

Nicael Jooste

Digital Water Systems & Platform Engineering

Internal Platforms · Digital Twins · Governed AI

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I bridge **complex water operations with modern software engineering**, combining hydrology, drinking-water treatment context, operational data, and AI-assisted development to build internal platforms, SDKs, APIs, and decision-support tools. My strongest work turns ambiguous domain knowledge into software foundations that survive beyond a pilot, several now in daily use across teams. Recent work includes digital-twin concepts for drinking-water treatment and distribution, internal Python SDKs adopted across a growing data team, and PHREEQC/EPANET simulation workflows.

SELECTED SYSTEMS & CAPABILITIES

Zero-to-one infrastructure software

From undefined operational problem to working internal platform: data model, API boundary, validation logic, user workflow, documentation, and rollout plan.

Simulation and scenario workflows

Python/API integration patterns for water-domain solvers such as PHREEQC and EPANET, with attention to validation, reproducibility, and decision-support usability.

Internal Python SDKs

Shared data-access and API-wrapping foundations that encode reusable domain logic and reduce one-off scripts, duplicated work, and fragile automation.

Governed AI adoption

Early LLM experimentation, a multidisciplinary focus group, management briefings, responsible-use guidance, Copilot adoption work, and AI-assisted engineering patterns shaped around governance and risk.

PROFESSIONAL EXPERIENCE

Data Scientist: Applied AI, Internal Software & Data Platforms

Jun 2021 - Present

Dunea N.V. - drinking-water utility

- Initiated and prototyped early digital-twin concepts for drinking-water treatment and distribution, turning telemetry, laboratory measurements, topology, treatment context, and validation logic into inspectable software workflows for live state, historical replay, scenario analysis, and reporting.
- Create and maintain internal Python SDKs that bridge enterprise data platforms and end-user workflows through standardized data access, API wrapping, reusable domain logic, and automation.
- Build internal applications and services with Python, FastAPI, React/Next.js, TypeScript, SQL, Azure, Docker, and CI/CD, using Power BI where an operational reporting surface is the right fit.
- Work on Python integration patterns for domain solvers such as PHREEQC and EPANET, connecting scientific models to web-based decision-support and scenario workflows.
- Helped raise internal data work to stronger software practices: validation, code review, typed interfaces, documentation, deployment discipline, and production ownership.
- Identified LLMs early, initiated a multidisciplinary focus group and an internal innovation group, and helped shape practical ChatGPT/Copilot experimentation and governed AI adoption.
- Built internal data products now in daily use across teams, delivered in-house rather than outsourced; coach junior data scientists and bridge domain experts, platform teams, delivery, and leadership.

ENGINEERING STACK & DOMAIN SYSTEMS

Water	drinking-water operations, treatment context, distribution context, water quality, hydrology, water resources, PHREEQC, EPANET
Software	Python, FastAPI, React/Next.js, TypeScript, SQL, API design, SDK design, internal tools, typed interfaces, documentation
Data systems	data engineering, telemetry, laboratory measurements, validation gates, data-quality flags, replay and scenario workflows
Cloud/dev	Azure, Docker, CI/CD, Git, cloud functions, reproducible development practices
Adoption	Power BI reporting surfaces, governed generative-AI adoption, AI-assisted engineering, stakeholder translation

EARLIER EXPERIENCE

Data Scientist

Aug 2019 - Jun 2021

Crunch Analytics - analytics consultancy

- Developed ETL pipelines, dashboards, and machine-learning models for horticulture and retail clients.
- Worked directly with clients to clarify operational needs, scope analytics projects, and deliver usable solutions.
- Automated workflows with Python, SQL, Google Cloud, and Power BI; contributed to proposals, workshops, and recruitment.

Student Assistant

Sep 2016 - Jan 2020

Delft University of Technology

- Supported course development, MOOC content, faculty communication, grading, workshops, and education support.
- Worked with professors, researchers, and students in a high-paced academic environment.

EDUCATION

MSc Water Management - Delft University of Technology

2016 - 2019

Specializations: Water Resource Management, Hydrology. **MSc thesis**: investigating MetOp ASCAT vegetation parameters with clustering. **Multidisciplinary field project**: mobile data gathering in the Phetchaburi river basin, Thailand.

BSc Civil Engineering - Delft University of Technology

2011 - 2016

BSc thesis fieldwork in Bandung, Indonesia: improving drinking-water treatment processes at PDAM Tirtawening Kota Bandung.

EXTERNAL SECTOR WORK

KWR / BTO digital twin roadmap

Contributed substantial domain, product, and implementation input to sector-level roadmap work on digital twins for drinking-water treatment; acknowledged as part of the steering committee.

KWR hydroinformatics / generative AI

Presented a practical generative-AI use case for a drinking-water utility, focused on extracting structure and decision support from operational plans.

SELECTED FIELD & RESEARCH CONTEXT

Thailand - water resource monitoring

Tested mobile data-gathering approaches in the Phetchaburi river basin, connecting field constraints, hydrological questions, local participation, and data quality.

ENGINEERING PHILOSOPHY

I am most useful where the problem is not only coding, but deciding what system should exist. I start from domain language and operational decisions, build the first working platform, and then make governance, validation, documentation, and ownership part of the product.

WORKING STRENGTHS

- Translating domain-heavy water operations into software models, APIs, data structures, and workflows.
- Using AI-assisted workflows as leverage while keeping architecture, validation, governance, and judgment explicit.
- Moving between hands-on implementation, stakeholder explanation, roadmap thinking, and technical mentoring.
- Building practical internal tools that respect enterprise constraints instead of stopping at prototypes.

TOOLS & METHODS

Python, FastAPI, React/Next.js, TypeScript, SQL, Azure, Docker, CI/CD, Git, PHREEQC, EPANET, API/SDK design, solver integration, validation gates, data modeling, Power BI, machine learning, AI-assisted development, technical documentation.

LANGUAGES & COMMUNICATION

- Dutch native; English full professional working proficiency.
- Afrikaans conversational; German basic reading/listening ability.
- Comfortable explaining technical work to domain experts, managers, engineers, and non-technical stakeholders.

Indonesia - treatment process improvement

Investigated treatment performance at a municipal drinking-water plant and helped identify practical process improvements through field measurements and operational observation.