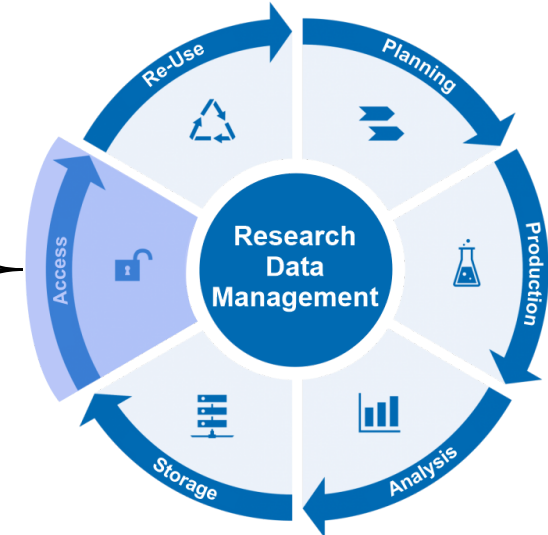
Data Access - Publication of Data

Important factors

Storage location: When accessing your data, consider **how you store the data** so that other researchers can **find** and **use** your data. Storage options here will depend on systems used or received within your project or organization.

Data format: The data should be stored in a **re-usable format**. This may mean storing raw data instead of processed data. Try to **use open and prevailing data formats**.

Completeness: Make sure that your **data is complete and described** in such a way that your results can be **reconstructed** and **reproduced**. The necessary description includes notes, protocols and other information describing the data, which are also part of the data to be made accessible. In addition, the completeness also includes a **secure re-use** of your data.



Collection of Activities of Data Access Management

- Selection of data to be published
- Determine copyrights and licenses
- Define access
- Use of Metadata
- Linking further materials
- Underlying processes are shared

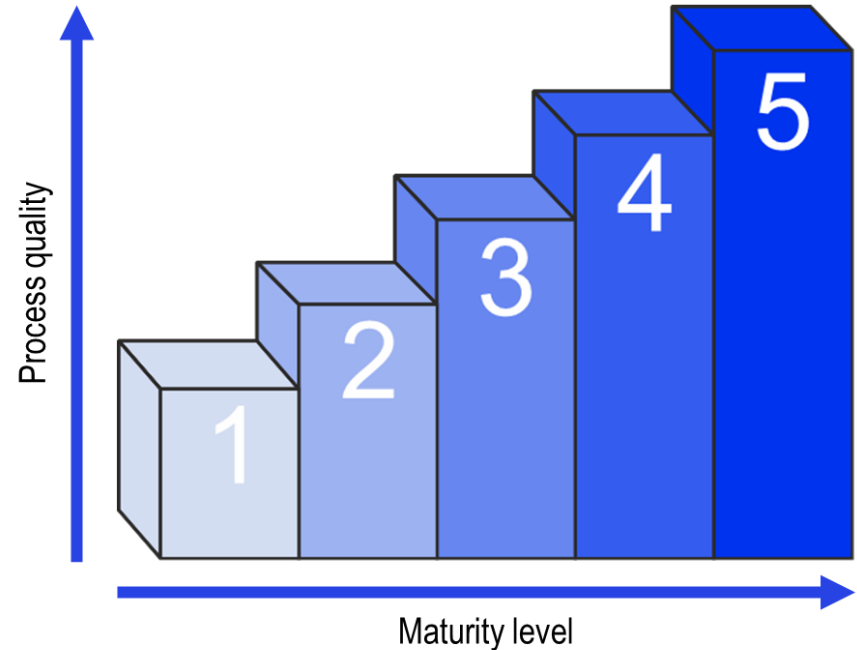
Collection of the Purpose of Shared Data

- Scientific transparency
- Verification of research results
- Re-Use of data
- Helps to avoid duplication
- Increase in citations

Maturity Model

What is a maturity model

- Tool for objective assessment of the quality of processes
- A model for organizational improvement
- A user centred guide
- Model is not prescriptive
- does not tell how to improve

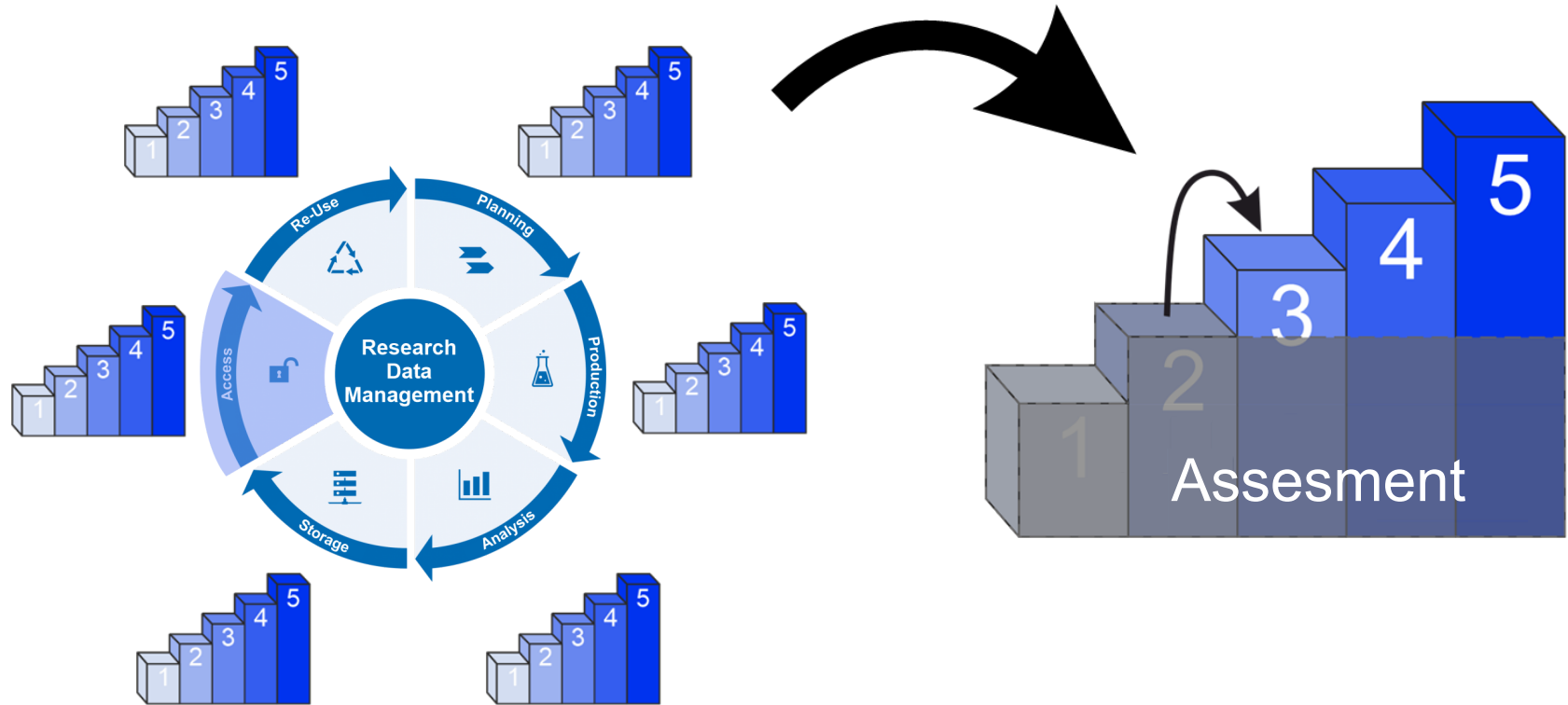


Why use a Maturity Model

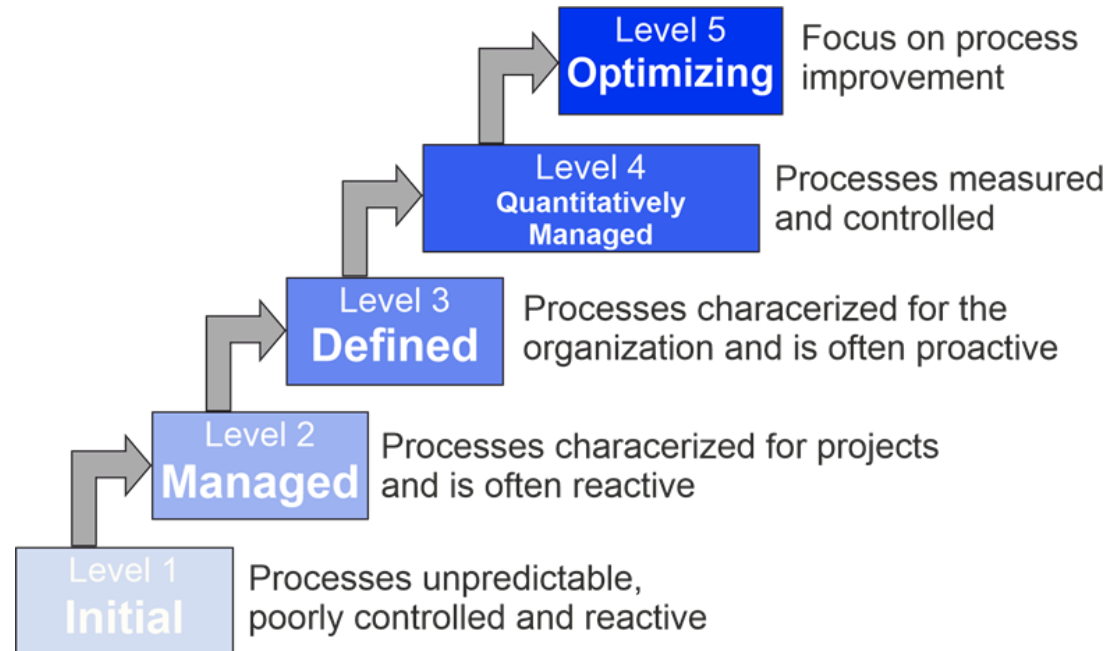
Use of a maturity model

- Tool for objective assessment of the quality of processes
- Identification of necessary means and resources
- Process improvement through a roadmap along discrete maturity stages
- Reference basis for the process view

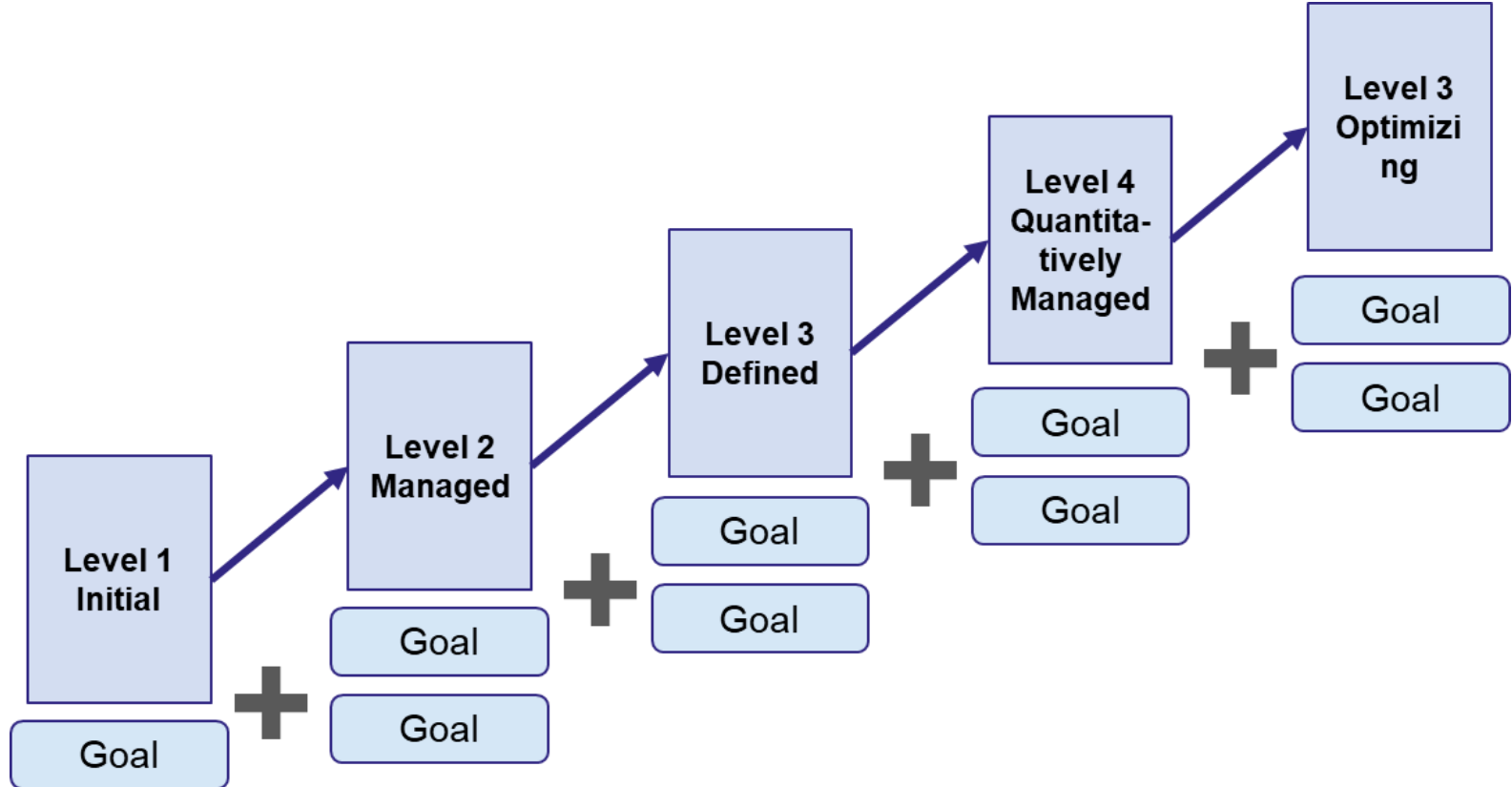
Using Maturity Models for Research Data Management



Maturity Levels - Key Characteristics [CMMI]



Improve the Maturity Level based on defined Goals



What prevents you from improving the Management of Data Access?



Survey: on the slide on the right.
Click on the cross of the fields that
agree

Go to the slide "Survey 1" in the audience area



What prevents you from improving the management of data access?

Amount of needed time 5

Lack of knowledge for execution 8

Lack of technical solutions 7

Lack of discipline-specific best practices 9

Missing benefits or feedback 5

Lack of resources in the organization/project 6

When you are done, click "I`m Done"
you can add "others" if needed.

other...

lack of policies
and processes
within the
infrastructure

dealing
with legal
and ethical
issues

export control
protocol within a
company/institute
(taking times &
forms to fill in)

lack of knowledge
how to make data
management
"better", especially if
the "old" solution
works (at least
somehow...)

What limits the Maturity Level

Limitations

- (Project) scope
- Available funds and resources
 - Lack of human resources
 - Lack of monetary capacities
 - Lack of technical solutions
- (Project) guidelines and interests

Data Access Management - Maturity Level Characteristics

Level	Maturity Level	Description
Level 1	Initial	Data access is performed ad hoc Access practices are not applied across projects/institution Data access takes place reactively
Level 2	Managed	Data access is planned and executed according to policies Researchers know how to make data accessible and resources are available Processes are characterized on project level
Level 3	Defined	Processes are characterised based on community/domain standards and regulations (norms, procedures, resources) specific requirements are derived and established depending on community based guidelines Data access is executed proactively
Level 4	Quantitatively Managed	Introduction and establishment of quantitative quality goals Metrics for data access are defined and used
Level 5	Optimizing	Continuous improvement of data access through technology and process improvements Development and revision of best practices

Initial - Goals and Practices

Key Description:

- Data Access is performed "**Ad hoc**", **reactively**
- No given practices or processes for making data accessible

- **No defined goals**, process is performed **intuitively**
- No defined process to manage data access
- No defined and uniform repositories or platforms to make data accessible

Managed - Goals and Practices

Key Description:

- Data Access is **planned** and executed according to policies
- Researchers know how to make data accessible and **resources** are **available**
- Processes are characterized on **project level**

The management and execution of data access is addressed and defined at project/organization level .	<ul style="list-style-type: none">• Establish which data should be shared• Establish for whom data is made accessible (A)• Establish how the re-use of data is allowed (R)
accessed data can be found according to general descriptions	<ul style="list-style-type: none">• Describe the data with general metadata (F)• Provide data with a unique identifier (F)
Technical system enable data to be shared and found (F)	<ul style="list-style-type: none">• Project-internal selection/development of a repository, platform• Define a repository/platform for data access• Identify and execute requirements for the project-internal use of the technical system

Defined - Goals and Practices

Key Description:

- **Community standards** and regulations
- **Specific requirements** are derived and established
- Data Access is executed **proactively**

<p>Community-oriented and project-common approaches and standards to data access management are defined</p>	<ul style="list-style-type: none"> • Identify and involve community-wide regulations and standards • Define execution on interoperability and reuse of the accessed data (oriented on domain-relevant community standards)
<p>The findability of the data is enhanced with a community-specific context (F)</p>	<ul style="list-style-type: none"> • Describe data with research and community specific metadata (F)
<ul style="list-style-type: none"> • The data can be integrated with other data (I) • The data can be interpreted without other systems (I) 	<ul style="list-style-type: none"> • Use of a formal, accessible description for knowledge representation of the data (I). • Reference to process-relevant and related (meta-)data (I)
<ul style="list-style-type: none"> • The reusability of the data made available is guaranteed (R) • The data comply with domain-relevant community standards for the research area (research method) (R) 	<ul style="list-style-type: none"> • Describe data with process-relevant attributes (R) • Share data in an established file format (R) • Identify and involve domain relevant community standards for (meta-)data (I,R)
<p>The technical systems fulfil the defined regulations and requirements of the domain</p>	<ul style="list-style-type: none"> • Develop or select technical system that meet the requirements of the standards

Quant. Managed - Goals and Practices

Key Description:

- Introduction and establishment of **quantitative goals**
- **Metrics** for data access are defined and used

Quantitative quality goals have been established regarding data access	<ul style="list-style-type: none">• Identify and involve metrics• Define quality control KPIs• Establish quantity quality goals
The data quality is ensured	<ul style="list-style-type: none">• Review the execution with regard to the defined characteristics• Introduce feedback on data quality and execution and adaptation
Implementation of quality assurance measures based on technical solutions	<ul style="list-style-type: none">• Define verification mechanism for complete and correct use of technical systems• Develop quality assurance measures for the technical solutions

Optimizing - Goals and Practices

Key Description:
- **Continuous improvement** of data access through technology and process improvements
- Development and revision of best practices

The defined processes are **continuously** and **proactively** improved and adapted

- Improve and define processes based on feedback and new standards from the domain

Processes related to structures or plans, training and best practices are developed and **continuously adapted**

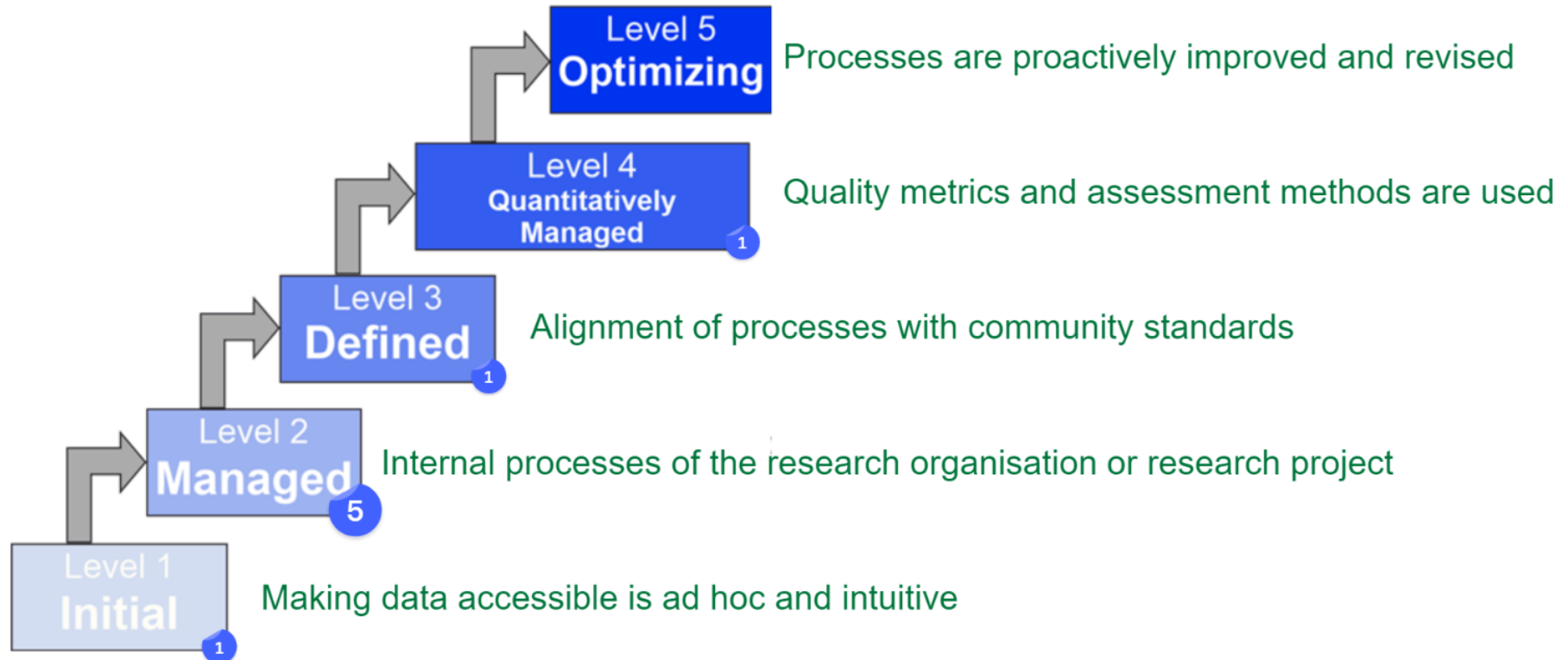
- Improve best practices and training
- **Ongoing exchange** with the **community** and execution of new standards

Resources for enabling technologies for data access are evaluated on a regular basis, and **improvements** are implemented

- Use and develop new technical standards
- Exchange and **develop** technical systems in the domain-relevant community



How do you assess your level of maturity for the process of making data available



Thank you very much!

Are there any open questions and suggestions?

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