

LIVEIQ – The Era of Living Intelligence

A Universal Framework for Real-Time Operational Efficiency

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To those building the intelligence of tomorrow.

Executive Summary

LivelQ is a new category of operational intelligence that continuously compares, in real time, actual performance against an ideal model and prescribes immediate actions to close the gap.

It provides a universal, sector-agnostic framework (LivelQ-M/O) that standardizes how efficiency is measured, explained, and optimized across transport, industry, construction, mining, energy, and logistics.

Core outcomes: faster decisions, continuous optimization, standardized KPIs, and safer, cleaner operations.

Manifesto: From Reactive Telemetry to Living Intelligence

Reactive telemetry and fragmented alerts are no longer enough. The world needs an operational intelligence layer that understands how things should work and acts instantly to approach that ideal.

LivelQ unifies AI, IoT, and systems engineering to create a living digital twin that measures, learns, and optimizes in the flow of work.

LivelQ-M: Universal Mathematical Model

Objective: minimize an operational loss function \mathcal{L} subject to safety/legal constraints, and derive a 0–100 Living Efficiency Index (EV).

State x_t , actions u_t , observations y_t , context c_t with dynamics $x_{t+1} = f(x_t, u_t, c_t) + \epsilon$; $y_t = g(x_t) + \eta$.

Ideal model x^*, y^* from: (1) physical/engineering; (2) historical best/frontier; (3) learned (ML); or (4) hybrid.

Discrepancy components $\Delta^k = \phi((z^k - z^*(c))/r(c))$ with robust ϕ and contextual scaling $r(c)$.

Operational loss: $\mathcal{L} = \sum_d \alpha_d [\sum_{k \in d} w_k \Delta^k]$. EV = $100 \cdot \exp(-\mathcal{L})$. Dimension EV via same form; total EV via weighted geometric mean.

Causality & prescription: SHAP/attribution on \mathcal{L} and counterfactual EV; control via MPC/RL with safety shields; uncertainty via Monte Carlo.

LivelQ-O: Universal Ontology

Purpose: a common, extensible vocabulary for assets, processes, data, context, models, events, KPIs, and actions.

Core classes: `li:Asset`, `li:Process`, `li:Operation`, `li:Task`, `li:Agent`, `li:Observation/li:Timeseries`, `li:KPI`, `li:Model`, `li:Policy`, `li:Context`, `li:Constraint`, `li:Event`, `li>Action`, `li:State`, `li:EVIndex`.

Key links: `observedBy`, `partOf`, `executes`, `hasModel`, `hasContext`, `constrainedBy`, `triggers/mitigatedBy`, `contributesToEV`, `prov` (provenance).

Aligned with W3C/SOSA-SSN, QUDT/UCUM, PROV-O, TIME, SAREF/ISA-95; extended with `li:*`.

Architecture

Layers: (1) Capture/IoT; (2) Edge processing; (3) Ideal Model Engine; (4) Live Comparator; (5) AI Core (explain/predict/prescribe); (6) Optimization/Action; (7) Human IQ (visualization).

Streaming computation with windowing (1s/1m/1h) and EWMA; versioned feature store and model registry.

Indicators & Models

Dimensions: Operational, Energy, Safety, Maintenance, Quality/ESG. Each KPI has definition, units, normalization $r(c)$, thresholds, weight w , and aggregation.

Examples: mobile-OEE (availability \times performance \times quality), specific fuel/energy, compliance rate, severity-of-use index, Remaining Useful Life (RUL).

Domain models: (a) Haul & Load; (b) Urban Transport eco-driving; (c) Continuous industrial process with safe MPC.

- Haul & Load (mining/construction): ideal payload 95–100%, zero idle, speed-by-slope; outputs EV■■■, EV■■■, EV■■■■, EV■■■■.
- Urban Transport: stable cruise, minimal stops, eco-driving coach + route re-planner.
- Continuous Process: safe MPC around optimal setpoints with quality/safety constraints.

Roadmap

v0.1 standard: publish LiveIQ-M/O specs and canonical KPI catalog.

Pilot implementations in mining/construction, transport, and industry; measure ΔEV and ROI.

Governance: weights α , w ; change control; audit with PROV-O; security-by-design.

Partner ecosystem and certification for LiveIQ-compliant solutions.

About Nextop

Nextop LDA, based in Portugal, develops AI and IoT technologies that transform operational data into real efficiency. Through LiveIQ, Nextop brings real-time intelligence to industries worldwide — turning information into immediate action.

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