Simon van Lierde

Research software engineer · Open software and data infrastructure for industrial ecology · PhD candidate, Leiden University

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PROFILE

I'm a full-stack research software engineer with three years of professional experience in software, data, and solution architecture, now in the third year of a PhD in Industrial Ecology at CML, Leiden University. I lead the development of R9lab, a platform that records what products are made of, and I own it end to end. I also build dashboards and interactive visualizations so that people outside the field can read the research. My code and data are open and follow the FAIR principles (findable, accessible, interoperable, reusable).

EXPERIENCE

PhD Researcher in Industrial Ecology @ CML, Leiden University — 2024 – present

- Lead developer of R9lab, responsible for the whole software lifecycle: a FastAPI/PostgreSQL backend with OAuth and Alembic migrations, React/TypeScript and Expo front-ends, CI/CD, Cloudflare networking, restic backups, and security hardening guided by OWASP ASVS.
- Ran two data-collection workshops (135 participants) and deployed the platform in a lab. By October 2026 it held 94 products, 1,779 components, and 4,455 images.
- Designed and deployed a central observability stack for CML's research software (OpenTelemetry, Grafana, OpenTofu). R9lab reports to it today.
- Built a Raspberry Pi camera plugin that captures images automatically. It has an OpenAPI spec and is released on PyPI.

Data Manager @ Nationale Milieudatabase (Dutch Environmental Database) — 2023 – 2024

- Managed the environmental databases behind sustainability calculations for the Dutch construction sector. Improved their data structure, consistency, and validation, and advised on software implementation.
- Brought the national environmental databases in line with open data standards (EU LCDN, PEF), working with policymakers, developers, and industry.

Solution Architect & Product Manager @ Metabolic — 2022 – 2023

- Designed tools for LCA (life-cycle assessment) and sustainability reporting. Advised the division's projects on how to apply LCA, EEIOA (environmentally extended input-output analysis), and MFA (material flow analysis).
- Product owner and domain expert for automated sustainability-reporting tools (FastAPI, Vue) that replaced static Excel models with REST APIs and web applications.

Consultant & Data Analyst, Sustainable Industries @ Metabolic — 2021 – 2022

- Built environmental-impact models (LCA, MFA) in Python for sustainability consulting projects, with clients in industry, NGOs, and government.

EDUCATION

MSc Industrial Ecology @ Leiden University & TU Delft — 2018 – 2023

Joint degree, specializing in environmental modeling, LCA, and GIS. My thesis used Python geoscripting to model the environmental impacts of space cooling in The Hague.

BSc Physics & Astronomy @ Radboud University — 2014 – 2018

Focus on mathematics, theoretical physics, and programming. Exchange semester at the National University of Singapore.

PUBLICATIONS

Rankin, K. H., Donati, F., Tu, Q., Ward-Bond, J., Reitz, N., Hiser, B., van Lierde, S., Suh, S., Saxe, S., Posen, I. D., & Hawes, J. K. **A call to ensure reproducibility of machine learning applications in industrial ecology**. *Research Square* [preprint]. 2026
10.21203/rs.3.rs-9270723/v1

van Lierde, S. **R9lab: data collection platform (software)**. *Zenodo*. 2026
10.5281/zenodo.16637742

PROJECTS

R9lab `github.com/CMLPlatform/r9lab`
Open-source platform that records what products are made of by taking them apart, and collects the photos that computer-vision research needs.

Brightway benchmarks `simonvanlierde.com/brightway-benchmarks`
Continuous performance benchmarks and numerical checks across Brightway releases, with a public results explorer. The suite exposed an iterative-calculation regression in bw2calc 3.0.0; the maintainer's fix shipped in 3.1.0. Synthetic inputs allow the benchmark cases to be rerun without distributing licensed inventory data.

MSc-thesis cooling dashboard `simonvanlierde.com/msc-thesis-ie`
My MSc thesis model, rebuilt as a Snakemake pipeline: an hourly heat balance for The Hague's buildings from the BAG, then LCA, with a dashboard (Nivo, MapLibre).

RaMa-Scene explorer `simonvanlierde.com/ramascene-explorer`
Map of where a country's consumption causes emissions, jobs and metal-ore extraction, over a baseline and 153 RaMa-Scene scenarios on EXIOBASE (Svelte, D3). It loads under 1 MB of a 51.5 MB Parquet file by range request, and Brightway, pymrio and numpy give the same footprint. Zenodo DOI.

jsonvet `github.com/simonvanlierde/jsonvet`
Pre-commit hook and Rust library that checks JSON, JSONC, JSON5 and three other dialects, released on PyPI and crates.io. Matched the Python original on all 40,228 test runs at 2.0, with every later difference documented; fuzz-tested.

Open-source contributions

- **Brightway and pymrio**: fixed wrong LCA scores, cleared two security advisories, made importing Brightway about 0.3 s faster, and made pymrio's extension calculation about 4× faster on EXIOBASE-sized tables (11.1 s to 2.9 s).
- **premise and Activity Browser**: fixed unreported scenario bugs in premise, and parameter, scenario-file and Monte Carlo bugs in Activity Browser (merged into major).
- **lca_algebraic (merged into dev)**: fixed sampling, method lookup and a time-zone cache bug; reduced parameter-expansion time and sped up the Sobol analysis step when second-order indices are not requested.
- **flodym**: stopped lifetime extension overwriting model parameters, and sped up the calculation.
- **Also merged**: bw_timex, SALib, the openLCA Python client, CodeMeta, Boavizta, SchemaStore, pyOpenSci (packaging instructions and tutorial examples), the NLeSC Python template, latex-credits, reauth and fastapi-mail (41 pull requests in all).

TALKS & TRAINING

Crowdsourcing the circular economy — Oct 2026
Open Science Festival 2026 (lightning talk)

NWO NAC 2026 (poster) — 2026

Brightcon 2025 — Oct 2025

ISIE 2025 — Jul 2025

- Schools: BMVA Computer Vision (2026); distributed and GPU computing, Utrecht University (2026); inventory modelling at scale, Départ de Sentier (2025); AI, machine learning and neural networks, Utrecht University (2024).

SKILLS

PROGRAMMING	Python, TypeScript/JavaScript, Rust, SQL, Bash
FRONT-END	React, Svelte, Vue, Astro, Expo/React Native, D3, MapLibre, WCAG 2.2 AA (axe-core)
BACK-END	FastAPI, REST/OpenAPI, WebSockets, OAuth, PostgreSQL, Alembic
DEVOPS	Docker, GitHub Actions, OpenTofu/Terraform (IaC), Cloudflare, Grafana, uv, pnpm
PRACTICES	Git/GitHub, pytest, Playwright, benchmarking, fuzzing, PyPI and crates.io releases, reproducible workflows, FAIR (Zenodo, CodeMeta), OWASP ASVS
DATA SCIENCE & ML	PyTorch, NumPy/SciPy, Pandas, DuckDB, Parquet, Snakemake

DOMAIN MODELING	LCA (Brightway), MFA, EEIOA (EXIOBASE), GIS, circular economy
LANGUAGES	Dutch (native), English (fluent), French (B1), Chinese (A2), Korean (elementary)

INTERESTS

Multi-day treks in the mountains · Fermenting (kimchi, kombucha, tempeh) and cooking for friends · Climbing and via ferrata