



NSVA

*NSVA's Data Management Journey:
A people centric management system*

*SWAN Digital Water Pavilion
Aquatech Amsterdam
2023-11-07*

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Key Challenges

Cultivate and deliver sustainable water services on a business-oriented basis, generating societal value for stakeholders and customer benefits for their clients

Ageing infrastructure

Increased costs

Higher compliance demands

A vast increase in data (not personnel)

Climate changes

Competence supply

Key Possibilities

Cultivate and deliver sustainable water services on a business-oriented basis, generating societal value for stakeholders and customer benefits for their clients

Information
exchange/
collaboration

Technically proficient
suppliers

Better insight from
existing data

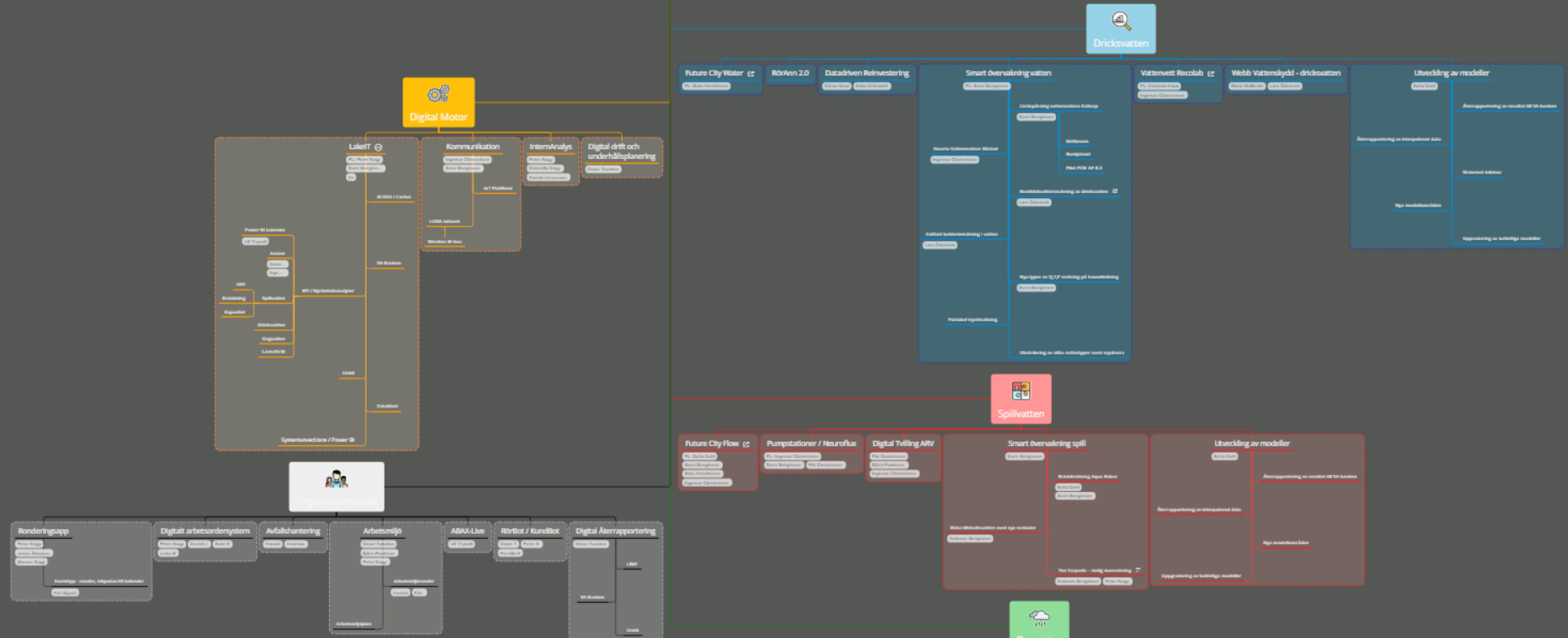
AI and
large language models

Large scale IoT
monitoring

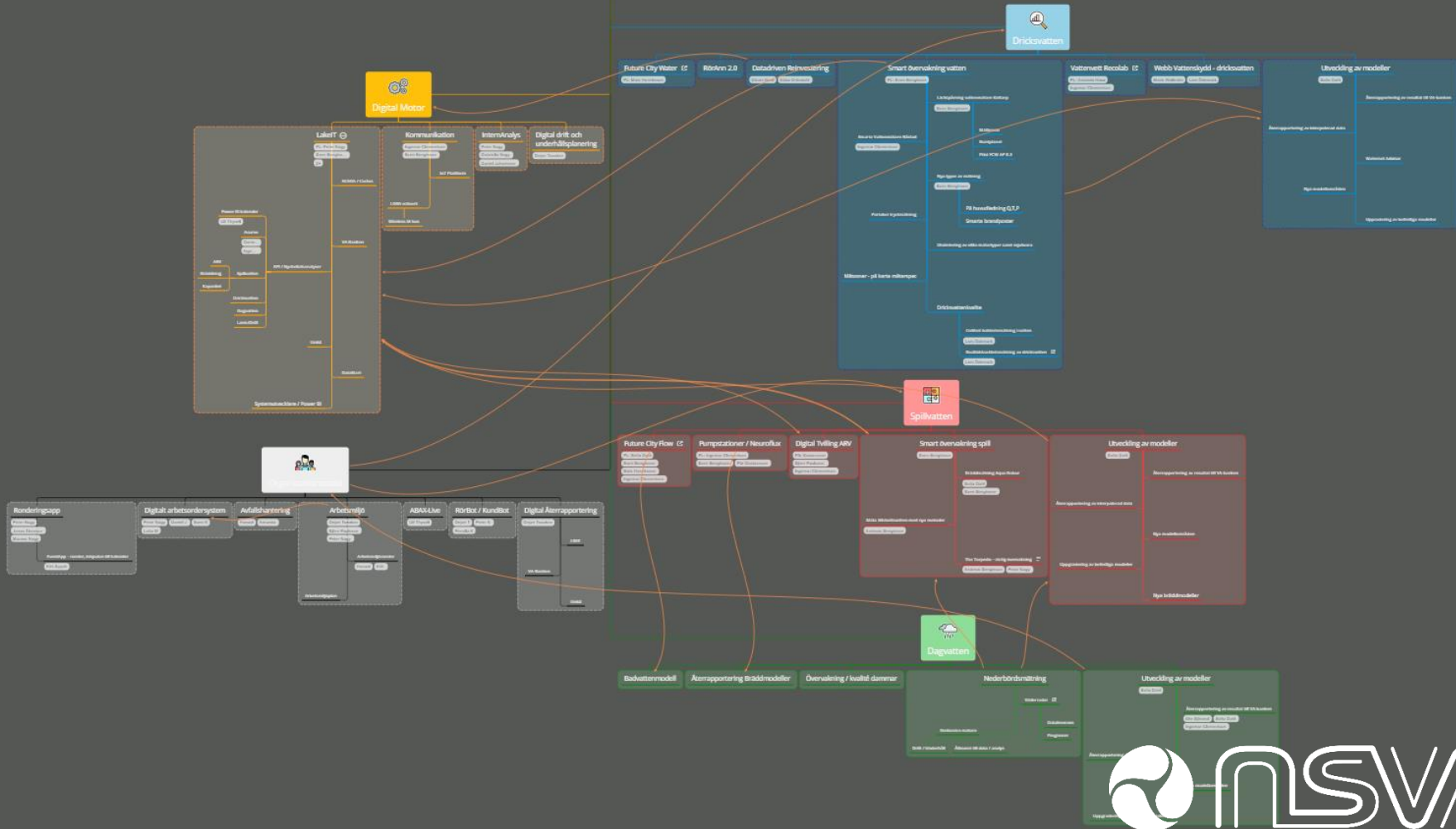
Technical
development



Digitaliseringsprojekt



Digitaliseringsprojekt



GOALS	
20 000 IoT devices	2030
Seamless water workloop	2023
Big data management platform	2023
Assembly-driven and predictive maintenance on all our sensor data	2027.5

Measurement & Monitoring 2030

Where do we measure?

- Refinement of existing data**
 - How can we assess the quality of current data?
 - Can we improve historic data with ML?
 - What do we need to measure to complement existing data?
- Optimization of measurement effort**
 - Pipe network and unexploited data → hydraulic influence
 - Combination of existing hydraulic models and other tech
 - Automatically find sensors physical measurement (backtracking, historical)
- The measuring smart agent**
 - What does cross measurement step (increasing value knowledge)?
 - Spatial partitioning based on water type

IoT Monitoring

- New ways of measuring**
 - Procurement of new ways of measuring
 - Land measurement IoT
 - Smart for hydraulics
 - Smart water pipes
 - LiDAR network
 - Complement in-house measurements in facilities
- Sensor meter workloop**
 - Evaluation of new equipment
 - Who receives alarm and who sets?
 - Responsibilities
 - Priority
 - New components
 - New Equipment
- Protocols for communication**
 - Needs to be "futureproof"
 - MQTT
 - Relation with protocols in SCADA system

Intelligence and infrastructure

- Safe communication and data management**
 - Consumption of external data - to where and why?
 - Firewalls within domain
 - Operations during a crisis
 - API calls - incoming and outgoing
- Data management**
 - Effective management of large volumes of time series data
 - Management of systems and responsibilities
 - Technical best practices - future proofing
 - Visualization and access to data
 - Analysis of large amounts of data to all formats
 - Scalability
 - Effective exchange of data between organizations
- AI Platform**
 - QUERY Integration to devices
 - Provide data to IoT apps
 - Integration with existing data
 - QUALITY CONTROL
- Machine Learning / AI**
 - Predictive maintenance
 - Prognosis for events
 - Data quality improvement - detection
- Alarm Management (or adequate amount of information)**
 - Prioritizing of alarms
 - Information to customer
 - Multi-stage alarm systems



GOALS	
25 000 IoT devices	2030
Sensor meter workshop	2025
Big data management platform	2025
Anomalidetection and predictive maintenance on all our sensor data	2027,5

Research application WANDA

NSVA Internal Development

External competence

A large number of possible providers



Project Participants



The SENSATIVE logo features a green sunburst icon to the left of the word "SENSATIVE" in green. To the right is a circular diagram with a tree in the center. The top of the circle is labeled "SERVICES ACCESS" and the bottom "CONNECTOR ABSTRACTIONS". The tree's roots are connected to various protocols: Z-wave, ZigBee, LoRaWAN, Bluetooth, M-Bus, CAN, and 433MHz. The top of the tree is connected to icons for a smartphone, a tablet, and a laptop. Two green arrows point horizontally from the tree to the left and right.

IoT Integration



The logo for backtick TECHNOLOGIES consists of a blue and black icon resembling a stylized 'b' or a backtick character, followed by the text "backtick" in a bold, lowercase sans-serif font and "TECHNOLOGIES" in a smaller, uppercase sans-serif font below it.

Data Management &
Product
Development



The NSVA logo features a stylized white circular icon on the left, followed by the letters "NSVA" in a large, white, outlined sans-serif font.

sweden  water research

Data & Problem
Owner

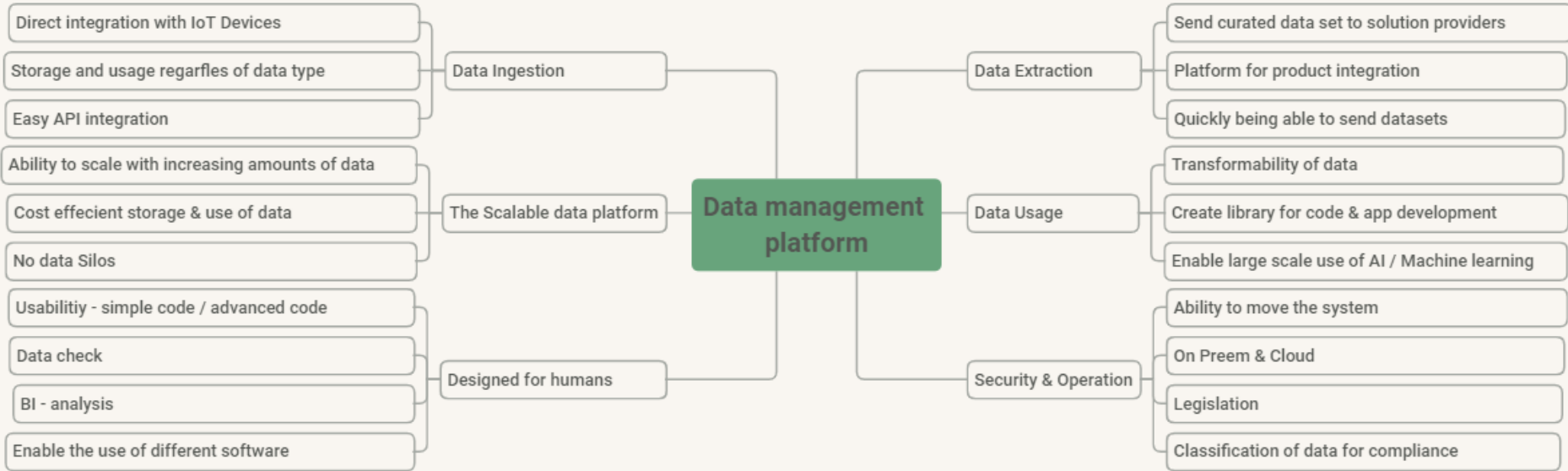


The cinter logo features the word "cinter" in a bold, dark blue, lowercase sans-serif font, with a small blue hexagon above the letter 'i'.

BIG DATA, SIMPLIFIED.

Final Product &
Startup

Key Components



UX Interviews



User interviews

Intervju kring dina erfarenheter av att använda data!

Bakgrund

I projektet "IoT & Datanalys" är utmaningen att framtidssäkra NSVAs data-infrastruktur samt möjliggöra användandet av befintliga och framtida data genom olika tjänster och tekniker. Backtick Technologies utvecklar en dataplattform (Cinter) där målet är att erbjuda så bra "data experiences" som möjligt.

Syfte

Genom flertalet intervjuer hoppas vi kunna kartlägga vilka tjänster och produkter som behöver förbättras och nyutvecklas. Fokus i dessa intervjuer är UX (User Experience) och vi vill lära oss mer för att kunna utforma plattformen och kringliggande produkter så bra som möjligt.

Vi hoppas lära oss

Vilka utmaningar som finns i nuvarande och kommande interaktioner med data, bla:

- vad orsakar frustration i nuvarande system, visualiseringsverktyg och rapporteringar?
- vilka behov finns och hur kan vi utforma lösningar på bästa sätt?
- vilka framtida möjligheter det kommer krävas verktyg för?

Intervjuerna

Tar cirka 45 minuter och genomförs av Jonathan Nery och Oskar Handmark. Inga förberedelser krävs.

Tack! 😊



Jonathan Nery
UX Designer
j@nery.se



Oskar Handmark
Founder
oskar@cinter.io



UX mapping

Automation Engineer

Daniel Johansson
2023-08-20

Primarily works with issues, maintenance of water pumps

Hours to comply with standards	Works with Cactus 3D	Aim to minimize the number of alarms	Want alarms to be data-driven
Wants historical data and wants to identify potential issues	Current alarms are NTC mechanical failures and components aren't in a format for best detection	Manage in real time, also via tablets operations and components aren't in a format for best detection	Preventive maintenance issues are a priority, but not data driven
Alarm categories A, B & C Urgent, Slowing working hours, Not usable	Cactus UI is cluttered and aligned with water's design needs	Some benefits in integrating data from different locations, e.g. Pressure, Temperature, etc.	Goals is to reduce and have security checks
The core focus is on Water Supply	Priority on taking care of water		

Key areas

1. Automation and compliance
2. Monitoring and analysis
3. Maintenance and preventive measures
4. Alarms and prioritization
5. UI
6. Security

Guiding light: Take care of water.

Development Engineer / Data Analyst

Sven Bengtsson
2023-06-20

Measures and monitors the data network and its analysis

Data quality is a technical concern	Graphics, scalability, and logical understanding patterns and anomalies	Challenging to compare data from different sources	Need for better tools and automation software support analysis and management
Needs to be able to account mapping sensor locations and connections	Challenging to integrate map and data analysis tools	Collaboration is needed, however it's limited to the physical visualizations and results	Collaboration occurs through different equipment and output metric reports, e.g. Modeling, research, testing, etc.
Sharing in real time is essential	Time series analysis is an integral part of the job	Needs more advanced tools for time series analysis	Challenging for documentation. Data location, collection and analysis. Needed for maintainability
Challenges to save and search in an useful manner	Mapping data is essential for understanding data in their systems, pipe network and water treatment	Hydraulic modeling and stress tests assess the system's capacities and test scenarios	Desire to enable integration to access and automate analysis within a data platform

Key areas

1. Analysis and quality
2. Tools and automation
3. Collaboration
4. Time series analysis
5. Mapping
6. Data access

Does not help that they are entered into Autodesk, becomes a parallel system. (DVG format)

Jonath

Significant manual reporting using Excel and PDF formats.

Some reports have a retention period.

Jonath

Would like to be able to link to Campaign metrics (Municipality, specific city areas), as well as rain flow, temperature, rain

Jonathan Nery

Challenge: unsure who is responsible for updating the data

Jonath

Data errors come in the form of:

- issues with the physical meter/sensor (e.g. they need to be cleaned off)
- different types of meters/sensors may produce nonuniform results.

Jonath

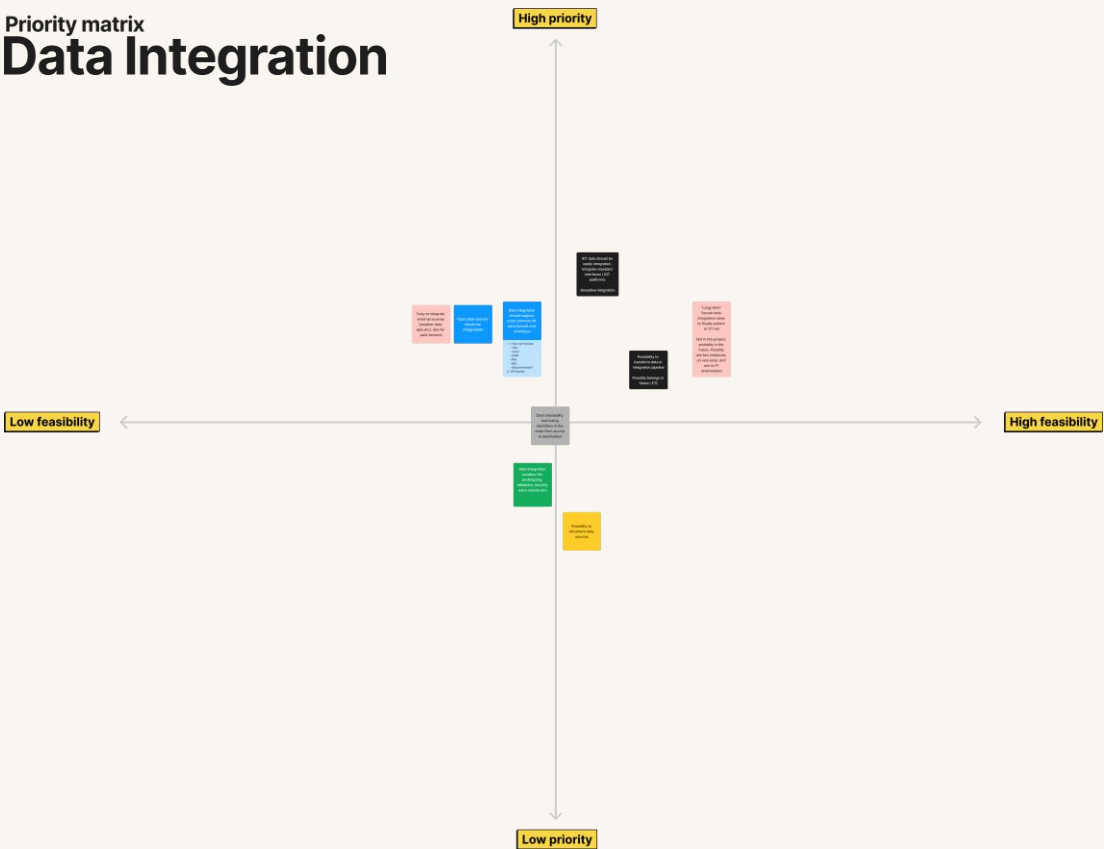
Maps and GIS play a key role to the organization, 50% of employees use maps daily.

Jonathan Nery

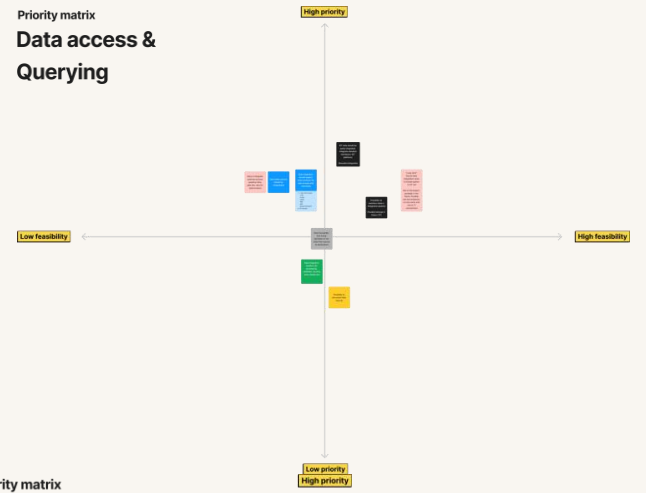


UX Mapping

Priority matrix Data Integration





Priority matrix Data access & Querying



Priority matrix Data Security & Governance



Data Catalog & Communication

 CATALOG 

DATA CATALOG

IoT

- Water Flow Harmonized**
- Water Flow Raw
- Device Locations

Weather



Radar

[+ New collection](#)

WORKSPACES

- André Eklund
- David Strömbäck
- Oskar Handmark
- Zuzzana Sadowska


Water Flow Harmonized

 IoT.water_flow_harmonized 

Water flow levels. Normalized timestamps, units of measurements and simple backfilling of missing water flow levels based on an average of the nearest two present previous values.







Device locations joined in from [Device Locations](#).

Owner	Columns	Created	Updated	Size
Ingemar Clementsson	6	04 APR 2023	31 OCT 2023	851 GB

Overview Stream Access Control Optimizations 

Key	Type	Custom Type	Description
name	string	Signal Name	Signal name, as from the source system
city	string	City	The city name
alive	boolean	Alive	True if the signal is considered alive
timestamp	timestamptz	Device Timestamp	Event timestamp, from the device
value	double	Flow level (l/s)	Flow level, as expressed in liters per second through the pipe

Activity




-  5 min ago
 Description updated
-  11 days ago
 Ownership transferred from Jonathan N. to Oskar H.
-  1 months ago
 Description updated



Security & Data Distribution

Water Flow Harmonized

ACCESS RIGHTS

	READ	WRITE	DELETE	ADMIN
Team A 	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Team B 	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vendor X 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CENTRALIZED DATA SECURITY

Cinter secures both dataset documentation, metadata and actual data with role-based access control (RBAC) policies.



SSO



Active Directory, LDAP



OpenID, SAML

MAJOR OPPORTUNITIES

- Pay-per-use not economical for volume
- Buyer fatigue for costly cloud solutions

OTHER OPPORTUNITIES

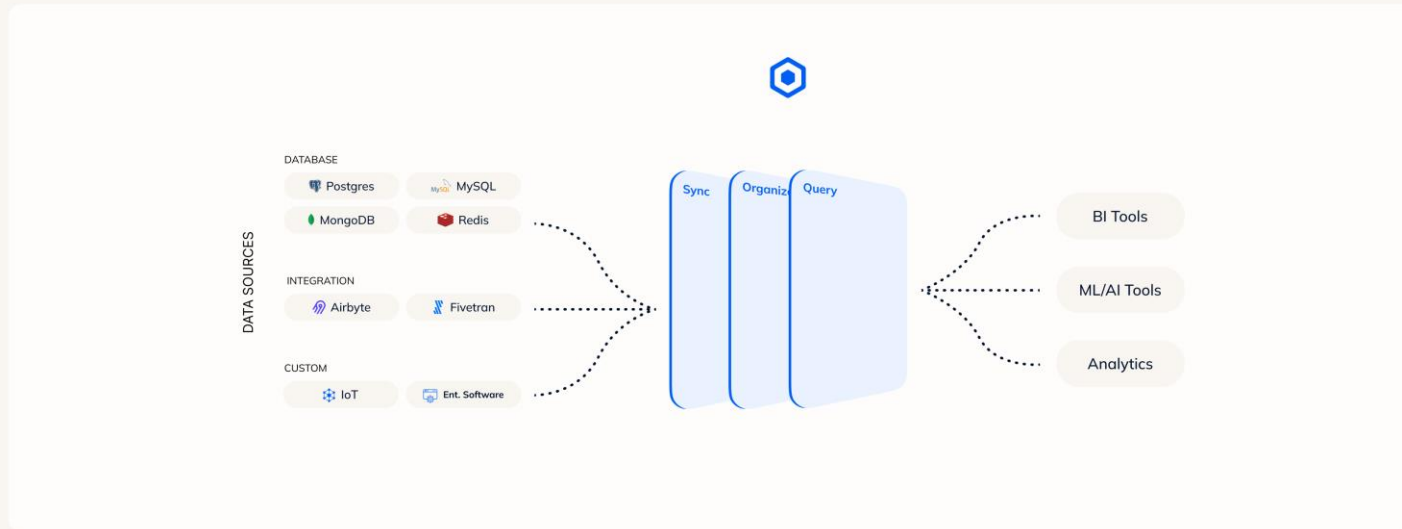
- Better user experience, more human
- EU-friendly (GDPR, Cloud Act, etc.)
- Options beyond the cloud



CLOUD | ON-PREM

MODERN & OPEN DATA LAKEHOUSE

Sync data from multiple sources • Organize and document data in the data catalog • Query data of all shapes and sizes with SQL



THE SOLUTION





cinter
BIG DATA, SIMPLIFIED.



WANDA *Water ANomaly Detection Application*



- Identify and automatically refine low-quality data for usability
- Understand factors affecting data quality by combining diverse data sources
- Facilitate the structuring of qualitative datasets



- Apply ML models to detect complex anomalies
- Allow users to enhance anomaly detections models through manual feedback



- Improved understanding of data quality and reasons for anomalies



Flow Below



VINNOVA



sweden  water research



End Goal

Cultivate and deliver sustainable water services on a business-oriented basis, generating societal value for stakeholders and customer benefits for their clients

Digital Transformation

Competence Supply

Professionalism