How co-designed interoperable open-source geospatial information tools support CCA and DRM

CRDM Session at GWF 2026, Amsterdam, 1st May 2026 - Dr. Benedikt Gräler

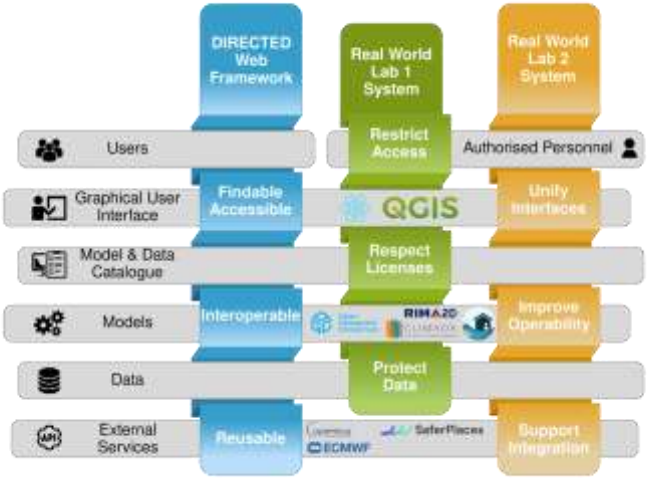
Strengthening Disaster Resilience: Integrated Geospatial Systems for Real-World Impact

Core Challenge:
Usage and integration of available data and models are often hampered by the lack of interoperability and technical skills of users. This creates a gap between massive data availability and coordinated, real-time, tailored information for actionable decision-making.

Our approach:
Co-designing and developing open-source geospatial information systems — proven in EU projects I-CISK and DIRECTED — that transform complex data and models into community resilience.

Figure: Illustration of our changing world by Gemini.

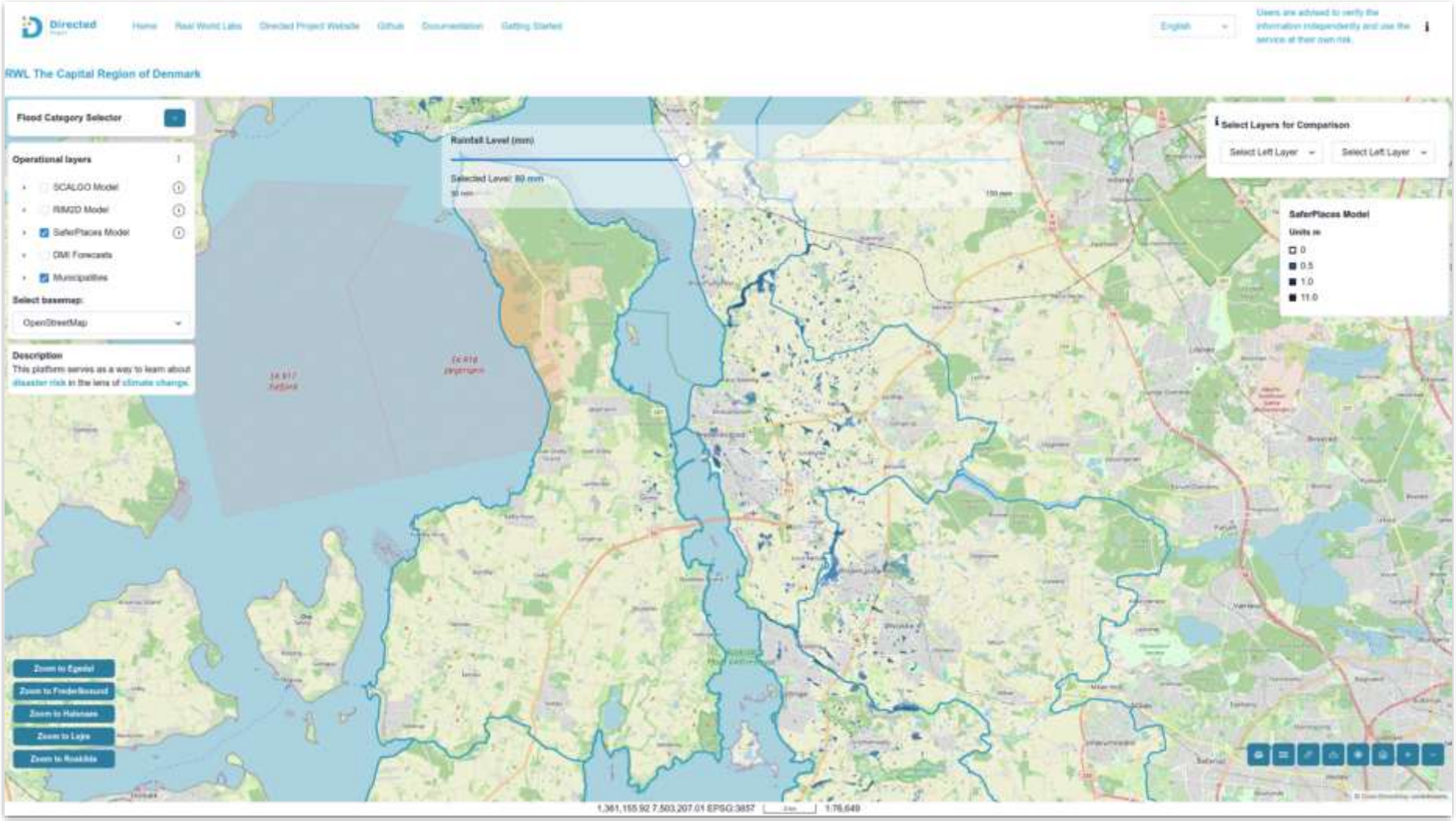
Building an Open-Source Data Fabric with User-Centric Design



The Bottleneck: Data and models cannot be effectively integrated without overcoming technical and inter-operability hurdles.

Our Method: We built a modular **open-source Data Fabric** that interoperably interweaves data and models.

- Co-developed with users and practitioners from 4 Real World Labs across Europe.
- Focused on identifying, harmonizing, and integrating relevant data sources into robust processing workflows (e.g., based on OGC API processes).
- A scalable infrastructure integrating real-time data from local to international meteorological, environmental and water agencies.
- Seamless data retrieval and visualization.


Directed
Home
Real World Labs
Directed Project Website
Github
Documentation
Getting Started
English
Users are advised to verify the information independently and use the service at their own risk.
RWL The Capital Region of Denmark
Flood Category Selector
Operational layers
SCALGO Model
RIMZD Model
SaferPlaces Model
DMI Forecasts
Municipalities
Select basemap:
OpenStreetMap
Description
This platform serves as a way to learn about disaster risk in the lens of climate change.
Rainfall Level (mm)
Selected Level: 80 mm
Select Layers for Comparison
Select Left Layer
Select Left Layer
SaferPlaces Model
Units m
0
0.5
1.0
11.0
Zoom to Egedal
Zoom to Frederikssund
Zoom to Halsnæs
Zoom to Lejre
Zoom to Roskilde
1,361,155.92 7,503,207.01 EPSG:3857
1:76,649

From Scientific Models to Intuitive, Real-Time Decision Support

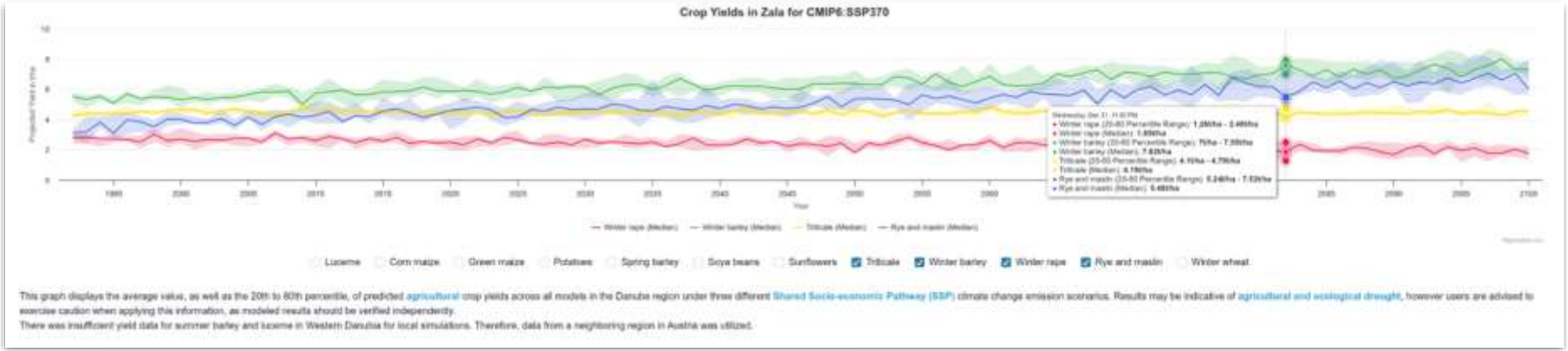
Turning Integrated geospatial systems into predictive, on-point DSS:

Leverage Geospatial Data Science & Spatial Statistics
Utilizing specialized geospatial data science and spatial statistics to analyze and interpret complex data.

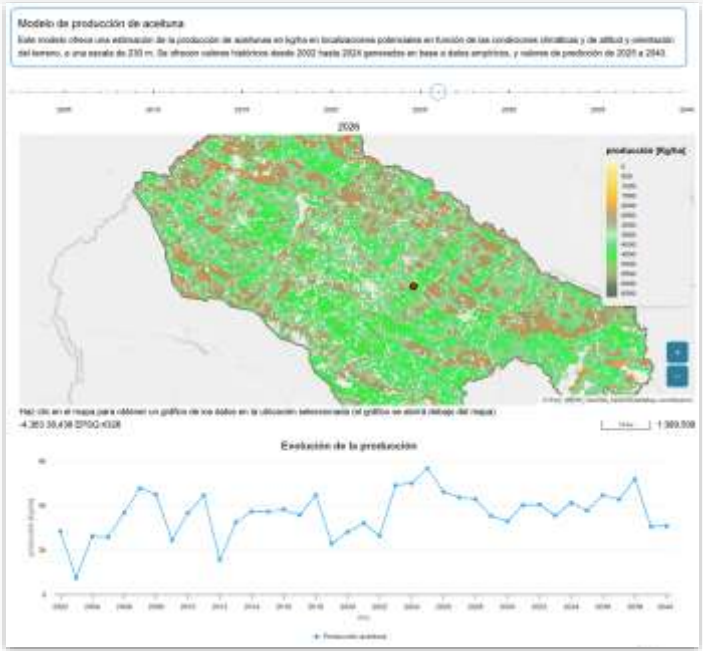
Enhance Predictive Power of Models
Improving the interoperability of climate and hazard models (e.g., ABSOLUT, RIM2D, saferplaces, CLIMADA) to explore various settings and scenarios.

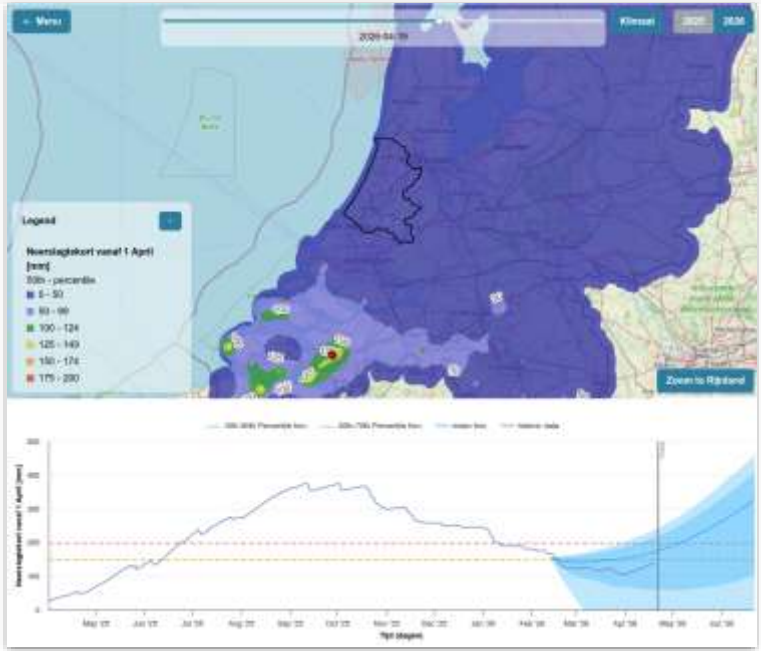
Make Information Intuitive & Interactive
Presenting Information derived from these models in an intuitive and interactive form, accessible and actionable to non-GIS experts.

Provide Near Real-Time Assessment
Offering near real-time assessments based on now-casted weather data, critically supporting DRM.



This graph displays the average value, as well as the 20th to 80th percentile, of predicted agricultural crop yields across all models in the Danuba region under three different Shared Socio-economic Pathway (SSP) climate change emission scenarios. Results may be indicative of agricultural and ecological drought, however users are advised to exercise caution when applying this information, as modeled results should be verified independently.
There was insufficient yield data for summer barley and lucerne in Western Danuba for local simulations. Therefore, data from a neighboring region in Austria was utilized.





Building Adaptive, Community-Centric Information Systems for CCA and DRM

I-CISK and DIRECTED showcase how prioritizing user-defined interoperability use cases and providing direct technical solutions yields tangible benefits for CCA and DRM. These projects provide the necessary **scalable**, **resilient**, and **adaptive geospatial infrastructure**. Open for widespread reuse and adoption.

Next Steps for widespread adoption of these advanced systems:

- **Capacity Building**: Raise awareness of practitioners to effectively utilize tailored information systems seamlessly integrating complex systems.
- **Standardization**: Reinforce the need for interoperable data and model ecosystems across scientific, policy, and response communities.

Our results prove that **open-source geospatial innovation** and **advanced spatial analytics** support a more **resilient tomorrow**.