

Towards Services to Enable FAIR Research Software in a Typical Research Project Cycle

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Vision

Data as a common good for excellent research, organised by the scientific community in Germany.

- Goals:
 - Improving the possibilities for using data for science and society
 - Creating the framework conditions for legally compliant, interoperable and sustainable data infrastructures
 - Strengthen competence in dealing with data
 - Increase the efficiency of the entire German science system
- Funded by state and federal governments with up to 90 million € per year
- Covering research data **and research software**
- High focus on developing and **providing services** for researchers

Goal: FAIR Research Software [1]



“Software, and its associated metadata, is easy for both humans and machines to find.”



“Software, and its metadata, is retrievable via standardised protocols.”



“Software interoperates with other software by exchanging data and/or metadata, and/or through interaction via application programming interfaces (APIs), described through standards.”

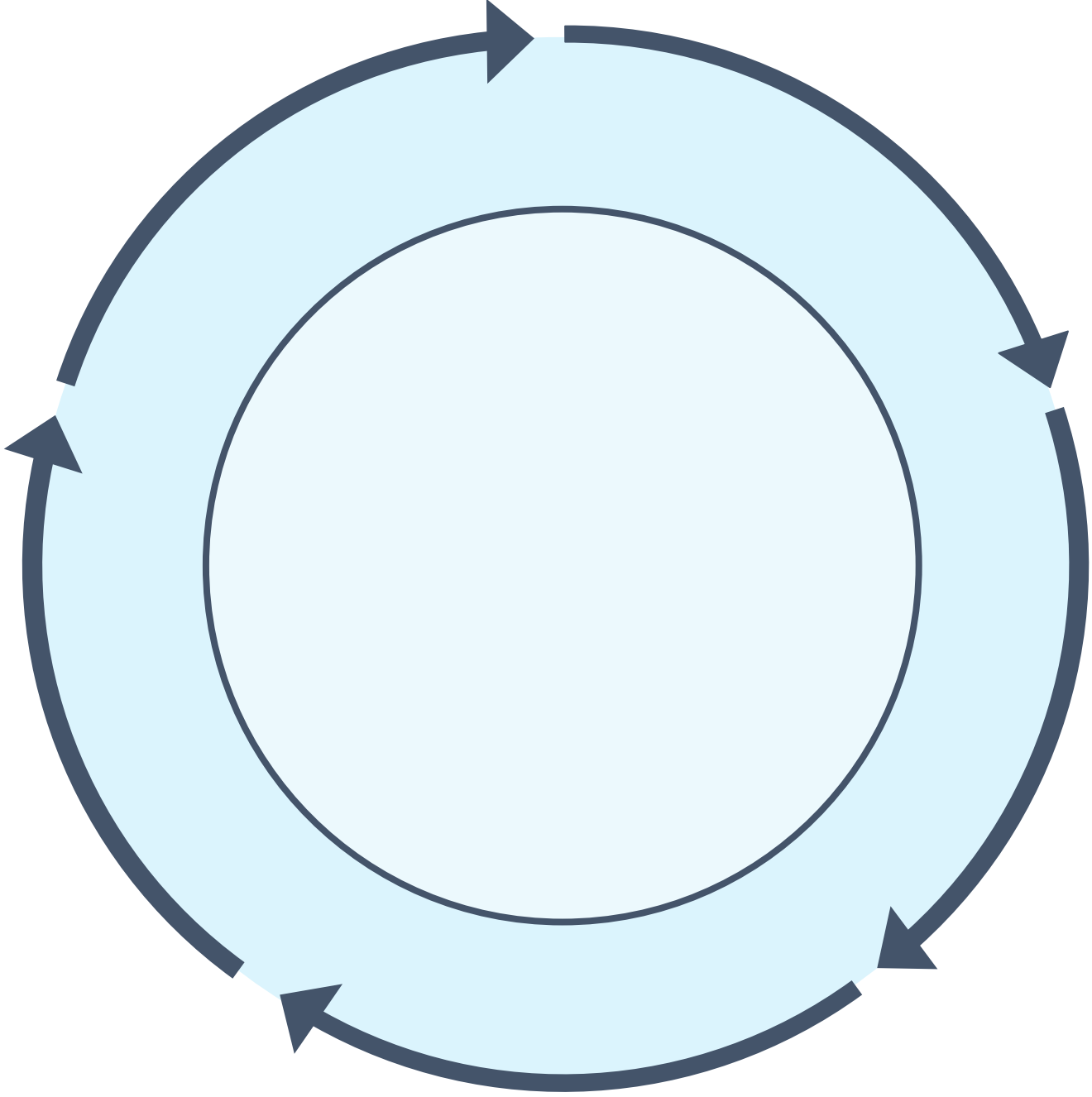


“Software is both usable (can be executed) and reusable (can be understood, modified, built upon, or incorporated into other software).”

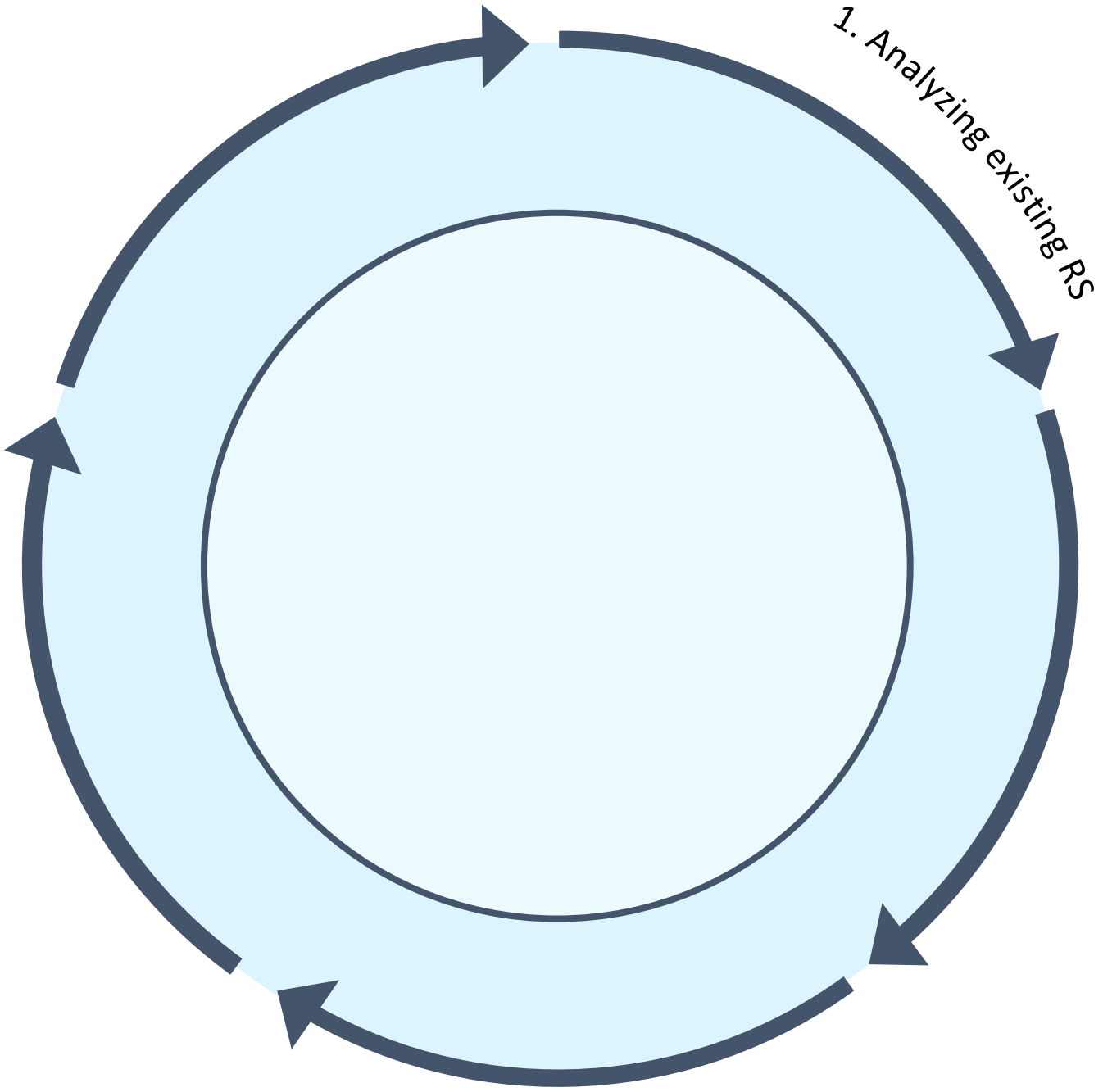
Icons by Sangya Pundir, CC BY-SA 4.0

[1] M. Barker *et al.*, “Introducing the FAIR Principles for research software,”

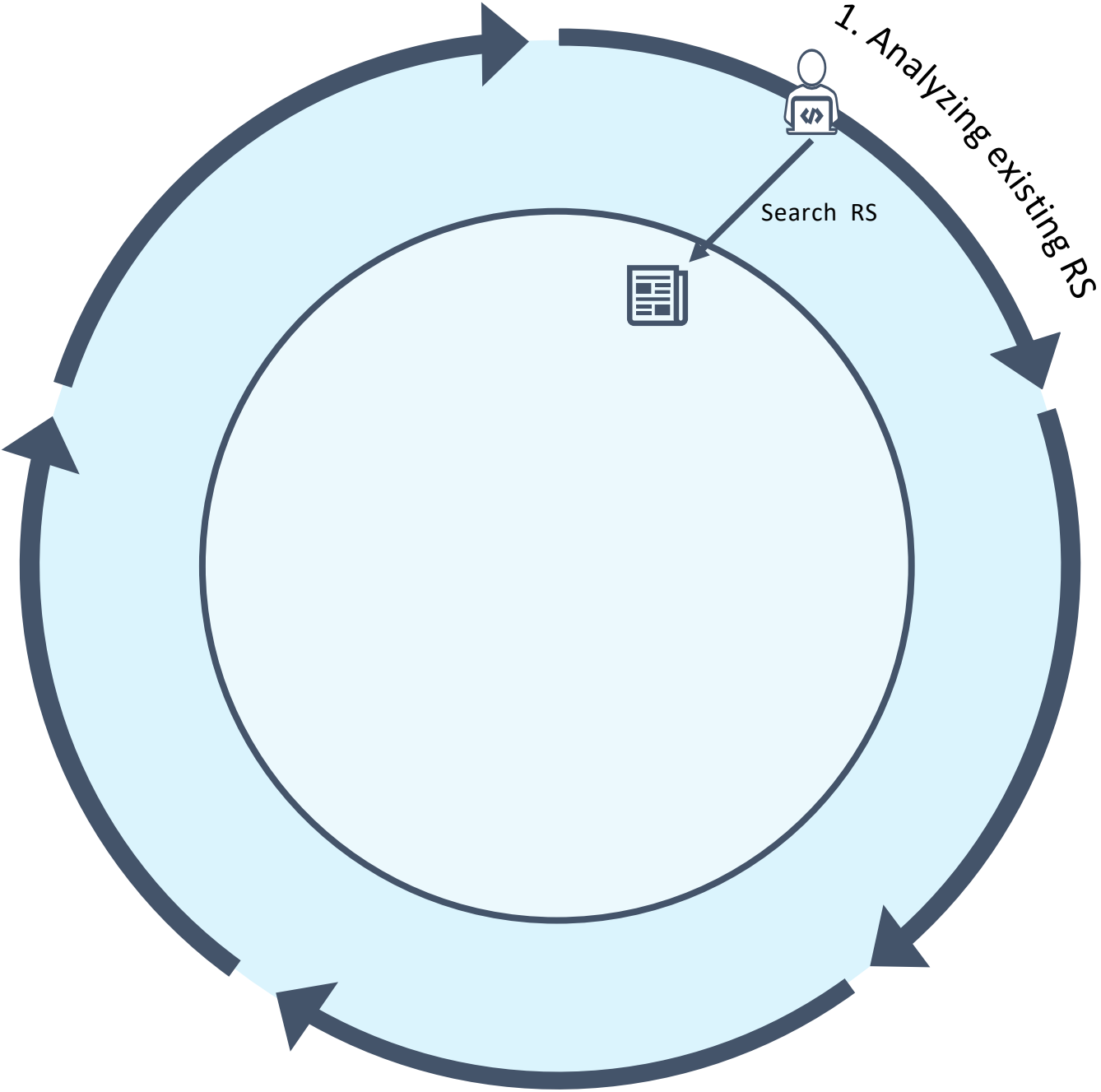
Research Project Life Cycle



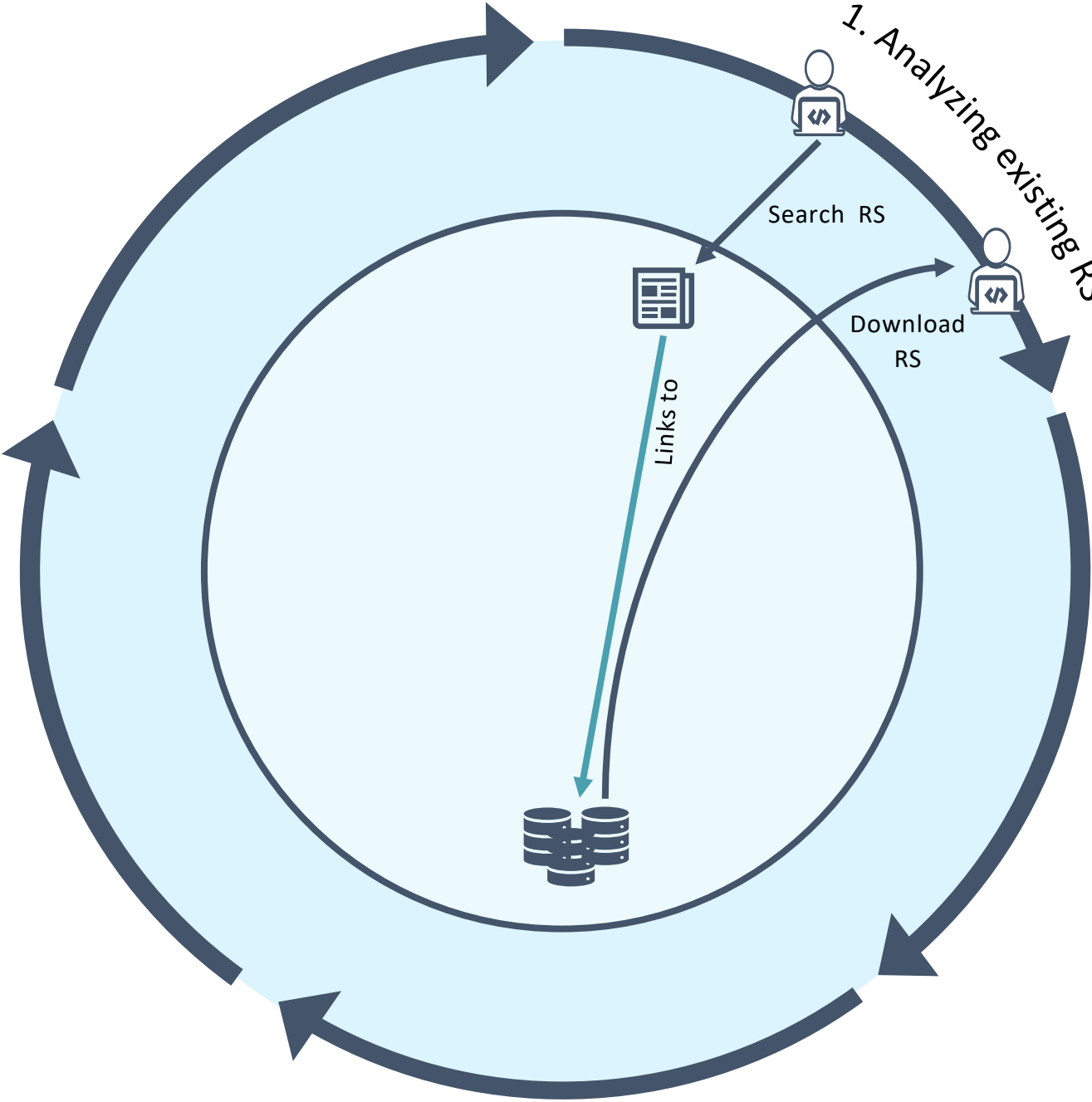
Research Project Life Cycle



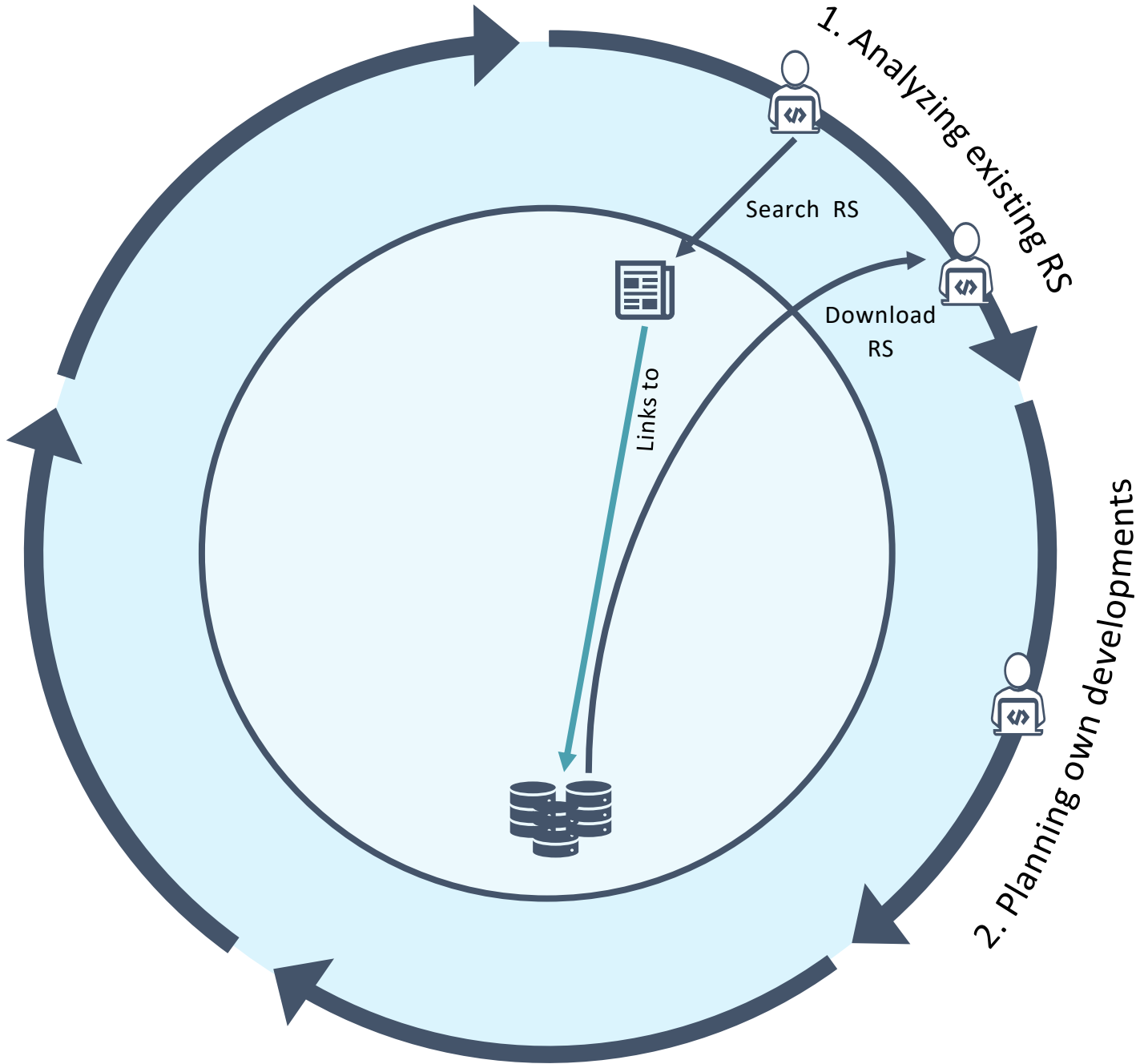
Research Project Life Cycle



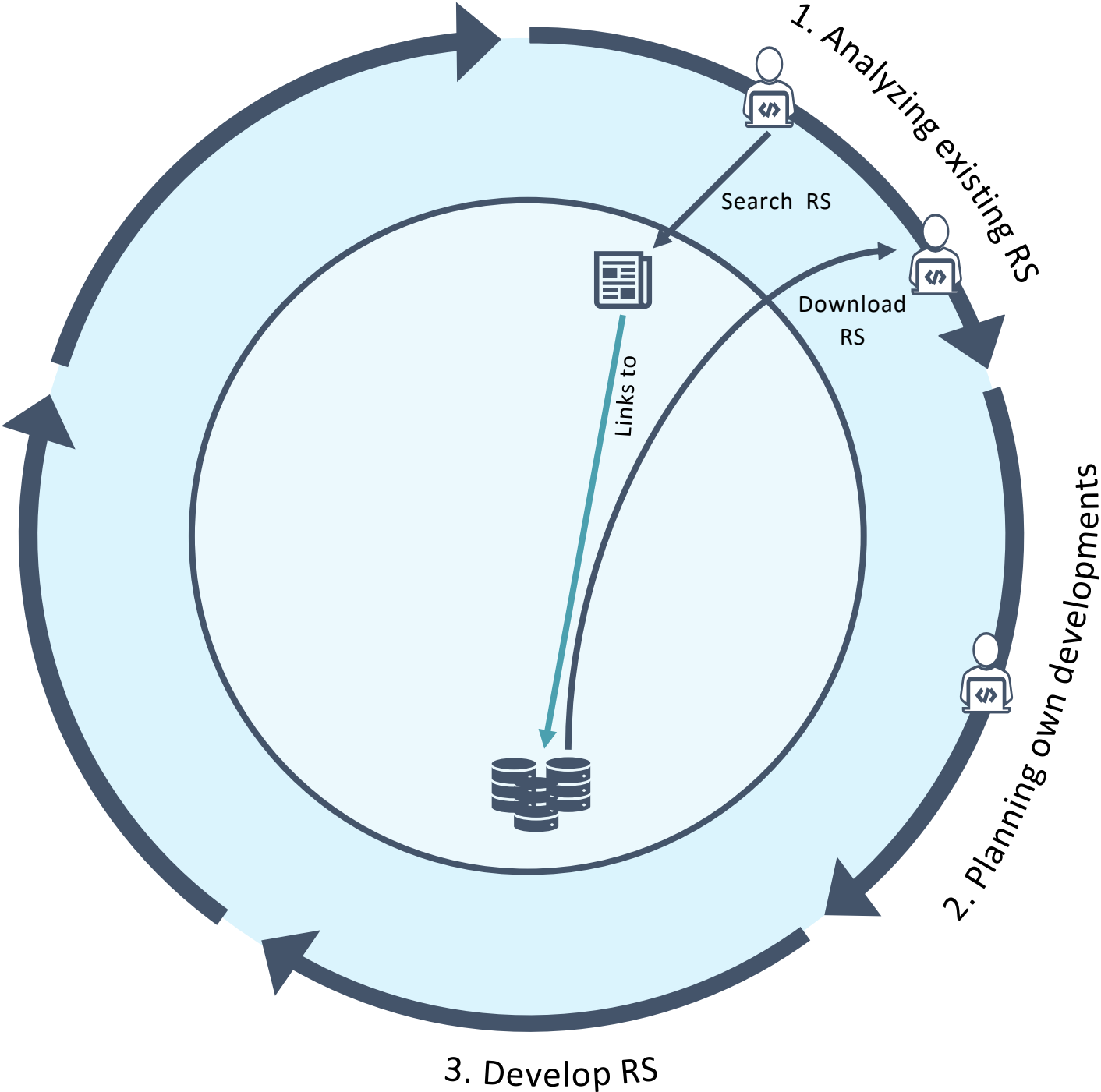
Research Project Life Cycle



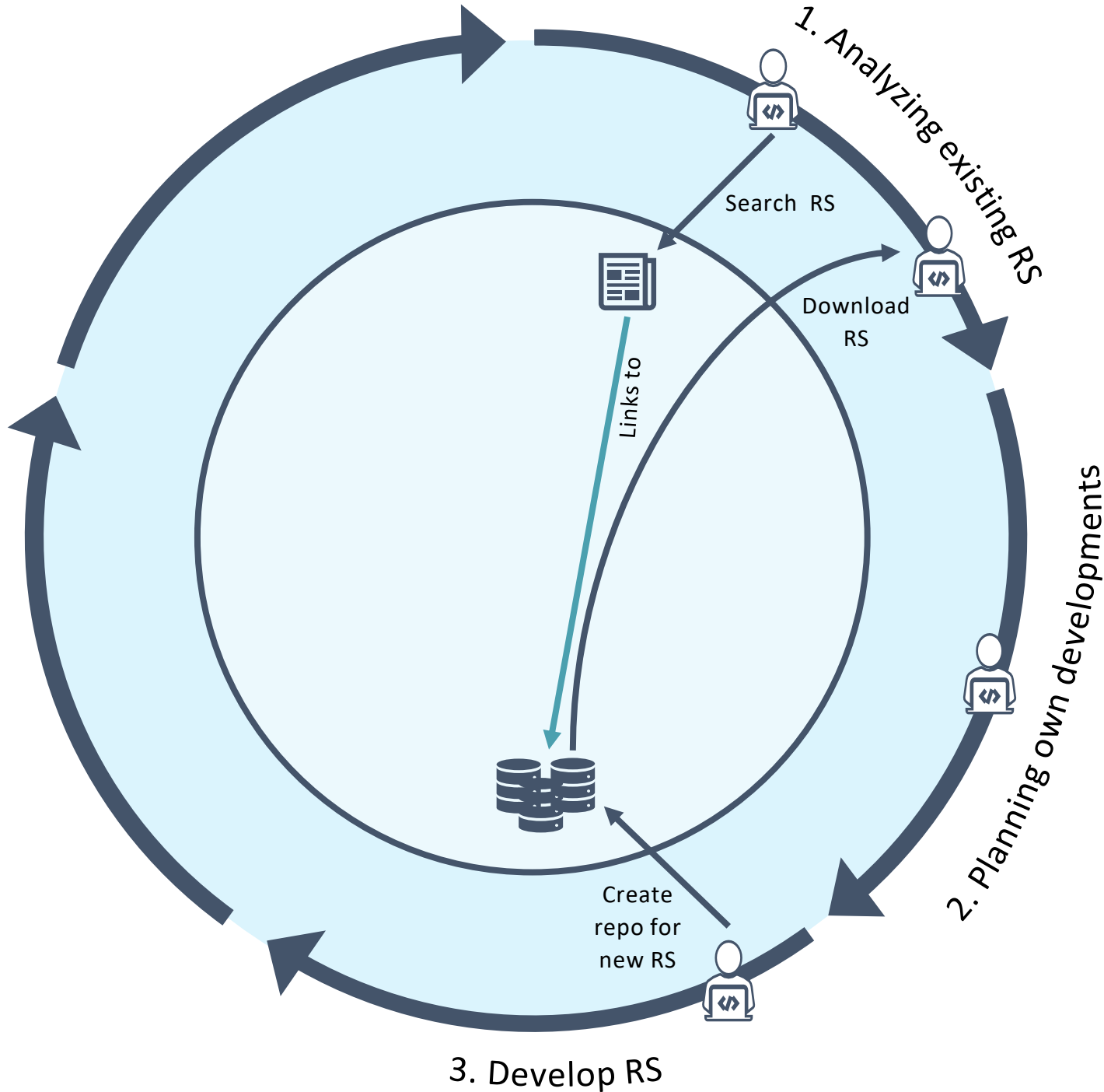
Research Project Life Cycle



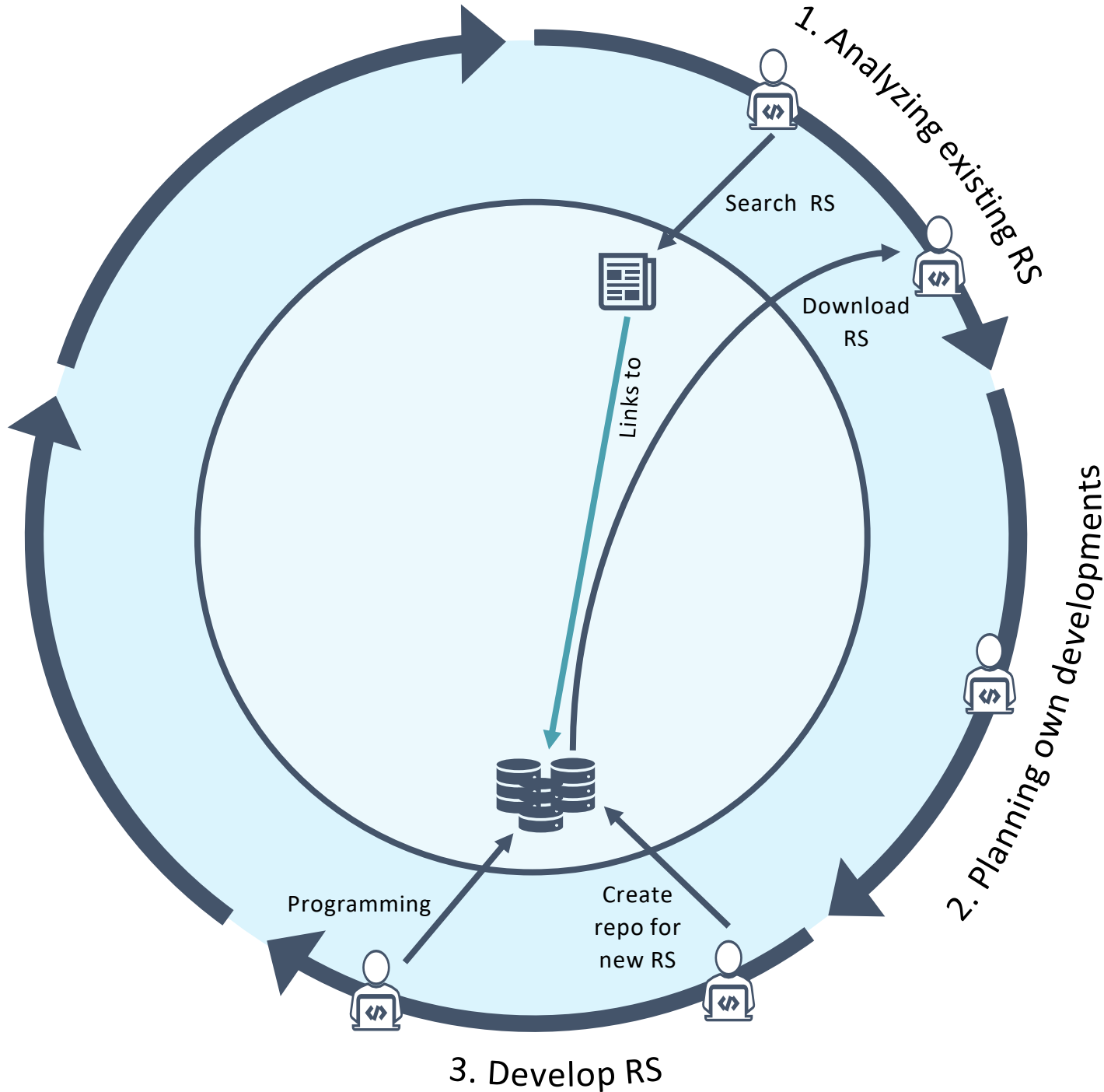
Research Project Life Cycle



Research Project Life Cycle



Research Project Life Cycle



3. Develop RS

2. Planning own developments

1. Analyzing existing RS

Search RS

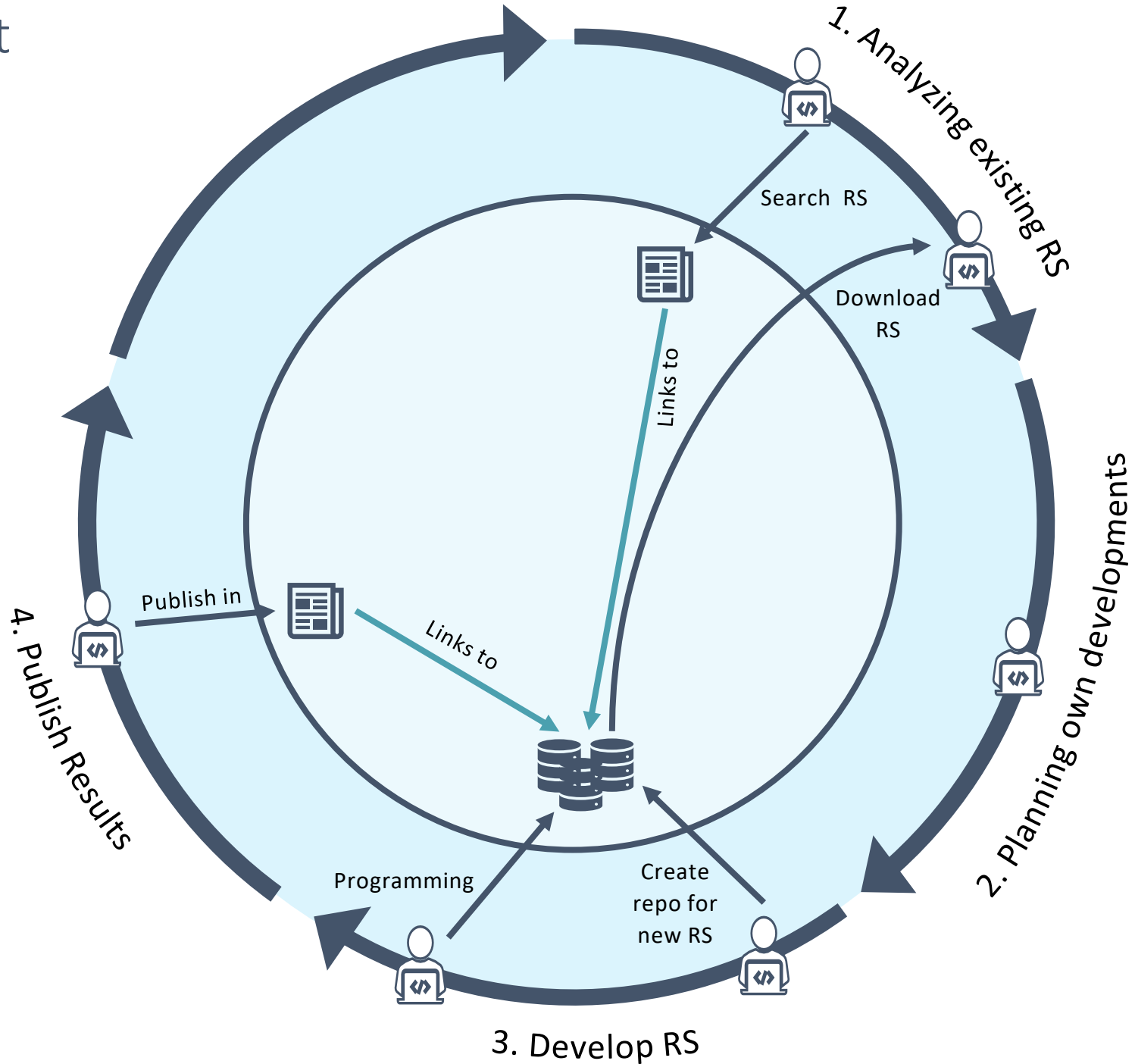
Download RS

Links to

Create repo for new RS

Programming

Research Project Life Cycle



Service Perspective

Service Perspective

FAIR
Research Software

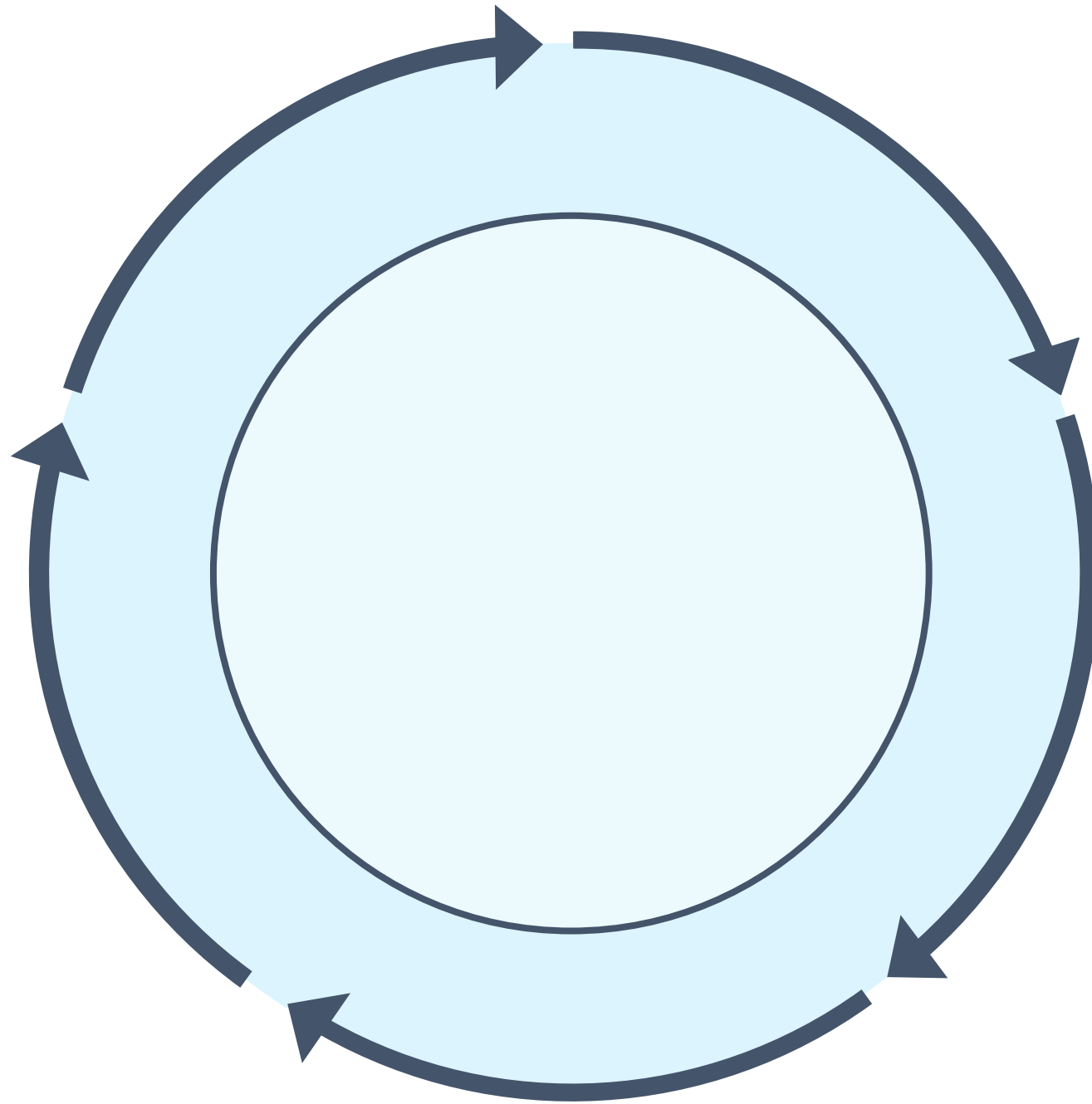
Service Perspective

FAIR
Research Software

Research Project
Life Cycle

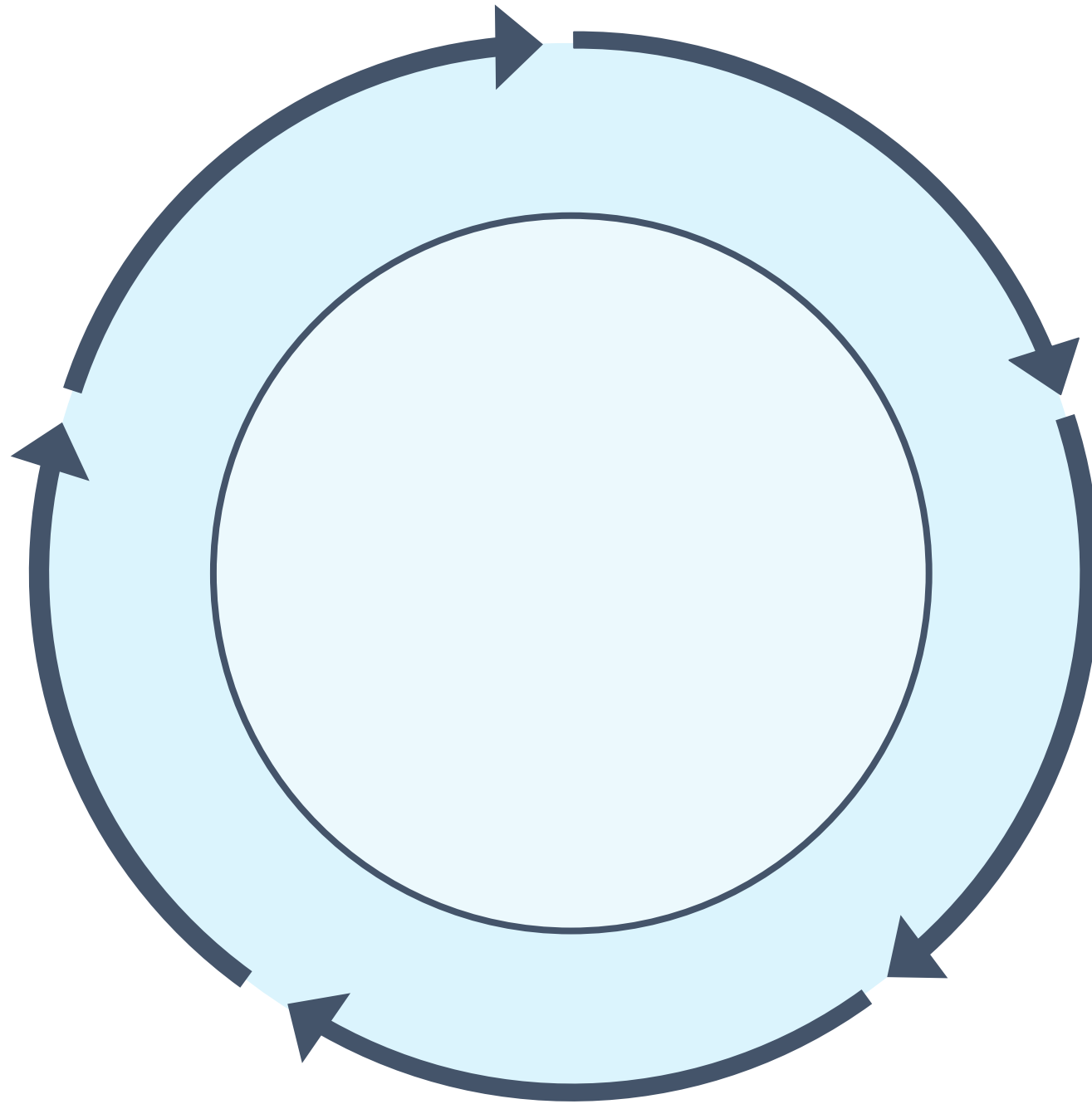


Vision:
Research Cycle
for FAIR RS



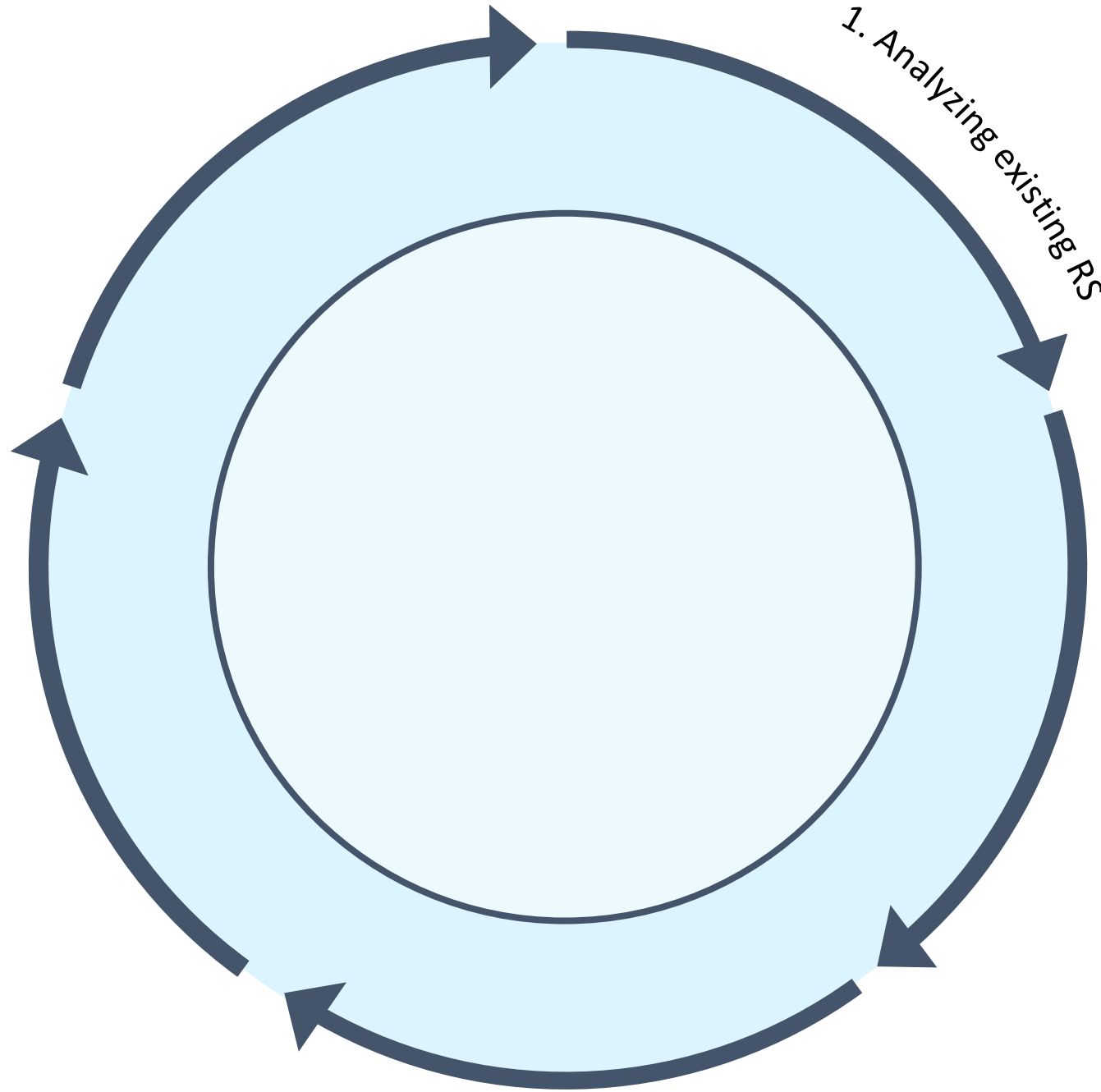
Vision: Research Cycle for FAIR RS

Services



Vision: Research Cycle for FAIR RS

Services

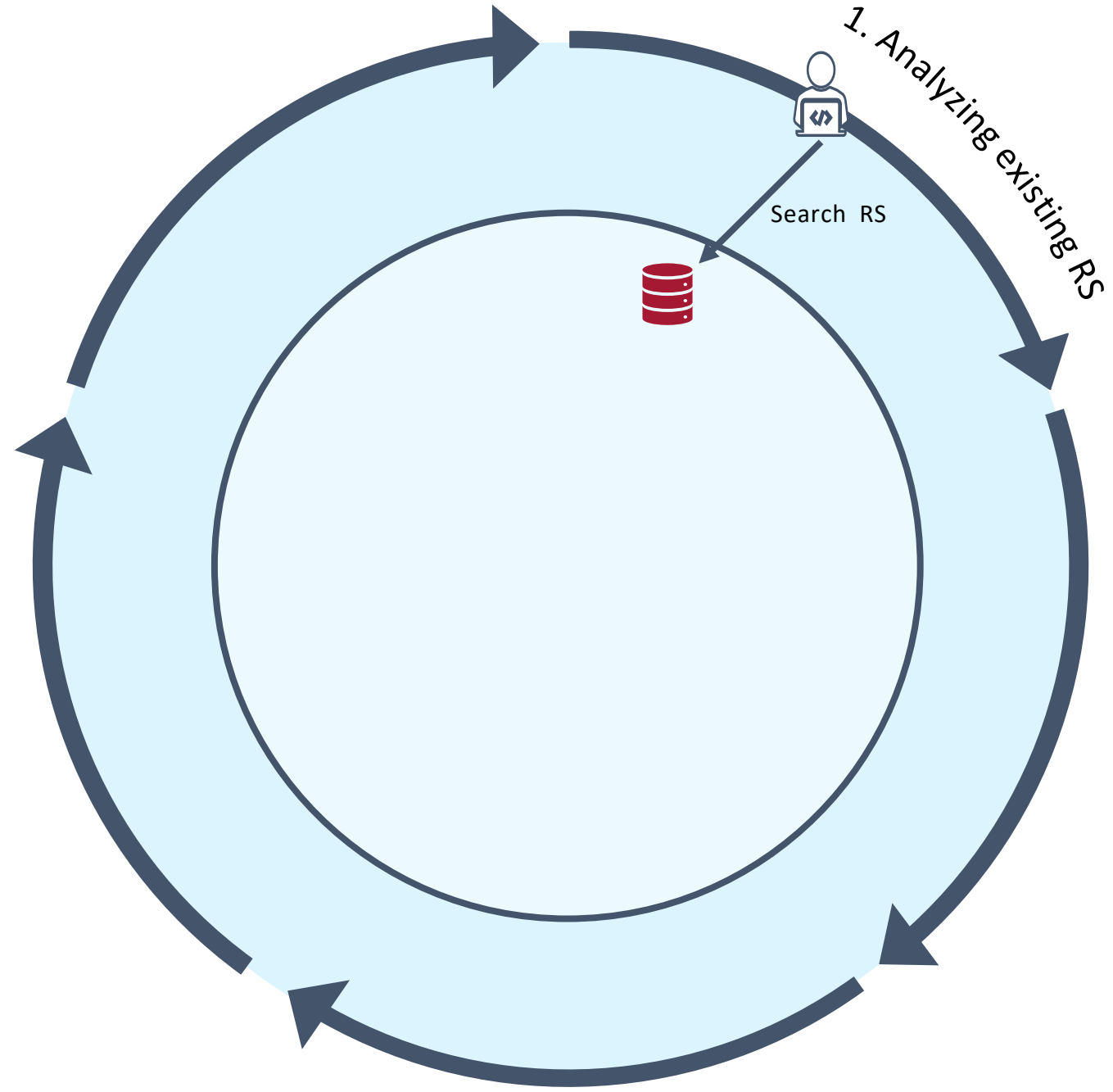


1. Analyzing existing RS

Vision:
Research Cycle
for FAIR RS

Services

 RS Registry



1. Analyzing existing RS

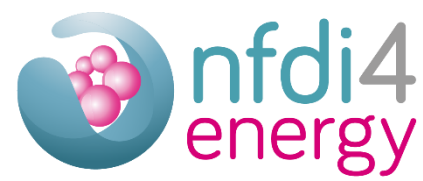
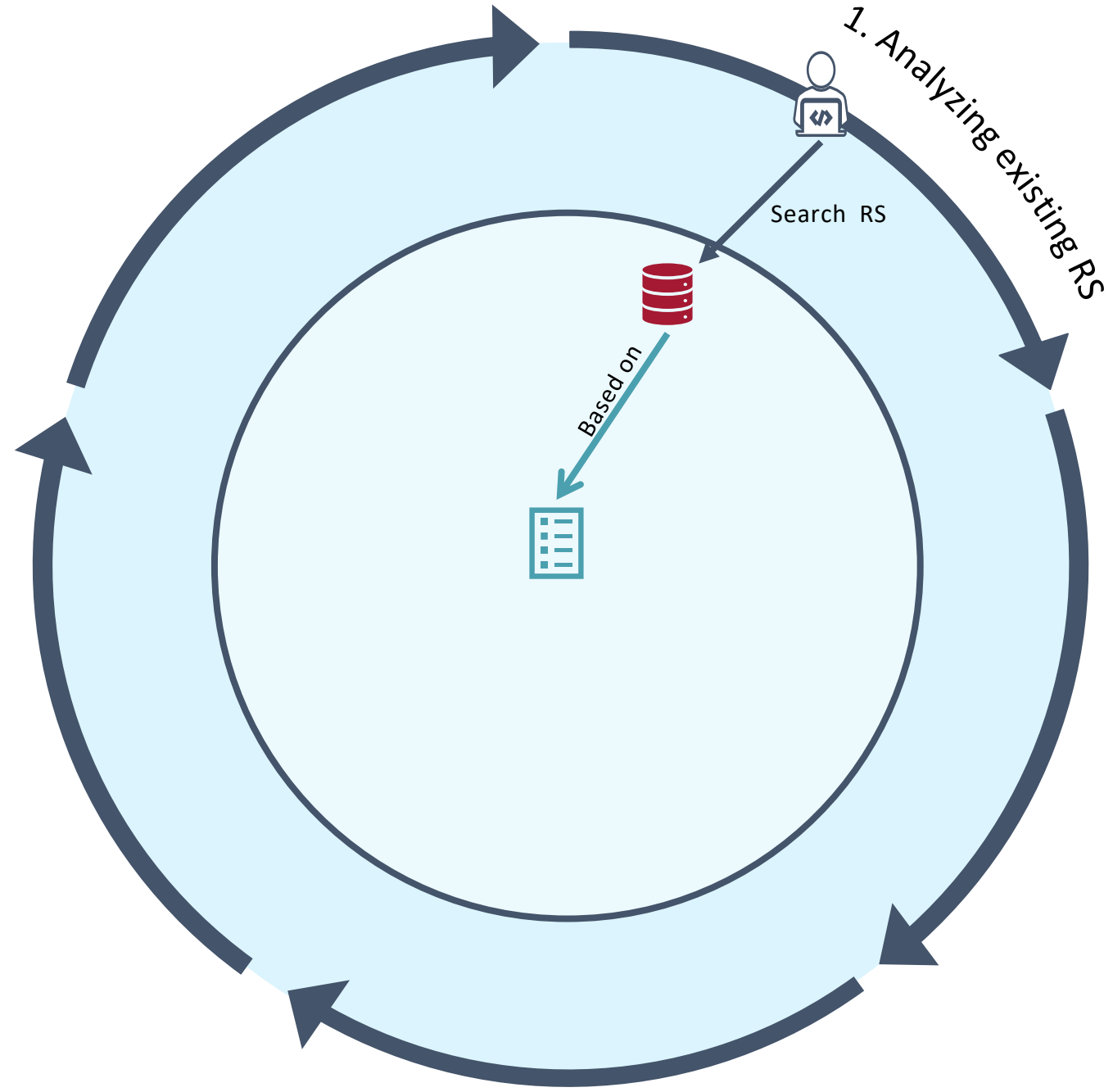


Standards/
Guidelines

Vision: Research Cycle for FAIR RS

Services

 RS Registry



Standards/
Guidelines

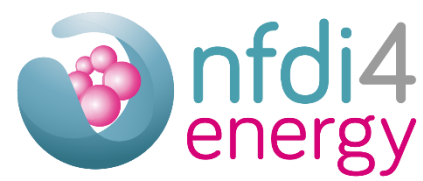
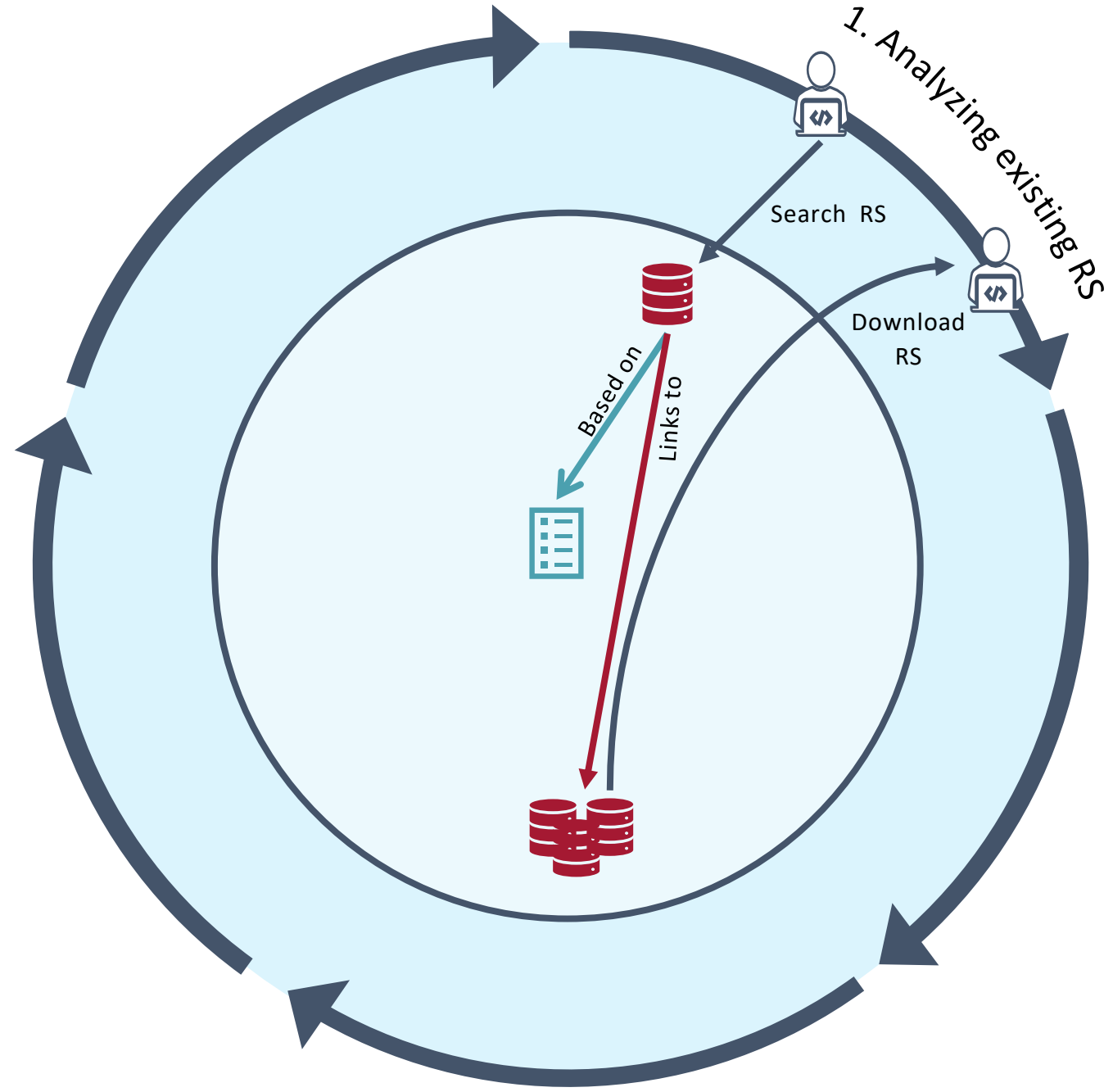
 Metadata
schema

Vision: Research Cycle for FAIR RS

Services

 RS Registry

 Software
Repositories



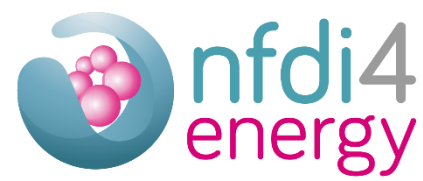
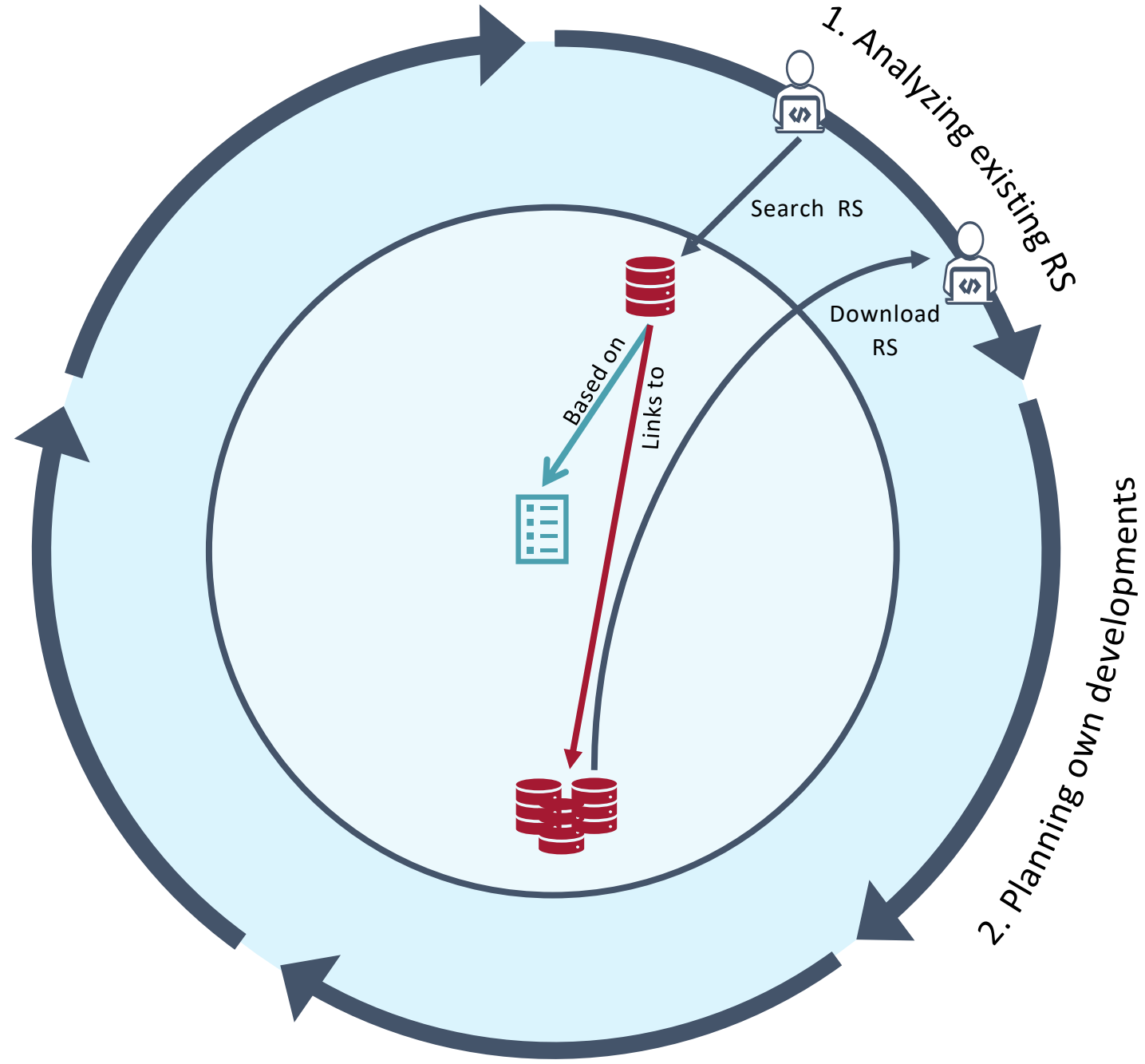
Standards/
Guidelines

Metadata
schema

Vision: Research Cycle for FAIR RS

Services

-  RS Registry
-  Software Repositories



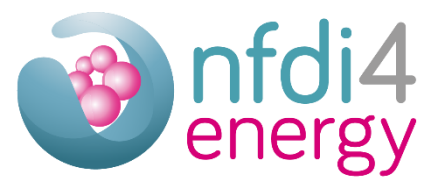
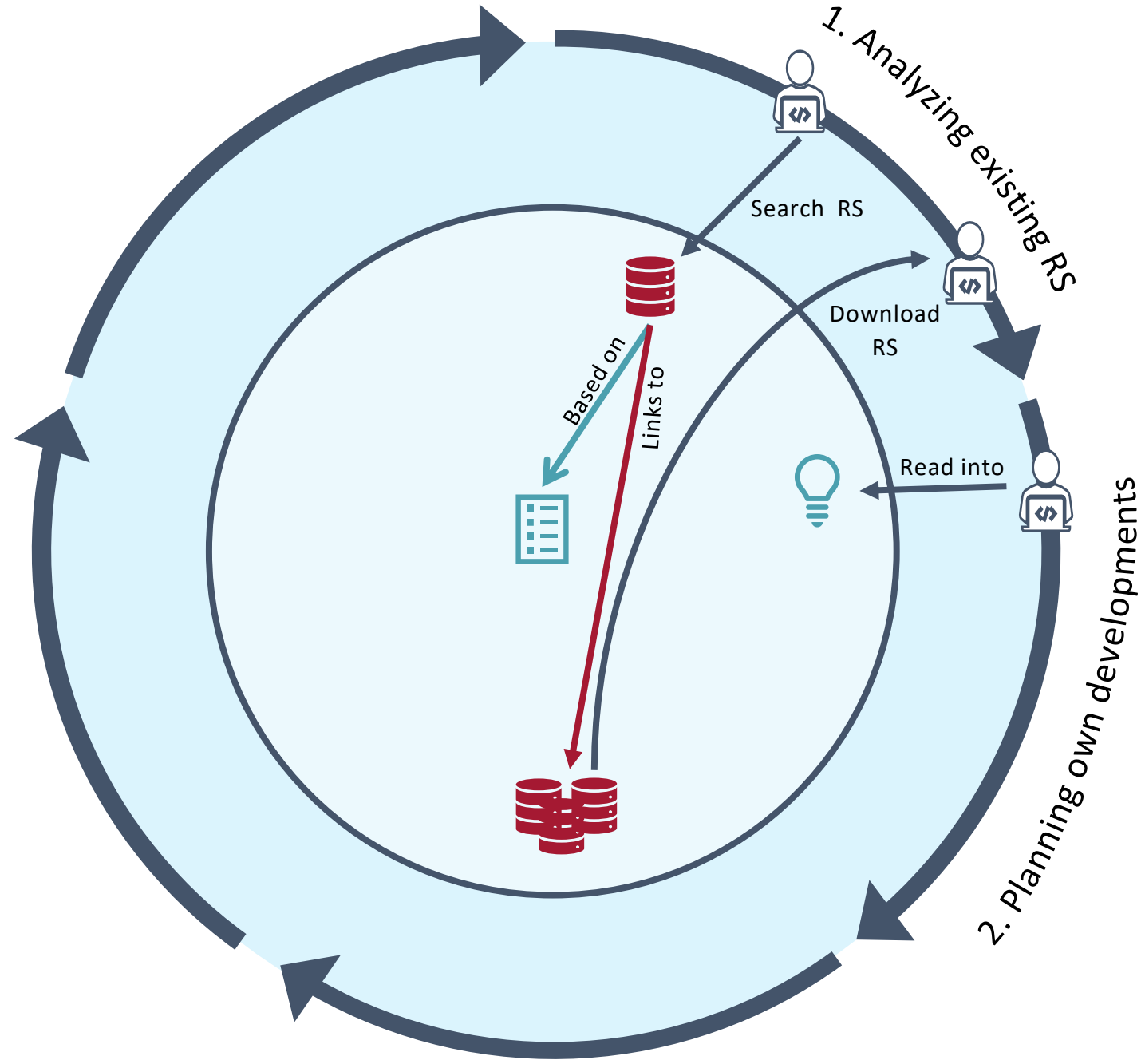
Standards/
Guidelines

-  Metadata schema



Vision: Research Cycle for FAIR RS

Services

-  RS Registry
-  Software Repositories

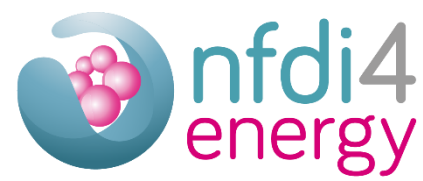
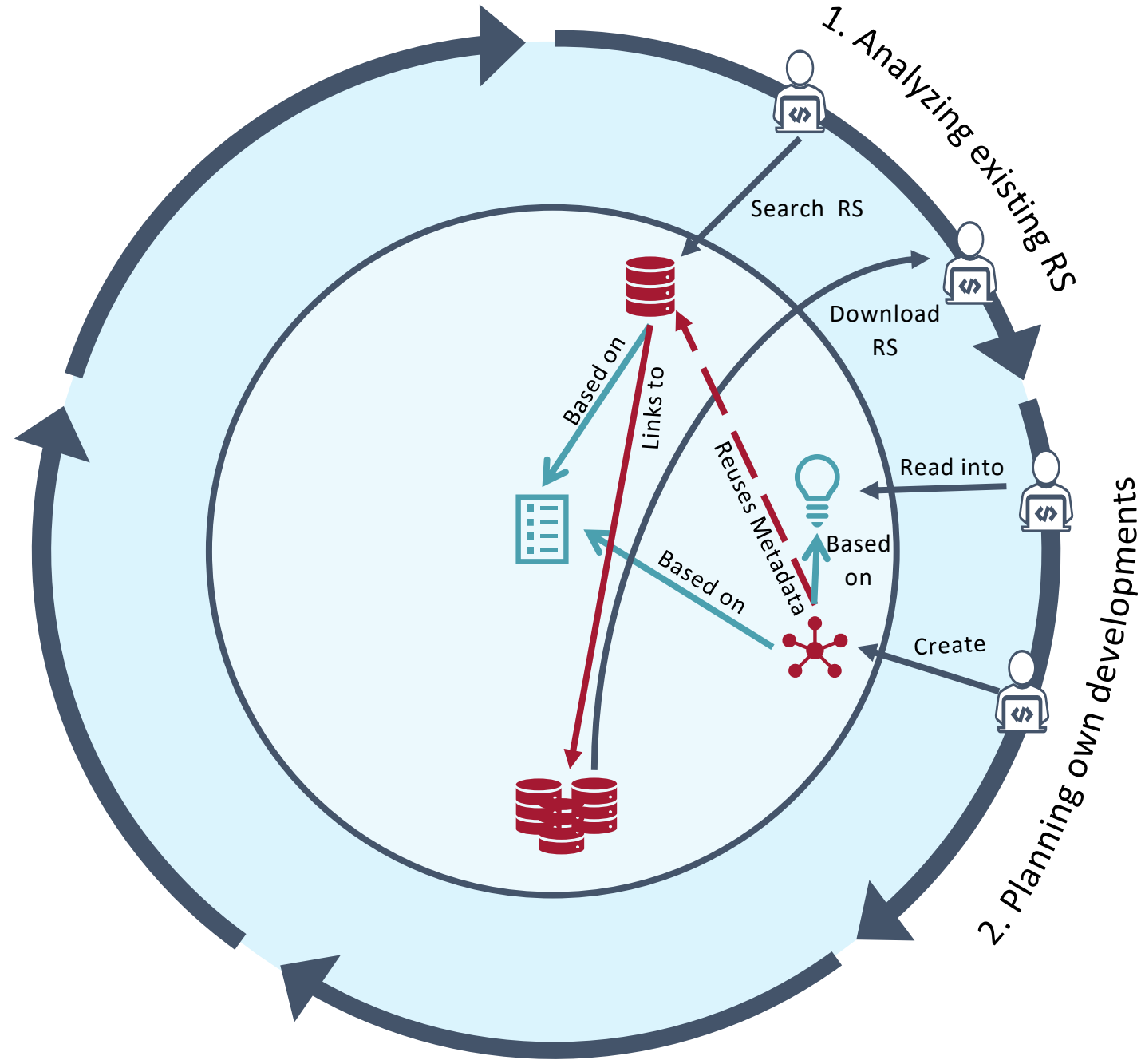


Standards/ Guidelines

-  Metadata schema
-  Guidelines for RSE

Vision: Research Cycle for FAIR RS

- Services
- RS Registry
 - Software Repositories
 - Software Management Plan



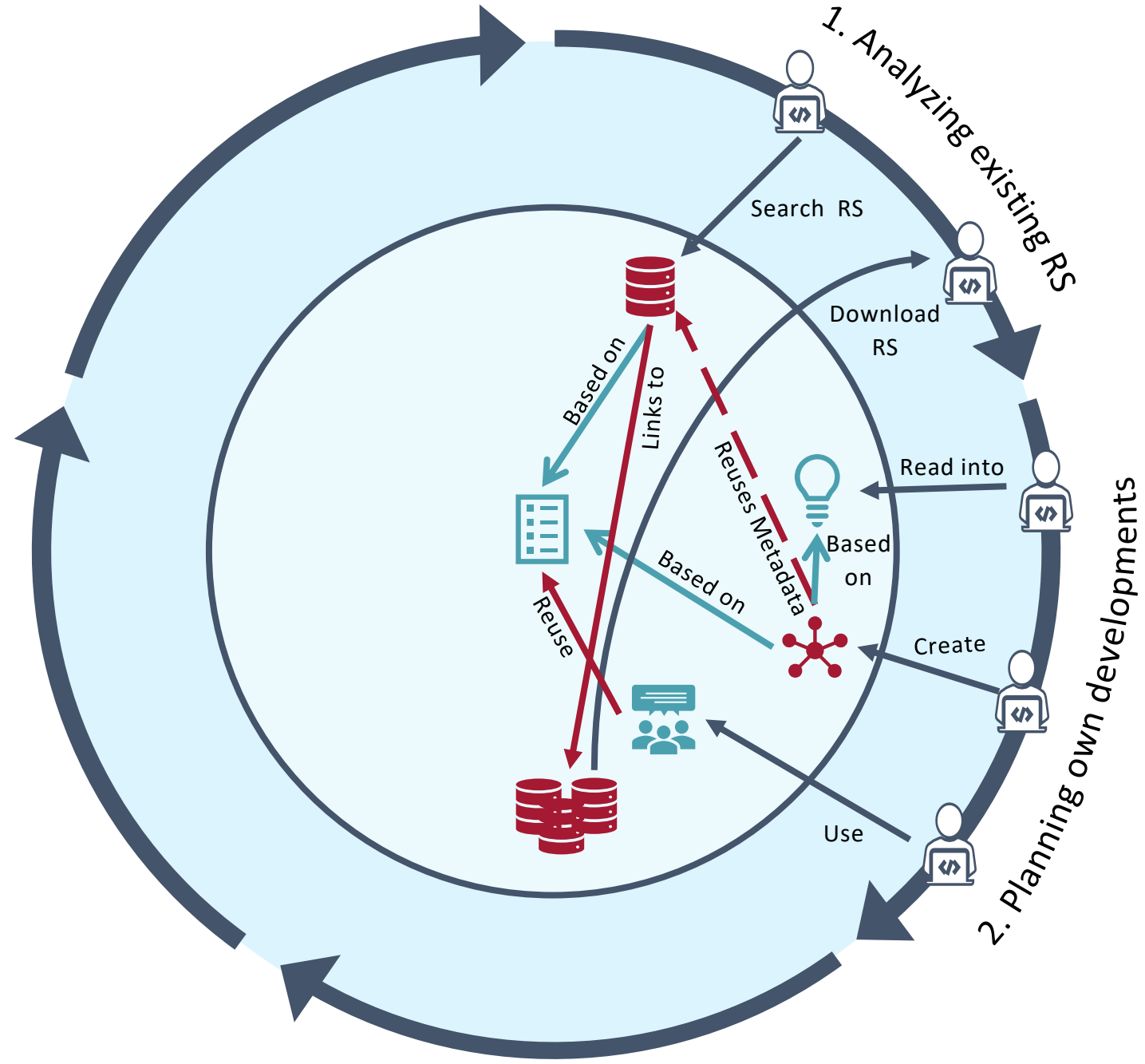
- Standards/
Guidelines
- Metadata schema
 - Guidelines for RSE

Vision: Research Cycle for FAIR RS

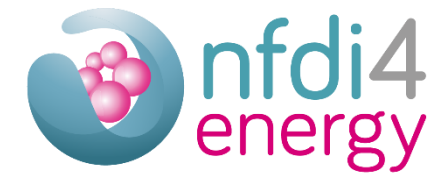


- Services
- RS Registry
 - Software Repositories
 - Software Management Plan

- Standards/
Guidelines
- Metadata schema
 - Guidelines for RSE
 - Interface standards



Vision: Research Cycle for FAIR RS



Services



RS Registry



Software Repositories



Software Management Plan

Standards/ Guidelines



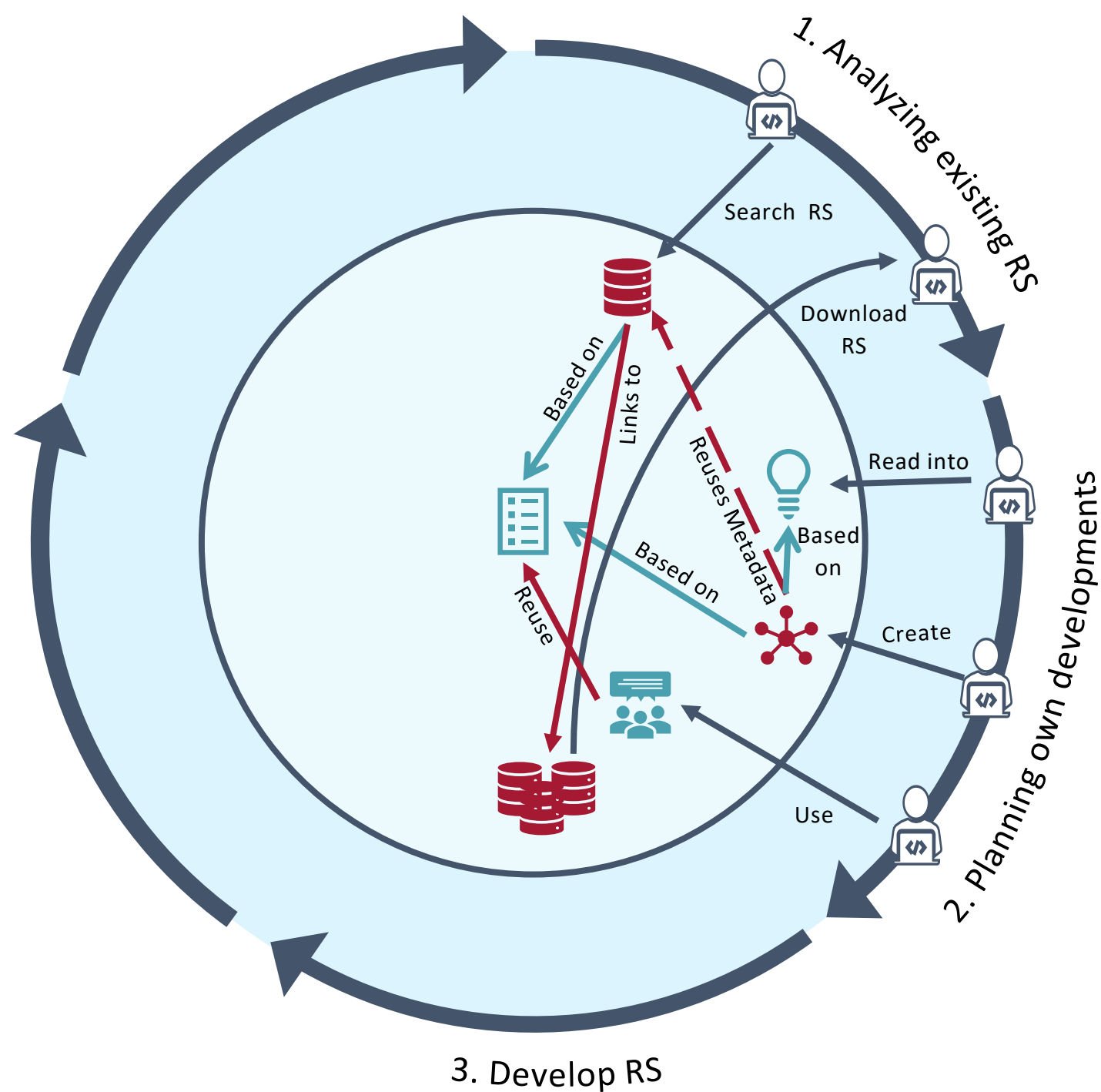
Metadata schema



Guidelines for RSE



Interface standards

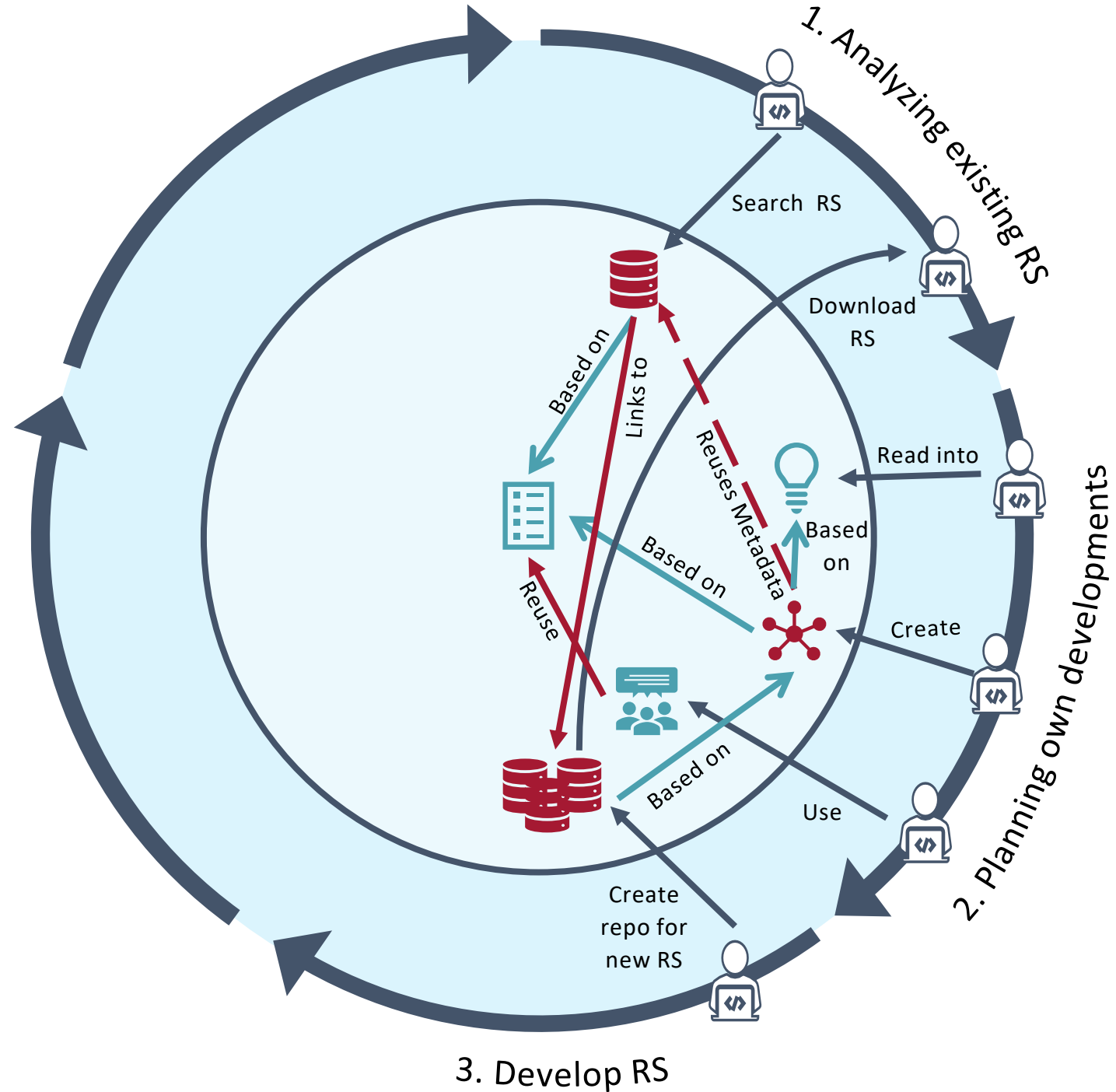


Vision: Research Cycle for FAIR RS



- Services**
- RS Registry
 - Software Repositories
 - Software Management Plan

- Standards/
Guidelines**
- Metadata schema
 - Guidelines for RSE
 - Interface standards



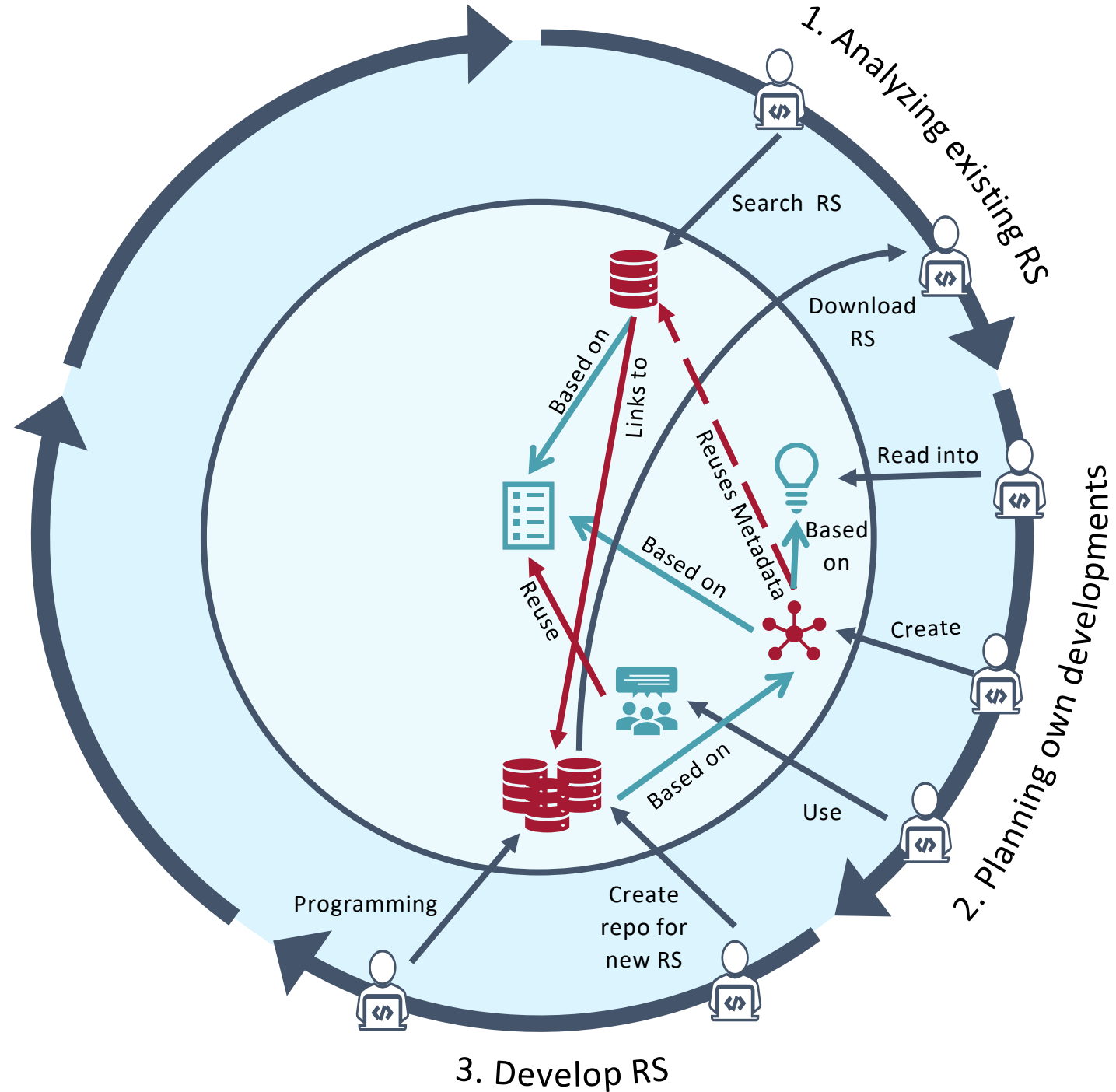
3. Develop RS

Vision: Research Cycle for FAIR RS



- Services**
- RS Registry
 - Software Repositories
 - Software Management Plan

- Standards/
Guidelines**
- Metadata schema
 - Guidelines for RSE
 - Interface standards

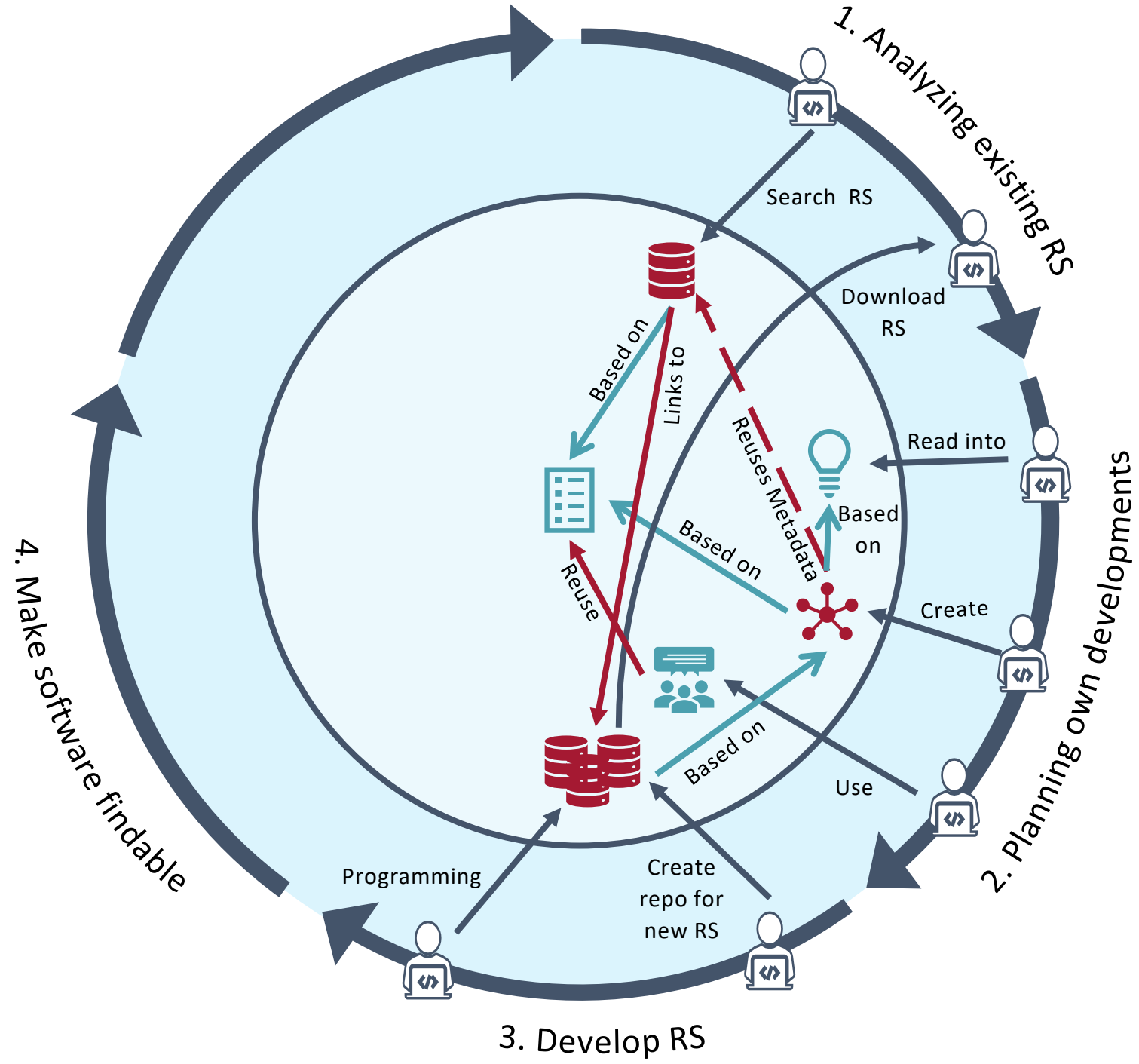


Vision: Research Cycle for FAIR RS



- Services
- RS Registry
 - Software Repositories
 - Software Management Plan

- Standards/
Guidelines
- Metadata schema
 - Guidelines for RSE
 - Interface standards

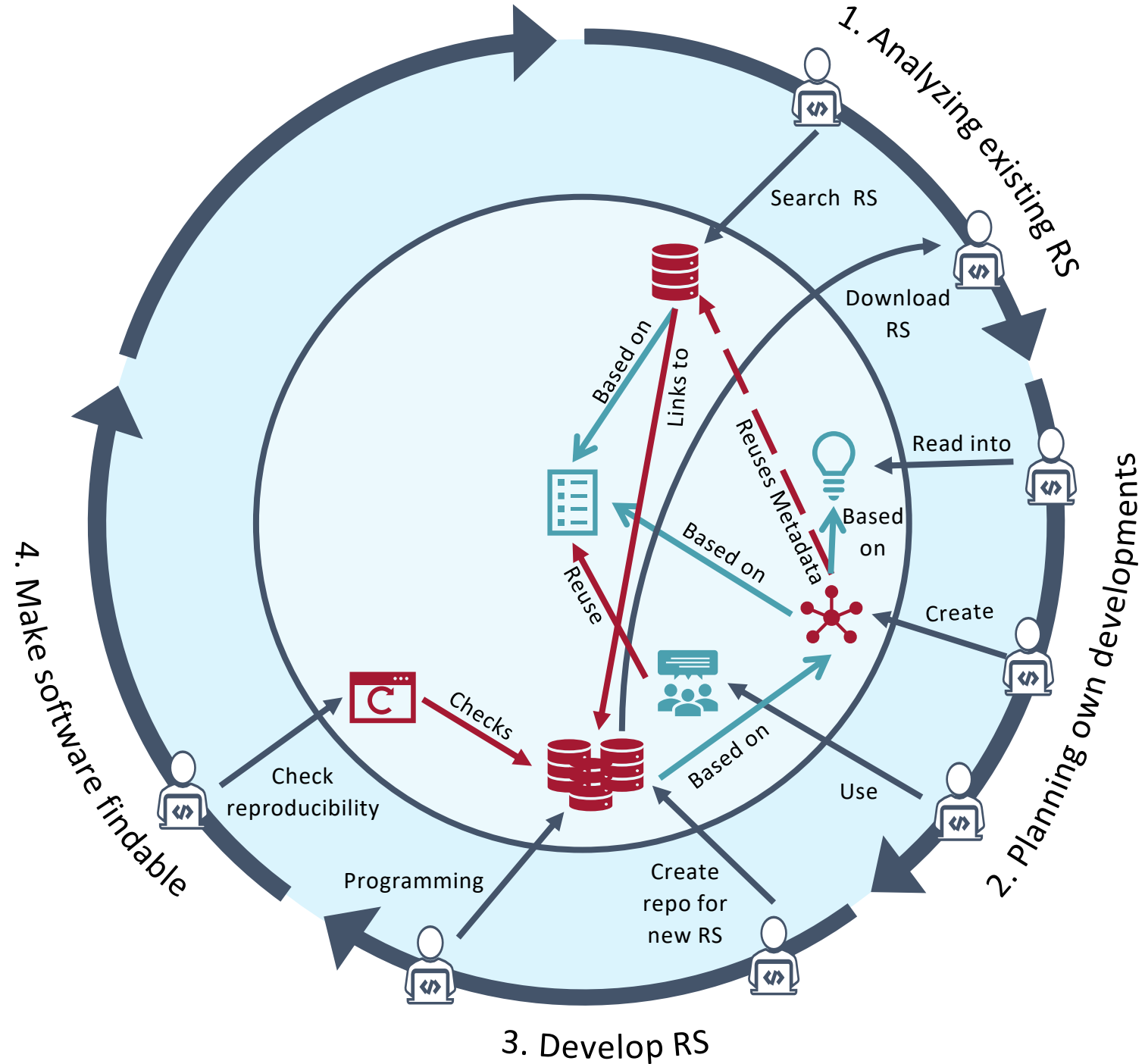


Vision: Research Cycle for FAIR RS



- Services**
- RS Registry
 - Software Repositories
 - Software Management Plan
 - Reproducibility Checker

- Standards/
Guidelines**
- Metadata schema
 - Guidelines for RSE
 - Interface standards

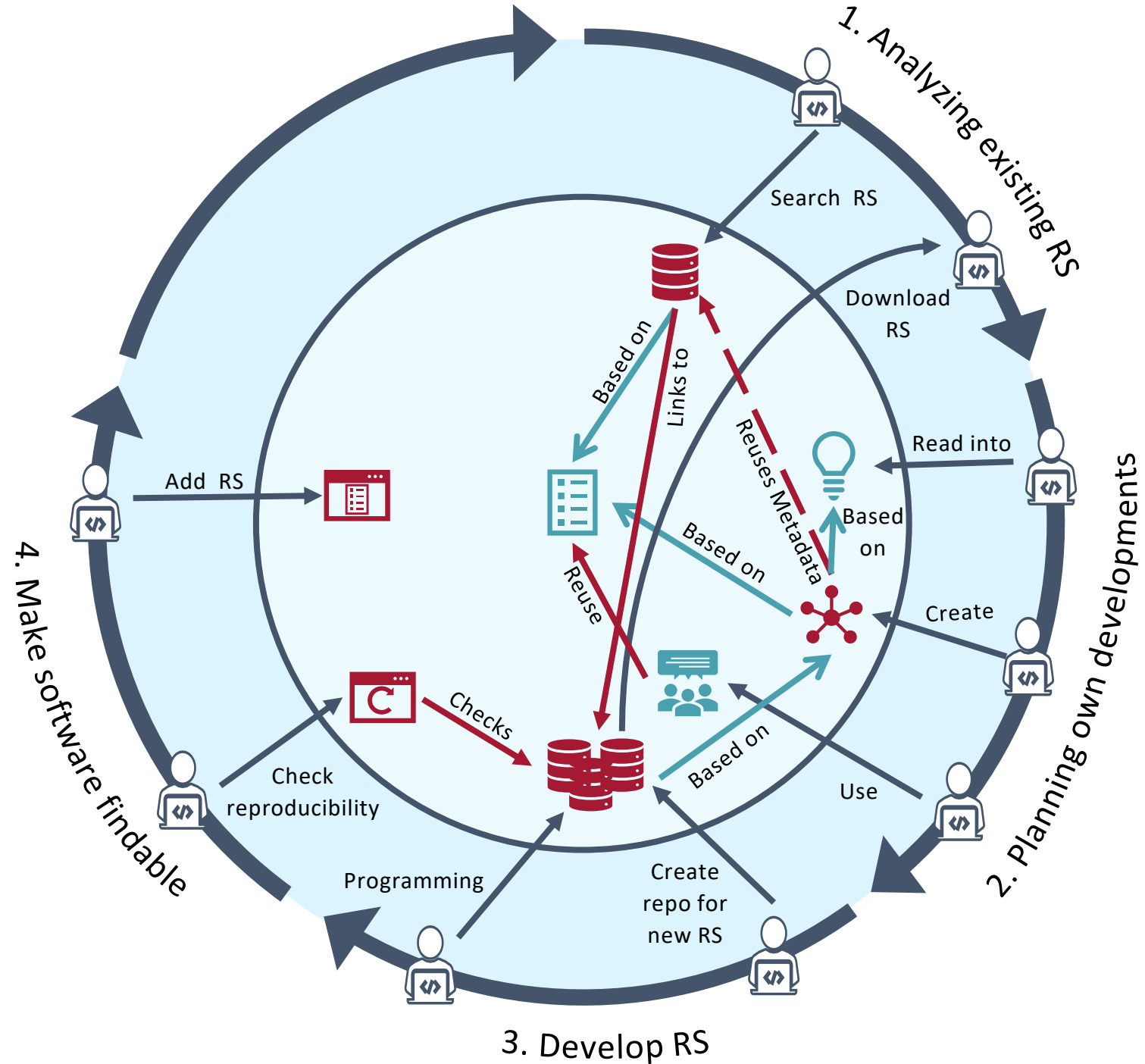


Vision: Research Cycle for FAIR RS

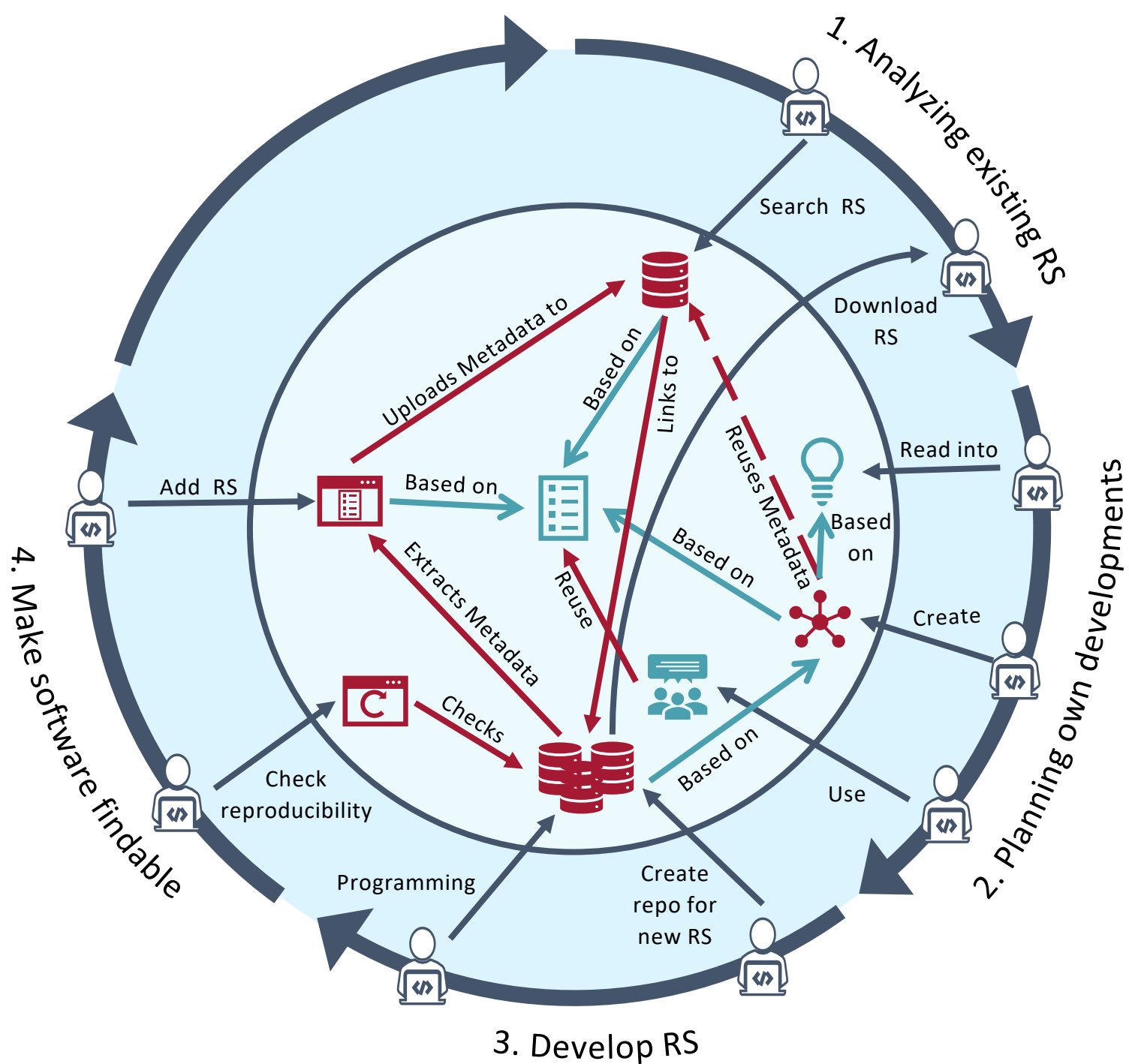


- Services
- RS Registry
 - Software Repositories
 - Software Management Plan
 - Reproducibility Checker
 - Metadata Generation Tool

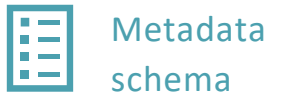
- Standards/
Guidelines
- Metadata schema
 - Guidelines for RSE
 - Interface standards



Vision: Research Cycle for FAIR RS



Standards/ Guidelines

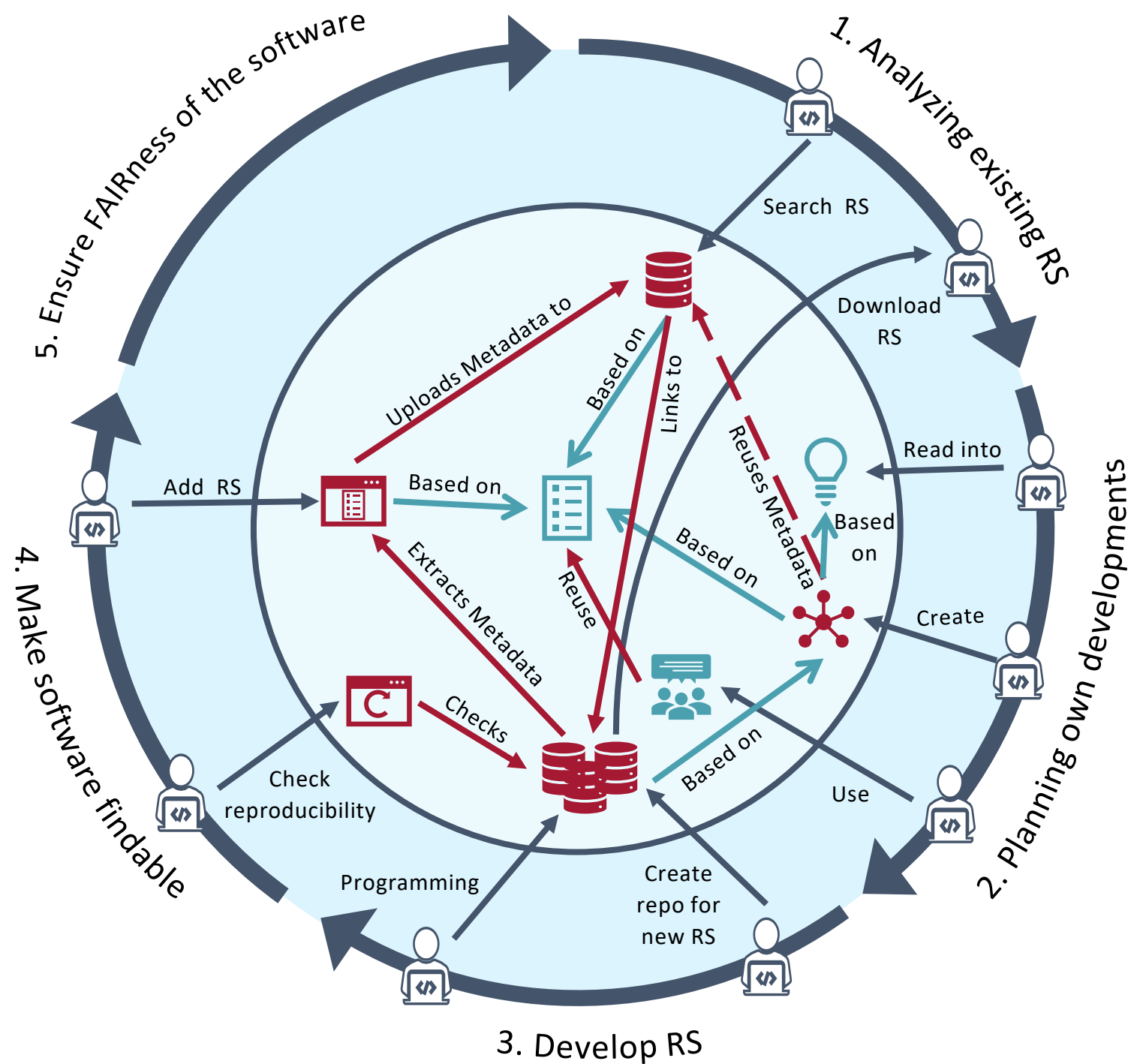


Vision: Research Cycle for FAIR RS



- Services**
- RS Registry
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 - Metadata Generation Tool

- Standards/
Guidelines**
- Metadata schema
 - Guidelines for RSE
 - Interface standards

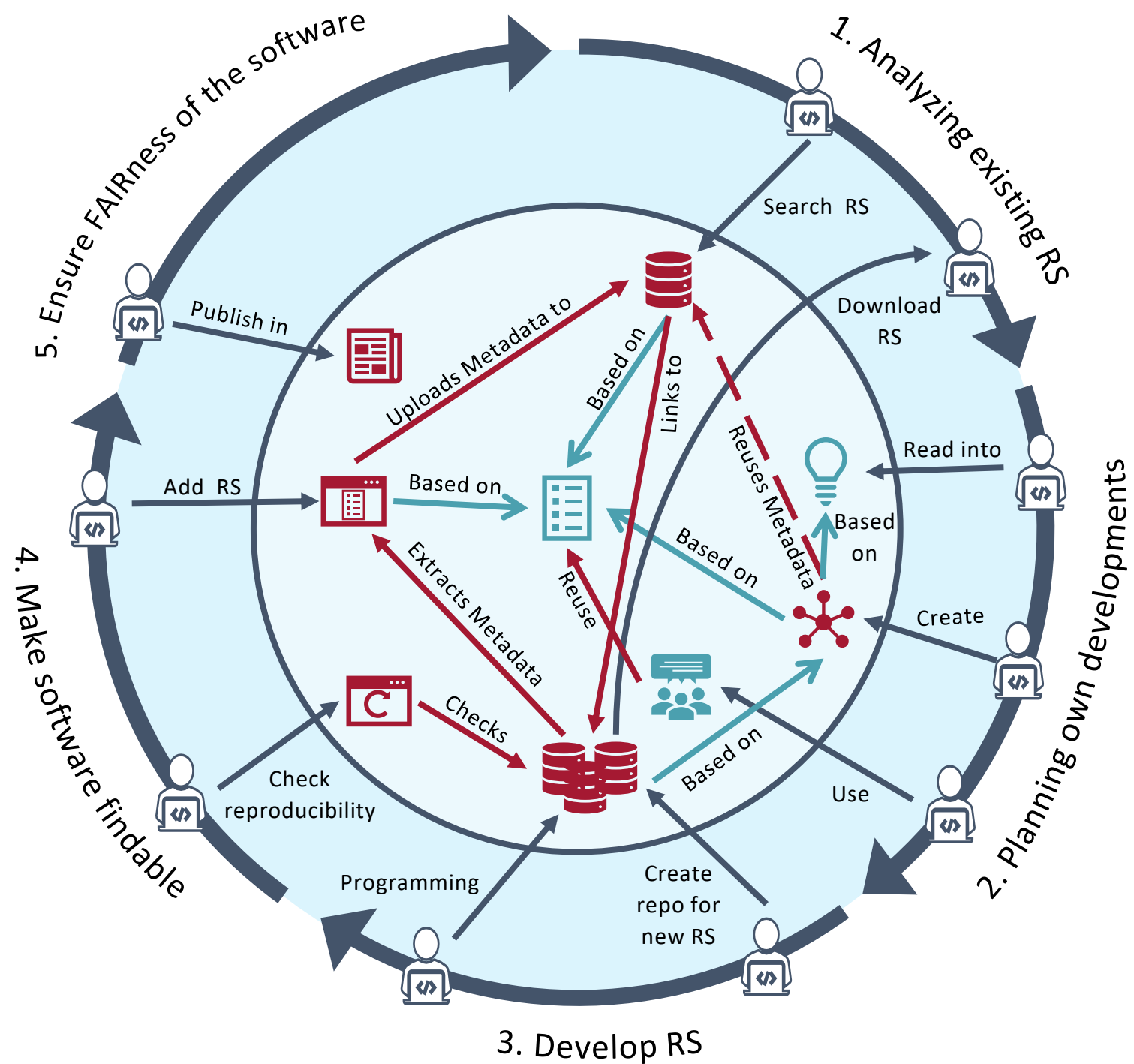


Vision: Research Cycle for FAIR RS



- Services
- RS Registry
 - Software Repositories
 - Software Management Plan
 - Reproducibility Checker
 - Metadata Generation Tool
 - Software Journals

- Standards/
Guidelines
- Metadata schema
 - Guidelines for RSE
 - Interface standards

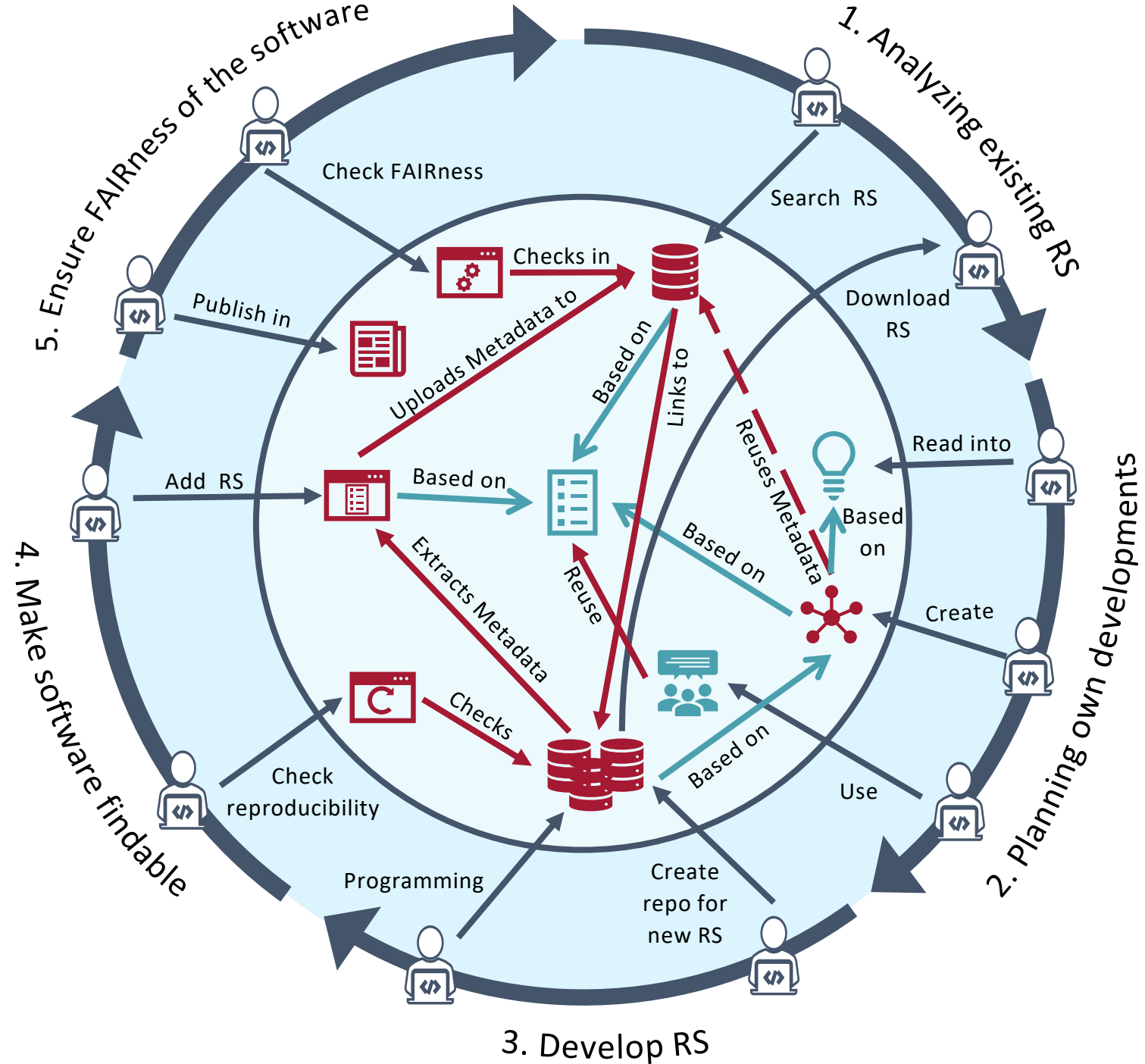


Vision: Research Cycle for FAIR RS



- Services
- RS Registry
 - Software Repositories
 - Software Management Plan
 - Reproducibility Checker
 - Metadata Generation Tool
 - Software Journals
 - FAIRness Evaluator

- Standards/
Guidelines
- Metadata schema
 - Guidelines for RSE
 - Interface standards



Current State in Energy Research: Standards/ Guidelines



Metadata
schema



Guidelines for
ERS Engineering



Interface
standards

Current State in Energy Research: Standards/ Guidelines



Metadata
schema

- Currently under development



Guidelines for
ERS Engineering



Interface
standards

Current State in Energy Research: Standards/ Guidelines



Metadata
schema

- Currently under development

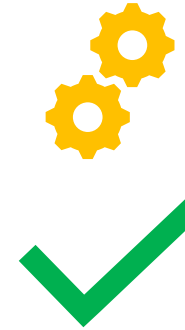


Guidelines for
ERS Engineering

- First version created



Interface
standards



Current State in Energy Research: Standards/ Guidelines



Metadata
schema

- Currently under development



Guidelines for
ERS Engineering

- First version created










Interface
standards








- Open Topic



Current State in Energy Research: Services

-  RS Registry
-  Software Repositories
-  Software Management Plan
-  Reproducibility Checker
-  Metadata Generation Tool
-  Software Journals
-  FAIRness Evaluator

Current State in Energy Research: Services








	RS Registry
	Software Repositories
	Software Management Plan
	Reproducibility Checker
	Metadata Generation Tool
	Software Journals
	FAIRness Evaluator

- Currently under development



Current State in Energy Research: Services



	RS Registry
	Software Repositories
	Software Management Plan
	Reproducibility Checker
	Metadata Generation Tool
	Software Journals
	FAIRness Evaluator

- Currently under development
- GitHub/GitLab are the standards

Current State in Energy Research: Services



RS Registry

- Currently under development



Software
Repositories

- GitHub/GitLab are the standards



GitHub



GitLab



Software
Management Plan

- Open Topic



Reproducibility
Checker



Metadata
Generation Tool




Software Journals



FAIRness
Evaluator

Current State in Energy Research: Services

	RS Registry	• Currently under development
	Software Repositories	• GitHub/GitLab are the standards
	Software Management Plan	• Open Topic
	Reproducibility Checker	• Open Topic
	Metadata Generation Tool	
	Software Journals	
	FAIRness Evaluator	



















Current State in Energy Research: Services


















	RS Registry	• Currently under development
	Software Repositories	• GitHub/GitLab are the standards
	Software Management Plan	• Open Topic
	Reproducibility Checker	• Open Topic
	Metadata Generation Tool	• Work in Progress
	Software Journals	
	FAIRness Evaluator	



Current State in Energy Research: Services

	RS Registry	• Currently under development		
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	FAIRness Evaluator			

Current State in Energy Research: Services

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	Software Journals	• JOSS as possible standard		
	FAIRness Evaluator	• Open Topic		

Outlook

- Services support researchers to make their research software FAIR
- General and domain-specific services required
- Development and provision of services as important topic in NFDI
- Better understanding of service-needs of RSEs is important!

Contact

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