Geodata analysis with decentralized cloud-integrated infrastructures: Lessons learned and solutions for public authorities

Florian Beyer, Patric Brandt, Heike Gerighausen & **Markus Möller**

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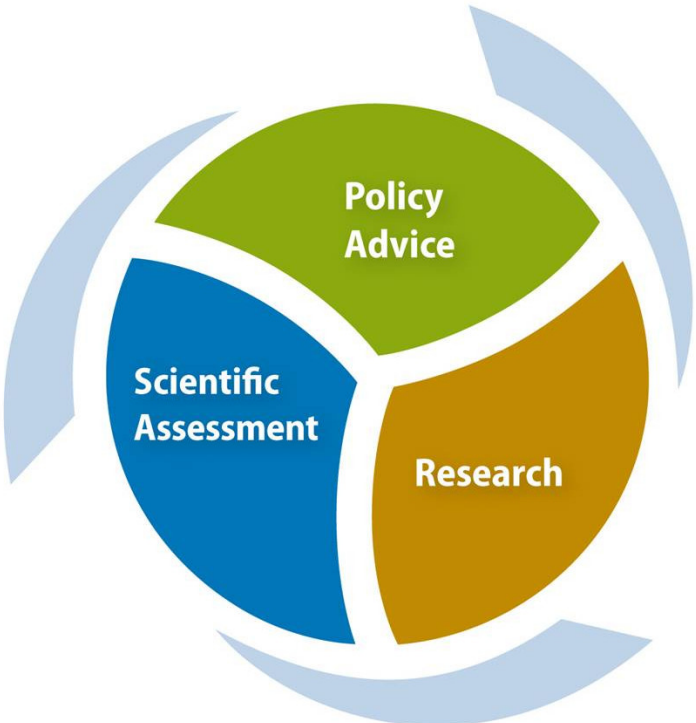
Julius Kühn Institute (JKI)



What is the JKI?

- ... is the Federal Research Centre for Cultivated Plants in Germany.
- ... was constituted on January 1st, 2008, as the research branch of the German Ministry of Food and Agriculture (BMEL).
- ... is both a research institute and a higher federal authority.

Who was Julius Kühn?

He lived from 1825 till 1910, established and developed the agrarian sciences as part of university education in Germany.

Julius Kühn Institute (JKI)

Reseach topics

- plant nutrition, agronomy and soil science
- plant genetics, breeding research
- plant protection and plant health

Organization

- 17 specialized institutes & several service units
- federal budget $\approx$ 90 Million € $\cdots$ third-party funds $\approx$ 20 Million €
- $\approx$ 750 permanent positions $\cdots$ $\approx$ 450 time contracts $\cdots$ $\approx$ 350 scientists

Big Data at a federal research institution

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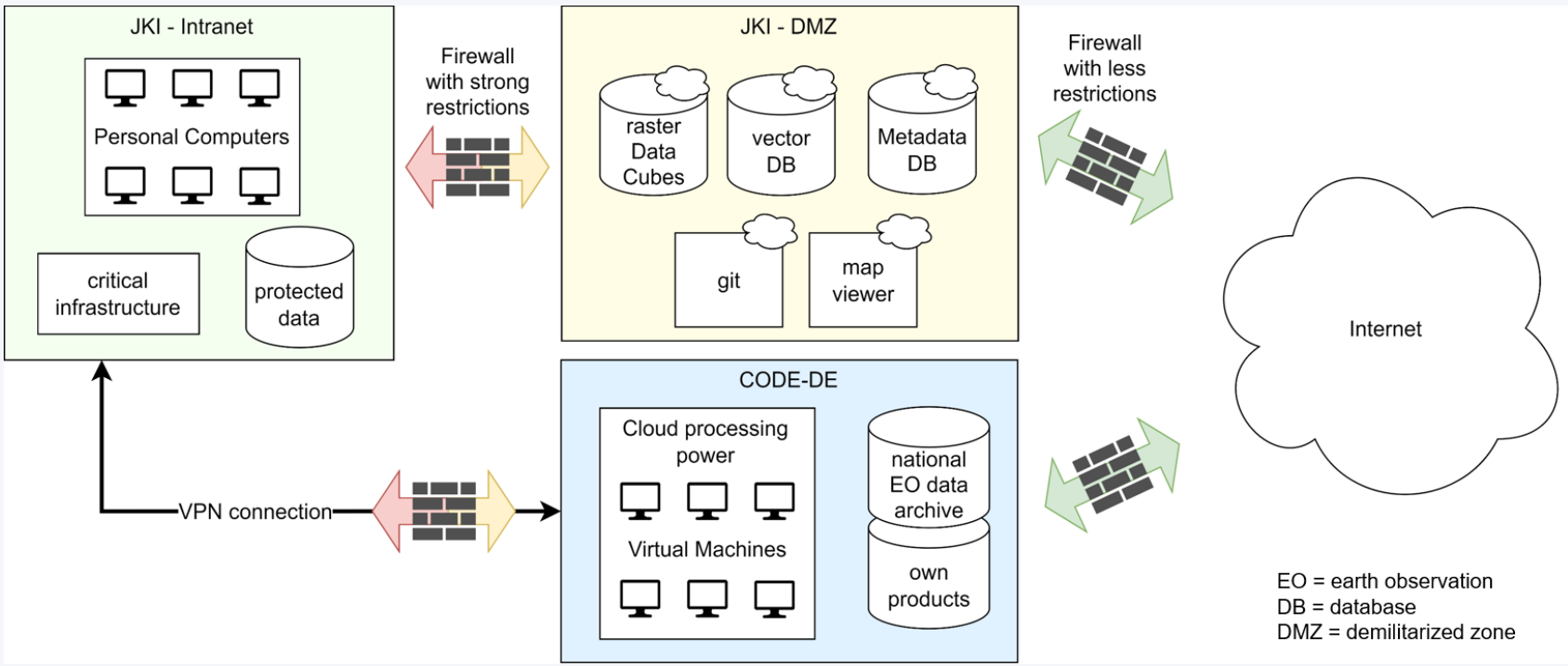
Federal Research Centre for Cultivated Plants

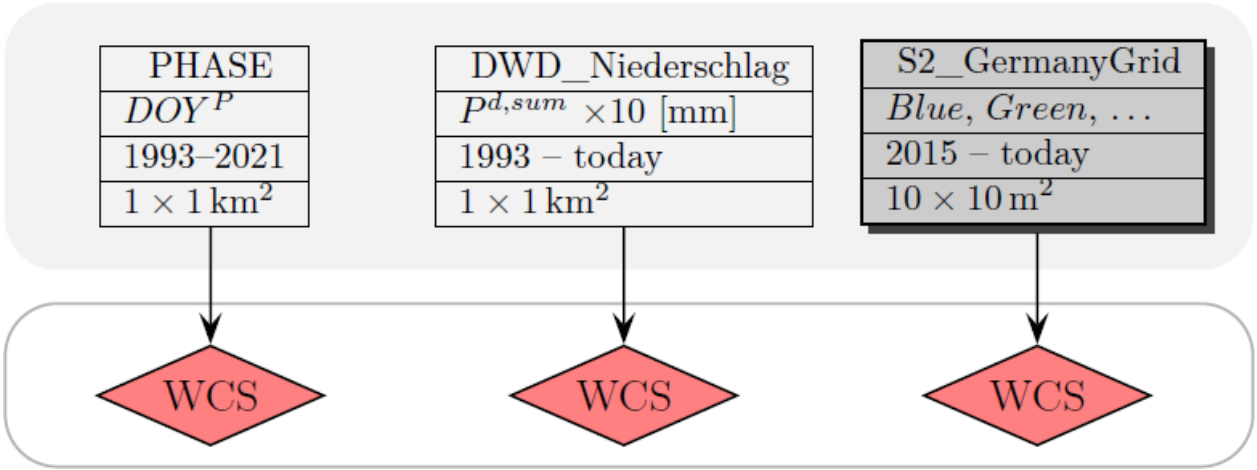
Spatial Data Infrastrcture at JKI (JKI SDI)



FAIRagro

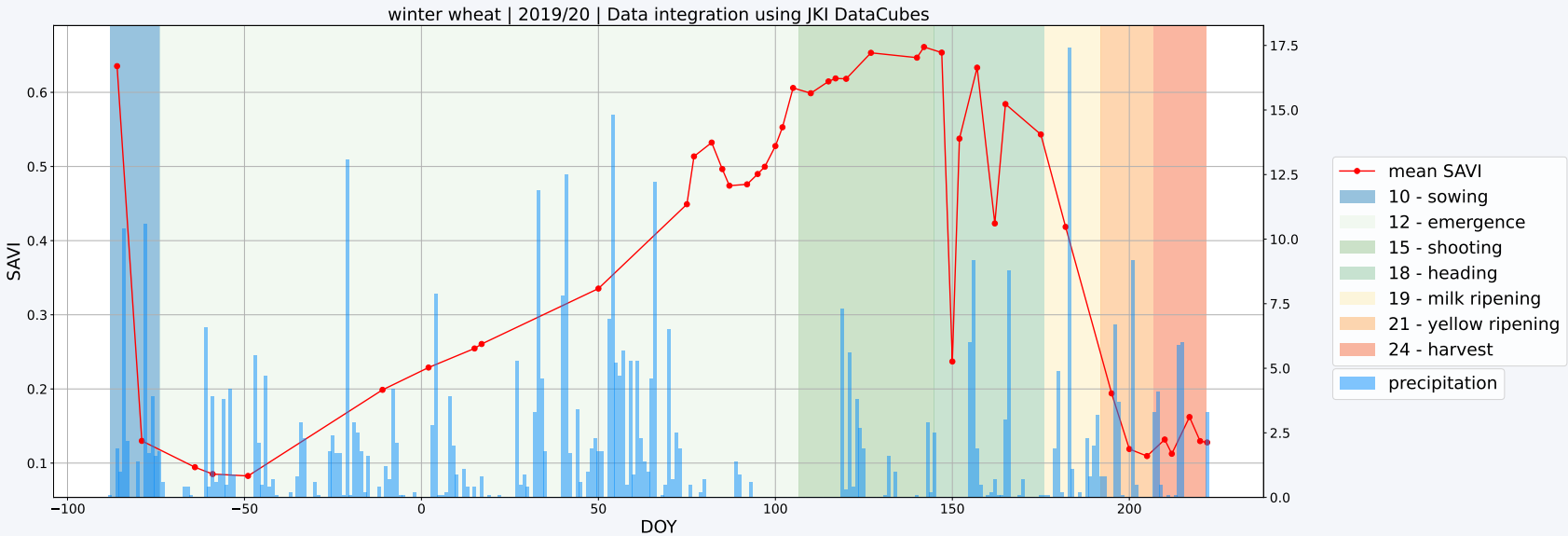
nfdi Nationale Forschungsdaten Infrastruktur

Big Data at a federal research institution



Beyer, F., 2023. JKI-GDM/DemoPhaseWCS: v1.0. Zenodo. 10.5281/ZENODO.7893966

Real-time WCS-based data integration



Big Data at a federal research institution

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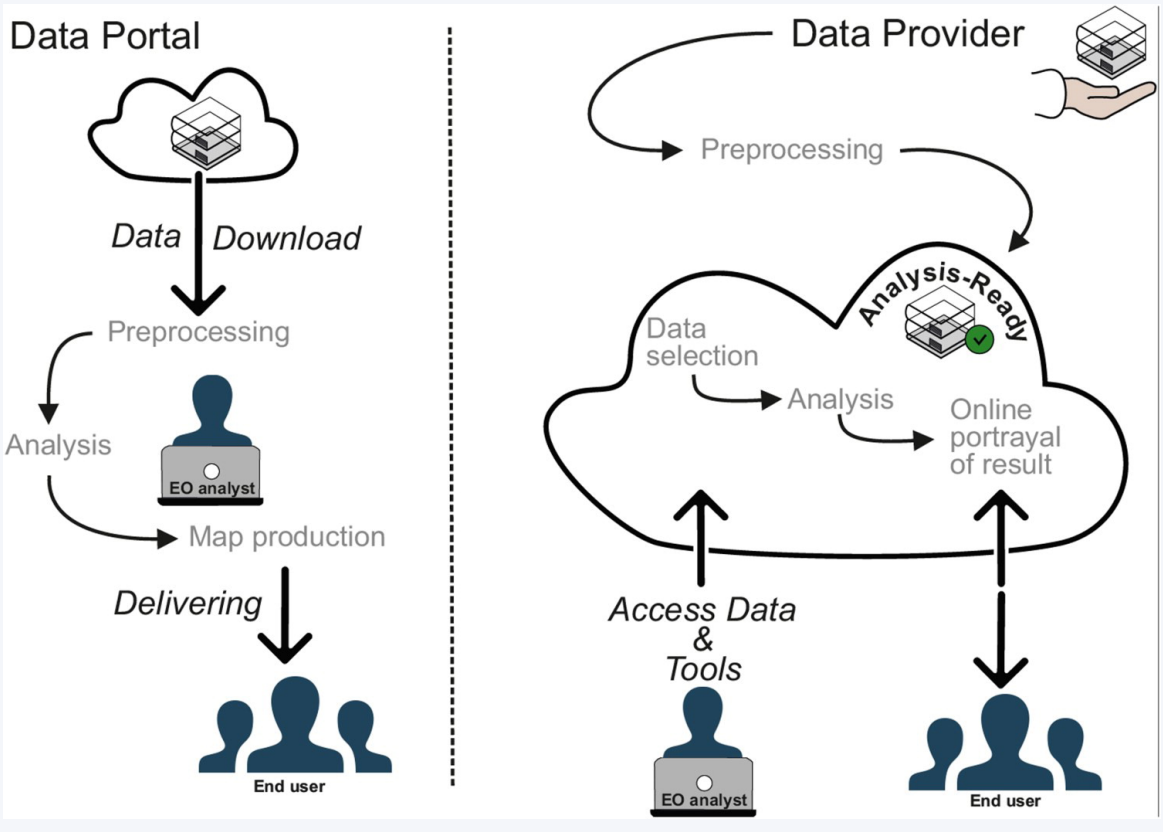
Paradigm shift



Sudmanns, M., Tiede, D., Lang, S., Bergstedt, H., Trost, G., Augustin, H., Baraldi, A., Blaschke, T., 2020. Big Earth data: disruptive changes in Earth observation data management and analysis? International Journal of Digital Earth 13, 832–850. https://doi.org/10.1080/17538947.2019.1585976

Big Data at a federal research institution

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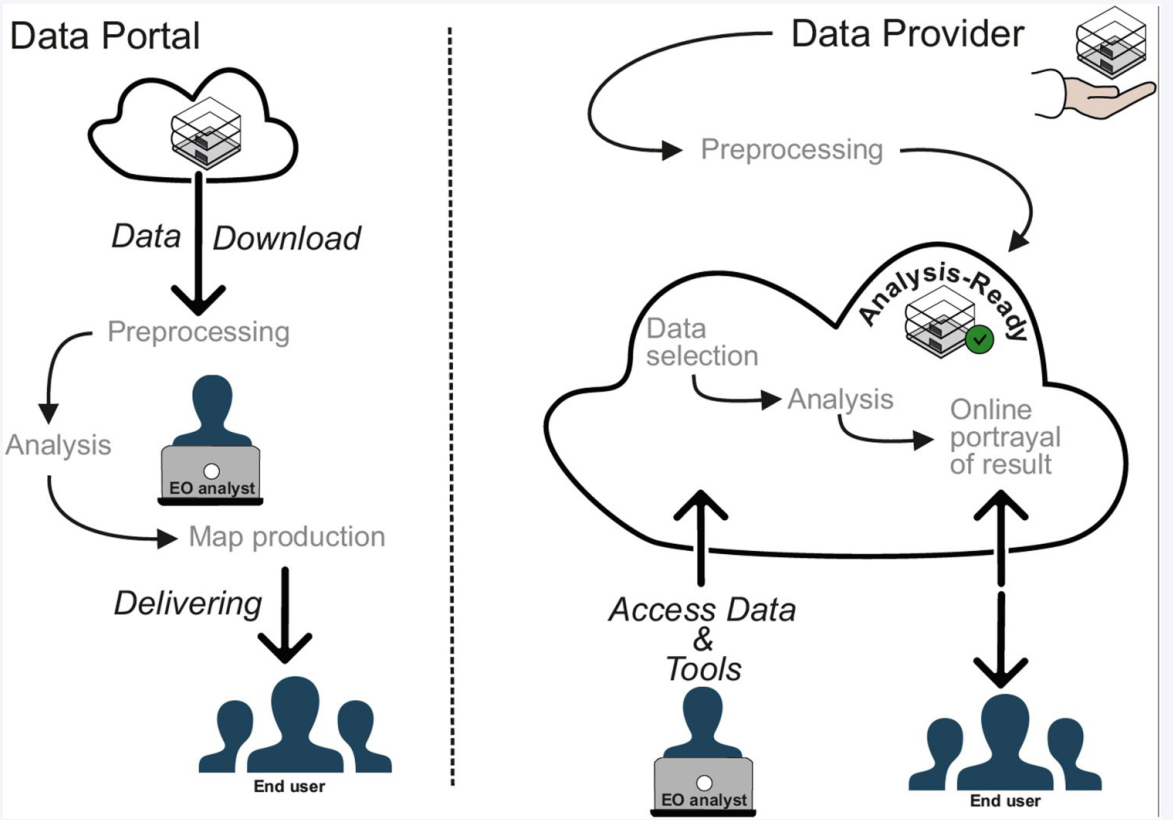
Paradigm shift: Obstacles



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Answers to seven questions not asked

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Obstacles: Communication

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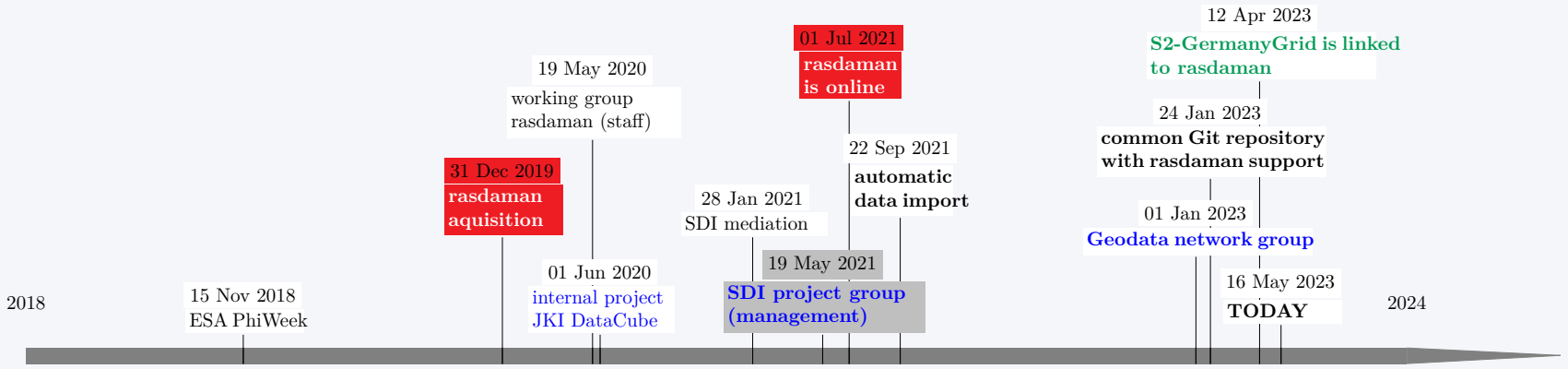
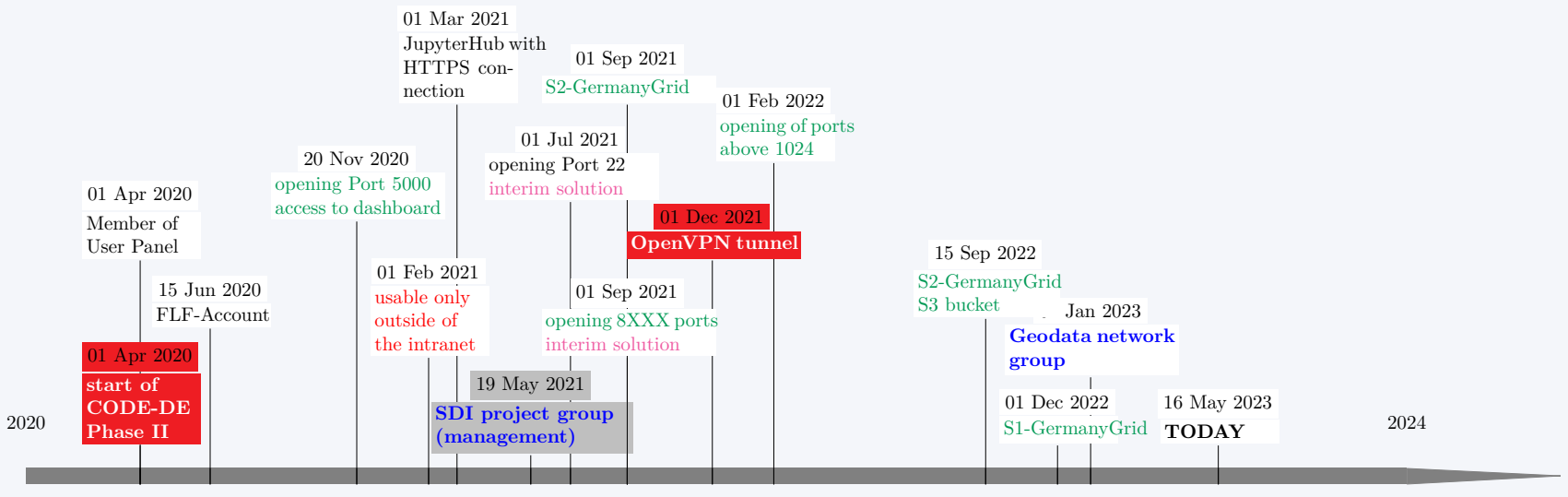
JKI Data Cube

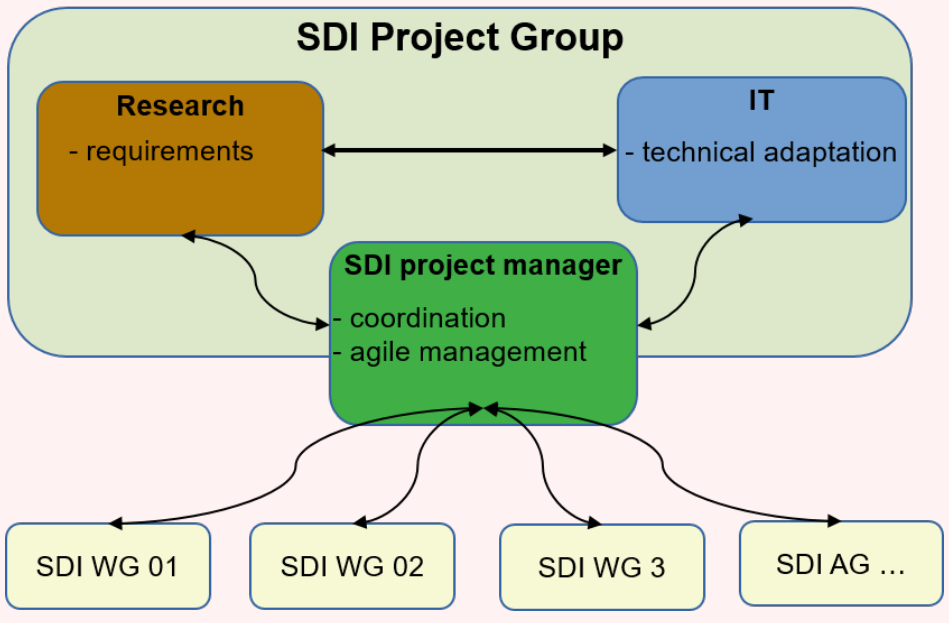


CODE-DE

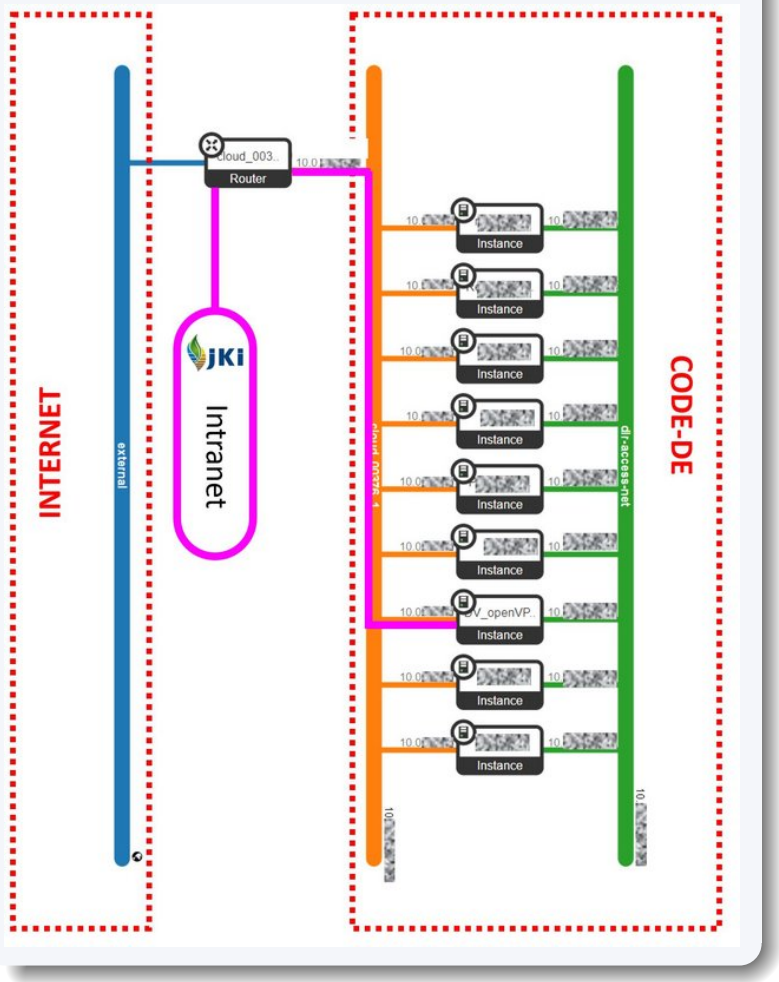


Obstacles: Communication

SDI project group



OpenVPN tunnel



solving higher-level structural, strategic, network, and security issues related to JKI SDI outside the IT ticket and hotline systems

Beyer, F.,2022. CODE-DE-Nutzung als deutsche Behörde: Technische Lösung zur Nutzung von virtuellen Maschinen. CODE-DE User Forum

Obstacles: Organisational structure

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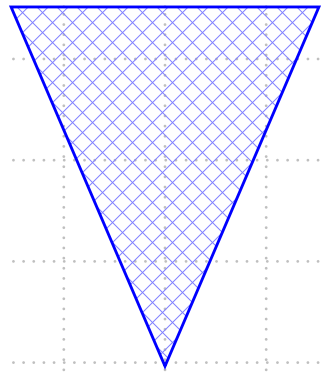
Digitization strategies at

- EU level
- national level (e.g., Germany)
- higher administrative level (e.g., BMEL)

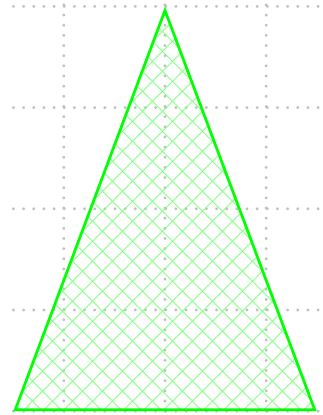


User

Free and high-performance access to Big Data and related technical facilities

IT security manager

Regulations on data security and protection of in-house critical infrastructure



Obstacles: Organisational structure

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Digitization strategies at . . .

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- higher administrative level (e.g., BMEL)

Implementation framework for public authorities!

Definition of concrete technical, financial, personnel and IT security requirements

User

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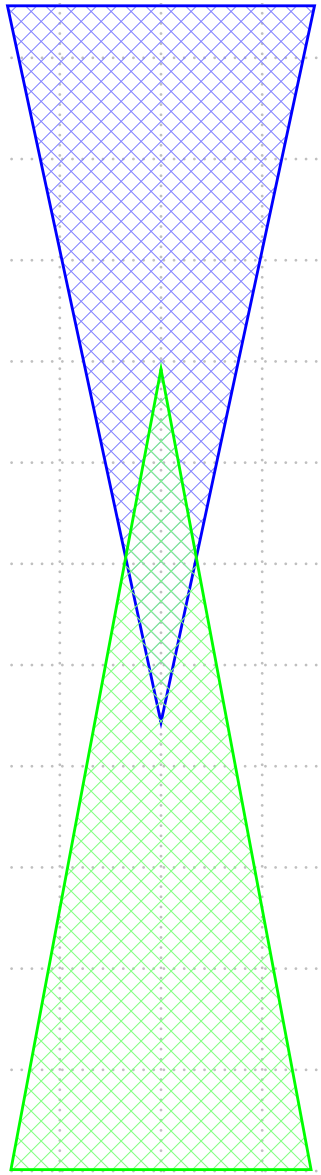

Lessons learned

- Cloud-integrated data infrastructures are key for big data storage and processing in agriculture.
- Restrictions on cyber security and data protection may delay or hinder the implementation of digitization in public authorities.
- Technical solutions exist to integrate innovative digital products.
- Organizational adapations and agile communication structures at all administrative levels support digitization.

Lessons learned

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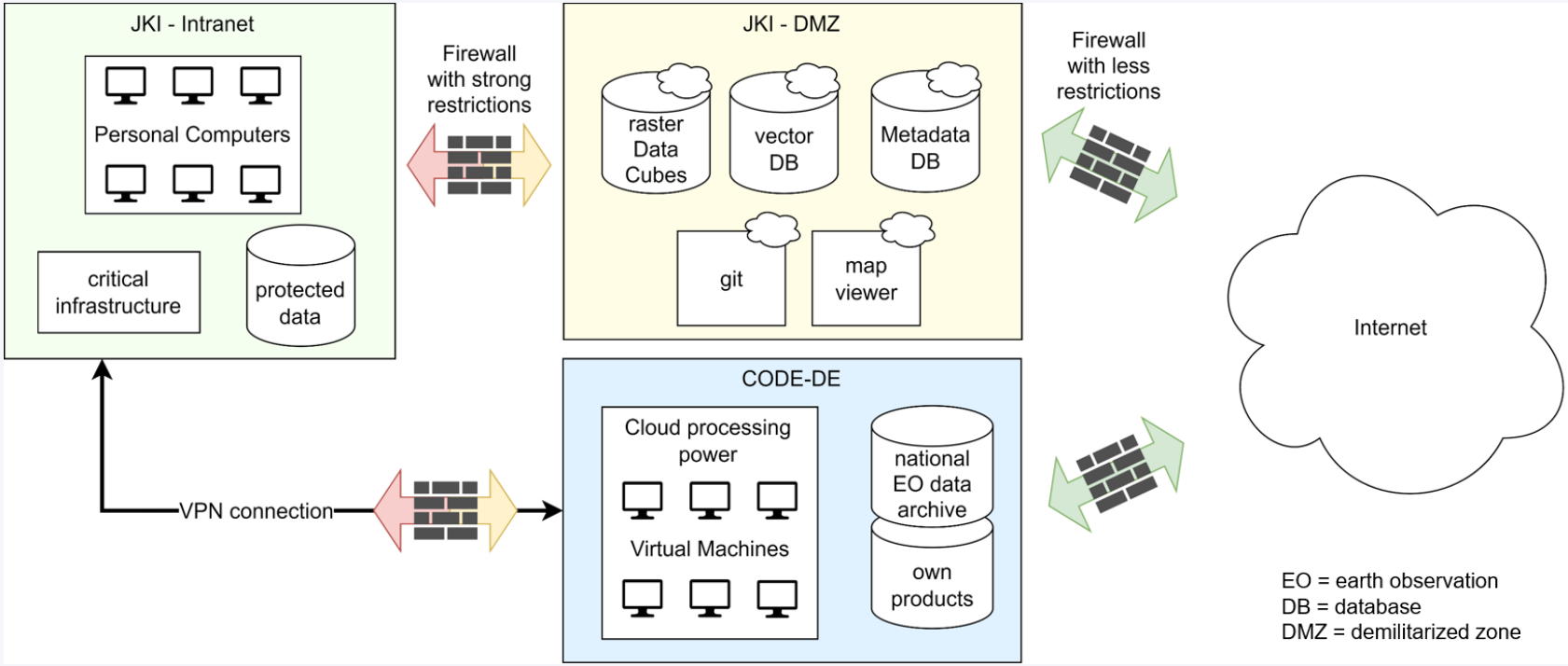
- Technical solutions exist to integrate innovative digital products.
- Organizational adapations and agile communication structures at all administrative levels support digitization.

Implementation framework for public authorities!

You are invited to participate in a white paper on pragmatic solutions for (German) authorities!

Beyer, F., Brandt, P., Schmidt, M., Stahl, U., Gerighausen, H., Möller, M., 2023. A paradigm shift towards decentralized cloud-integrated spatial data infrastructures: Lessons learned and solutions provided for public authorities. submitted

Thank you for your attention!



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