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ARTECH International

Nuran Aslantas

Artech International

nuran@artechconsulting.net

Who We Are

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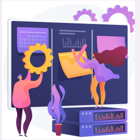
Artech International

SME-Brussels,Belgium

We are specialised in LLM-powered Digital Product Passport (DPP) architectures.

We design **trusted, interoperable, and regulation-aware DPP frameworks** that unify:

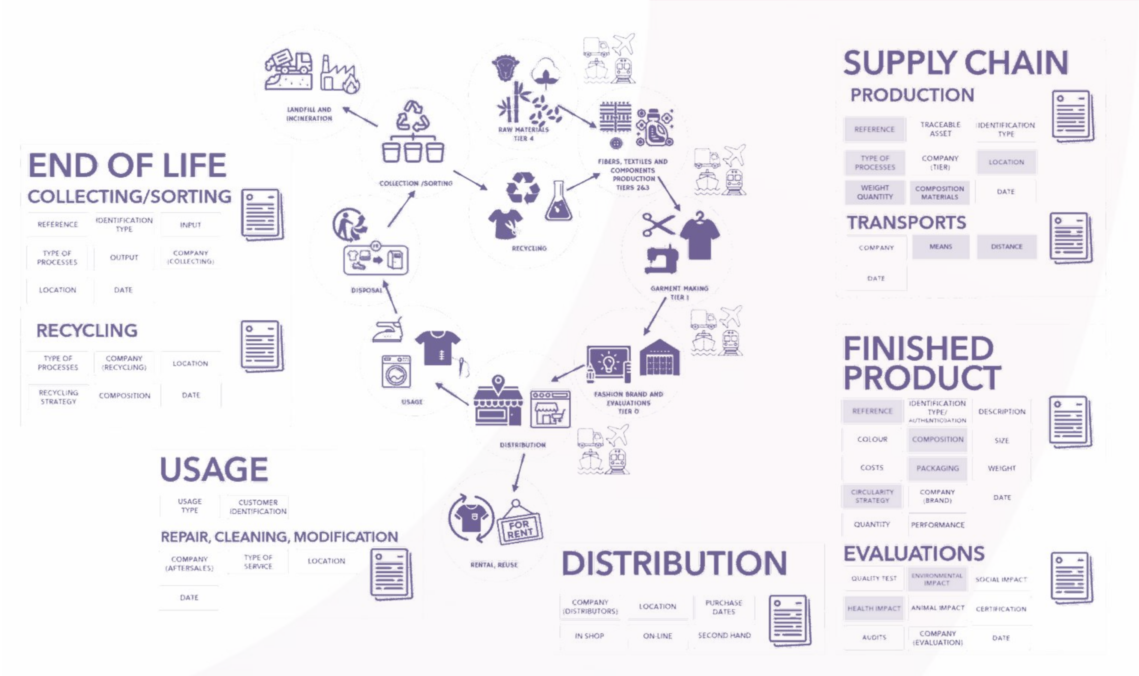


Engineering data

Regulatory obligations

Sustainability & ESG metrics

into **one coherent lifecycle view** from **design to end-of-life**



What We Do

We build **a single system that bridges**

Engineering ↔ Regulation ↔ Sustainability

- ✔ **Semantic, interoperable Digital Product Passports**
- ✔ Apply **Large Language Models (LLMs)** to:
  - ✔ Automated regulatory compliance
  - ✔ Material, process & product validation
  - ✔ ESG & sustainability analytics
- ✔ Transform fragmented ECS data into **actionable, auditable intelligence**

Our LLM-Powered DPP Stack
End-to-end lifecycle governance for ECS
(Design → Manufacturing → Use → End-of-Life)

ESG & Sustainability Impact Layer
- Quantified lifecycle environmental impacts
- ESG indicators by design
- Decision support for sustainable ECS innovation

LLM-Based Compliance & Security Layer
- Continuous compliance for materials, processes & products
- Alignment with evolving EU regulations
- Audit-ready, traceable compliance evidence

LLM Semantic Intelligence Layer
- Interprets unstructured engineering & regulatory data
- Translates across tools, domains & stakeholders
- Enables cross-value-chain interoperability

Digital Product Passport – Data Backbone
- Structured product, material & process data
- Full lifecycle traceability
- Foundation for compliance and circularity

Trusted ECS data across the value chain

Continuous, automated compliance

Sustainability & ESG by design

EU Project & Collaboration Experience

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Coordinator Role

✔ **GreenFab-X** – *Coordinator*
Funded under **HORIZON-JU-Chips-2025-IA**
Status: Grant Agreement Phase (ongoing)
Focus on AI-driven digital twin technologies to optimize processes, materials, and lifecycle sustainability in the semiconductor value chain.

✔ **5G4PHealth** – *Coordinator – ongoing*
5G- and AI-enabled predictive and personalized healthcare, focusing on IoMT data exchange and secure digital health services. *(Celtic Next)*

Partner Role

✔ **Waste2Green** – *EIT Food Impact (2023–2025) – ongoing*
→ Digital Product Passports for biostimulants & biopesticides, circular bioeconomy

✔ **BASE** – *Horizon Europe – ongoing*
→ Digital Battery Passport for supply-chain traceability & circular business models

✔ **MainVerse** – *XECS – ongoing*
→ AI-driven digital twins & unmanned systems for industrial maintenance

✔ **Disrupting MaaS** – *EIT Urban Mobility – finalised*
→ **Mobility as a Service (MaaS)** training & real-world deployment

✔ **SLOADZ** – *EIT Urban Mobility – finalised*
→ Urban logistics optimisation platforms across European cities

ECS-SRIA 2026 – Challenges

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1.1 Major Challenge 6: ***Sustainable semiconductor manufacturing***

SRIA Challenge	Our Contribution
High resource intensity & hazardous substances (energy, water, chemicals, PFAS)	DPP capture process-level energy, water, and material data, while LLM semantic intelligence interprets chemical datasheets and regulations (REACH, PFAS), enabling resource optimisation and regulation-aware material substitution.
Lack of transparency across complex semiconductor supply chains	DPP act as a trusted lifecycle data backbone for supplier, sourcing, and process information, supported by semantic interoperability, enabling end-to-end traceability across the semiconductor value chain.
Missing lifecycle-oriented sustainability governance under increasing regulation (REACH, ESPR, DPP, Chips Act)	DPP-centred lifecycle governance framework, combined with LLM-based regulatory compliance, ensures continuous compliance, audit-readiness, and reduced certification risk across design, manufacturing, and end-of-life.
Fragmented sustainability data & lack of comparable indicators	LLM-driven sustainability intelligence transforms unstructured fab documentation into quantified ESG and lifecycle indicators (energy, water, CO_2, resources), enabling benchmarking, optimisation, and sustainability-by-design decisions.

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1.2 Major Challenge 3: ***Sustainability***

SRIA Challenge	Our Contribution
Growing e-waste, long ECS lifetimes & high replacement rates	DPP capture configuration, usage, and condition of components, modules, and systems, enabling repair, refurbishment, selective replacement, software upgrades, and second-life use, directly reducing e-waste and CO_2 emissions.
Poor recyclability due to highly integrated CMS designs	DPP-based transparency of module composition and interfaces, supported by semantic descriptions, enables design-for-disassembly, easier dismantling, and improved component and material recovery at end-of-life.
Circularity and sustainability requirements unknown at design time	LLM semantic intelligence links evolving eco-design, circular-economy, and regulatory requirements (e.g. RoHS, PFAS) to design and material choices, enabling future-proof, regulation-aware ECS design.
Lack of reliable lifecycle data and transparency for sustainability assessment & business models	Certified lifecycle data in DPP, interpreted by LLMs, delivers consistent LCA based sustainability indicators (energy, materials, CO_2) and supports circular business models based on transparency, reuse, repair, and recycling.

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1.4 Major Challenge 2: ***SoS Interoperability***

SRIA Challenge	Our Contribution
Heterogeneous data models and standards across constituent systems	LLM-based Semantic Intelligence Layer supports meaning-level translation and integration between standardised data models (e.g. ISO 10303, ISO 15926, BIM), significantly reducing manual interoperability engineering effort.
Divergent implementations of the same standards	Assisted semantic alignment identifies correspondences and inconsistencies between different standard implementations, enabling vendor- and tool-agnostic interoperability with human validation.
Manual, costly, and error-prone SoS integration processes	Automated and AI-assisted translation and integration mechanisms generate mapping suggestions, transformation rules, and integration artefacts, automating substantial parts of SoS interoperability engineering while keeping engineers in the loop.
Poor lifecycle support for SoS evolution (updates, upgrades, extensions)	DPP provides lifecycle-aware traceability of interfaces, data models, and dependencies, enabling dynamic, design-time and run-time interoperability, efficient system evolution, and long-term SoS governance.

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2.3 Architecture and Design: Methods and Tools

SRIA Challenge	Our Contribution
Cost- & Effort-Efficient Design and Validation	DPP combined with LLM semantic intelligence structure design data, validation artefacts, and requirements, enabling traceable, tool-supported, and reuse-oriented design and validation workflows that reduce cost while ensuring high-quality ECS.
Sustainable Design for Sustainability	DPP as design-time artefacts integrate sustainability and regulatory constraints into engineering workflows, while LLMs interpret LCA, ESG, and eco-design requirements, enabling early sustainability assessment and regulation-aware design decisions.
Managing Complexity	Semantic abstraction and lifecycle structuring using LLM interpretation of heterogeneous design, system, and lifecycle data, with DPP as a unifying backbone, reduce cognitive, system, and integration complexity across ECS lifecycles.
Managing Diversity	LLM-assisted semantic interoperability and DPP-based common reference models enable integration across diverse tools, data models, technologies, and stakeholders, supporting diversity without enforcing uniformity.

2.4 Quality, Reliability, Safety and Cyber-Security

SRIA Challenge	Our Contribution
HW quality, reliability & safety over long lifecycles	DPP capture HW/SW configurations, validation evidence, and lifecycle events, while LLM-based regulatory intelligence ensures traceable, regulation-aligned quality and safety assurance across updates and evolution.
Dependable connected software & OTA updates	DPP-based software lifecycle governance combined with LLM interpretation of standards and regulations enables controlled, auditable, and dependable software evolution.
Cybersecurity, privacy & post-quantum resilience	Lifecycle security inventories in DPP, interpreted by LLMs, support continuous cybersecurity, privacy, and post-quantum transition planning, ensuring long-term security resilience.
Human systems integration & trust	Semantic abstraction and explainable compliance summaries make complex quality, safety, and regulatory information understandable and actionable for engineers, operators, and authorities.

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ECS Key Application Areas-*Mobility*

SRIA Challenge	Our Contribution
Long-lived, evolving Software-Defined Vehicles	Vehicle-level DPP provide lifecycle traceability of ECUs, HW/SW configurations, and dependencies, enabling governance across decades-long vehicle lifetimes.
Safety, security & compliance under continuous OTA updates	LLM-based semantic and regulatory impact analysis assesses OTA effects on safety, cybersecurity, and compliance, enabling controlled and auditable updates.
SoS complexity across vehicle subsystems	LLM semantic intelligence supports meaning-level integration across ECUs, sensors, cloud, and backend systems, reducing SDV integration complexity.
Sustainability & circularity of vehicles	Extended DPP support repairability, upgradeability, second-life use, and recycling, aligning SDV with circular-economy objectives.

ECS Key Application Areas-Digital Industry – Sustainable Production

SRIA Challenge	Our Contribution
Traceability of energy, materials & waste flows	Plant- and product-level DPP capture material, energy, and waste flows, enabling end-to-end lifecycle traceability aligned with LCA.
Reliable sustainability data under dynamic conditions	LLM-assisted harmonisation of IoT and virtual sensor data ensures consistent, trustworthy sustainability indicators across operating conditions.
Human-centred, efficient production operations	LLM-powered virtual assistants provide decision support to operators, reducing losses caused by deviations, failures, and human factors.
Green Deal & regulatory compliance	LLM-based regulatory compliance intelligence links sustainability regulations to production data, enabling audit-ready reporting and Green Deal alignment.

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THANK YOU FOR YOUR ATTENTION

Contacts

Rue de la Presse 4,
Brussels 1000 Belgium

nuran@artechconsulting.net

www.artechconsulting.net