Mathias Vanden Auweele

Kampenhout, Belgium | mathias@matdata.eu | 0491 16 16 88 | matdata.eu

mathiasvda | MathiasVDA | mathias.vanden.auweele

@mathiasvda@Mastodon

About Me

Innovative data freelancer with over 15 years of experience developing user-centered and data-centric IT systems. Starting from business idea and going all the way a solution in production and even beyond.

Education

ME **KUL, university of Leuven, Belgium**, Master in engineering, Energy — Sept 2007 – June 2009

- Graduated Magna cum laude

ME **GroepT, Leuven, Belgium**, Master in engineering, Electromechanics — Sept 2003 – June 2007

- Graduated Magna cum laude

Experience

Matdata, Freelance data consultant — Europe, Feb 2025 – present

Infrabel, Teamlead data centricity — Brussels, Belgium, Apr 2022 – Feb 2025

- Lead the migration toward a data centric software landscape
- Be the data single point of contact for a department of 9000+ employees
- Steer the application landscape and implement the digital strategy
- Manage and improve the data quality
- Portfolio manager for data projects

Infrabel, Project lead digitalisation — Brussels, Belgium, Jan 2020 – Apr 2022

- Design and produce innovative digital solutions to improve the different activities of Infrabel Operations (maintenance, construction, operation, logistics, ...)

Infrabel, Project lead strategic project reporting — Brussels, Belgium, Sept 2017 – Jan 2020

- Align the innovation projects with the internal strategic vision
- Project prioritisation and portfolio management
- Implement a strategic project/program reporting system
- Setup a PMO office

Infrabel, Engineer catenary data cell — Brussels, Belgium, Sept 2009 – Sept 2017

- Responsible for OCL measurement systems & all related IT
- Responsible for work management system of catenary
- Expand the technical inventory and develop supporting tools
- Participation in CEN/CENELEC and EIM/ERA working groups
- Uniformisation of the catenary design principles

Languages

Dutch: mother tongue

French: fluent

English: fluent

Projects and Technologies

The project and technology lists below are a summary. More details such as screenshots or self-estimated-proficiency can be found and easily queried on https://expertise.matdata.eu/

Projects

Asset360

Data platform

- A data platform combining all asset data, setting the golden record and creating the foundation for a data centric landscape.
- **Roles**: Business analyst, Product owner
- **Technologies**: Airflow, Apache Jena Fuseki, Data centricity, Data governance, Dbeaver, Postgresql, Python, Railway

Asset recognition on images from measurement train

Image processing

- A backend processing system to identify railway assets on pictures taken by camera's on measurement trains. The results help in creating inventories and manual digital inspection. The goal is to also categorize assets according to their state (health/worn..)
- **Roles**: Business analyst, Data analyst
- **Technologies**: Dbeaver, Image recognition AI, Postgresql, Railway, S3

Automated data pipelines

Data processing

- A backend system to automate data transfers from several databases. Using several techniques such as delta transfer or ID based copying.
- **Roles**: Data analyst, Data architect, DevOps engineer, Developer
- **Technologies**: Apache nifi, Dbeaver, Git, Gitlab CI CD, Kerberos, Loki, MSSQL, Openshift, Oracle, Postgresql, SAP HANA BIQ, SAS, Serilog

Camera inspection system for OCL

Measurement system

- We installed over 16 camera's on a measurement train to inspect the overhead contact line system from multiple perspectives. The camera's are triggered based on distance travelled. The images are timestamped and the server time is synced with a Stratum 1 local NTP server. In post processing, the location of the images is calculated. The images are used for digital inspection of the system, both manual (using a webapp) and automatically (using AI).
- **Roles**: Project lead, Technician
- **Technologies**: Camera, Laser, NTP, Railway, S3, SSH

Change context management application

Webapp

- A full stack application to manage change context inside the topology management system.
- **Roles**: Data architect, Product owner
- **Technologies**: Apache Jena Fuseki, Git, Gitlab CI CD, Helm charts, Python, RDF, Railway, SHACL, SPARQL, VueJs

Contact wire thickness measurement system

Measurement system

- A hardware system using camera's and lasers mounted on a pantograph to measure the thickness of a wire. The results are very important to optimize maintenance and renewal and avoid catenary incidents.
- **Roles**: Business analyst, Data architect, Developer, Project lead

- **Technologies**: Camera, Laser, Laser triangulation, Railway

Contact wire uplift measurement system Measurement system

- A solar/battery powered hardware system mounted in the catenary, measuring the vertical movement of the contact wire at the passage of a train. Everything was designed, assembled, programmed, ... by myself.
- **Roles**: Business analyst, Developer
- **Technologies**: Arduino, C++, Git, PCB design, Raspberry Pi

Data centric strategy Strategy

- An enterprise like a railway infrastructure manager, typically has a very siloed data/IT landscape. In order to make certain use cases possible, data has to be integrated between silo's. That's not always possible using existing systems and a spaghetti mess begins. And long term approach to data integration is defining a data centric strategy, meaning to create a data layer based on a single enterprise data model. This project set up several key requirements to becoming data centric. Reporting was done on director and enterprise level.
- **Roles**: Product owner, Project lead, SPOC data for department of 9000 employees, Teacher, Teamlead
- **Technologies**: Project management, Railway

Data cube: linear phenomena's Data processing

- Linear assets and linear events typically have a start and an end position using a linear referencing system (kilometerpole position). For BI and operational systems, it is easier if these linear things are denormalised. A innovative model and process was thought out to calculate smallest linear segments with a unique set of properties (over 100 properties were thus defined).
- **Roles**: Business analyst, Data architect, Developer
- **Technologies**: Dbeaver, Postgresql, Qlikview, Topology

Data integration of old track tamper machines Measurement system

- Older tamping machines use a relative system for track tamping. That means that the position of the track is corrected based on it's current position, contrary to a absolute system were the design position is respected. In order to make evaluate the effectiveness of tamping and ensure the end quality, the measurements that are done on the machine are forwarded and combined with design parameters and other measurements. For this, a state of the art GNSS system was installed, the measurement computers were connected to an Azure server over SSH and data transfer is automated.
- **Roles**: Developer, Project lead, Technician
- **Technologies**: Azure, GNSS, Reverse proxy, SSH

Data integration: operational platform & track length Data processing

- The data about operational length of tracks and platforms was a manually controlled inventory. This was laborious and not of high quality. This project had as goal to automatically calculate the operational length based on track topology, signal and platform locations. Integrating all the data into a common topology was the challenge.
- **Roles**: Data analyst, Data architect, Developer, SPOC data for department of 9000 employees
- **Technologies**: Dbeaver, Plpgsql, PostGIS, Postgresql, PowerBI, Topology

ERA RINF Chatbot Semantic

- A proof of concept to show how RDF data together with an ontology can be used together with a LLM such as ChatGPT. The project result is a public web application where the user can ask questions in natural language and get a data result as output.
- **Roles**: DevOps engineer, Developer, Ontologist

- **Technologies**: Azure, Docker, ERA ontology, Git, Gitlab CI CD, LLM & ChatGPT, OWL, Python, RDF, Streamlit

Energy settlement data lookup Data processing

- Energy settlement (responsible for a large part of the operational turnover of the company) is still done mainly using Excel. Several interfaces to existing JSON API services were added to the Excel file to add a higher level of automation to the system.
- **Roles**: Business analyst, Data architect, Developer
- **Technologies**: Excel, JSON API, Power Query

Enterprise data governance model Strategy

- In order to improve data deficiencies, the enterprise decided to review the current governance model and implement a new one. A high level strategic project started and data governance was discussed on multiple dimensions (structure, roles, governing bodies, policies, vision, ...). The project result has impact on the enterprise structure.
- **Roles**: Department representative, SPOC data for department of 9000 employees, Teamlead
- **Technologies**: Data centricity, Data governance, Project management

Enterprise data model Semantic

- A very important element in an enterprise to avoid siloed data, is to have an enterprise data model by which the data (and applications..) are modelled. This ensures data interoperability from the start of the application. When dealing with legacy systems, starting an enterprise data model is not that easy. The goal of this project is setting up a team of experts that know the domain and are able to model the enterprise. In order to make the model as extensible as possible, semantic technologies were chosen. The model is published in different forms, among which is a Widoco internet site.
- **Roles**: DevOps engineer, Developer, Ontologist, SPOC data for department of 9000 employees, Teacher, Teamlead
- **Technologies**: ERA ontology, Gist, Git, Gitlab CI CD, OWL, Protege, QUDT, RSM, RTM, RailML, SHACL, SHACL Play, SKOS, Widoco

GPS trackers for mobile safety equipment Measurement system

- In order to reduce the number of "signals passed at danger", a project was launched to track in real time the location of safety equipment. A custom GPS tracker was designed and interfaced with the internal network over LTE.
- **Roles**: Business analyst, Developer, Project lead
- **Technologies**: Binary, Firewall, GNSS, Git, Gitlab CI CD, JSON API, Traccar

Inventory: OCL auxiliary tracks Data processing

- The legacy system to manage the electrified auxiliary tracks was not data centric. The goal of the project was to combine the available data such as the track topology and the sectioning of the OCL to create the inventory, resulting in a dramatically reduced workload.
- **Roles**: Data architect, Developer, Project lead
- **Technologies**: Dbeaver, Plpgsql, PostGIS, Postgresql, QGIS, Qlikview, Topology

Lightning detection alerting system Data processing

- Lightning strikes on railway infrastructure can cause serious damage and is not always detected. There exist commercially available measurement systems that interface their data of the lightning strike location and strength. We interfaced with these datasources and mapped the location (with some business rules) on the rail network. An email system was put in place to notify the installation responsible person. A GIS webapp and dashboard were also developed.

- **Roles**: Data architect, Developer, Project lead
- **Technologies**: Angular, Dbeaver, Docker, Git, Gitlab CI CD, Kerberos, Leaflet, MSSQL, Nginx, Openshift, PostGIS, Postgresql, QGIS, Qlikview

Linear measurement data viewer Desktop app

- Linear measurements used to be distribute on paper or sometimes pdf. Obviously, this does not allow for normal data analysis, let alone be a driver for predictive maintenance. For this project, a data platform was set up with an automatic data transfer from measurement system to storage, automatic loading of the measurement onto the data platform and alert creation according to business rules. Furthermore an analysis desktop tool was developed that allows to visualise the measurement on an interactive chart. Other features were also developed, such as an image viewer, lidar viewer, trend analysis, inventory viewer and management, event viewer, GIS viewer, GPS tracking, export, ...
- **Roles**: Business analyst, Data analyst, Data architect, DevOps engineer, Developer, Project lead
- **Technologies**: Camera, ClickOnce, Dbeaver, GPSD, Git, Gitlab CI CD, Leaflet, Lidar, PostGIS, Postgresql, Qlikview, Scichart, Serilog, Topology, WMS

Location measurement system for measurement train Measurement system

- Location measurement of a measurement train is very important. The usability of the other measurement systems depend on the ability to locate the measurement. Before this project, each measurement system had it's own GNSS antenna, odometer sensor and so on. And not to mention its own quality of the location. The inhouse project developed a measurement system that is independent of any other and is optimised for railway vehicles.
- **Roles**: Data architect, DevOps engineer, Developer, Project lead, Technician
- **Technologies**: GNSS, GPSD, Git, Grafana, IMU, Odometry, Prometheus, Python, Raspberry Pi, SSH

Location post processing system for railway vehicles Data processing

- Train vehicle locations arrives as GNSS positions. Depending on the quality of the hardware, a reliable and accurate position is not always guaranteed. The post processing system will handle a location collection from a train path and use all available information sources, such as signaling train detection information, in order to improve the quality of the location. This is very important for other infrastructure measurements.
- **Roles**: Business analyst, Data architect, Developer, Project lead
- **Technologies**: Dbeaver, GNSS, Git, Gitlab CI CD, IMU, Odometry, Openshift, PgRouting, PostGIS, Postgresql, QGIS, RTM, S3, Serilog, Topology

Mapping train statistic on RINF data model Data processing

- The EU requests publishing data based on the RINF data model. Our train statistics data model is not using the RINF model as a basis. A translation system was set up to convert from one model into the other allowing to comply with EU requirements.
- **Roles**: Data analyst, Data architect, Developer
- **Technologies**: Dbeaver, ERA ontology, Excel, Git, PgRouting, Plpgsql, Postgresql, QGIS, RTM, SPARQL

Measurement train image post processing Data processing

- Several measurement trains are equipped with camera's that capture the railway infrastructure from different angles. These images are timestamped, but not necessary positioned. The goal of this project is to create an automatic image processing service that positions the image, based on its timestamp, the position of the camera in the vehicle and the position of the vehicle.
- **Roles**: Business analyst, Data architect, Developer, Project lead

- **Technologies**: GNSS, Git, Gitlab CI CD, Openshift, S3, Serilog

Mobile app for geolocated technical assistance Mobile app

- This was the first mobile application of the enterprise. It's a GIS application, working very similar to a Map application. The user can interact with the map, search for assets, get directions, report incidents, ... Very important features of the app were the ability to visualise defect axle counters. This mostly happened during works and with the mobile app, the work teams have the ability to repair the issue before the track enters back into service (which would cause a significant amount of delays). Also requesting the technical designs or the traffic management system viewer based on your location is possible.
- **Roles**: Business analyst, Data architect, Developer, Project lead, Teamlead
- **Technologies**: Android, Azure, Fastlane, GNSS, Git, Gitlab CI CD, JSON API, SSH, VueJs, iOS

Mobile app: synced documentation Mobile app

- A mobile app for catenary technicians for documentation lookup that is accessible offline and synced when online. The app uses Git to accomplish the syncing.
- **Roles**: Business analyst, Data architect, DevOps engineer
- **Technologies**: Android, Fastlane, Git, iOS

Model for FTE calculation of OCL technicians Strategy

- The enterprise is divided into about 15 workcenters. Each workcenter is assigned a certain resource amount, expressed in full time equivalents and number of worktrains. Each workcenter has also a certain amount of workload, expressed in number of assets and their maintenance charge. The project had as goal to create an objective and as realistic as possible model to calculate the absolute resource need for each workcenter. Simulations should also be possible: what if workcenters would merge, what if maintenance load increased, what if new assets were assigned, ...
- **Roles**: Business analyst, Data analyst, Data architect, Developer, Project lead
- **Technologies**: Dbeaver, Excel, Oracle, Postgresql, SQL, VBA

OCL sectioning topology management application Data management app

- A frontend GIS (graphical) management application running in QGIS to build and update the sectioning database of the overhead contact line. The base layer is the track topology on which a layer of sectioning elements and cables are attached. A backend program creates a sectioning topology from these singular and linear elements that is linked to the track topology. The resulting data-centric inventory is then used for calculating the electrified length of the network, for safety sheets or even for validating request for putting out of service.
- **Roles**: Business analyst, Data architect, Developer
- **Technologies**: Data centricity, Dbeaver, Git, PgRouting, Plpgsql, PostGIS, Postgresql, QGIS, RTM, Railway, Topology

Openrail Strategy

- The Openrail foundation is an opensource initiative started by OBB, DB, SNCF and UIC. As I am a big supporter of opensource, European initiatives, I managed to convince my company to join the Openrail foundation. I took upon myself a role in the technical committee to represent my company and opensource one of our projects.
- **Roles**: Business analyst, Company representative, SPOC data for department of 9000 employees
- **Technologies**: Project management, Railway

Pantograph shock detection system Measurement system

- A measurement systems deployed on about 15 commercial vehicles. The pur-

pose is to detect shocks happening due to pantograph/catenary interaction. The measurement system consists of accelerometers on the pantograph head on high voltage and a low voltage system inside the train. Both communicate wirelessly. Every shock is transmitted and analysed by a server side centrally and self developed system. The biggest innovation is the method used for grouping the alerts. The location associated with the shock depends on the placement of the GNSS antenna compared to the pantograph head and on the orientation of the vehicle. Several other business rules are important as well to make this, relatively big data system, business usable. But at the end of project, it became fully integrated with the work management system and workorders were automatically created when possible.

- **Roles**: Business analyst, Data analyst, Data architect, Developer, Project lead, Technician
- **Technologies**: Accelerometers, Firewall, GNSS, Git, Gitlab CI CD, Loki, Openshift, Plpgsql, PostGIS, PowerBI, QGIS, Qlikview, RTM, Railway, SSH, Serilog, Topology

Pole inventory management system Data processing

- The legacy measurement system was file based and project specific. We went to a database based system with a QGIS management layer. A data quality improvement campaign was launched to improve the inventory based on measurement registrations of overhead structure. Pole naming was improved based on camera systems and AI detections.
- **Roles**: Data analyst, Developer, Project lead, Teamlead
- **Technologies**: Dbeaver, LRS, PostGIS, Postgresql, QGIS, Railway, WMS

PostGIS: GIS to LRS calculation library Data processing

- The goal of the project was a set of database functions to allow conversion between geographic coordinates, schematic coordinates, intrinsic coordinates and linear referencing (LRS) coordinates. Not only for points but also for linear segments and area's.
- **Roles**: Data analyst, Data architect, Developer, Project lead
- **Technologies**: Git, LRS, PgRouting, Plpgsql, PostGIS, Postgresql, RTM, Railway, Topology

Post processing of binary linear measurement file Data processing

- A measurement train contains many measurement systems that collect a lot of data. In order to reduce the amount of bytes, the data is mostly written into binary files having a specific binary structure. The goal of this project is to automatically read the binary files and write the data into a usable system such as a database.
- **Roles**: Business analyst, Data analyst, Data architect, Developer, Project lead
- **Technologies**: Binary, ClickOnce, Git, Gitlab CI CD, Postgresql

Product owner: enterprise GIS tooling Strategy

- Ensuring the proper usage of resources. Building the right things. Having a complete and clear roadmap.
- **Roles**: Data architect, Project lead, SPOC data for department of 9000 employees, Teamlead
- **Technologies**: Jira, Oracle, PostGIS, Project management, QGIS, RTM

Product owner: railway micro-topology management platform Business process

- The track microtopology topology is a very important data aspect for a railway infrastructure manager. It's without a doubt, THE data foundation. The process needs to run smoothly, errors need to be corrected ASAP and clients need to be heard.
- **Roles**: Business analyst, Product owner, SPOC data for department of 9000 employees, Teamlead

- **Technologies**: AutoCAD suite, Data centricity, Jira, LandXML, Oracle, RTM, Railway, Topology

Product owner: work management system OCL — Strategy

- A work management systems allows the planning of workorders and is necessary to lower the administrative burden on technicians. The system has a time table (dates as columns and people as rows) for availability planning, an inventory with maintenance requirements, an incident reporting environment and a workorder system to link everything together. The system requires many types of reporting and interfacing with other systems.
- **Roles**: Business analyst, Data analyst, Product owner, Project lead
- **Technologies**: Git, Java, Oracle, Oracle Forms, Project management, Qlikview, SAP CATS, SAP CO, SAP PM

RCM-DX — Strategy

- Measurement systems on the market for railway mostly use a proprietary data exchange format. This creates a digitalisation barrier. RCM-DX aims to standardise the data exchange format of linear measurements. This is an open-source project.
- **Roles**: Data analyst, Teamlead
- **Technologies**: Binary, HDF5, RCM-DX format

RailML ontology workgroup — Semantic

- The workgroup aims to create an ontology for the railML data exchange format.
- **Roles**: Ontologist
- **Technologies**: Git, Nextcloud, OWL, Protege, RDF, RTM, RailML, Railway, SHACL, SPARQL, Widoco

Setup PMO office — Business process

- At the time of the start of the project, project management was not done very professionally at the enterprise for development projects. Granted, that is a very difficult type of project to manage due to its complexity. The goal of setting up the PMO office was to give a central support and a way to connect people with similar issues. Management also wanted reporting, so that was also set up using the PMO system.
- **Roles**: Business analyst, Project lead
- **Technologies**: Data centricity, Data governance, MS Project, Project management

Shelter GIS position management system — Data management app

- A data management application in QGIS to manage the geographic location of shelters (containing signaling or power equipment). Several different sources of data are available for the user to manage the relevant data, including GPS coordinates of inspections of the shelters and satelite images.
- **Roles**: Data analyst, Data architect, Developer
- **Technologies**: Dbeaver, Git, ODK, Plpgsql, PostGIS, Postgresql, PowerBI, QGIS, Topology, WMS

Signaling topology calculation program — Data processing

- Having a track micro topology is a solid foundation for railway infrastructure data. But for some applications, reworking that topology into a signaling topology simplifies the usage. The goal of this project was to do this rework and publish the resulting topology.
- **Roles**: Business analyst, Data architect, Developer, Project lead
- **Technologies**: Git, PgRouting, PostGIS, QGIS, RTM, Railway, Topology

Strategic project reporting — Business process

- A periodic relevant reporting on the status of strategic projects was requested by the upper management. A special focus was put on change and issue reporting. Projects were categorized into two types: development and roll-out programs. A prioritisation model was also developed to objectively score projects for attention and resource reasons.
- **Roles**: Business analyst, Data architect, Developer, Project lead
- **Technologies**: Dbeaver, MS Project, PMO, Postgresql, Project management, Qlikview, Sharepoint

Topologie to be Business process

- The goal of the project was to ensure that micro topology data was available at the time of creation, many years before the topology change would get into service. For this a new business process needs to be put in place with enhanced tooling. The result would be an increased data centric foundation. The design process for new equipment is not well connected with the micro topology since the AS IS topology is insufficient for them. Publishing the TO BE micro topology data would allow them to position the new assets already on the correct topologic location. That will give a snowball effect of data centric benefits.
- **Roles**: Business analyst, Data architect, Project lead
- **Technologies**: AutoCAD suite, Data centricity, Git, Jira, RTM, Topology

Trainannouncer Data processing

- A backend system using the train detection system to announce the train number to measurement systems. The train detection data arrives on a message queue, this queue is continuously read and processed for relevant messages. When train enters or exists a zone with a measurement system, the announcer will send this data to the measurement system. The measurement system uses this information for immediate action (pulling the train aside) or predictive actions (worn carbon of the pantograph).
- **Roles**: Data architect, DevOps engineer, Developer
- **Technologies**: Dbeaver, Git, Gitlab CI CD, IBM MQ, Openshift, Postgresql, PowerBI, SSH, Serilog

Webapp for digital inspection Webapp

- The goal of the project is to create a webapp that allows users to perform a digital inspection of the railway infrastructure. The app is GIS based, it shows the railway network and works very similar to Google streetview. The user clicks a location and can look around. Features are available to annotate the location. AI detections and Lidar interaction is also possible.
- **Roles**: Business analyst, Data architect, Project lead
- **Technologies**: Angular, Dbeaver, Git, Gitlab CI CD, JSON API, Lidar, Loki, Nginx, Plpgsql, PostGIS, Postgresql, Railway, Reverse proxy, SQL, Serilog, WMS

Webapp on SAP PM for workorder and ressource planning Planningtool

- SAP is not a very user friendly system. The available tools to perform planning of workorders are insufficient for railway purposes. Thus a new web application was designed and interfaced with SAP backend. This project is part of a "planningtools" program to improve the business process and optimise the use of resources.
- **Roles**: Data architect, Project lead
- **Technologies**: Azure, Logseq, SAP PM

Webapp: OCL safety sheets Webapp

- The goal was to replace an old fashioned system with technical limitations (certainly concerning interfacing and access) with a modern web application. The application consists of an API that returns "dangerous places" and other sectioning information of the overhead contact line. The web application allows to easily query the API and print a pdf.

- **Roles**: Business analyst, Data architect, DevOps engineer, Developer
- **Technologies**: Angular, Git, JSON API, Openshift, Oracle Forms

Webapp: common path of several railway vehicles Webapp

- Sometimes, multiple railway vehicles are discovered with damages on the same location, for example 30cm out of center of the pantograph. This is a clear sign of an infrastructure issue. In order to narrow down the location of the infrastructure problem, the train paths are visualised on a map that is common to all the vehicle. The challenging part of this project is to find a sufficiently detailed trainpath and a relation between the vehicle and the trains in which it served.
- **Roles**: Business analyst, Data architect, DevOps engineer, Project lead
- **Technologies**: Angular, Docker, Git, Gitlab CI CD, JSON API, Nginx, Openshift, PgRouting, Topology, WMS

Webapp: train protection system Webapp

- A (work)traindriver that comes out of a track out of service, needs to configure his vehicle to the correct TPS system (TBL1+ or ETCS L1 LS, L1 FS, L2). This webapp allows the driver to correct locate himself on the track topology, using either a signal or his GPS position and give a driving direction. The app will then calculate the TPS level. The challenge of this project was to inventorise the TPS systems on the topology and create a routing algorithm using business logic to find "the next signal" on the trainpath, returning multiple if applicable. The TPS inventory is also used as an opendata dataset.
- **Roles**: Business analyst, Data architect, DevOps engineer, Project lead
- **Technologies**: ADFS, Angular, Docker, Firewall, GNSS, Git, Gitlab CI CD, JSON API, Openshift, PgRouting, PostGIS, QGIS, Reverse proxy

Technologies

AI/MV: Image recognition AI, LLM & ChatGPT, OpenCV

API: JSON API, MS Graph

Authentication: ADFS, Kerberos

Business: Data governance, MS Project, PMO, Project management, Railway

Communication: NFC

Data analytics: Excel, Grafana, Power Query, PowerBI, Qlikview

Data models: ERA ontology, Gist, HDF5, LRS, QUDT, RCM-DX format, RSM, RTM, RailML, Topology, schema/org

Data platform: Jira, Opendatasoft, Sharepoint

Data storage: S3

Data strategy: Data centricity, Opendata

Databases: Dbeaver, MSSQL, MySQL, Oracle, Postgresql

DevOps: Devcontainers, Docker, Git, Github actions, Gitlab CI CD, Helm charts

ERP: SAP PM

Frontend: Scichart, Streamlit

GIS & topology: PgRouting, PostGIS, QGIS, WMS

IaaS / Container orchestration: Azure, Kubernetes, Openshift

Message queue: IBM MQ, MQTT

Micro computer: Arduino, PLC, Raspberry Pi

Mobile: Android, iOS

Monitoring system: Loki, Prometheus

Networking: Cloudflare, Firewall, Forward proxy, Reverse proxy, SSH, VPN

Operating systems: Debian, Raspbian, Ubuntu, Windows

Other: Logseq, Nextcloud, ODK, OpenHAB

Programming languages: C# /NET, Java, PHP, Plpgsql, Python, SQL, VBA

Scheduler: Airflow, Quartz/NET

Semantic technologies: Apache Jena Fuseki, GeoSPARQL, GraphDB, OWL, Ontop, Protege, RDF, RML & YARRRML, RMLMapper, SHACL, SHACL Play, SKOS, SOLID, SPARQL, SPARQL Anything, Virtuoso, Widoco

Sensors & measurements: DSMR, GNSS, IMU, Laser, Laser triangulation, Lidar, NTP, Odometry

Webservers: Caddy, Nginx