HELMHOLTZ

RESEARCH FOR
GRAND CHALLENGES

HIFIS | HELMHOLTZ FEDERATED IT SERVICES

Helmholtz Digital Services for Science - Collaboration made easy.

HIFIS at PUNCHLunch, 2022-03-24
https://indico.desy.de/event/33357

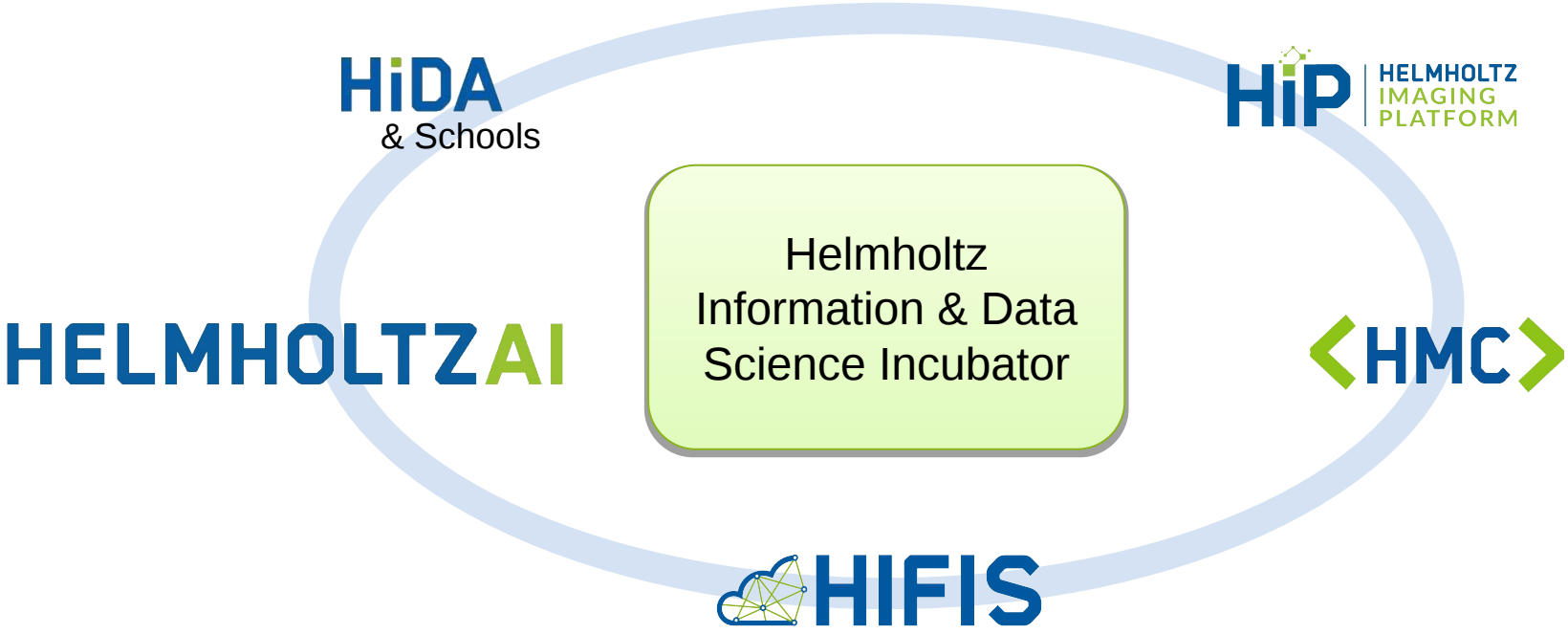
Uwe Jandt

Why Incubator Platforms + HIFIS?

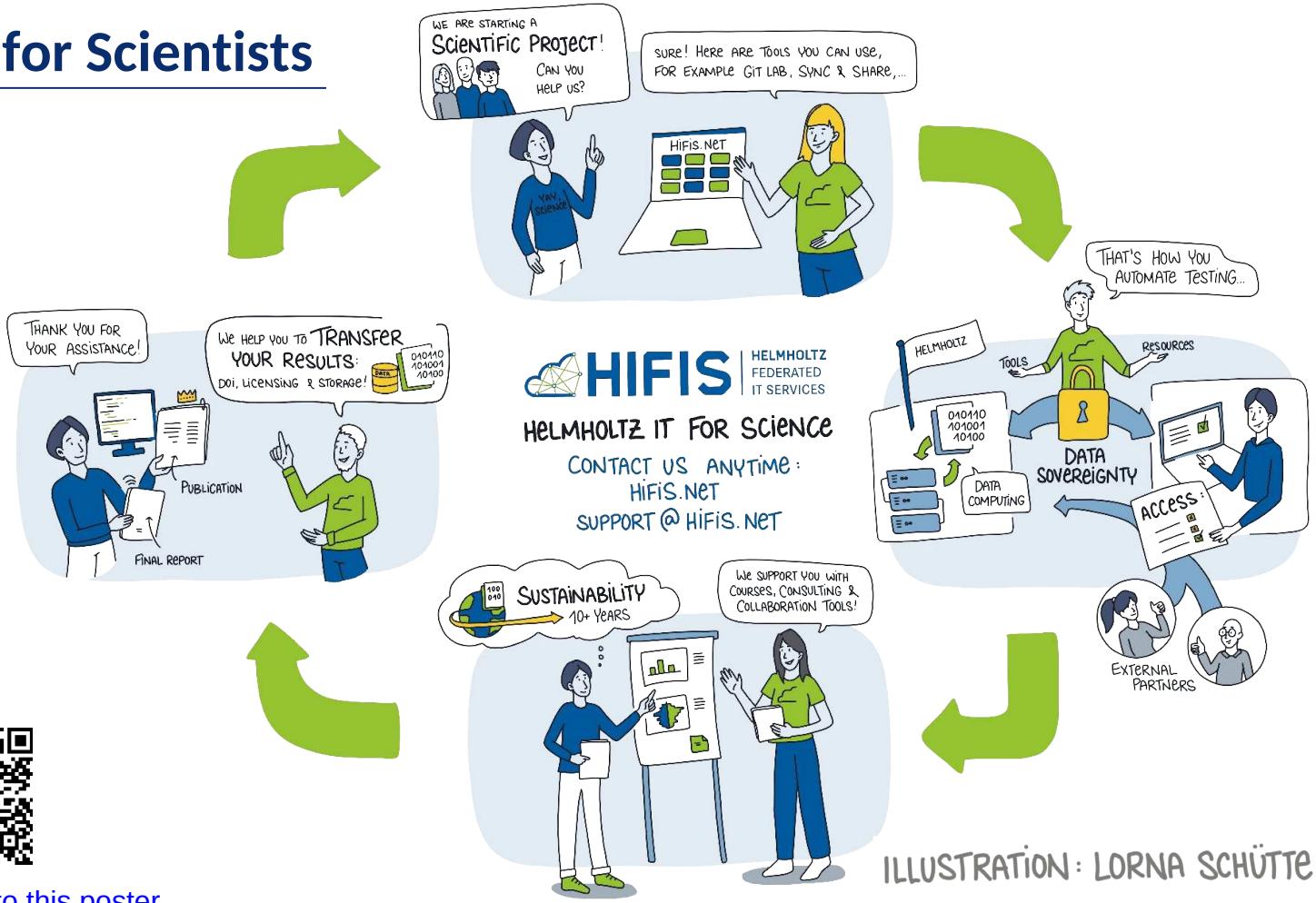
HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

Helmholtz aims for **joint research & information environment** for all Research Fields:

- Cross-centre platforms for Education, interdisciplinary science and IT infrastructure.



HIFIS for Scientists



- Link to this poster

HIFIS offers to users in Helmholtz & Partners

I. Helmholtz Cloud + Backbone

- Provide high performance **collaboration and community services**
- **Connect all centres** and their world-wide collaboration partners!
- **Secure, simple access** and **easy-to-use**

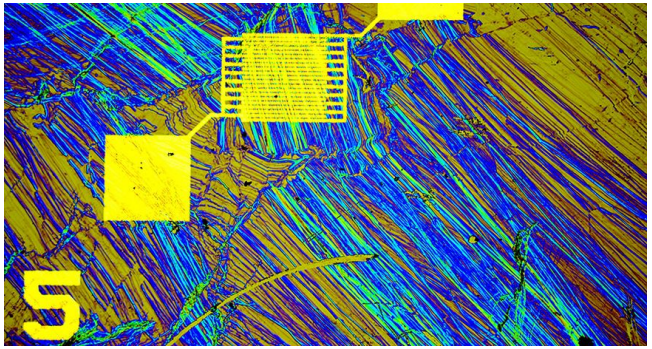


Bild 1: Strukturen aus organischen Halbleiter-Polymeren/ Himani Arora/HZDR
Bild 2: Mosaic Expedition/Stefan Hendricks/AWI

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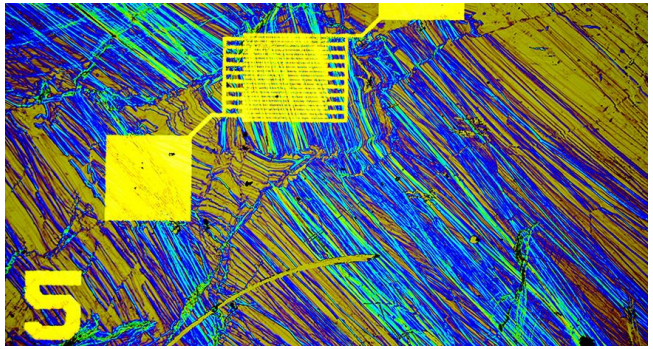
II. Establish **best-practices** for **Research Software Engineering**:

- High level of knowledge, quality, visibility and sustainability
- State-of the-art SW development infrastructures



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Free of charge! (in Helmholtz)

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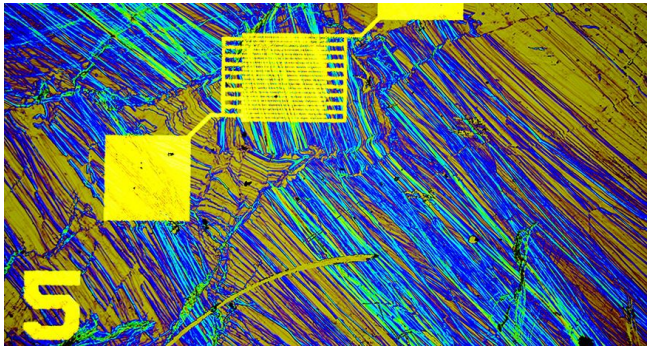

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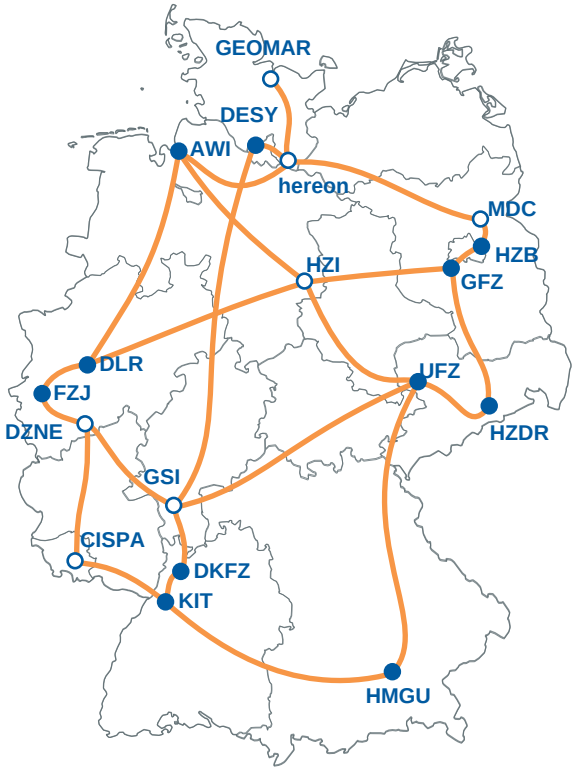
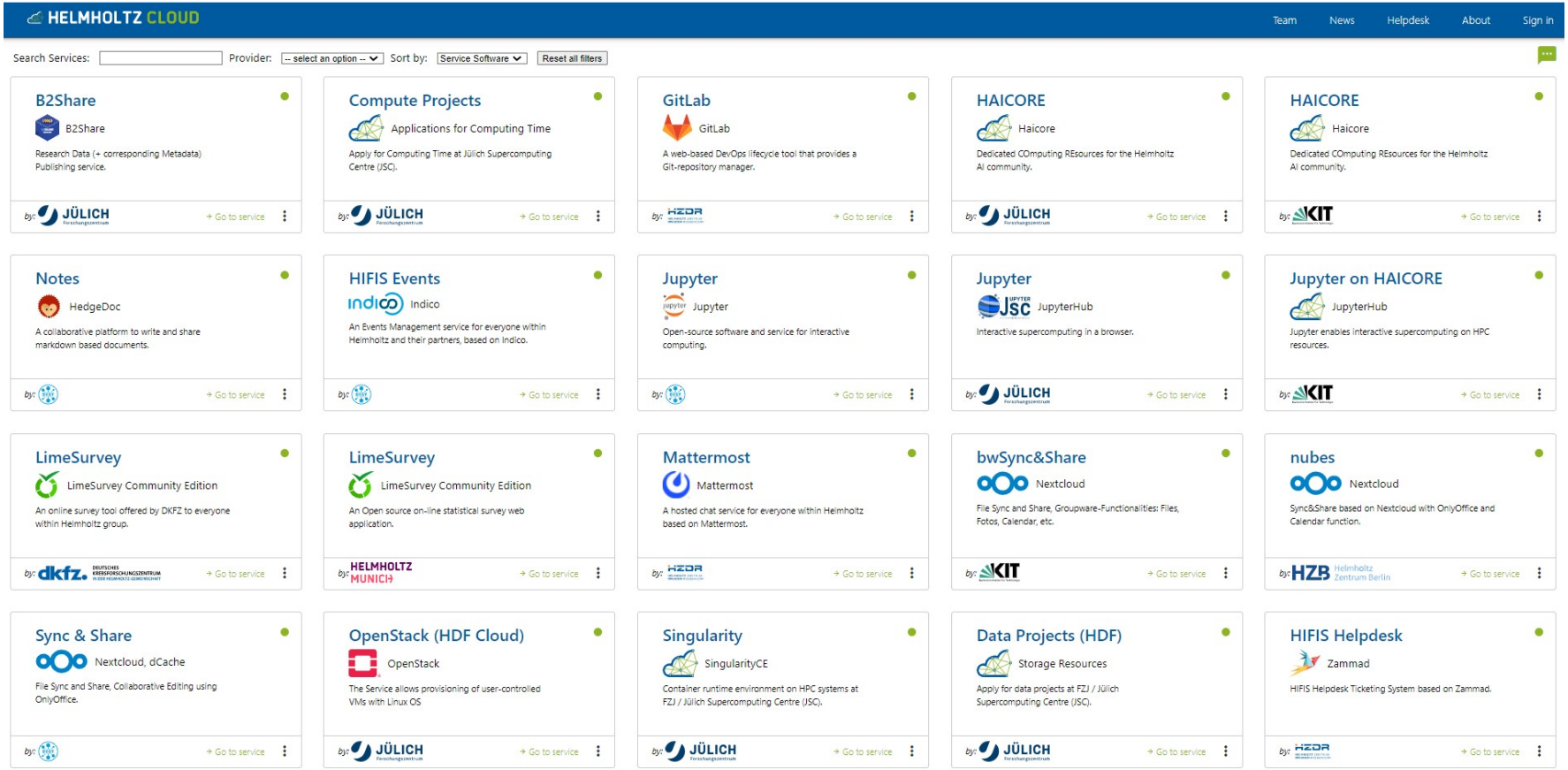
Who is HIFIS?

- **Team: 11 (out of 18) Helmholtz centres**
- Main Coordination: DESY
- Three Clusters:
  - **Backbone Cluster** (head: DESY)
    Core Services for Authentication, Authorisation, Large Data Transfer, etc.
  - **Cloud Cluster** (head: HZB)
    Helmholtz Cloud Platform
  - **Software Cluster** (head: HZDR)
    Platform, Training, Support for high quality, sustainable Research Software Engineering



- https://hifis.net/team

I. Cloud Services + Portal



- cloud.helmholtz.de/services

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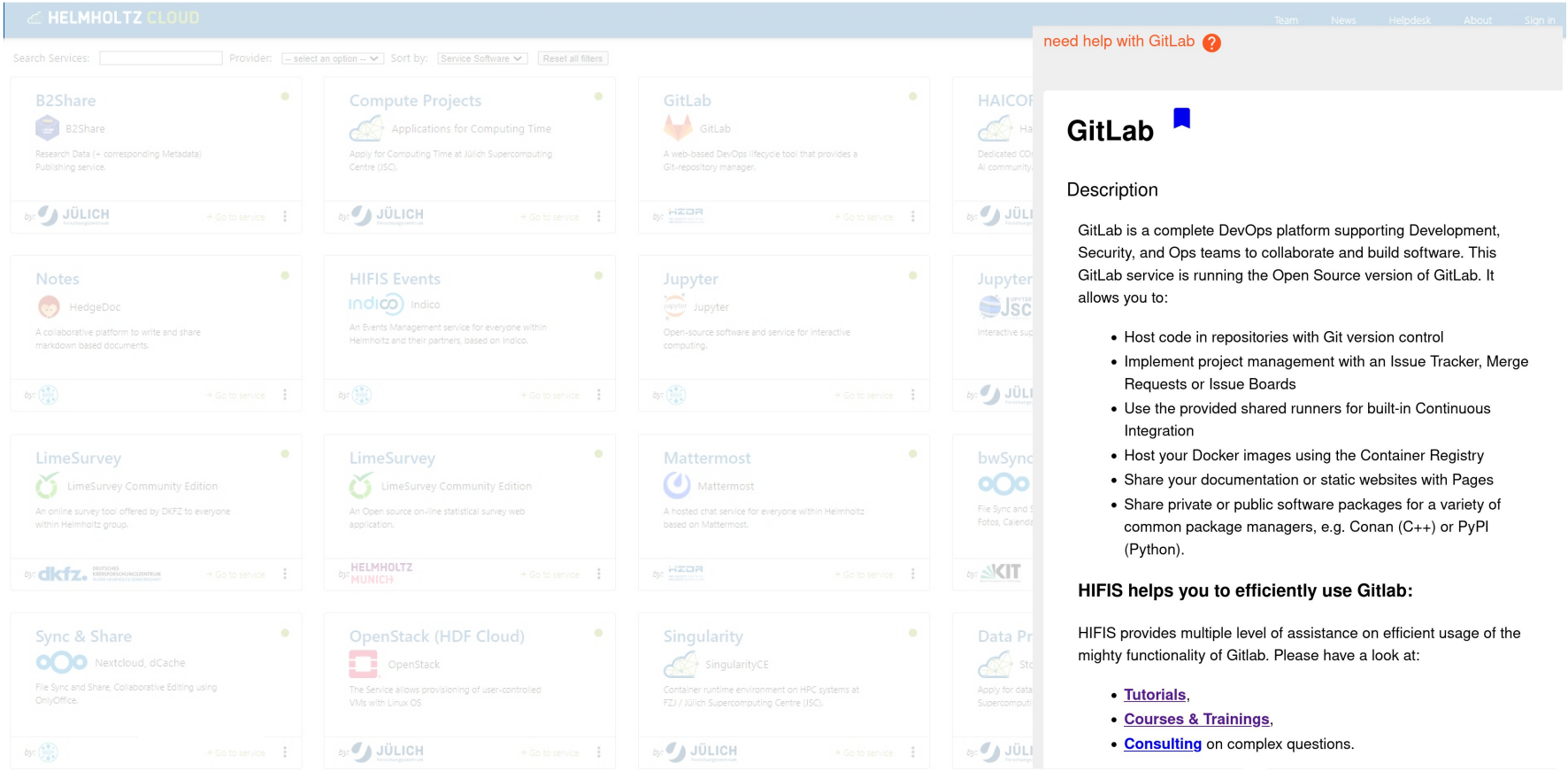

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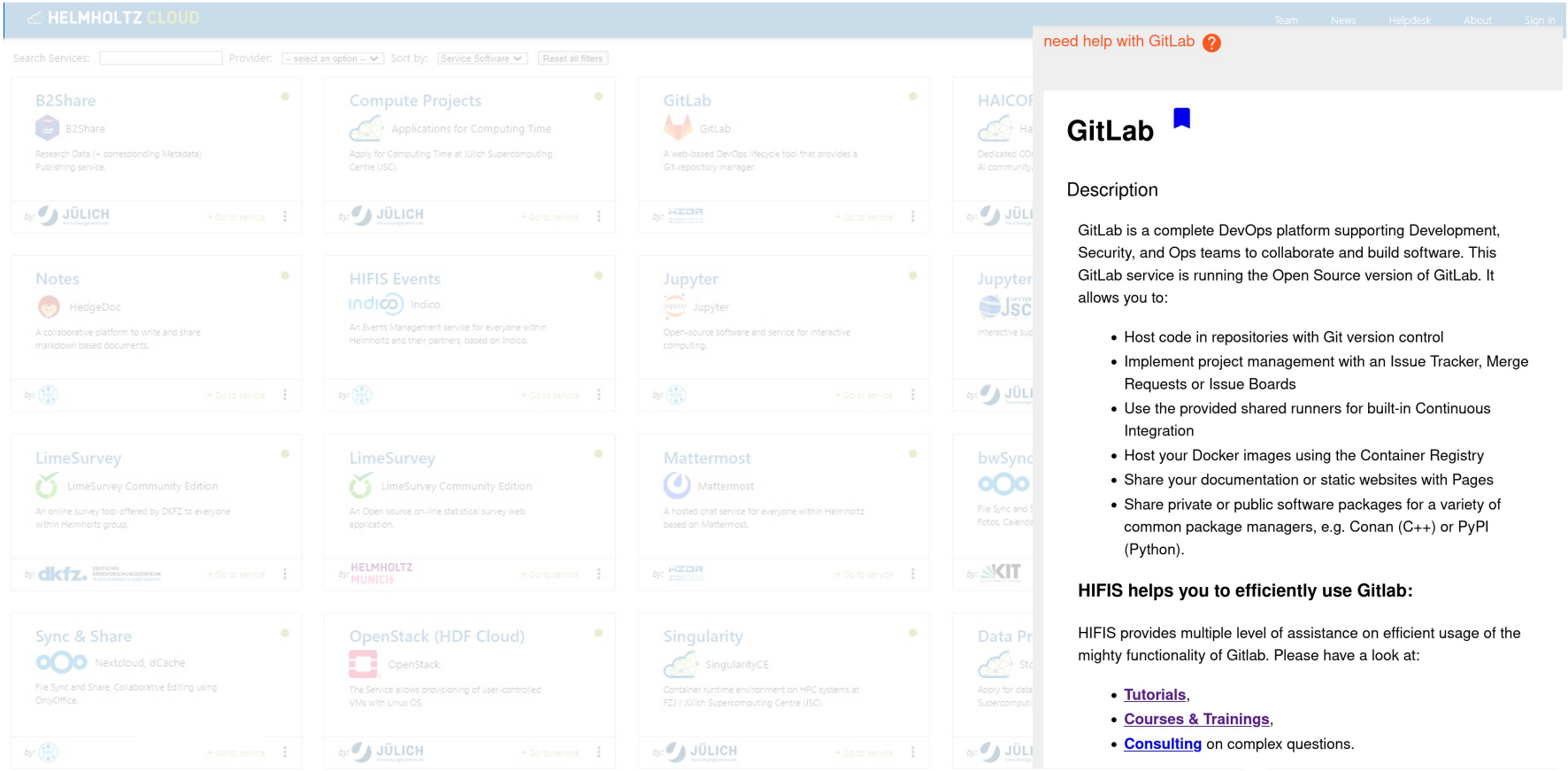

I. IAM&AAI - Access to distributed ressources

Conventional approach - 1:1 connection
- 2 partners (1 service provider, 1 service user):
- separate contract for each service

- https://aai.helmholtz.de/howto
- https://aai.helmholtz.de/concept

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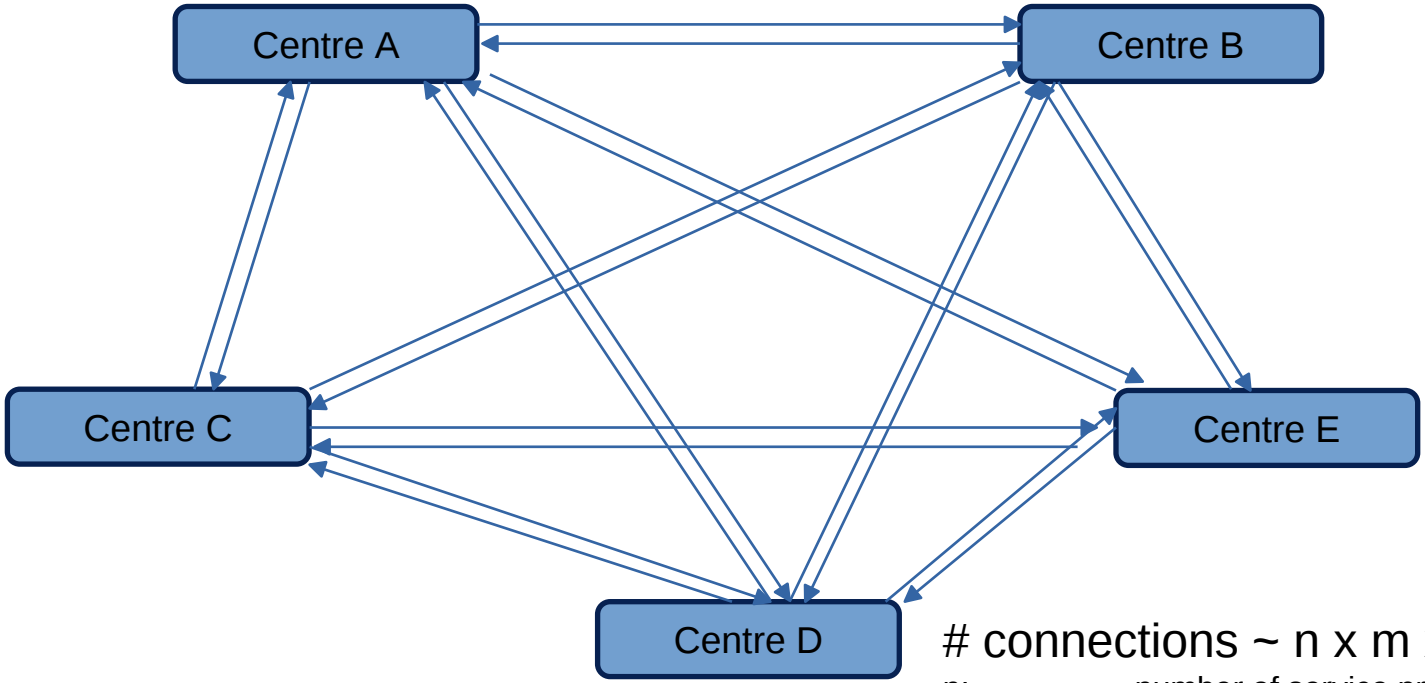
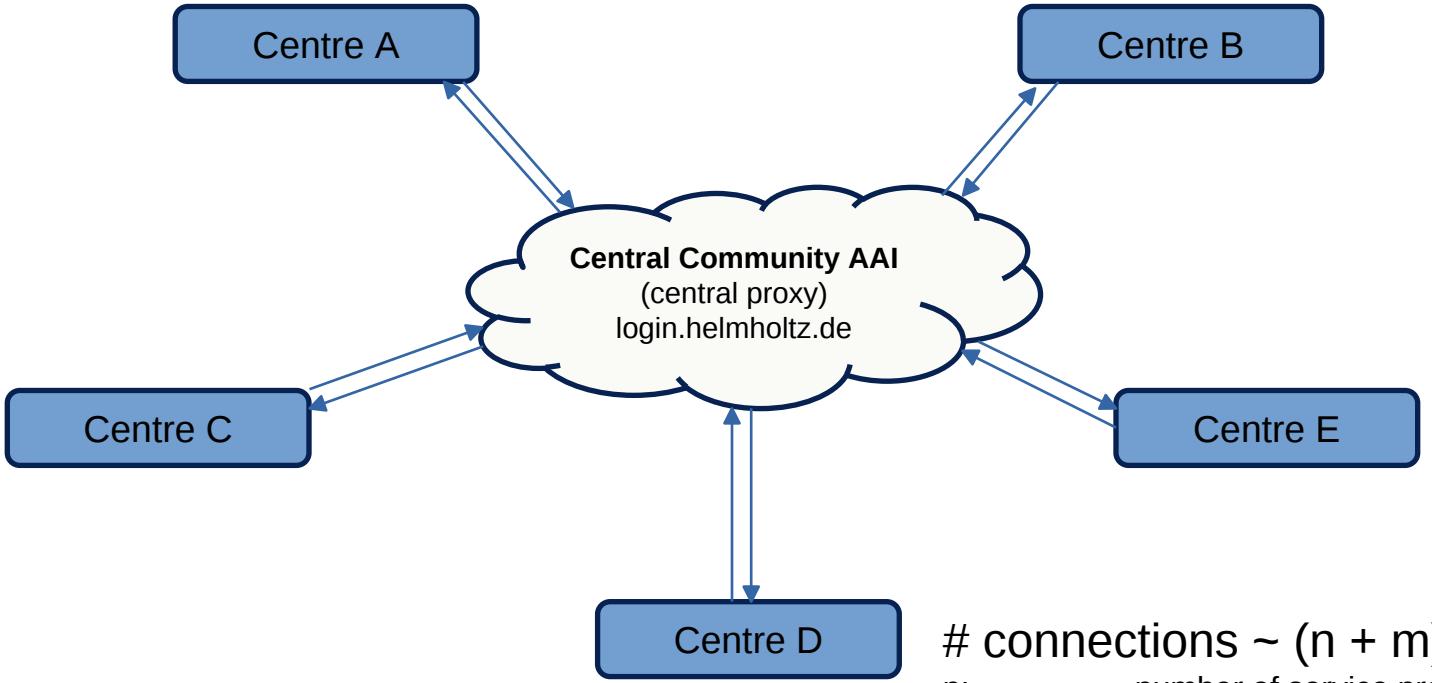


connections ~ n x m x s

n: (>10)	number of service providing centres
m:	numbers of using centres (19)
s:	number of services

- https://aai.helmholtz.de/howto
- https://aai.helmholtz.de/concept

I. IAM&AAI - Solution, following AARC Blueprint



- https://aarc-project.eu/architecture/
- https://aai.helmholtz.de/howto
- https://aai.helmholtz.de/concept

connections ~ (n + m)

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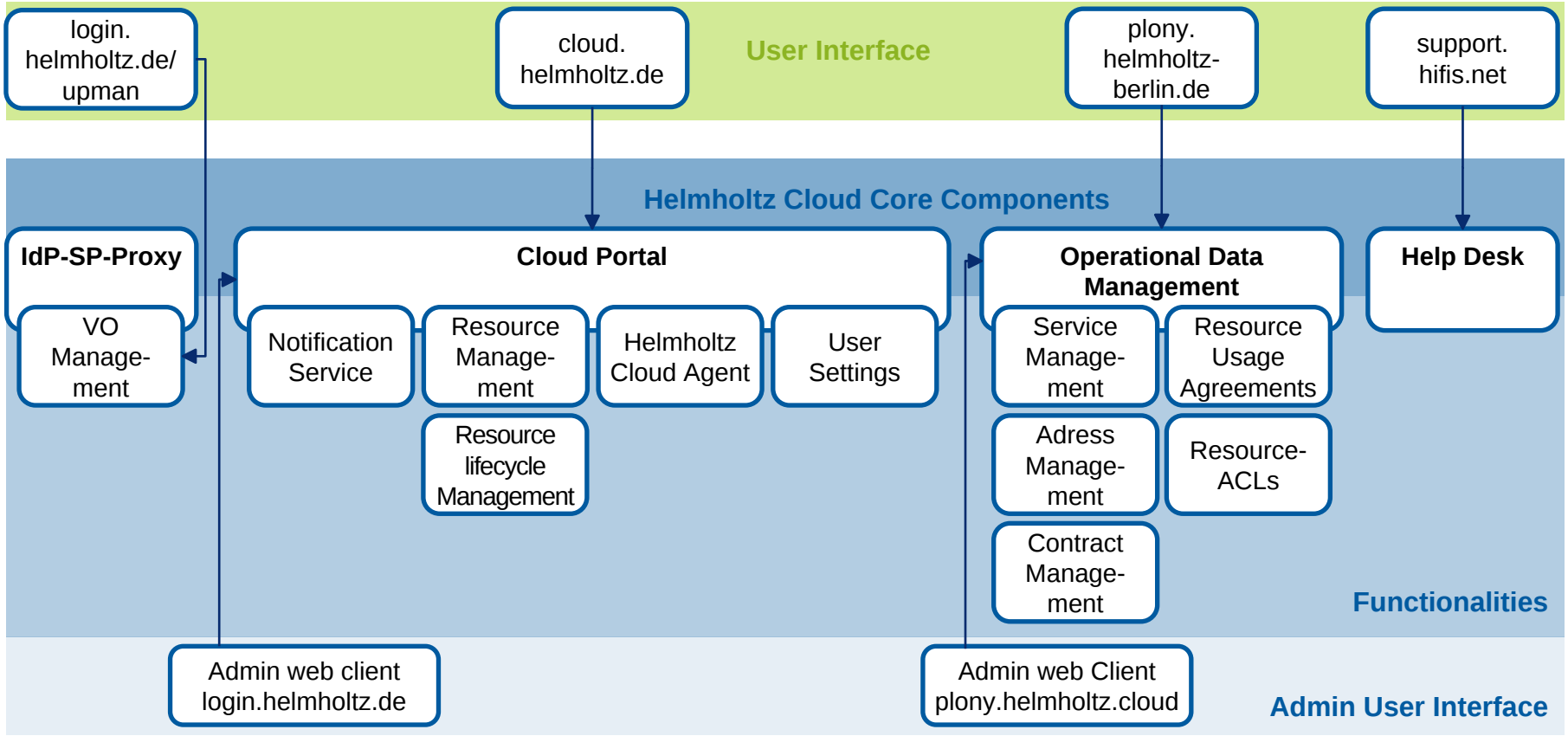
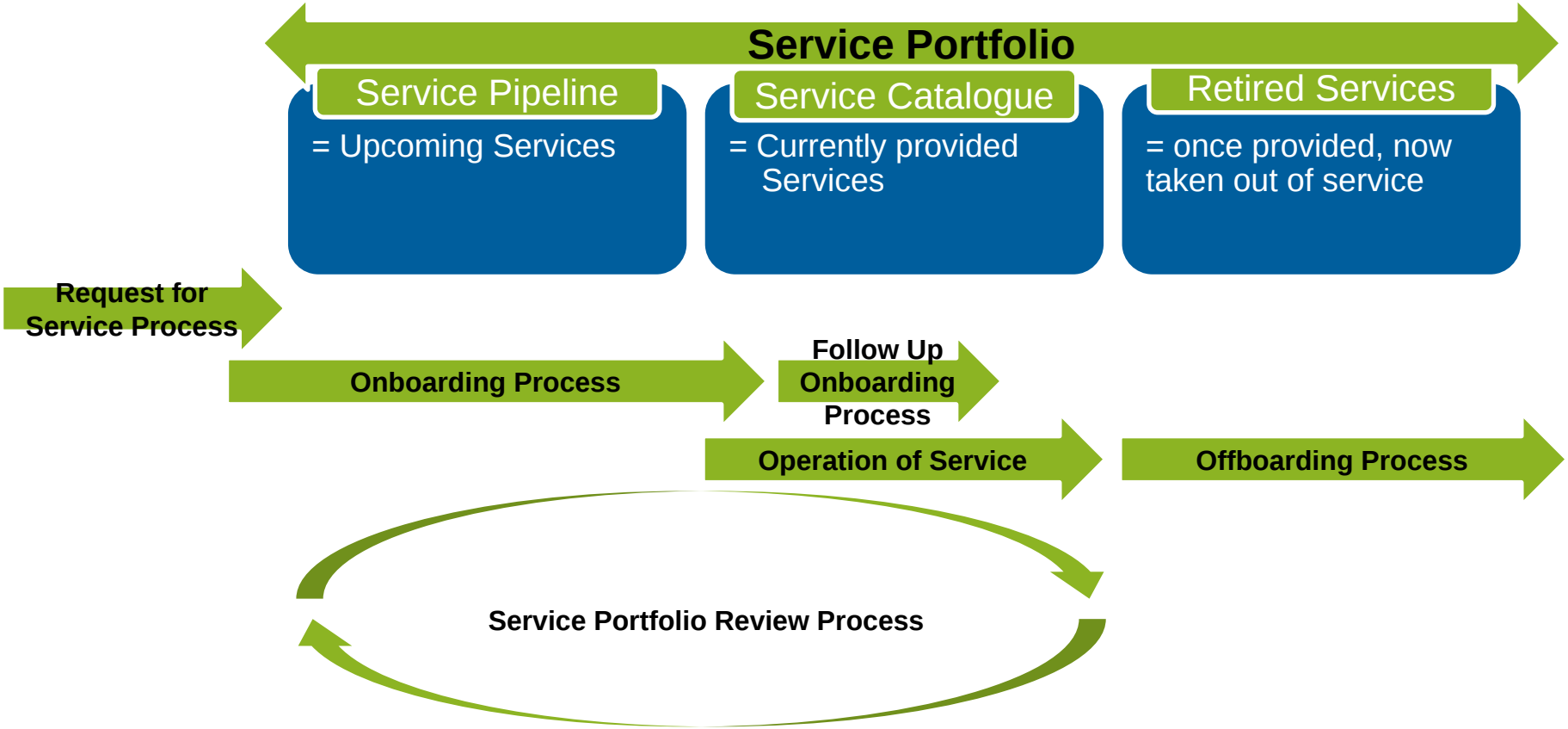
I. Cloud: Architecture

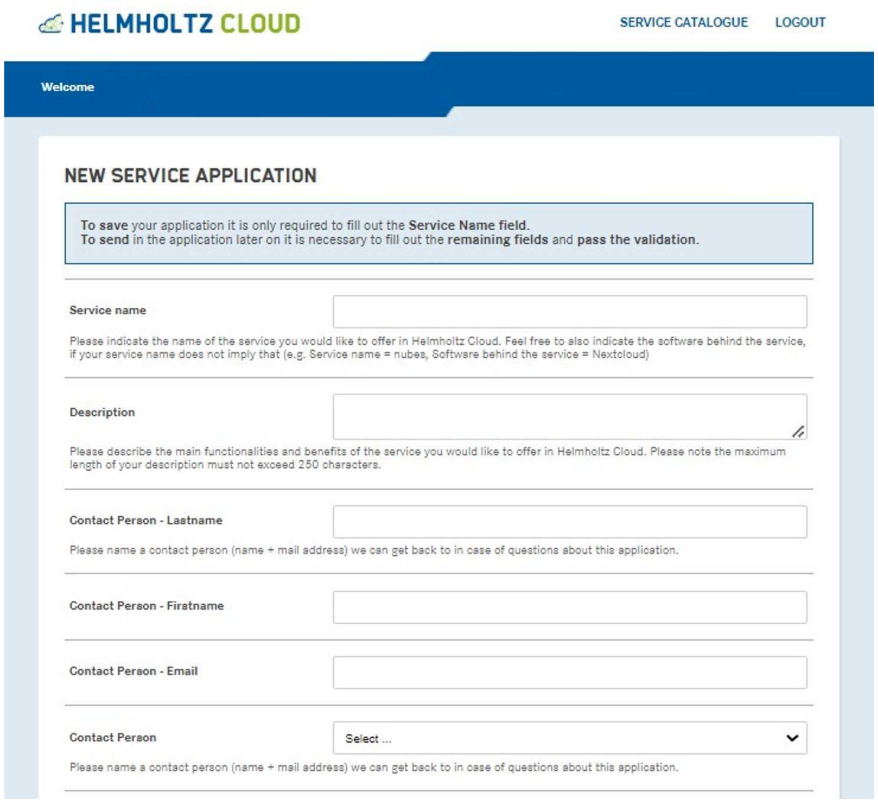


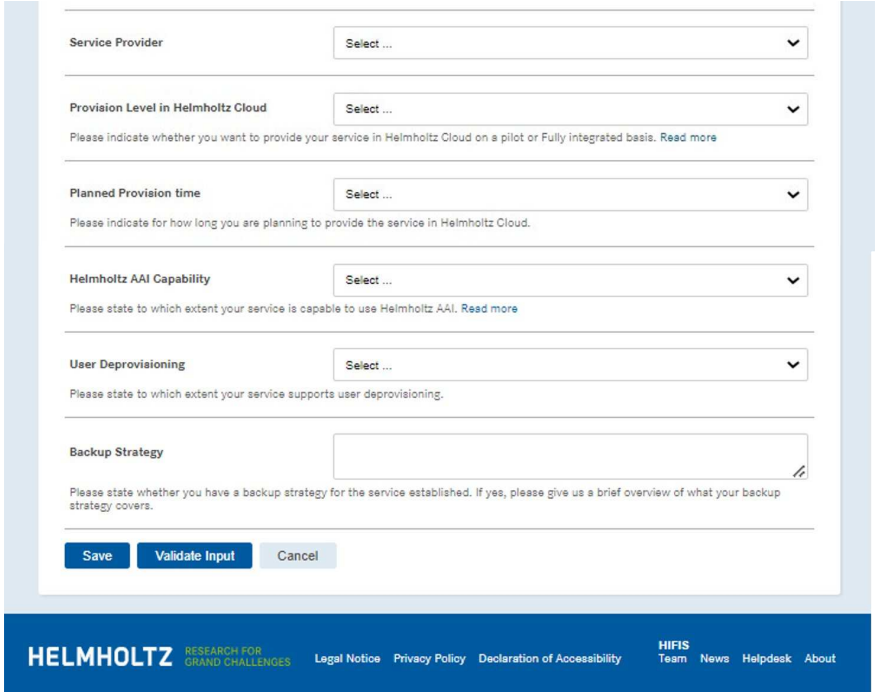
I. Cloud: Process Framework for Helmholtz Cloud Service Portfolio



- Process Framework for Helmholtz Cloud Service Portfolio

I. Cloud: Onboarding Process – Online Application





- https://plony.helmholtz-berlin.de/

I. Cloud Regulation

- **Reform des Gemeinnützigkeitsrechts vom 29.12.2020**
  - § 57 Abs. 3 Satz 1 AO: “Eine Körperschaft verfolgt ihre steuerbegünstigten Zwecke auch dann unmittelbar im Sinne des Absatzes 1 Satz 1, wenn sie satzungsgemäß durch planmäßiges Zusammenwirken mit mindestens einer weiteren Körperschaft, die im Übrigen die Voraussetzungen der §§ 51 bis 68 erfüllt, einen steuerbegünstigten Zweck verwirklicht. Die §§ 14 sowie 65 bis 68 sind mit der Maßgabe anzuwenden, dass für das Vorliegen der Eigenschaft als Zweckbetrieb bei der jeweiligen Körperschaft die Tätigkeiten der nach Satz 1 zusammenwirkenden Körperschaften zusammenzufassen sind.”
- The Cloud Regulation consequently emphasizes:
  - All Helmholtz centres have the **same funding purpose**.
  - **All members contribute** to HIFIS and the Helmholtz Cloud.
  - All **resources** are **offers**.
  - No member may make any claim to the use of the resources.
  - Resources replaces the term service to avoid the impression of a trade.

I. Cloud GDPR

- **Roles in the Helmholtz Cloud according to data protection law**
- **Helmholtz Cloud Core Components:**
  - The entities of the Helmholtz Association participating in the operation of the Helmholtz Cloud via HIFIS are jointly responsible. (i.e. all Helmholtz Centres because HIFIS is funded and steered by all members of the Helmholtz Association, regardless if they are providing or using a Cloud Service.)

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- **Next Step:**
  - Define a Joint Controller Agreement for Helmholtz Cloud Core Components
    - In close Cooperation with Helmholtz AK Datenschutz
    - And with consultancy from KPMG

II. Software Services

Best-practices for sustainable Research Software Engineering on multiple levels:

II. Software Services

Best-practices for sustainable Research Software Engineering on multiple levels:

Education & Training

- **Courses, material** and **workshops** for getting you started or boosting your software engineering practice.

Community

- Build and foster communities to support the necessary **cultural change** when dealing with research software.

Consulting

- **Contact points** for researchers for questions and problems in the context of RSE.

Technology

- Provide a sustainable, well integrated and easy to use **technology infrastructure** for research software development.

II. Software Services

Education & Training

Basic

- First Steps in Python-Programming
- Project Management with GitLab
- Version Control using Git

Intermediate

- GitLab for Software Development in Teams
- Let us Make Your Script Ready for Publication
- OOP Programming with Python (available in 2022)
- Continuous Integration (CI) using GitLab CI (available in 2022)

Advanced

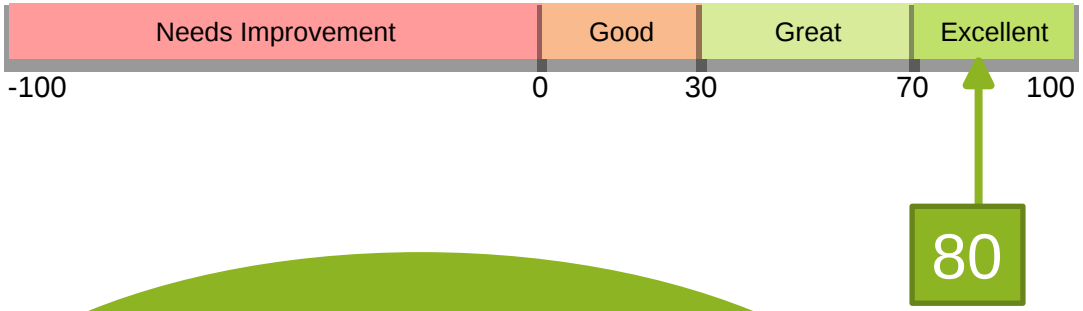
- Using Containers in Science
- Test Automation with Python

➢ https://hifis.net/events

II. Software Services

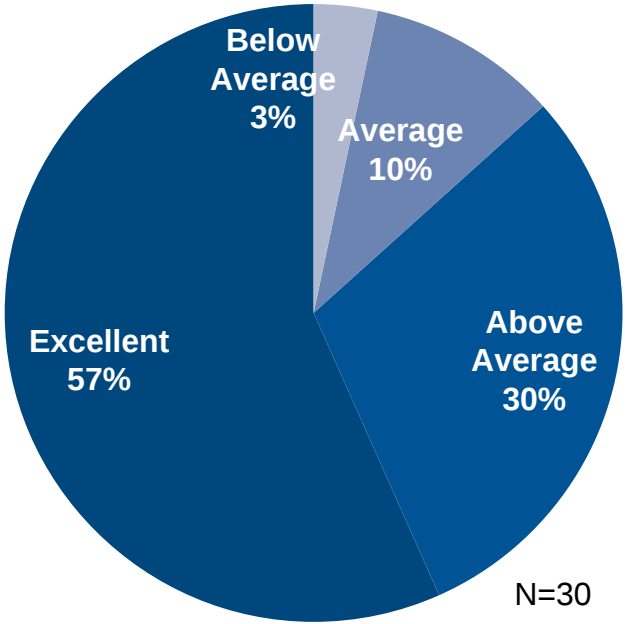
Consulting

Net Promoter Score



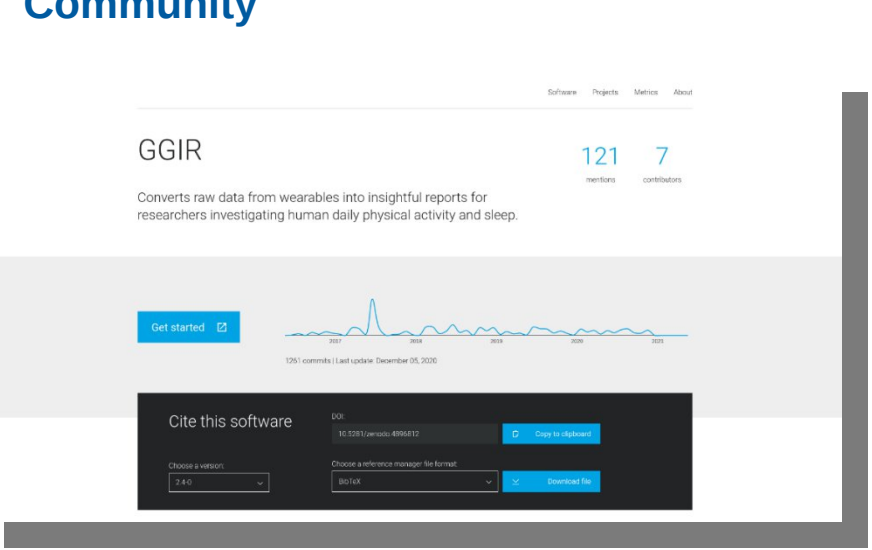
This was a great experience. Having worked at a Helmholtz institution for many years, it is a bit difficult for senior staff to understand that this is really a free and open service meant to support research groups in different fields. This is quite uncommon in "old Helmholtz" and it may take a while before HIFIS becomes widely known and accepted…

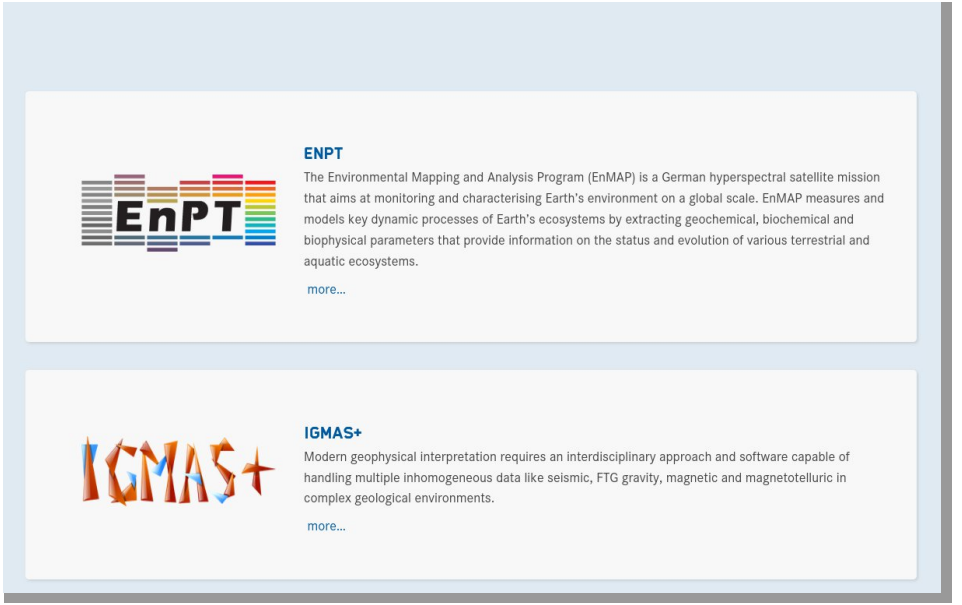
Impact of the consultation on your project or work



II. Software Services

Community



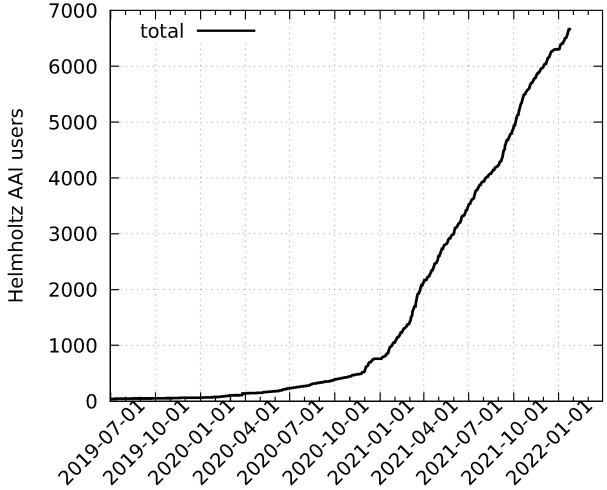


- Started development of a Research Software Directory for Helmholtz
- To be built on top of and in cooperation with the Netherlands eScience center solution

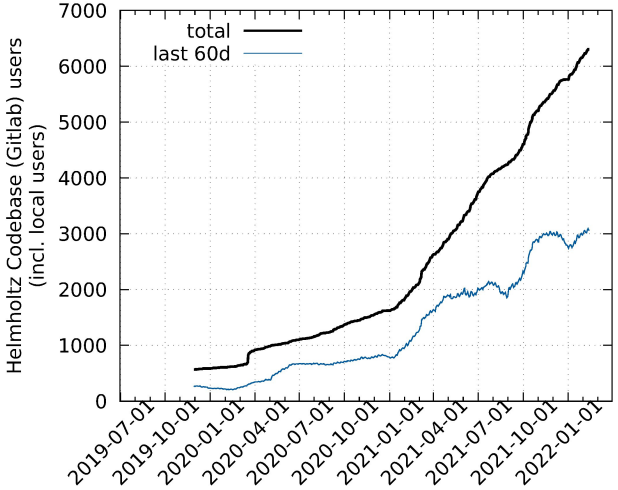
- Present & Promote top success stories of Research Software Engineering in Helmholtz
- approx. **90 Proposals** so far, to be presented in: hifis.net/spotlights

HIFIS Usage: AAI, Cloud, Software Services

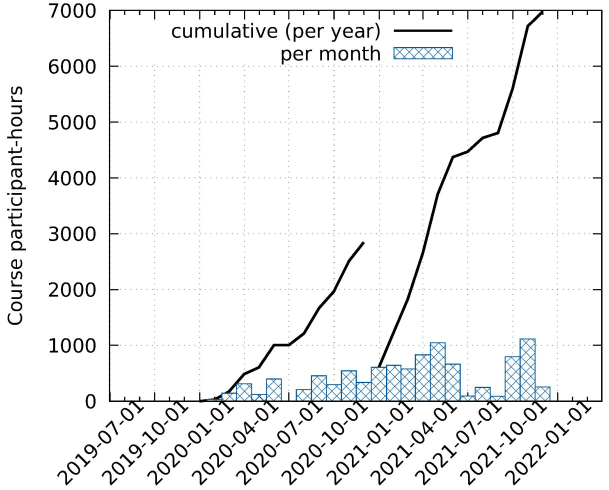
Temporal development of selected KPI



AAI
--> Cloud Services



Gitlab HZDR

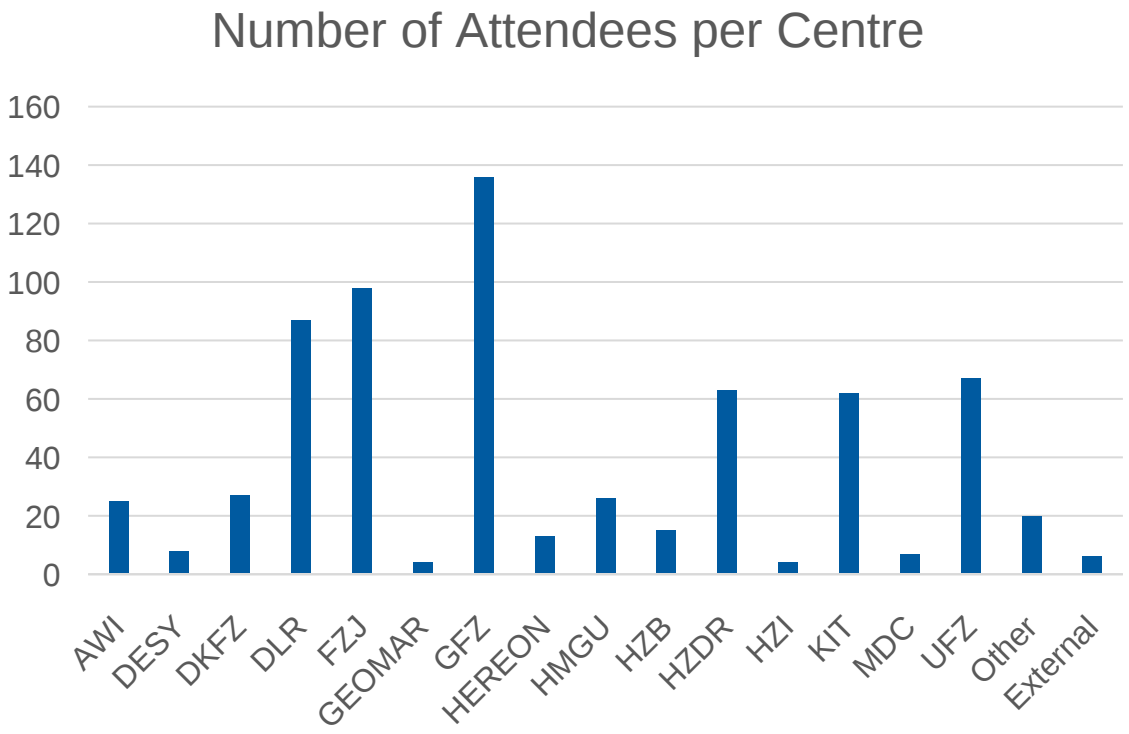


Course participant hours

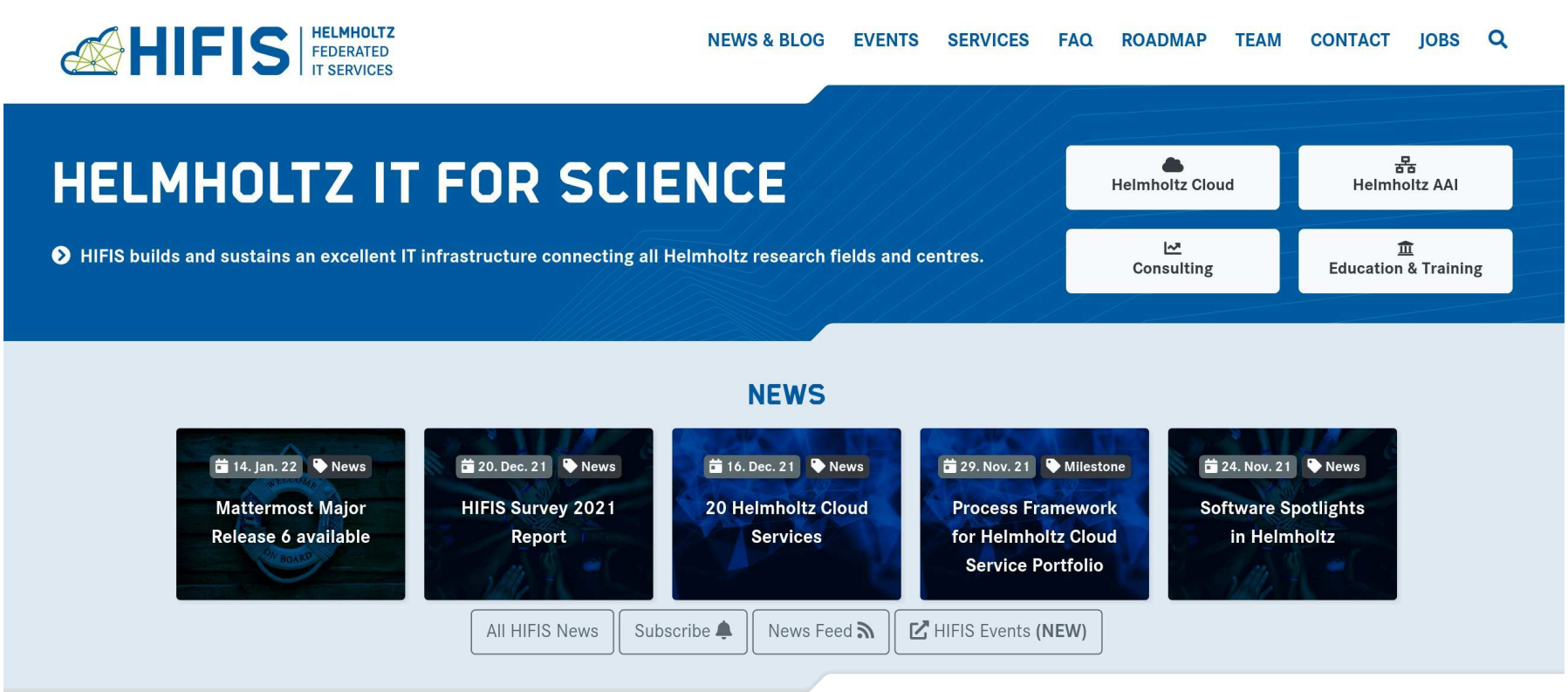
HIFIS Usage: AAI, Cloud, Software Services

Education & Training

- **36** online workshops in 2021
- About **668** attendees from **16** Helmholtz centers



HIFIS Services in a nutshell



- https://hifis.net

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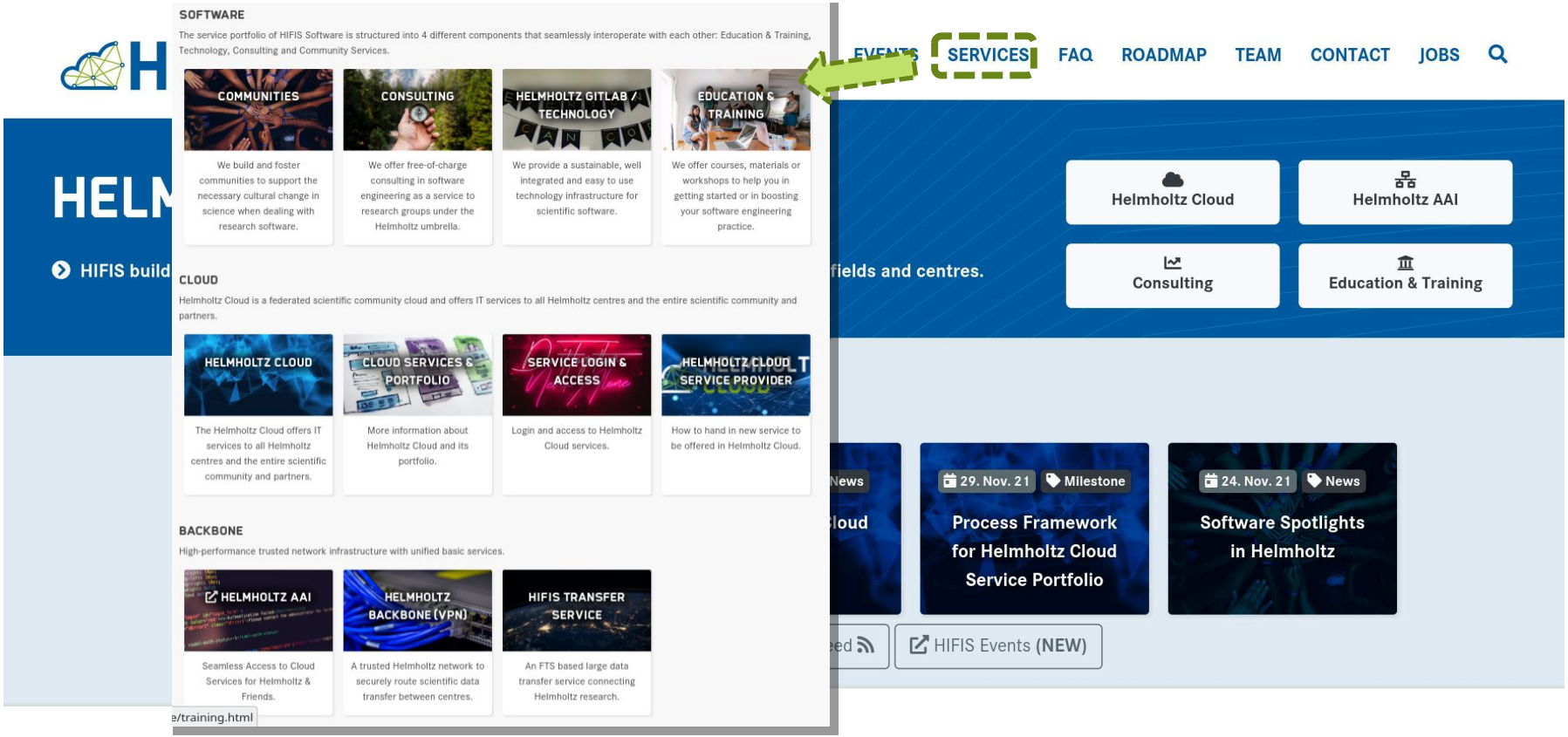

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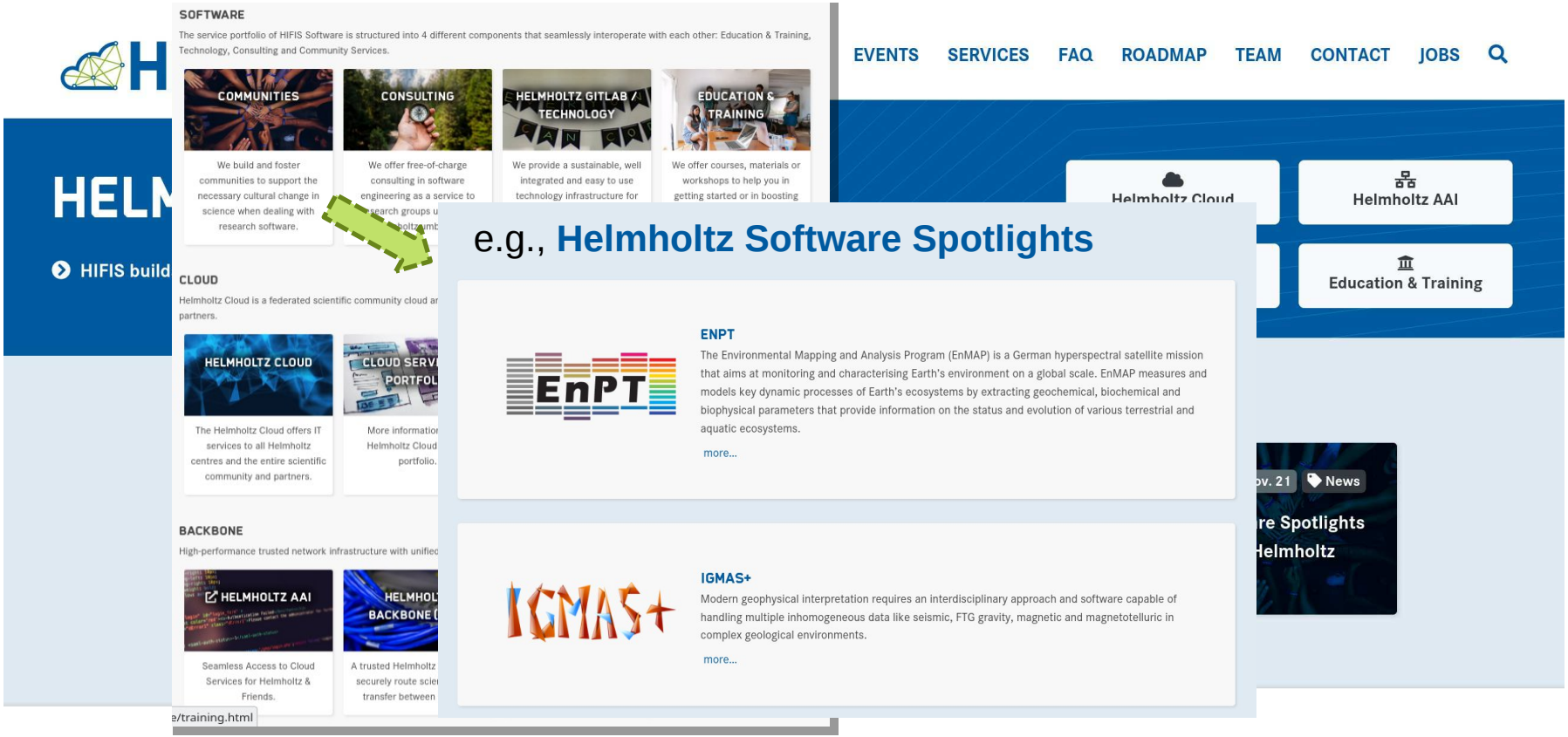

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HIFIS Take home

I. Helmholtz Digital Services for Science - Collaboration made easy.

- Try it! Most Software and Cloud Services readily available for Helmholtz + Partners.

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II. Next: Deepening integration, improving user experience

- Cloud + Software Services Review
- Cloud Service Regulation will be proceeded and submitted to MV
- Further improve outreach esp. to still underrepresented centres

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III. Further possible Collaboration & Blueprint

- Blueprint for Community based **AAI** +
  Federated / distributed “basis” **cloud services**
- Helmholtz Cloud (Portal) as potential **broker** for
  external services
- Consulting on RSE for facilitated transfer

HIFIS Take home

IV. Consult us:

- https://hifis.net
- support@hifis.net
- Resonator Podcast

Podcast

Poster

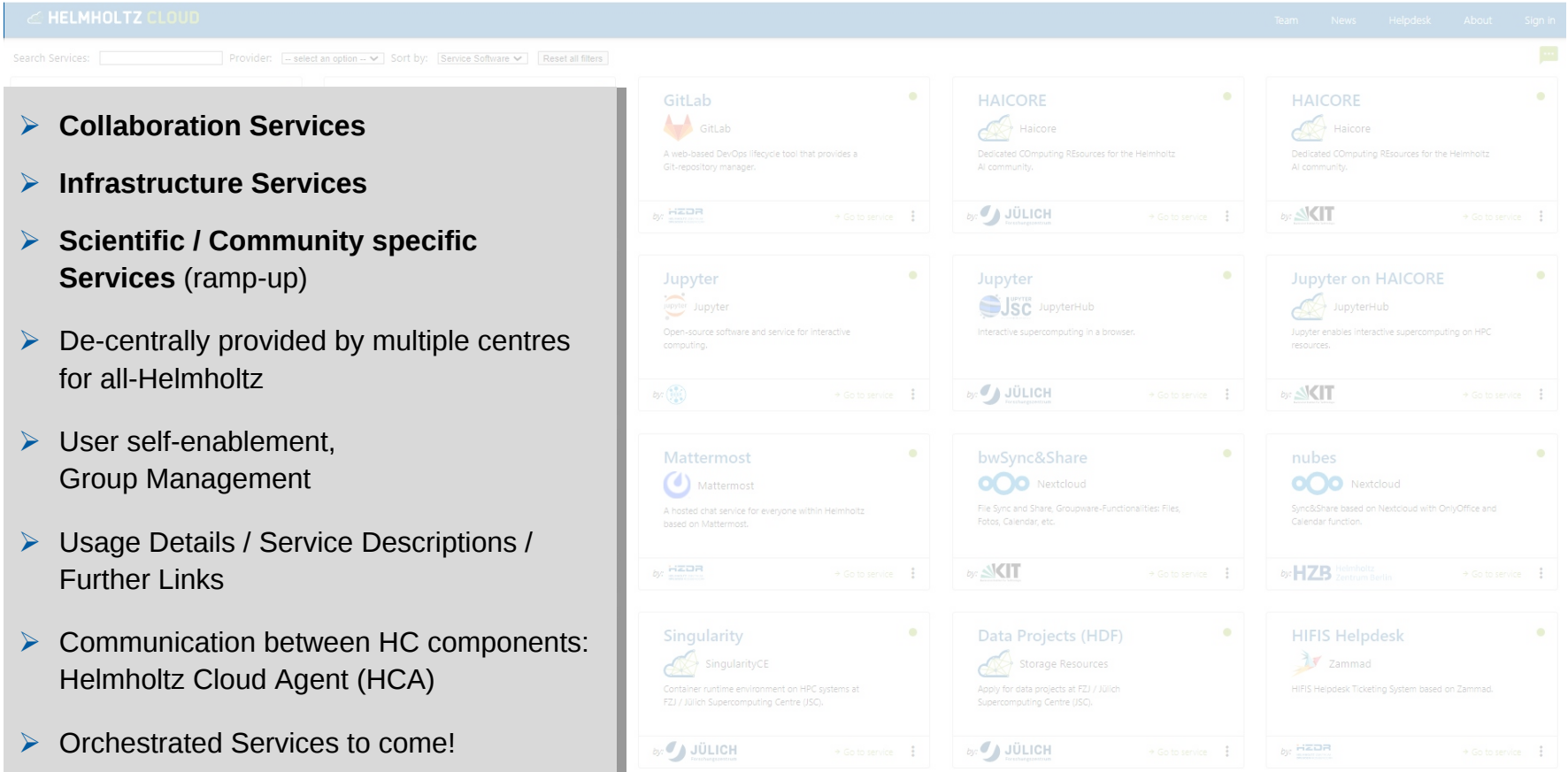
QUESTIONS?

Katerina Limpitsouni via undraw.co

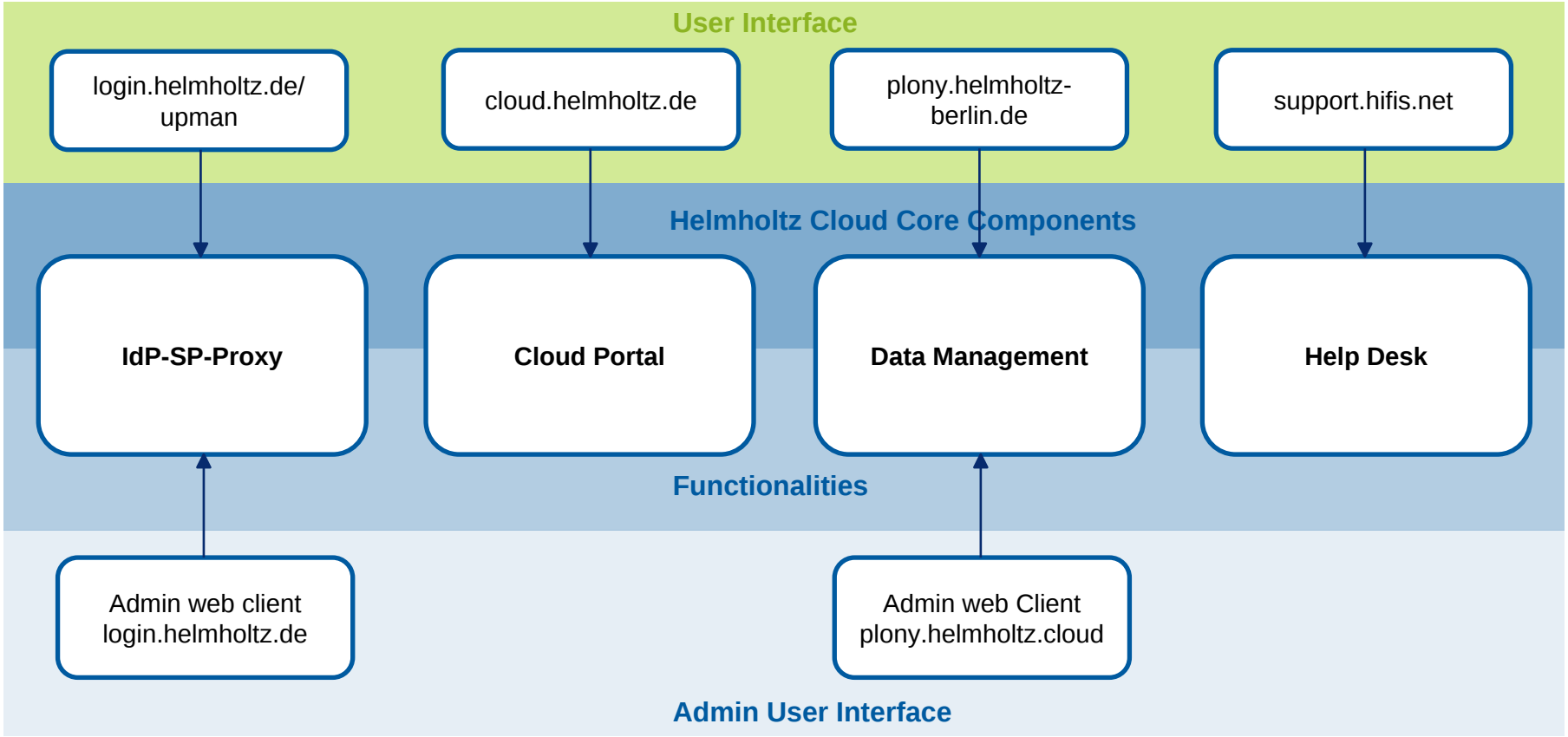
SPARE SLIDES

I. Cloud Services + Portal

- **Collaboration Services**
- **Infrastructure Services**
- **Scientific / Community specific Services** (ramp-up)
- De-centrally provided by multiple centres for all-Helmholtz
- User self-enablement, Group Management
- Usage Details / Service Descriptions / Further Links
- Communication between HC components: Helmholtz Cloud Agent (HCA)
- Orchestrated Services to come!

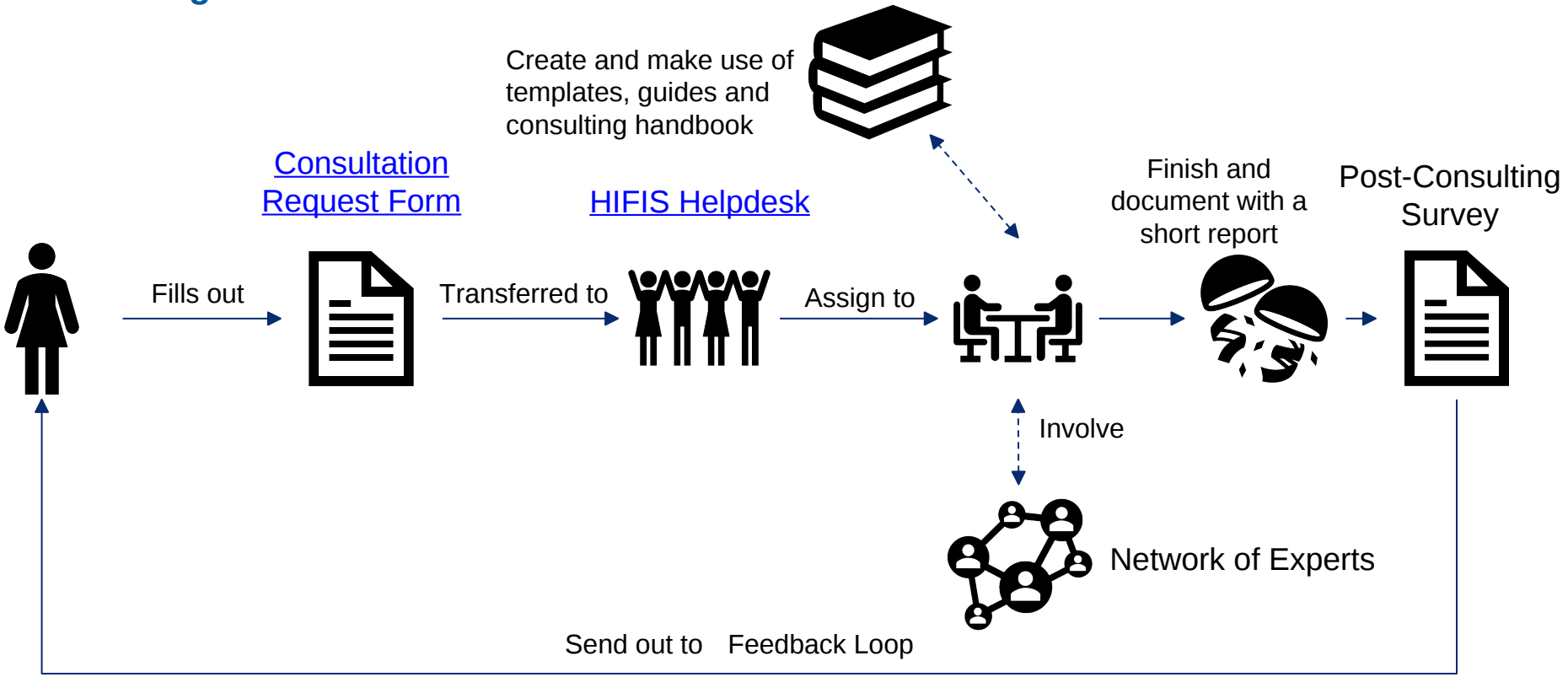


I. Cloud Core Components



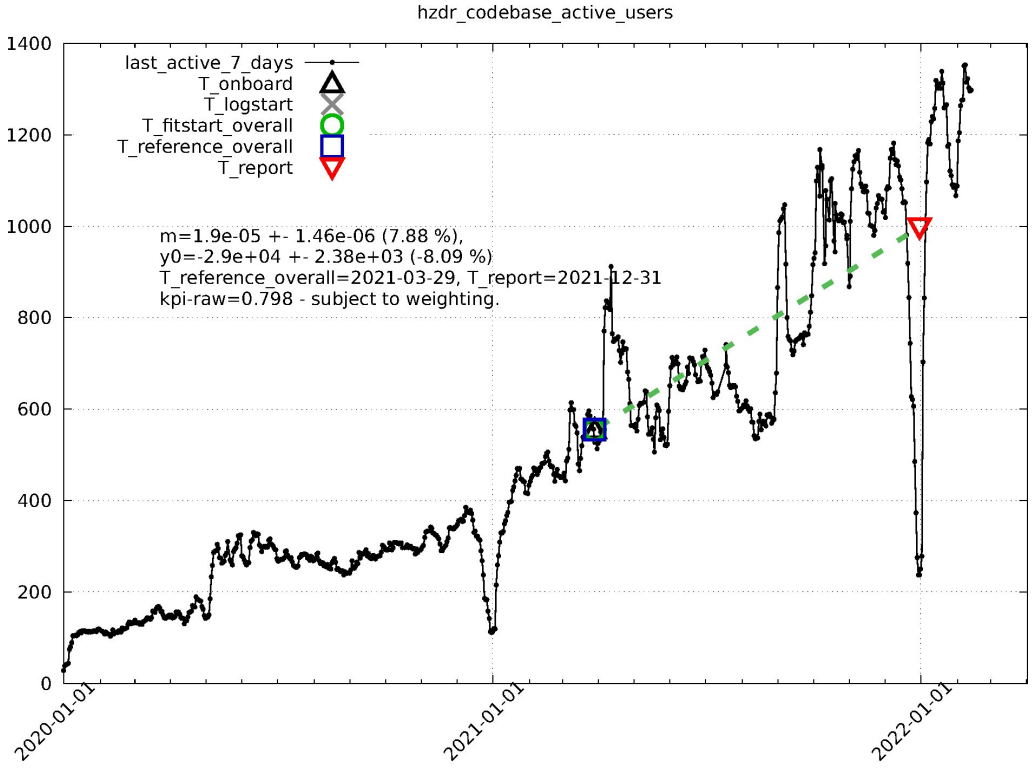
II. Software Services

Consulting



HIFIS Usage: Cloud Service Operation KPI

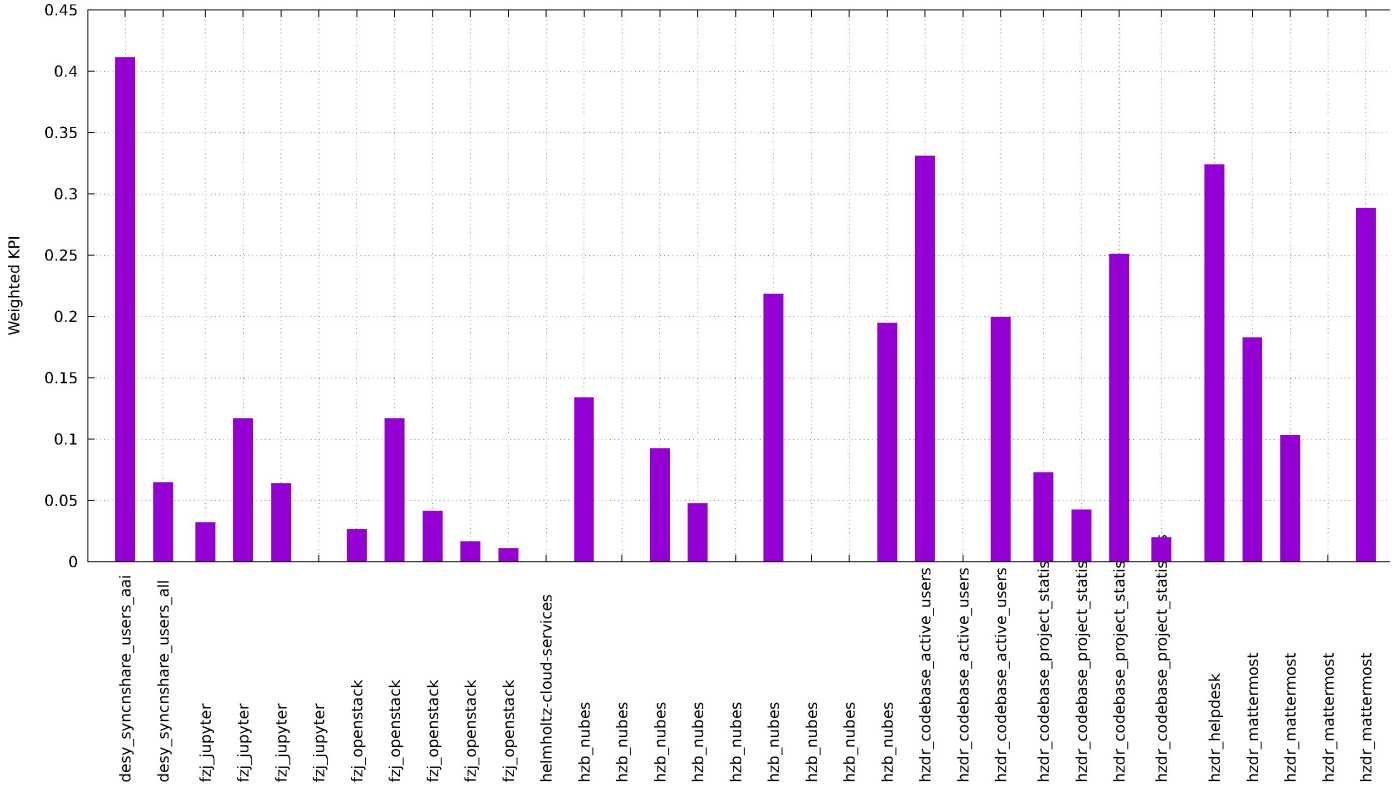
- Measuring users and usage KPI per service; overall weight per service is defined as 1
- Increase of service users/usage w.r.t reference time point results in >0; reduction in <0
- Total 7 services included so far; others onboarded later than Oct 01
- Deal with data heterogeneity
- All data and doc public
- E.g. HZDR Codebase/Gitlab (active users in 7 days)



- https://gitlab.hzdr.de/hifis/overall/kpi/kpi-plots-ci
- https://hifis.net/doc/cloud-service-kpi/

HIFIS Usage: Cloud Service Operation KPI

- This year's overall KPI=3.39 (for 7 services measured)
- Contributions of services:



HIFIS Usage: Overall KPI

	KPI	2019	2020	2021
P1a	**Number of individual users** (Sect A2.2)	65	769	6303
P1b	**Number of collaborating projects (VOs)** (Sect 7.1)	3	26	49
P1c	**Active Cloud Services Usage**[26]	-	-	3.39
P2a	**Number of IT services (all AAI registered)** (Sect A2.2)	14	85	106
P2b	**Number of IT services in Cloud Service Portfolio**	0	38	39
P2c	**Number of IT services in fully operation modus**	0	0	19
P3	**Number of courses and events organised**[27]	-	24	38
P4	**Number of published resources**[28]	7	31	19
P5	**Number of Milestones achieved** (Sect 7.3)	1	7	14

II. Software Services

Consulting

- Free-of-charge software consulting for research groups within the Helmholtz umbrella
- Possible topics include, but are not limited to Licensing and Open Source, setting up new projects, code migrations etc.
- **Initial References:**
  - Making a project HPC ready
  - Setting up and introducing Continuous Integration
  - Frequent requests about licensing and Open Source

Katerina Limpitsouni via undraw.co

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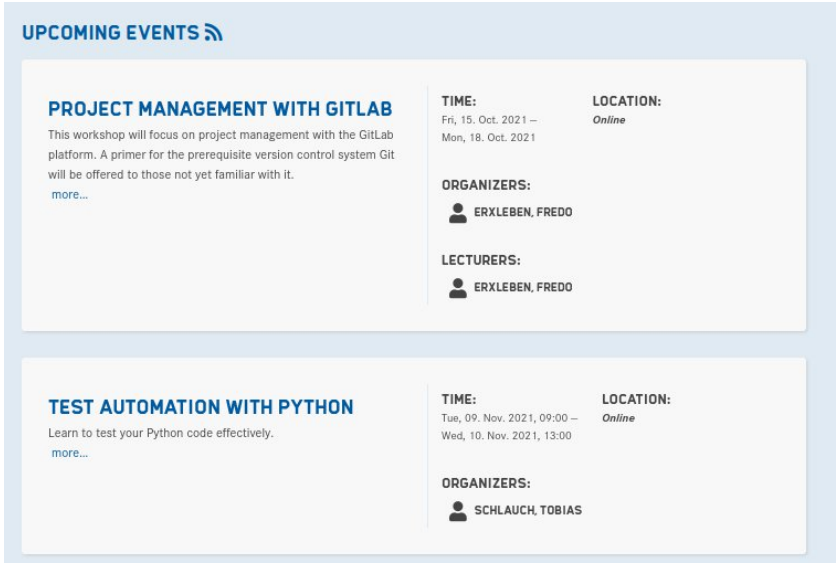
- **Helmholtz Cloud Services (Fully integrated and Pilot):**
  - The entities of the Helmholtz Association that share data collections and services act as joint controllers.
  - The entities that provides another unit of the Helmholtz Association with an IT service in the Helmholtz Cloud for its own use acts as a processor.
  - The entities that grants external third parties access to the data collections and services in the Helmholtz Cloud is the responsible party.

II. Software Services

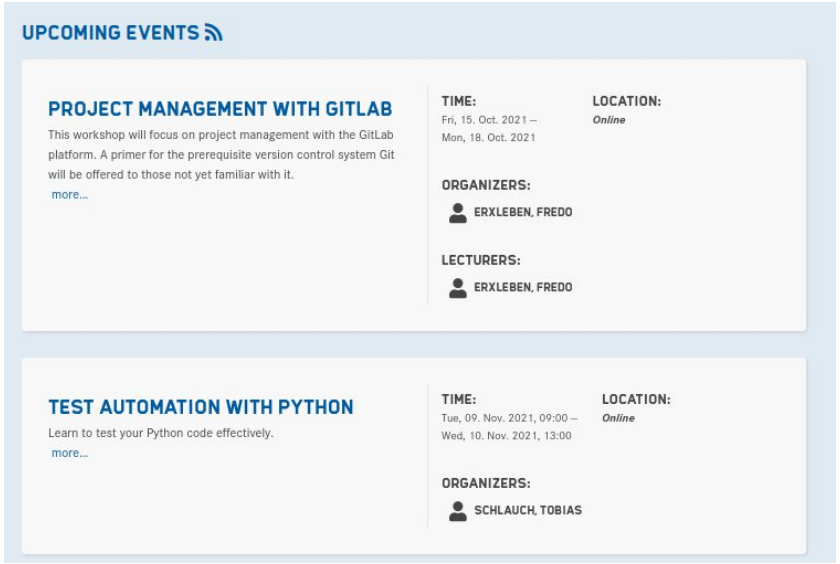
...It's even easier than one, two ...

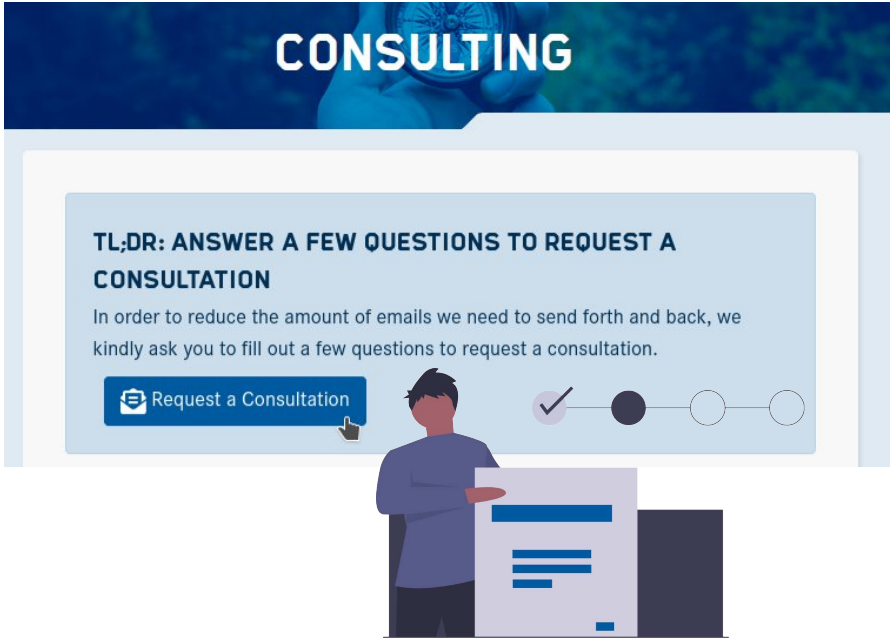


- https://hifis.net/events

II. Software Services

...It's even easier than one, two, three!





Katerina Limpitsouni via undraw.co

- https://hifis.net/events
- https://hifis.net/consulting

II. Software Services

Community

- **Investigated multiple formats of community building**
- **Example:** Hacky Hours
  - HackyHourHandbook: https://github.com/amandamiotto/HackyHourHandbook
  - Informal regularly scheduled catchup
  - Discuss software engineering related topics for accelerating their research
  - In average **9.5** participants. 10 different centers joined. (Goal not met)
- Format discontinued and reorientation of the work package

II. Software Services

Technology

Provide a sustainable, well integrated and easy to use technology infrastructure for research software development.

Transparency | Accessibility | Reliability | Reusability

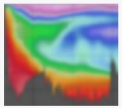
- Everything we implement is shared as Open Source software
  - https://gitlab.com/hifis/ansible
- Infrastructure as code Remove manual components, Transparently visible for Helmholtz employees
  - https://gitlab.hzdr.de/hifis-software-deployment/

II. Helmholtz Software Spotlights

ENPT

The Environmental Mapping and Analysis Program (EnMAP) is a German hyperspectral satellite mission that aims at monitoring and characterising Earth's environment on a global scale. EnMAP measures and models key dynamic processes of Earth's ecosystems by extracting geochemical, biochemical and biophysical parameters that provide information on the status and evolution of various terrestrial and aquatic ecosystems.

more...



ODV

Ocean Data View (ODV) is a software package for the interactive exploration, analysis and visualization of oceanographic and other geo-referenced environmental data. ODV runs on Windows, MacOS, and Linux. ODV data and view files are platform-independent and can be exchanged between different systems.

more...

IGMAS+

Modern geophysical interpretation requires an interdisciplinary approach and software capable of handling multiple inhomogeneous data like seismic, FTG gravity, magnetic and magnetotelluric in complex geological environments.

more...

RCE

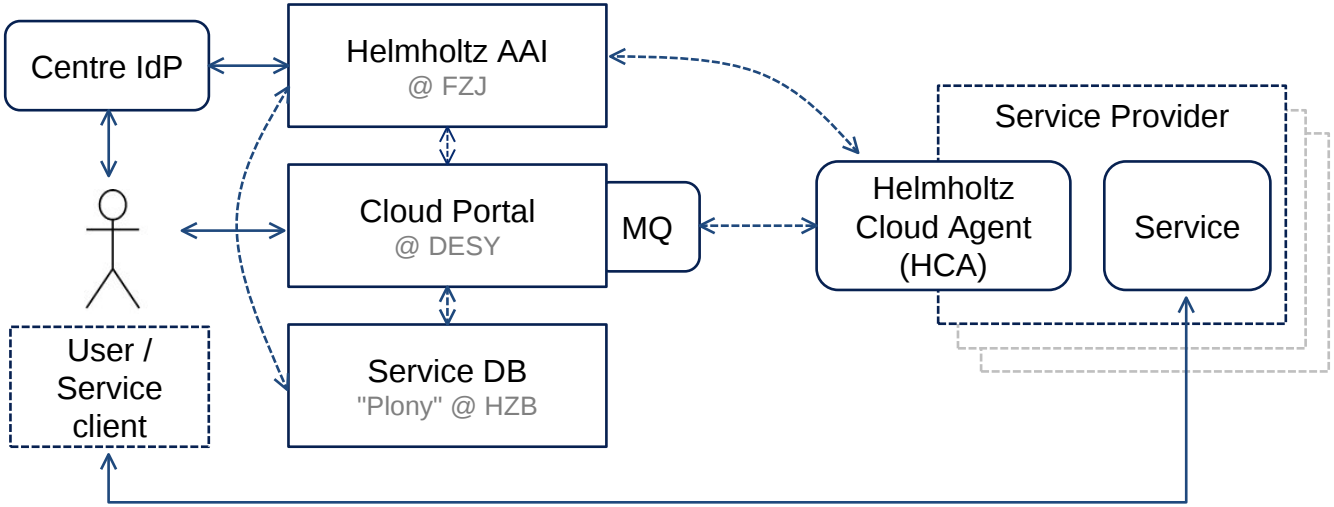
RCE is a distributed integration environment for scientists and engineers to analyze, optimize, and design complex systems like aircraft, ships, or satellites.

more...

- Present & Promote top success stories of Reseach Software Engineering in Helmholtz
- from all Helmholtz Research Communities
- approx. **90 Proposals** so far, to be presented in: https://hifis.net/spotlights
- ... more to come. Stay tuned!

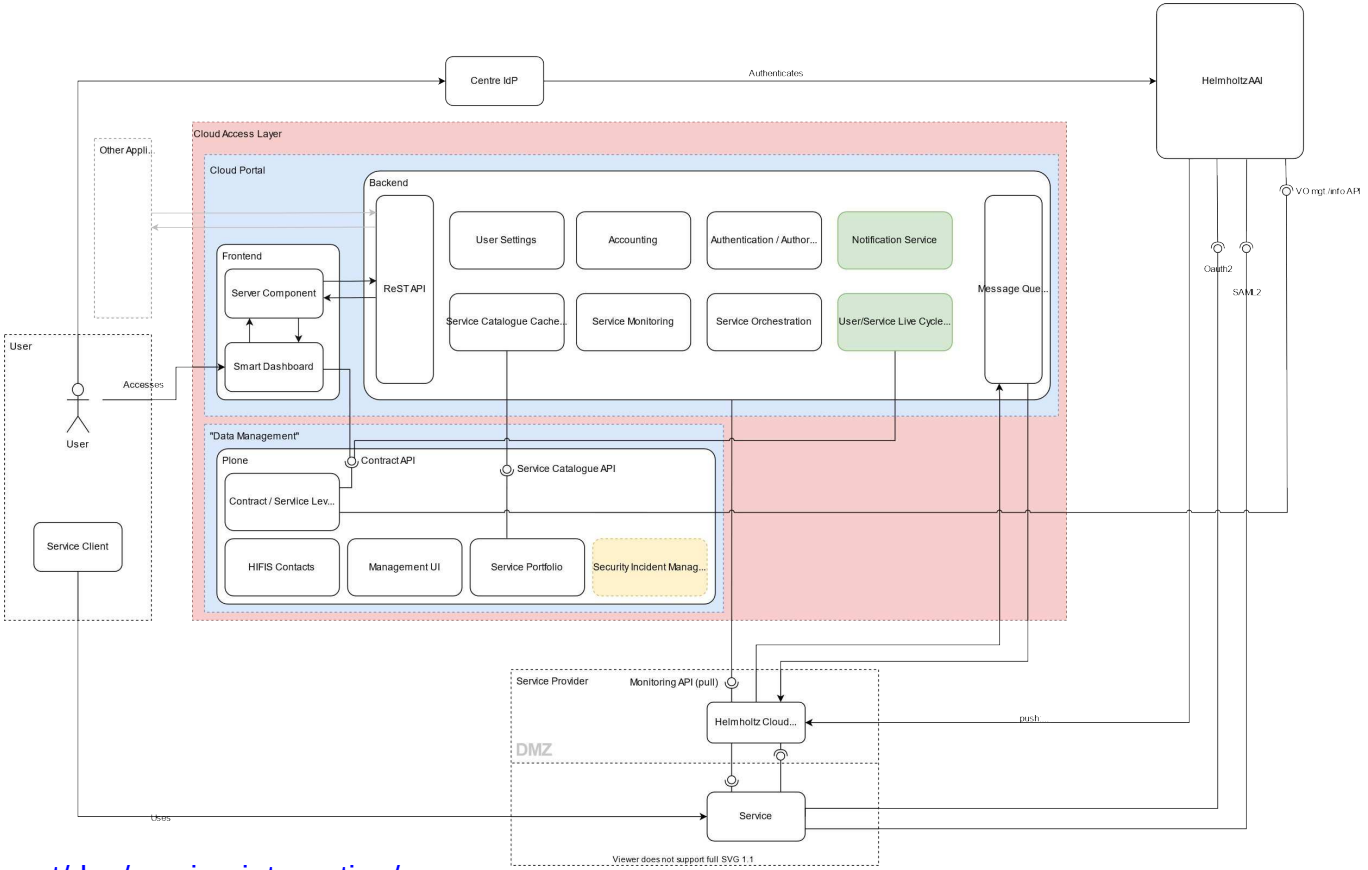
Ib. Architecture (under development)

- hifis.net/doc/service-integration/
- hifis.net/doc/service-integration/hca/
  - Modularity / Flexibility
  - Different levels of integration possible
  - Open



- VO Federation for File Sync&Share & beyond -- today 5:30 PM

I. Cloud: Architecture



- https://hifis.net/doc/service-integration/