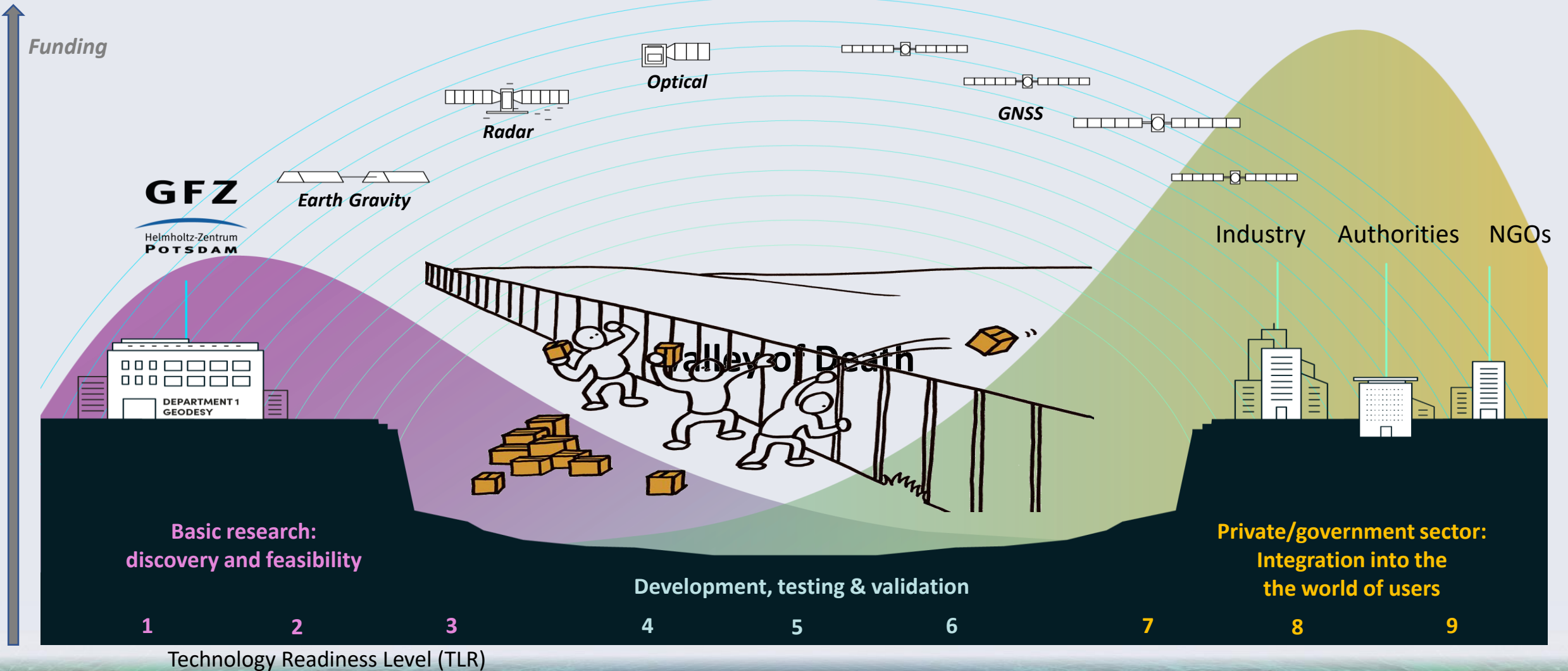# Technology Transfer
# From science to market and society
Lessons learned

Daniel Spengler, Julia Neelmeijer, Alison L. Beamish, Robert Behling, Romulo Goncalves, André Lingenfelser, Arash Madadi, Daniela Rabe, Daniel Scheffler, Maria Thiele

Department of Geodesy, Section of Remote Sensing and Geoinformatics
Helmholtz Centre Potsdam – German Centre for Geosciences (GFZ)

Transfer in remote sensing – the status

Transfer in remote sensing – the chance
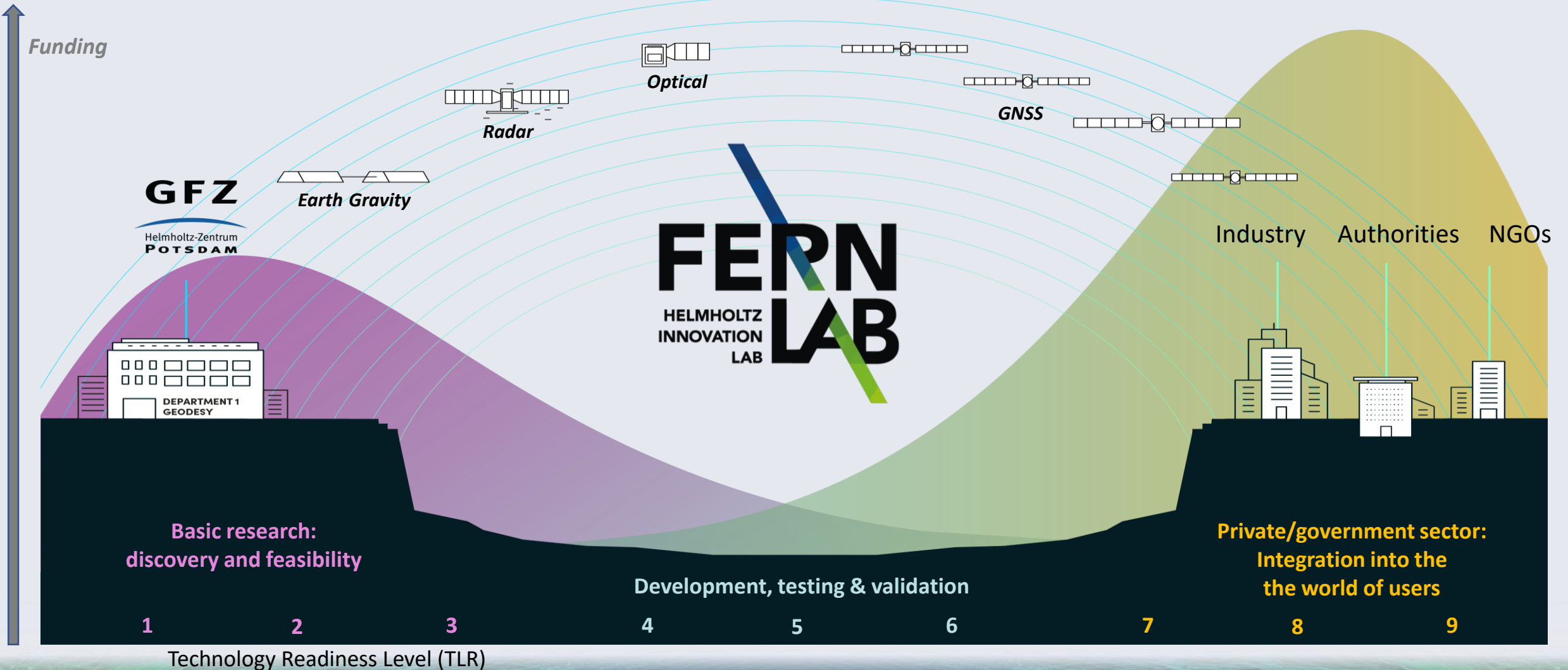
Aim of FERN.Lab - increase of TT activities

- bring promising remote-sensing related methods into use
  -> increase knowledge and technology transfer activities at GFZ Dept. 1
- joint effort with TT: support establishing a transfer culture at GFZ
- establishment of know-how for sustainable software development
- blueprint for successful technology transfer at GFZ and other research
  institutions in the field of geodata (e.g. interest by DLR)

Accomplished to date:

- successful transfer projects with external partners!
- contribution to transfer strategy of GFZ - link to POF IV goals
- 1 scientific publication on the strategy of the Innovation Lab FERN.Lab
- point of contact for software distributions questions from scientists

FERN.Lab vision and aim

IDENTIFY & COLLECT

COMBINE & PROCESS

ANALYSE & TEST

IMPLEMENT & APPLY

	European Union (EU27)					Global	
	2021		2031			2021	2031
	Value	%	Value	%		Value	Value
Data revenues (€ m)	82	15.4	117	14.6	Data revenues (€ m)	536	797
Value-added service revenues (€ m)	342	15.3	664	14.2	Value-added service revenues (€ m)	2,236	4,662

EO and GNSS Market Report, 2022

IDENTIFY & COLLECT

Selection of sensor and data for specific applications

COMBINE & PROCESS

Data processing and combination

ANALYSE & TEST

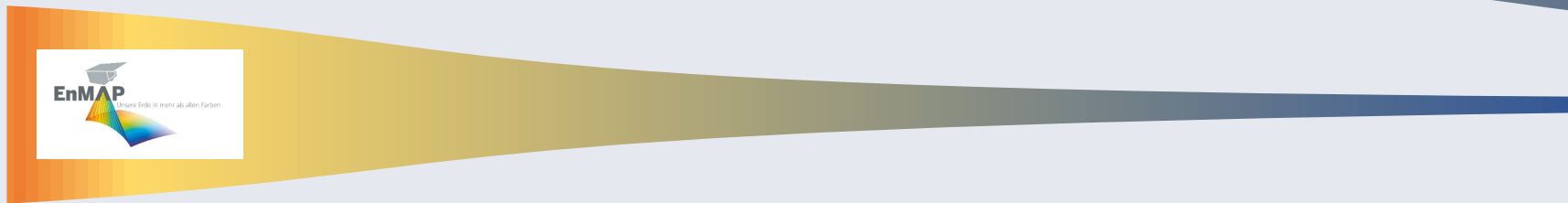Method development and validation
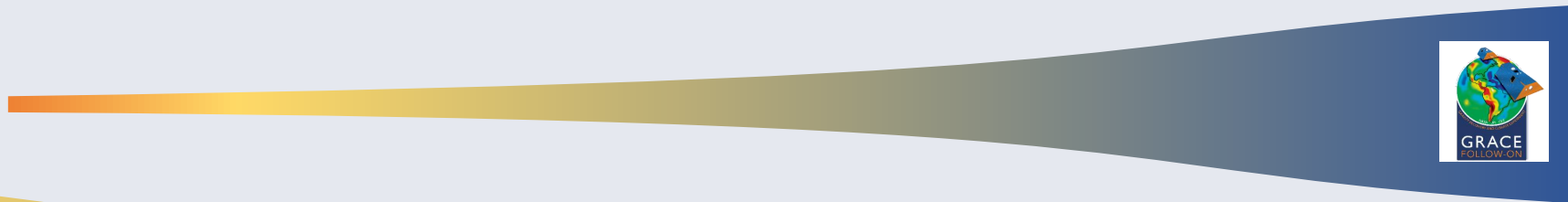
IMPLEMENT & APPLY

Operationalisation and valorisation

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A perspective on benefits

**Combination of technology- und knowledge transfer into industry, politics & society
= commercial + non-commercial transfer in the field of remote sensing**
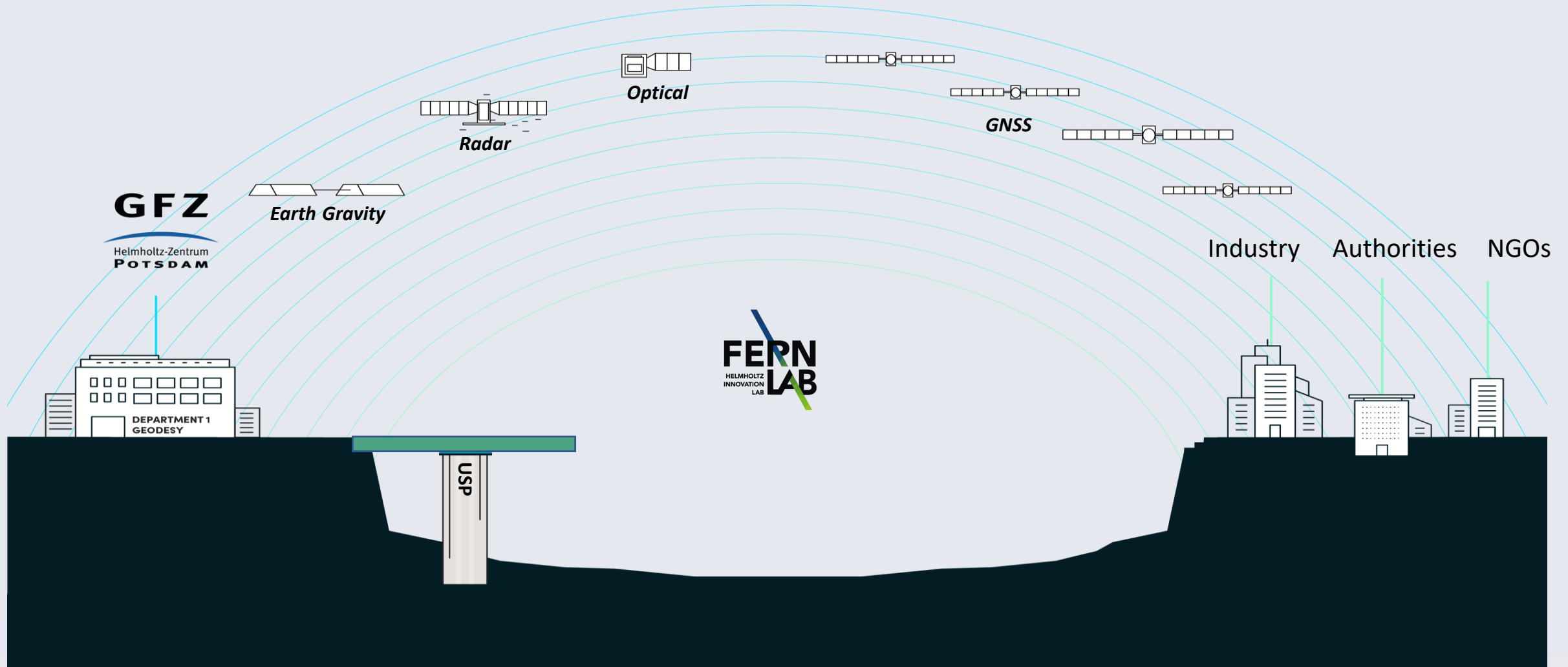

commercialization potential

social impact

local scale

global scale

# Building the bridge – requires pillars

Definition of FERN.Lab USP

- Based on technology screening → diamond selection!
  - \>70 technologies at GFZ Department Geodesy

  - Hyperspectral data processing and analysis
  - Earth Gravity data processing and analysis
  - Data processing, homogenization, multisensoral analysis
  - Topic specific data analysis (e.g. habitat mapping)

Open questions to answer

- Finding place at market….

- What is required by the market? Market needs?
  - High quality analysis ready data
  - custom made solutions
  - …

Unexpected long process!
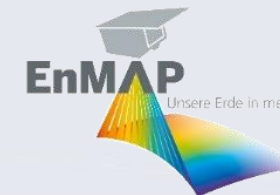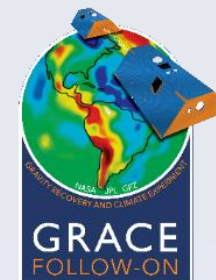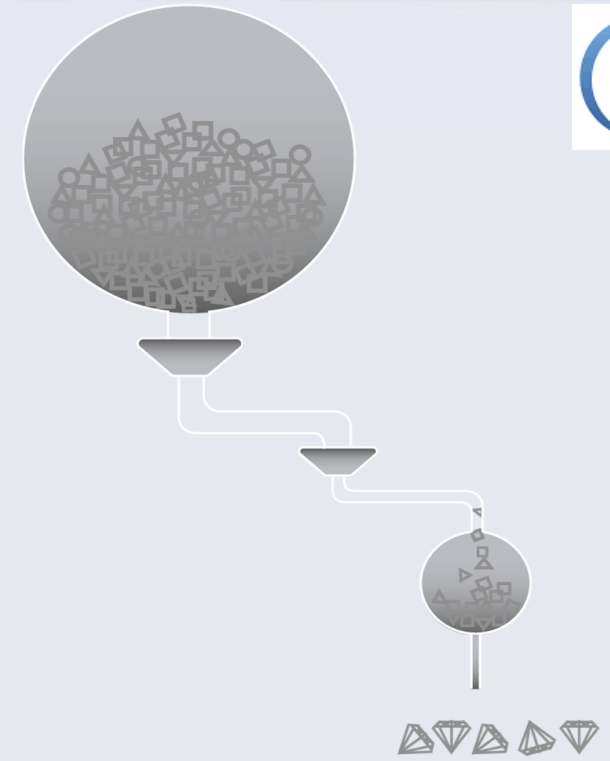
Building the bridge – FERN.Lab lessons learned

Open Science

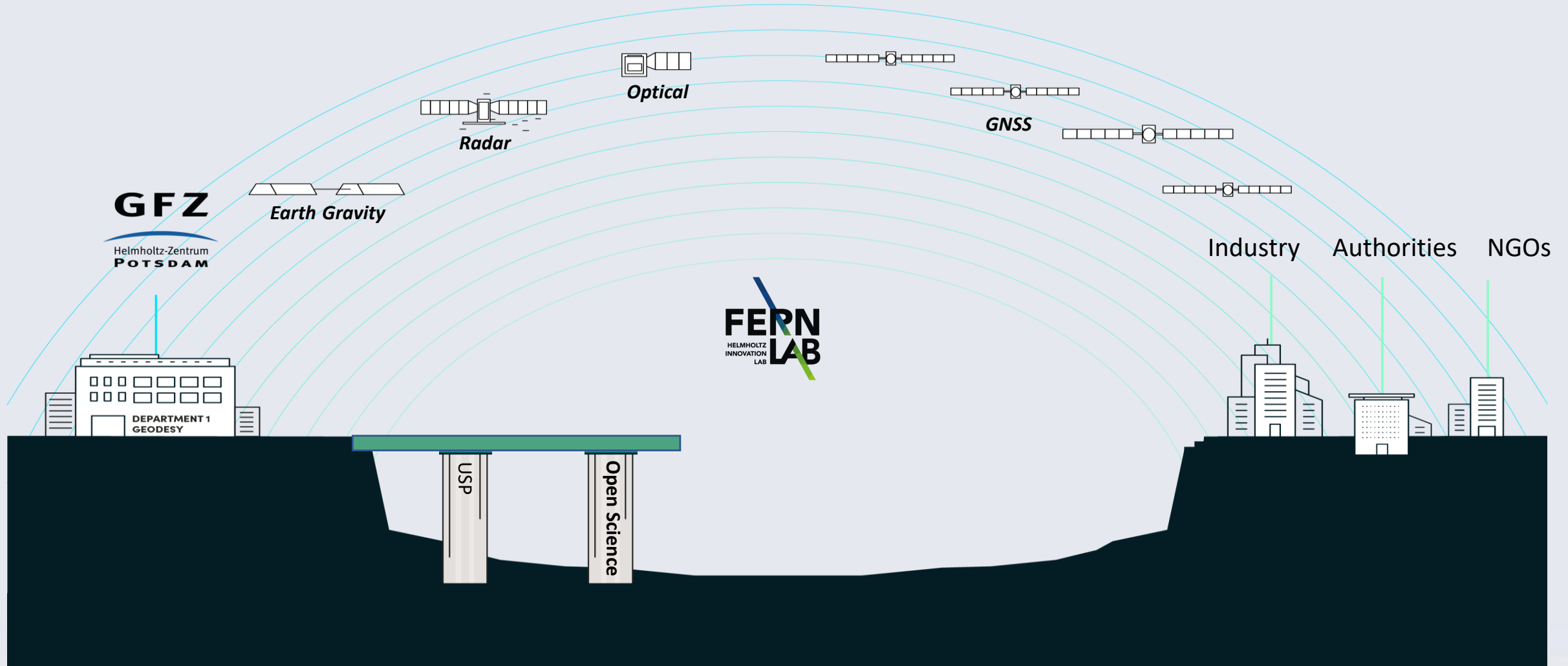- Germany [Helmholtz Association of Research Centers] is pushing Open Science

- Benefits for scientist, following open science objectives
  - Visibility
  - Increasing impact of research
  - Increasing network

- Technology Transfer requires a change of the scientist's mindset!

→ Commercial use does not have to be in contrast to Open Science
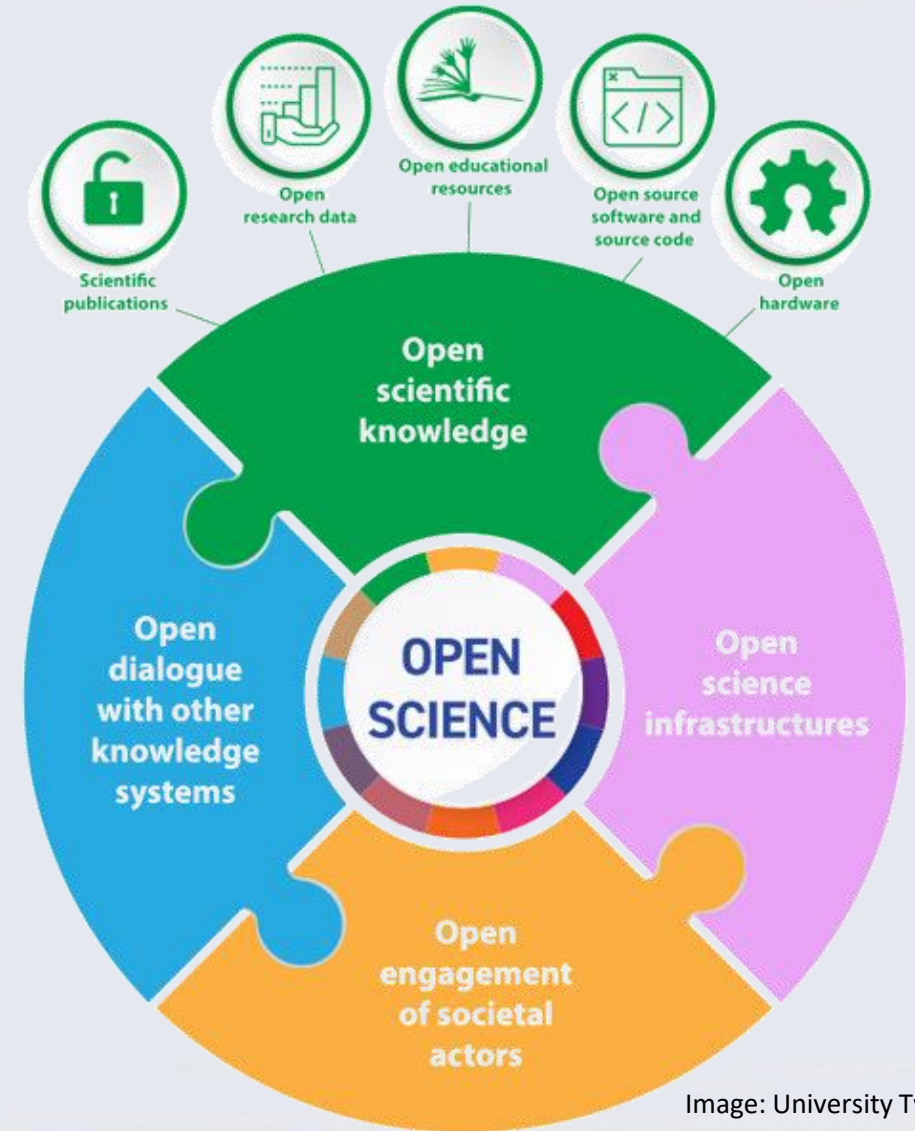
Image: University Twente

Building Transfer on Open Science

Commercialisation:
- Dual Licencing
- Software Patenting

Addons:
- E.g. UI, API, advanced feature, customization
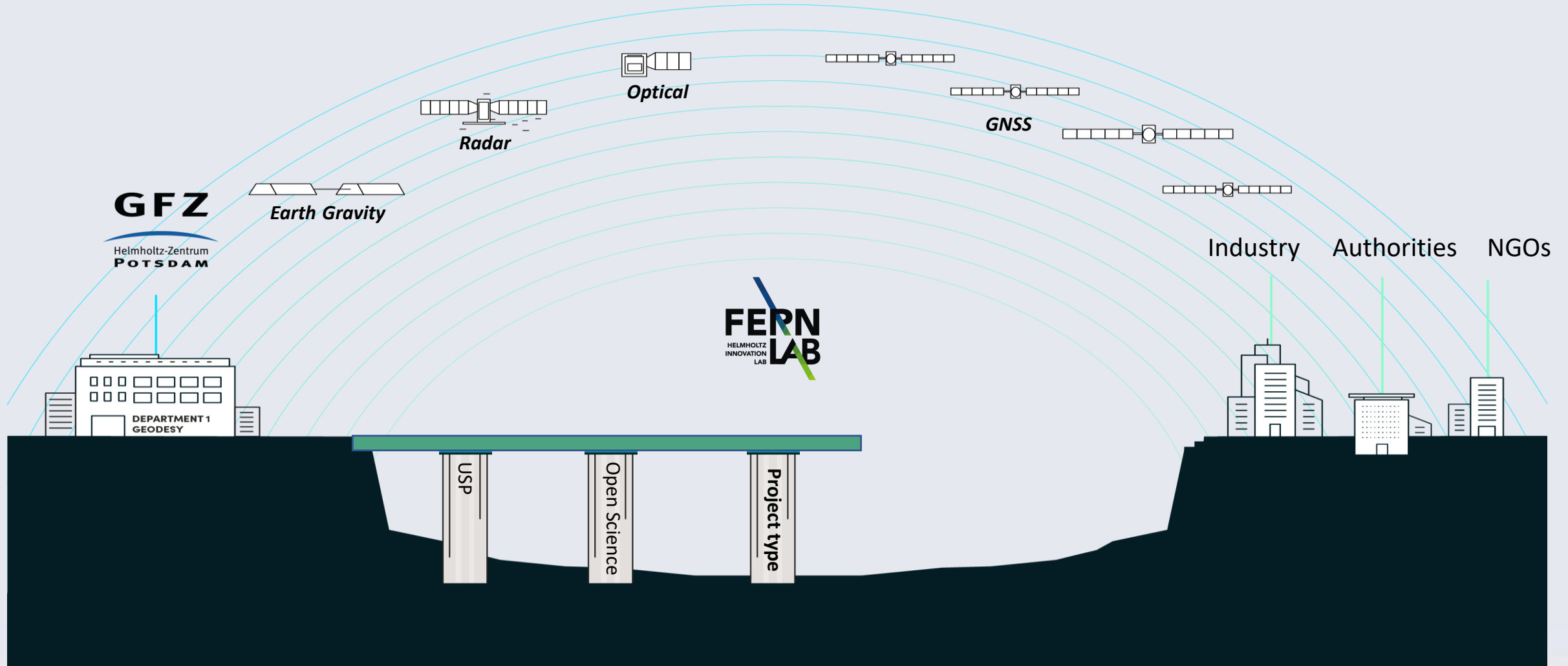
Software Sustainability

- Collaboration with scientist

- Open Source Version
- e.g. EUPL, GPLv3 Licenses
- With copyleft

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Building the bridge – FERN.Lab lessons learned

Project types

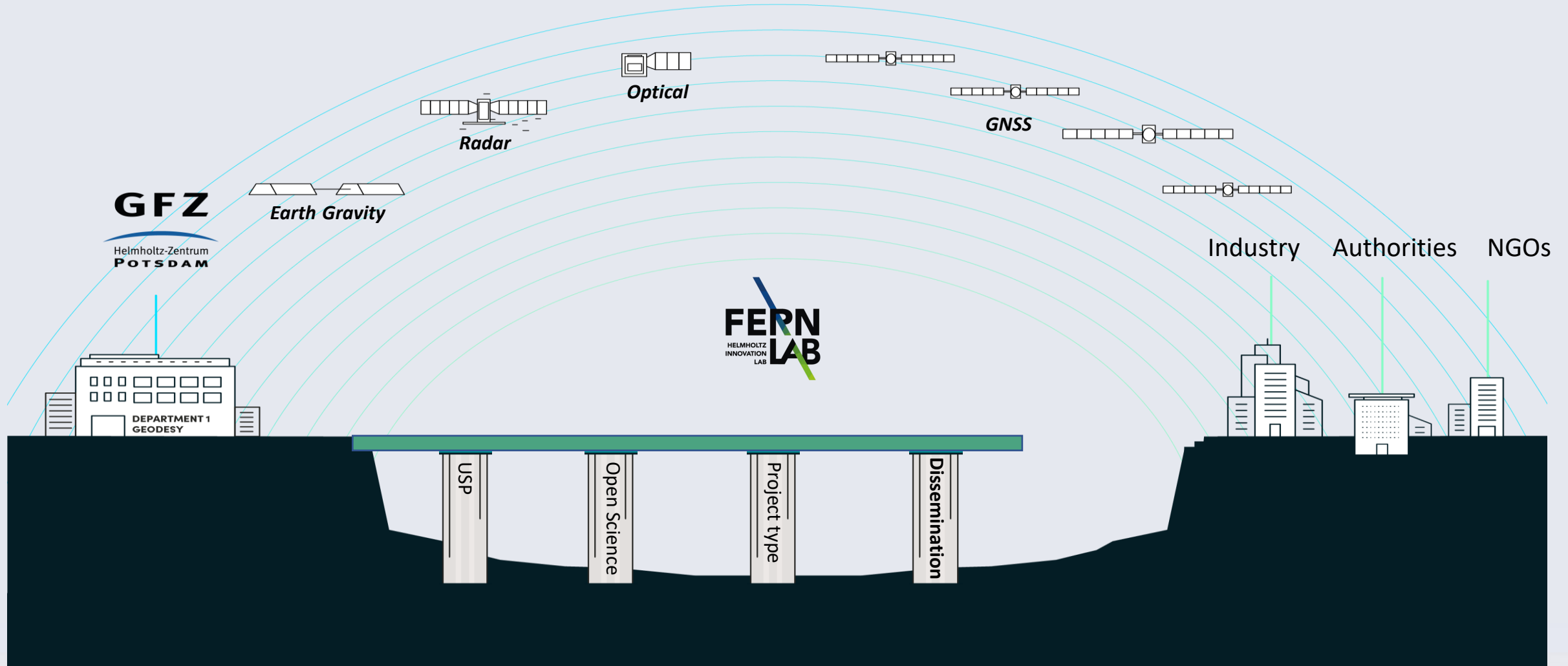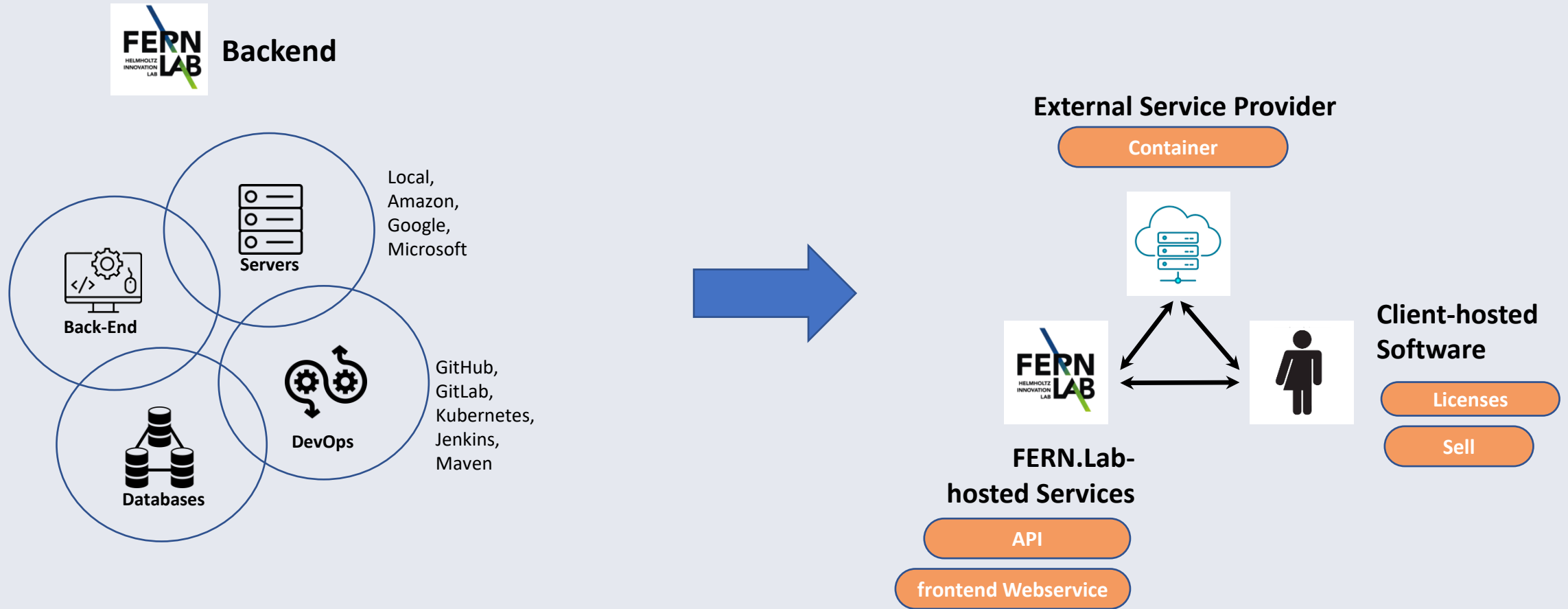| In-house developments	R&D 3rd party	Contract research	Honest Broker / Internal Support
Time investment: 40%	**Time investment:** 35%	**Time investment:** 10%	**Time investment: 15%**
Aim: increase TRL Level of GFZ methods, bridge the gap to operational use	**Aim:** work jointly with potential end-users on product development	**Aim:** develop product for customer	**Aim:** support of GFZ scientists -> raise awareness of TT topic Consulting externals
Focus: ■ technology + knowledge transfer of existing open source solutions ■ testing different TT paths ■ **High internal need**	**Focus:** ■ transfer-focused 3rd projects finance via ZIM network/ other 3rd party calls ■ revenues via license/sell software/IP ■ **Strong request by German SMEs**	**Focus:** ■ direct payment for developing work ■ revenues via license/sell software/IP ■ **Lower request compared to expectation → long negotiation processes**	**Focus:** ■ support proposals/ workshops ■ counselling (licenses, tenders, spin-off founding) ■ improve GFZ-intern processes

Evaluation of project types

- Rating required time and revenue (financial, but also non commercial e.g. visibility, new cooperations)
  → criterias for sucessful transfer are required

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09.11.2022

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Building the bridge – FERN.Lab lessons learned

Dissemination

Backend

Back-End

Servers — Local, Amazon, Google, Microsoft

Databases

DevOps — GitHub, GitLab, Kubernetes, Jenkins, Maven

External Service Provider

Container

Client-hosted Software

Licenses

Sell

FERN.Lab-hosted Services

API

frontend Webservice

Full Stack Service Development – Minimal Sampling Classifier

Based on Open Research Software Development Habitat Sampler (C. Neumann)

Frontend development workflow

Development of webinterface for classification including expert knowledge

Classification results, export Options

Optional statistical analysis


Launch planned for Q4/2022
Evaluation of external platforms for hosting in process

API on Cloud Infrastructure

Licensing in progress!

**FINDR:
02/21-06/23**

- EU 3rd party project: ConstellR (D), Cyphronet (PL), eLeaf (NL)
- Build a central platform for data from all satellite data providers (currently: multispectral data, planned also for thermal, hyperspec.)
- Download including automated data harmonisation for multi-spectral data sets
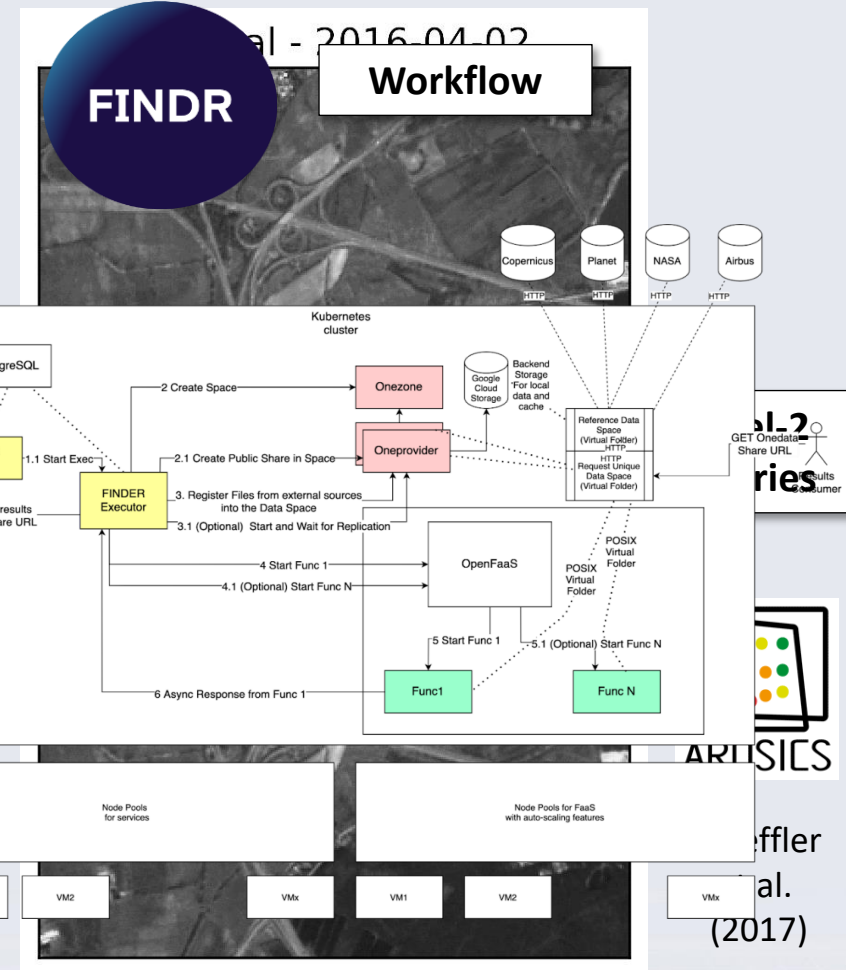- Contribution to FERN.Lab method building kit
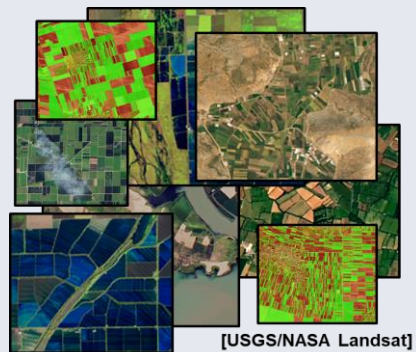
**Data
provider**
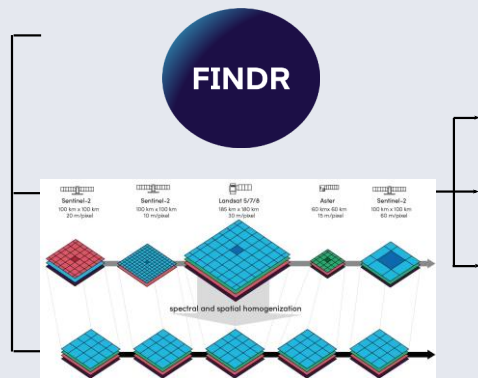
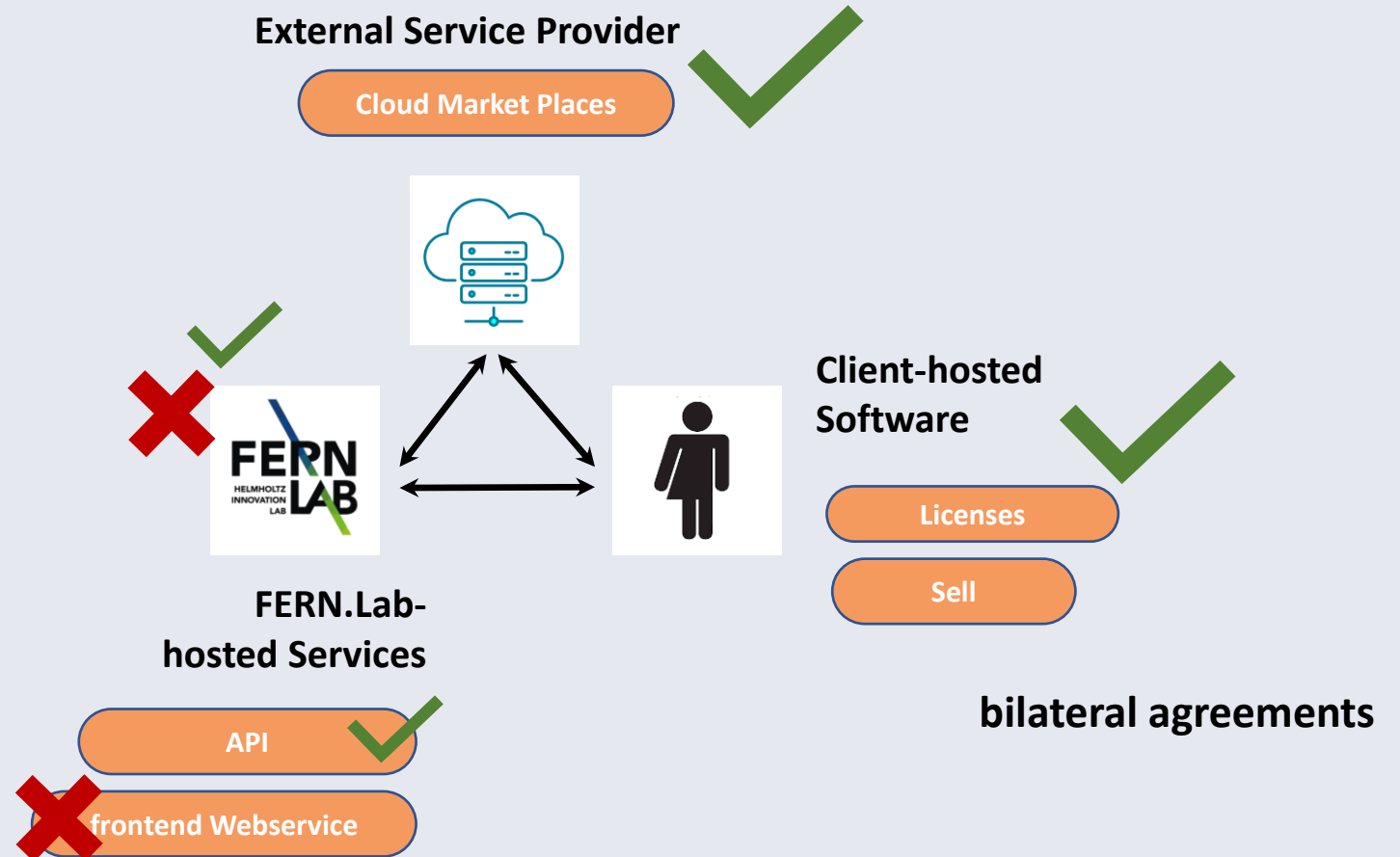**Easy Data Access via FINDR
homogenisation of
multisensor data**

Data user

Dissemination

Increasing options of EO marketplaces

External Service Provider

Cloud Market Places

no self-hosted FERN.Lab services!

- Full Stack Development required
- User management incl. payment required

- Potential high effort for maintenance
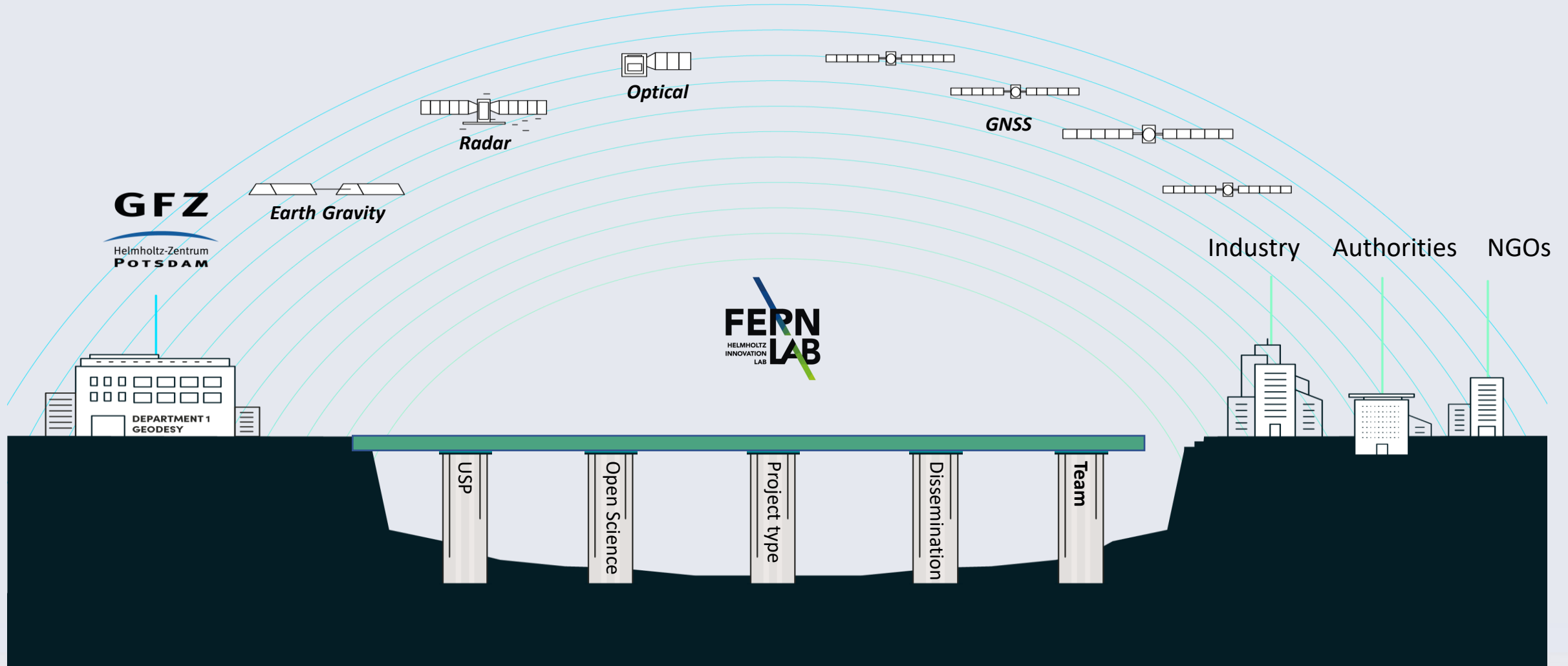- End customer market not foreseen in FERN.Lab strategy

Client-hosted Software

Licenses

Sell

FERN.Lab-hosted Services

bilateral agreements

API

frontend Webservice

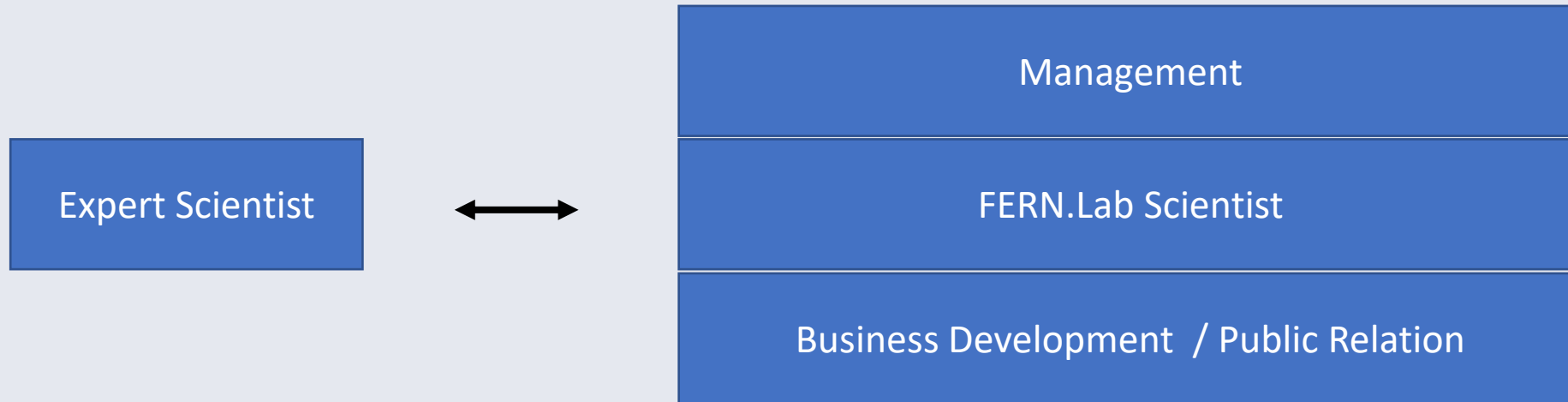# Outreach

- Website
- Corporate Design

- Social Media

Building the bridge – FERN.Lab lessons learned

Team skills for transfer of earth observation methods

- Multidisciplinary team (proposal idea)

Management
FERN.Lab Scientist
Business Development / Public Relation

Expert Scientist ⟷

Required team skills for sucessful technology transfer for earth observation methods

Management		Business Development / Public Relation
Expert Scientist	FERN.Lab Scientists	Tec Team for Software Development
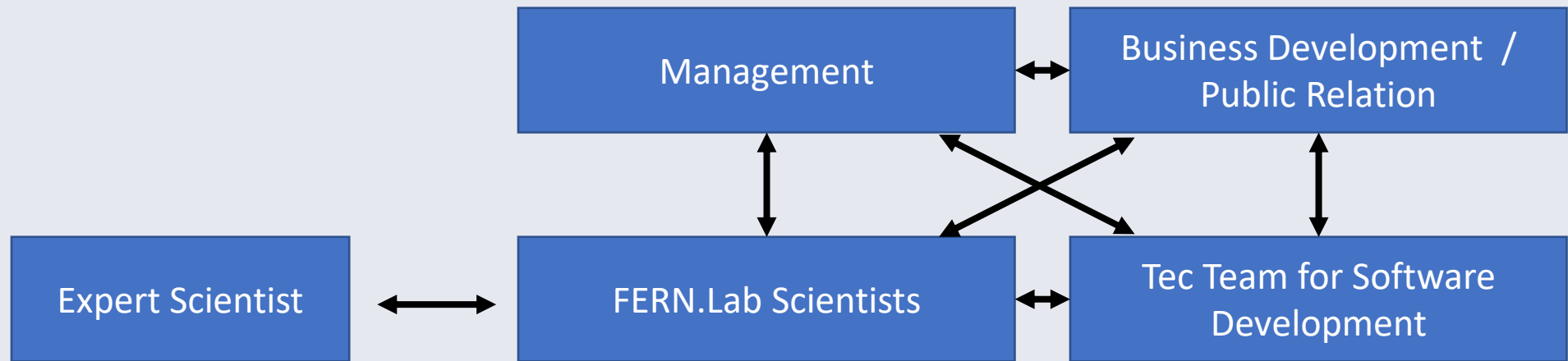
Agile working processes established

No one works on single projects!!!

FERN.Lab – Interdisciplinary Team - close to science!

And many more scientists collaborating with FERN.Lab in different projects…

Dr. Daniel Spengler
Management

Dr. Julia Neelmeijer
Management/Methods

André Lingenfelser
Business Development

Maria Thiele
Public Relation
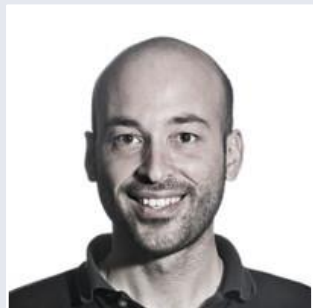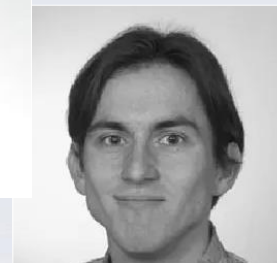
Dr. Romulo Goncalves
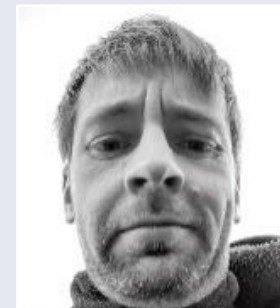Software Development

Daniela Rabe
Software Development

Arash Madadi
Software Development

Dr. Robert Behling
Method Development

Dr. Alison Beamish
Method Development

Daniel Scheffler
Method Development

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Potsdam

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LAB
23

FERN.Lab - Bridges the Innovation Valley, Key Messages

For sucess you need!

- Clear USP
- Technology and Knowledge Transfer based on Open Science
- Different types of cooperation options
- Different types of dissemination options
- Multidisciplinary team

- Time and support of your organisation

Get in contact with

fernlab@gfz-potsdam.de