EU Green Week Event
August 27th, 2024
Henrik Dissing

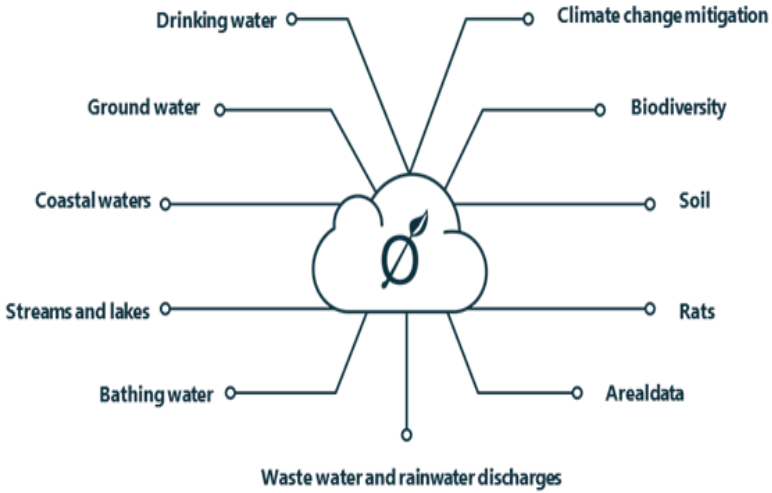
Towards a European Water Data Ecosystem

Presentation of Water4All White Paper on Best Practices in Water Data Management

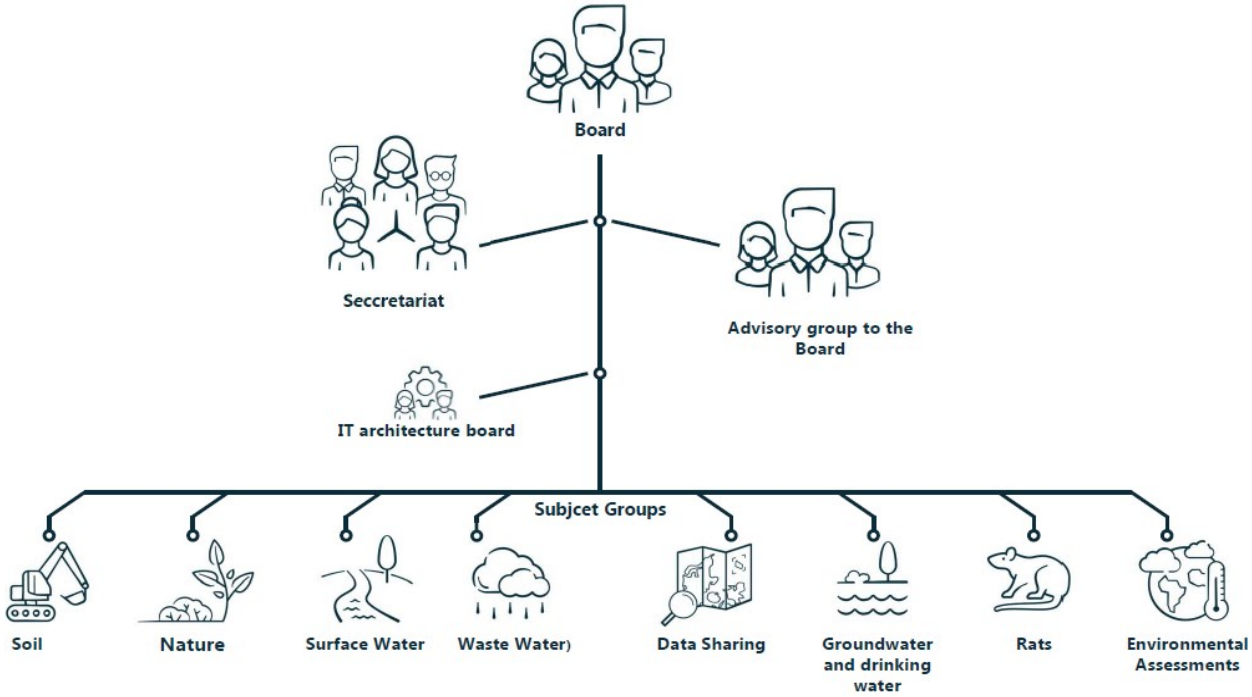
Danmarks Miljøportal
Data om miljøet i Danmark

Danish Environmental Portal

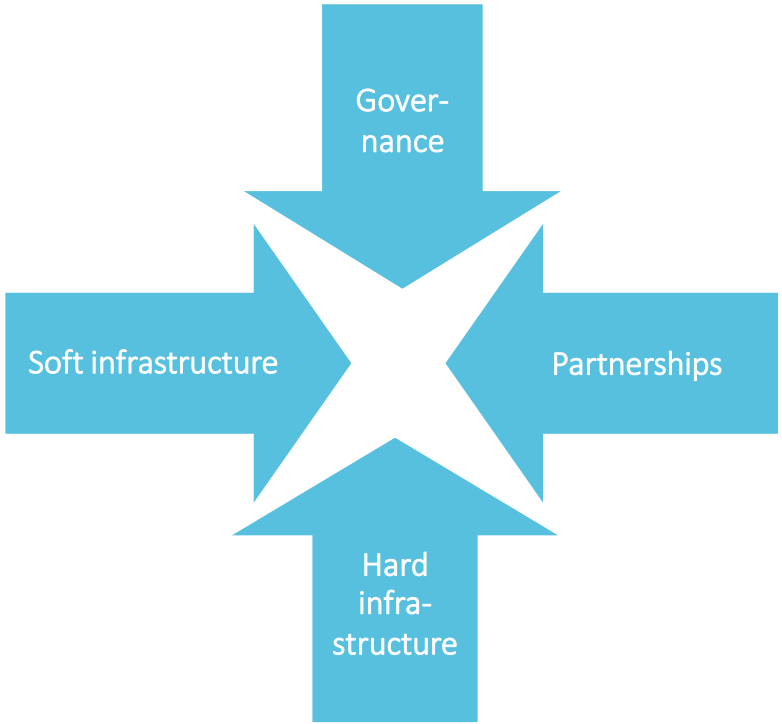
- Digital Hub/Intermediary for **Water and Environment Data in Denmark**
- **Data-in from 150 organizations, Data-out to 2.000 organizations**
- Data are used by public entities for planning tasks; by companies to develop water management services to public and private customers; by start-ups to develop new tools; by researchers to develop insights
- www.miljoeportal.dk



Governance Structure

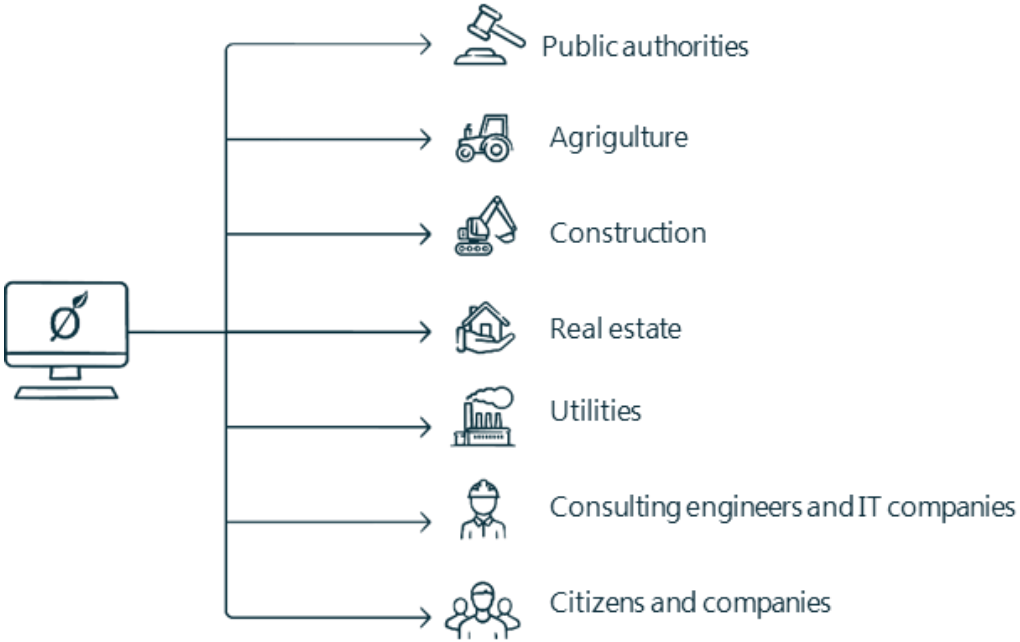


We are working from a data space perspective

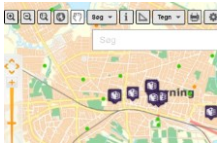


- **Soft infrastructure**
  - Data sharing agreements
  - Data standards
  - License rigths
- **Hard infrastructure**
  - Normal IT
- **Partnerships**
  - Whom should you work with?
  - Who are most important?
- **Governance**
  - How are decisions made?
  - How are disagreements handled?

Data is being used in ways we never imagined



SEPTIMA



EnviDan

Miljøstyrelsen vinder flot pris med § 3-Natur App'en

22-05-2018

Landmanden og naturinteresserede har i et stykke tid haft mulighed for med mobil og app i hånden at undersøge, hvornår de befinder sig på et areal, der er regis..

e·nettet

En simpel verden

DINGEO I HELE DANMARK

EJENDOMS DATA RAPPORT

> Avanceret søgning

De offentlige ejendomsvurderinger

Ejendomsvurdering I Danmark betaler boligejere to typer af skat af fast ejendom – ejendomsværdiskat til staten og ejendomsskat (grundskyld) til kommunen. Skatterne beregnes med udgangspunkt i de offentlige ejendomsvurderinger, som foretages af SKAT.

RAMBØLL DANMARK

COWI

BYG & MILJØ

Our vision

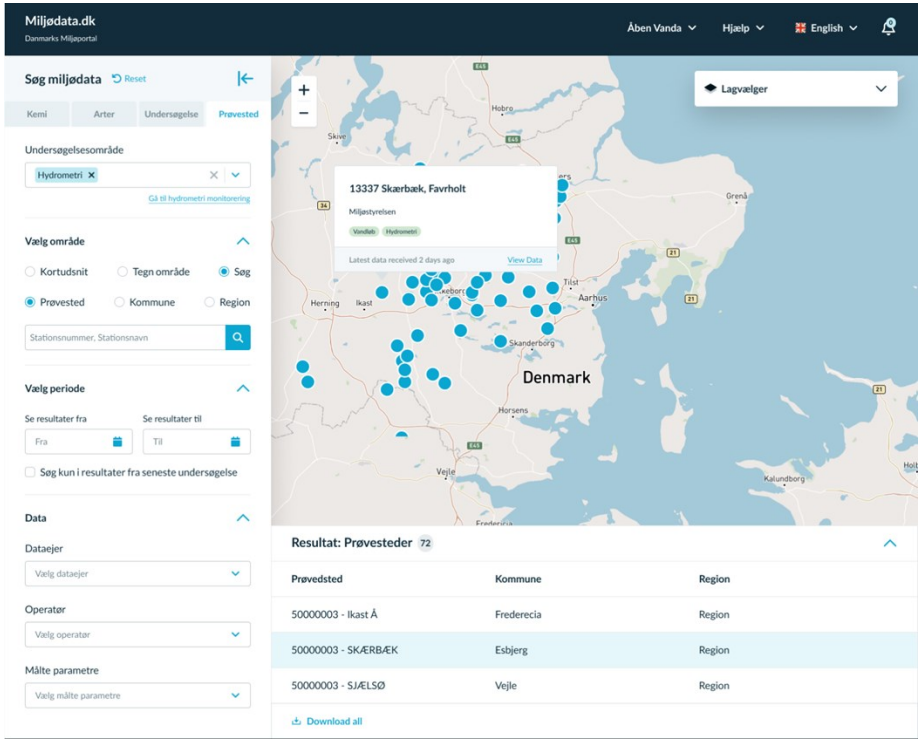
Public authorities and private actors should
SHARE, USE and REUSE obersevable and measurable data in a
Standardized, harmonized and true and fair way

Unleashing potentials – case: hydrometri

Hydrometry data harmonized for multi purpose use eg flood warnings

Followed up by harmonizing groundwater data and marine data for the same system

Next: Overflow data



Evolution of environmental data in Denmark

Data collected for research purposes
Expert advice based on data they have in their systems

Data collected for monitoring/reporting purposes
Expert advice based on data in national systems

Data collected to provide decision support
Expert knowledge codified so users can make decisions themselves

Reducing CO2, Nitrogen and improving ground water and biodiversity – by major landuse reform

- Prolem How do we spend 40 billion to get the most environmental benefits when models are silobased, e.g. biodiversity and groundwater
- Need to provide decision makers at the local and national level with a userfriendly decision support tool
- We envision to use the same system infrastructure to determine cumulative impact in respect to the marine environment in the North Sea and Baltic Sea – focus on cumulative effects when establishing wind farms

Aftale om et Grønt Danmark

Aftale mellem regeringen,
Landbrug & Fødevarer,
Danmarks Naturfredningsforening,
Fødevareforbundet NNF,
Dansk Metal,
Dansk Industri og
Kommunernes Landsforening

24. juni 2024

Inga Marie Galløe and 83 others 2 comments • 2 reposts

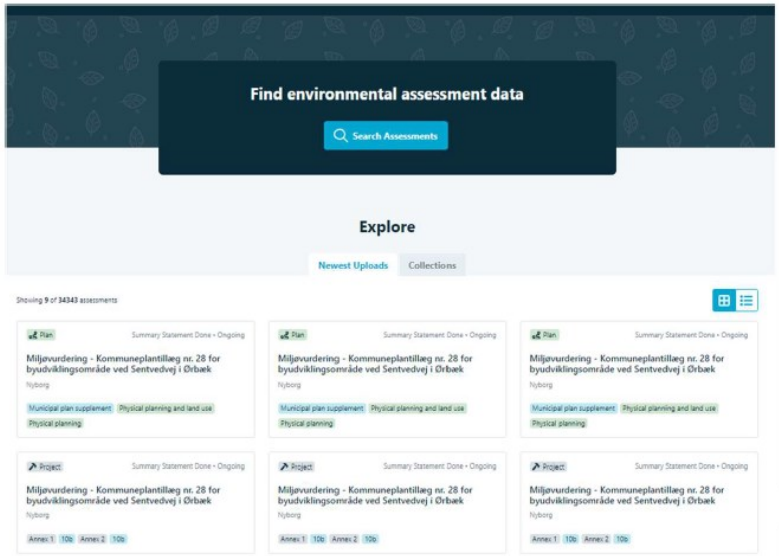
32

EA Hub – Search functions

- Search functions include:

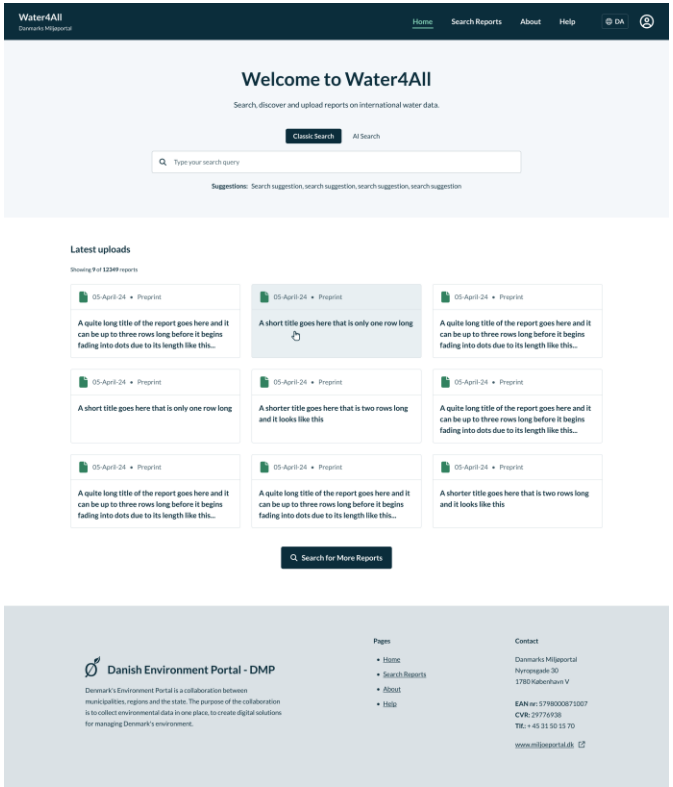
1. Geographic search for a specific location
2. Filter search based on, e.g., type of EA, developer, title, etc.
3. AI assisted search into the specific PDF files

- Functionalities include:
  - Combining GIS (geographic) data with normal data
  - Indexing all pdf files
  - AI search based on Open AI in Azure



Water Data Sharing Facility

- The W4A platform allows for two types of search
  - classic search, keywords and tags
  - AI assisted search – semantics and more context
- The home screen shows the latest Water reports uploaded
- Water reports can be uploaded after login
- Reports can be searched directly from the *home* screen or by pressing *search reports*, which redirects to a map solution



New developments

From add-on to integrated part

- Environment integrated part of economic decision making

ESG CSRD DATA – From local to global

- Shift from government to private

New technologies

- AI, satalite data, IoT, Cloud
- Some code and solutions can be apllied globally

From sector approach to holistic approach

- Planetary boundaries

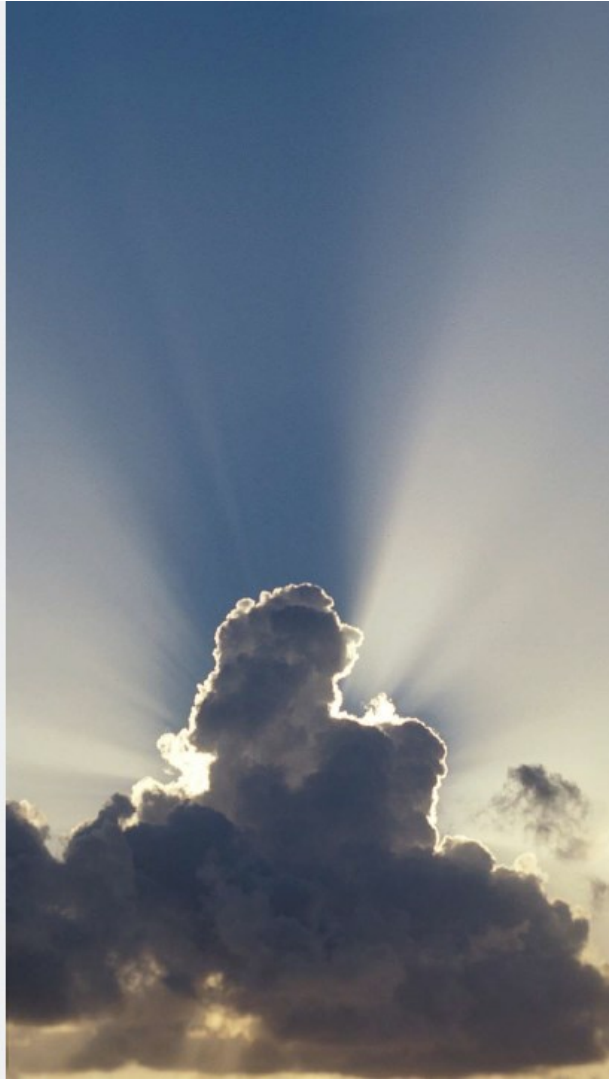
Why is data sharing difficult - complexity

- Data models are like IT architecture – top management leave it to the experts
- No intregrated approach to data modelling
- Resistance to share data which are not 100% correct
- Not enough time is spend on understanding the limitations of data

Recommendatations

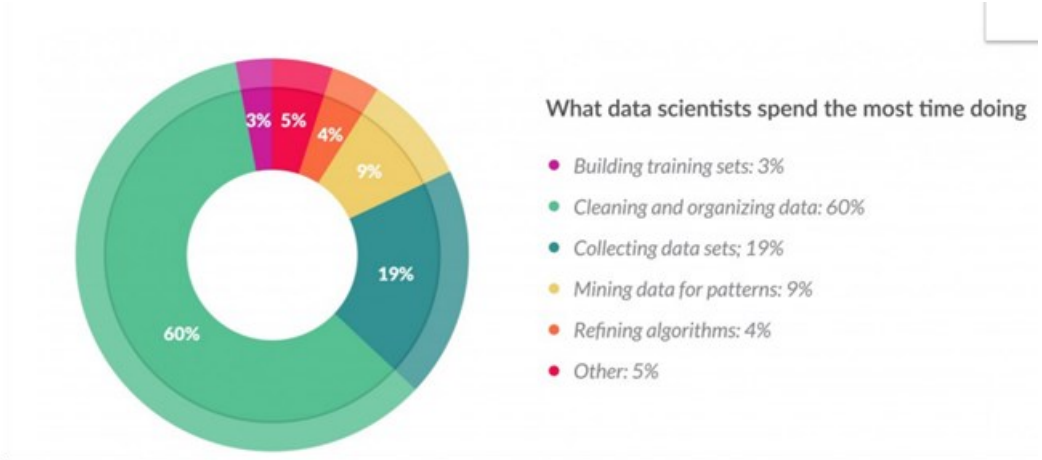
- Establish EU codelists for observable properties – e.g. chemical substances and taxonomi – to enable that rules and regulations can be digitalized and make data models and data sharing easier.

- Example list of chemical substances
https://parameterlisten.miljoeportal.dk/parameters



Reduce unproductive activities

Data Scientists only spend 20% of their time creating value (Forrester, 2019)



Water4All White Paper on Best Practices in Water Data Management

- Why a White Paper?
  - We need to understand and describe data in the same way
  - Leadership levels should see Data Management as Strategically Important
  - Current practices implies too much time spend for unproductive actions and potential for value creation hampered

- Structure of White Paper
  - Potential Value Creation
  - Barriers and Problems
  - Envisioning a European Water Data Ecosystem
  - Recommendations

Potentials for Value Creation #1

- **Reducing costs and time** spend by Environmental Authorities for a range of tasks including EIAs, permits and enforcement processes, management and analysis related to water pollution problems
- Allowing for **better integration** of water flows and levels of rivers, cloudbursts, stormwater, overflows and groundwater close to the surface, altogether improving climate change adaptation
- Improving researchers and innovative companies **finding and accessing data**, not least results of monitoring programs, leading to strengthened relevance of new solutions and knowledge

Potentials for Value Creation #2

- **Reducing operational costs** for operating data management systems and ensuring harmonizing of data from different sources, leading to increased interoperability and reusability
- **Smoother transfer of data** within national levels, as well as at international scale, including reporting to EEA and other EU structures
- Development of **better digital decision support** tools based on harmonized data, including increased frequency of planning cycle, e.g. nutrient management and reduction of euthrophication
- Overall, implementation of **better communication** lines between organizational leadership and IT developers, allowing for new IT solutions to have a stronger emphasis on value creation.

Barriers and Problems #1

- **Decision makers don’t pay attention to data.** The return of investments of investing in data are not known to decision makers as they often perceive data collection and data sharing as a cost not as a strategic business assets.
- **Lack of willingness to share data.** Many organizations and departments in organizations are hesitant to share data as they perceive that other organizations should just look at their website, not realizing that the value of the use of data is far bigger when data is combined.
- **Fragmented Data Systems:** Member states often aintain separate data systems for water monitoring, management, and reporting. Lack of integration and interoperability between these systems makes it challenging to share data seamlessly across bers.
- **Diverse Data Standards:** Different member states may use varying data standards, formats, and protocols for collecting, storing, and sharing water-related data. Incompatibility between these standards complicates efforts to harmonize data and facilitate cross-border sharing.
- **Technical Challenges:** Technical issues, such as outdated infrastructure, limited bandwidth, and incompatible software systems, can hinder the exchange of large volumes of data across borders. Ensuring compatibility and interoperability of data systems is essential for overcoming these challenges.
- **Limited access:** No access for researchers, innovators and service providers to the large data volumes of end-users (utilities, river commissions, national monitoring programs). Data Owners and Data End-users don't see themselves as part of a Data Ecosystem

Barriers and Problems #2

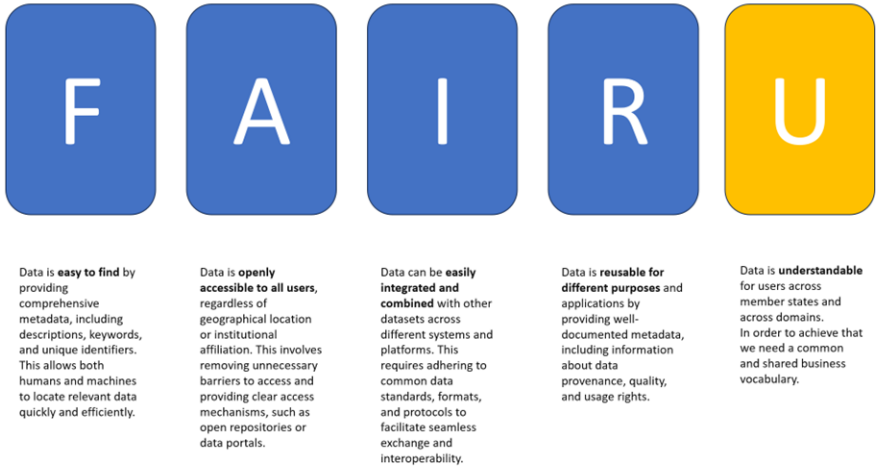
- **Legal and Regulatory Frameworks:** Legal and regulatory barriers, such as data protection laws, privacy regulations, and intellectual property rights, can restrict the sharing of sensitive or proprietary data across borders. Harmonizing these frameworks while ensuring data security and privacy is a complex endeavor.
- **Resource Constraints:** Some member states may lack the financial, technical, or human resources needed to develop and maintain robust data sharing mechanisms. Limited investment in data infrastructure, capacity building, and training can impede efforts to improve data sharing across borders.
- **What's in it for me?**: Data sharing and providing data in a standardized format will require resources and economy. Resources that are used for others to understand the data. The political pressure and commitment are crucial to make it happen.
- **Cultural and Linguistic Differences:** Cultural and linguistic diversity within the EU can pose challenges to effective communication and collaboration among stakeholders. Language barriers may hinder the sharing of data, information, and knowledge, particularly among regions with different linguistic backgrounds.
- **Political and Institutional Factors:** Political differences and institutional barriers, such as bureaucratic processes, competing priorities, and jurisdictional disputes, can hamper efforts to establish common data sharing frameworks and protocols. Lack of political will and leadership may also hinder progress in this area.
- **Lack of Trust and Transparency**: Concerns about data accuracy, reliability, and misuse may undermine trust among stakeholders and discourage data sharing. Building trust through transparent processes, data validation mechanisms, and accountability measures is crucial for promoting collaboration and cooperation in data sharing initiatives.

The IT-architecture must support:

- Needs for **standardization** and **classification** of data
- Needs for **collection** and **recording** of observable and measurable data in IT solutions
- Needs for a **shared documentation** framework to collect and record data **consistently** and in **high quality**
- Needs to **compile** and **compare** data to gain new insights
- Needs to **transform** data from multiple sources into **a common format and semantics**
- Needs to **monitor and track** the development of specific conditions over time
- Needs for a **well-documented** and **informed** decision-making basis
- Needs to **share** and **understand** data between two or more parties, including **exchanging data** across authorities, organizations, and IT solutions

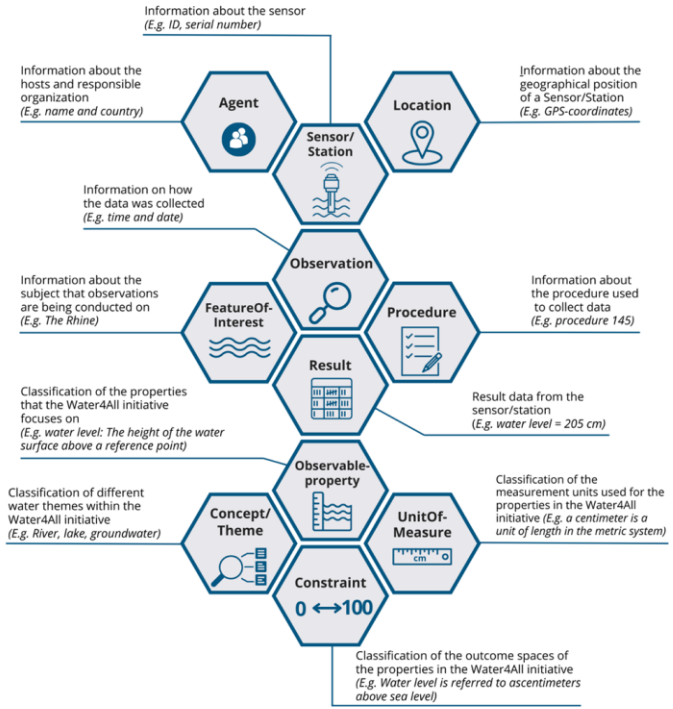
Ensure Leadership Focus on Data Management

- Create attention about the value of appropriate data management and digitalization
- Create more with more: Share data for more purposes
- Adhere to FAIR principles: Make data Findable, Accessible, Interoperable and Reusable
- Make relevant data available for companies (service providers), start ups (innovation), researchers (new insights)

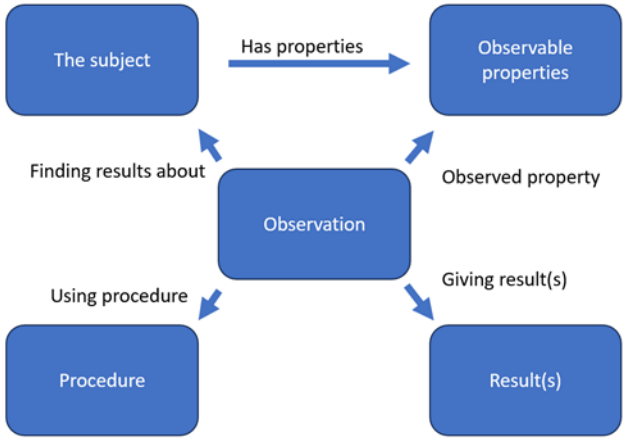


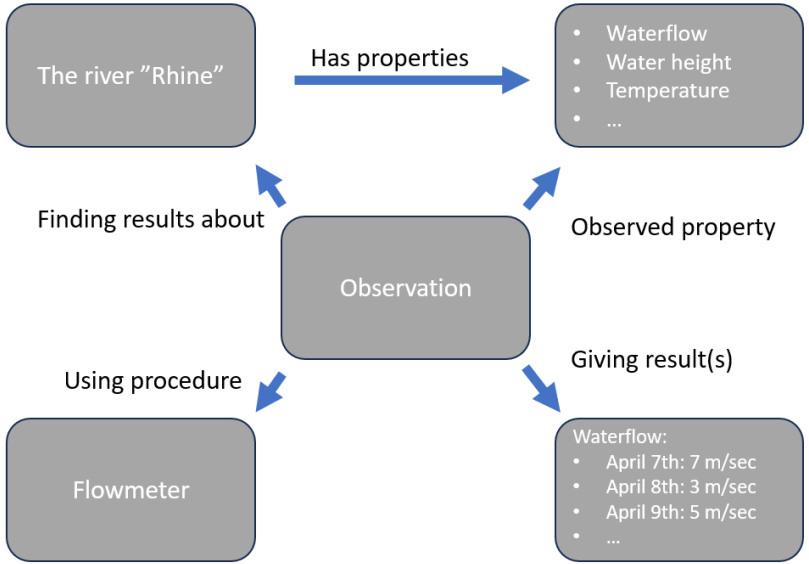
White Paper “Best Practices in Water Data Management”

- Shared approach to understand and describe data, classification lists, documentation, use of metrics
- Base your Data Models on the Building Blocks of Observation and Measurements Concept



Using Observations and Measurements principles





How data from different domains is collected in a harmonized way

Theme/subject	Overvable property				Result		Metadata about observation		
River	**Property**	**Unit Of Measurement**	**Constraint**	**Procedure**	**Date 09.04.23**	**Date 27.07.23**	**Sensor/station**	**Agent**	**Location**
	Water level	Meter above sea level	0<	Hydrological Monitoring Protocols	8.5	6.3	Data logger 12	Danmarks miljøportal	55.7604° N 12.4617° E
	Water flow	Liters per second (L/s)	0-10	Hydrological Monitoring Protocols	575	324	Flow meter 1	Danmarks miljøportal	55.7604° N 12.4617° E
	Temperature	Degree Celsius	-5 - 50	Field Measurement Techniques	7	18	Temperature logger	Danmarks miljøportal	55.7604° N 12.4617° E
Lake	**Property**	**Unit Of Measurement**	**Constraint**	**Procedure**	**Date 09.04.23**	**Date 27.07.23**	**Sensor/station**	**Agent**	**Location**
	Water level	Meter above sea level	0<	Monitoring and Assessment of Water Resources	22	17	Station 46	Ministero della Transizione Ecologica	45.6045° N 10.5199° E
	Oxygen level	Milligram/liter	0-15	Monitoring and Assessment of Water Resources	358	412	Sensor 23	Ministero della Transizione Ecologica	45.6045° N 10.5199° E
	Temperature	Degree Celsius	-5 - 50	Field Measurement Techniques	10	22	Sensor 23	Ministero della Transizione Ecologica	45.6045° N 10.5199° E
Groundwater	**Property**	**Unit Of Measurement**	**Constraint**	**Procedure**	**Date 09.04.23**	**Date 27.07.23**	**Sensor/station**	**Agent**	**Location**
	Water level	Meter above reference point	0<	Groundwater Monitoring Procedures	7.5	7.1	Groundwater level sensor	Bundesministerium für Umwelt	51.1657° N 10.4515° E
	Temperature	Degree Celsius	-5 - 50	Groundwater Monitoring Procedures	2	5	Sensor 3	Bundesministerium für Umwelt	51.1657° N 10.4515° E
	Salinity	Parts per thousand	0 - 30	Groundwater Monitoring Procedures	2	3	Sensor 4	Bundesministerium für Umwelt	51.1657° N 10.4515° E

Recommendations #1

- Demonstrate business value of sharing data.
- Identify incentives for sharing data between researchers.
- Identify barriers to sharing data - organizations.
- Identify barriers to sharing data between different sub-domains in the water sector.
- Agree on a process to advance a concept of Observations and Measurements principles
- Common data model
- Observable property catalogue
- Common classifications/vocabularies

Recommendations #2

- Governance process
- Improve framework for conditions by analysing cases, which have led to significant value creation
- Build on joint, cross-cutting strategies
- Emphasize Technical Coherence
- Regulate approaches to managing chemical parameters
- Align use of metadata
- Develop, implement and enforce a unanimous approach to site descriptions
- Analyze interoperability problems related to biological data

Henrik Dissing

Danish Environmental Portal

hendi@miljoeportal.dk

+45 41782030