White Paper: Business Value and Sector-Specific Advantages of Hexagon TRK500 and 700 Neo and AAI RepliMap.

AI-Powered World Replication at Scale: Unlocking Industry Value with Hexagon's TRK System and AAI's RepliMap, to create a replica of the world.

Executive Summary

In an era of rapidly advancing digital transformation, organizations across industries face a shared challenge: how to replicate the physical world in high fidelity, at scale, and at a cost that makes virtual simulation feasible and effective. This white paper presents a strategic collaboration between **Hexagon**, a global leader in precision mapping, and **Automotive Artificial Intelligence (AAI) GmbH**, a pioneer in AI-driven tooling.

Hexagon's **Pegasus TRK500/700 Neo** delivers ultra-precise, vehicle-mounted mobile mapping system (MMS) capabilities. AAI's **RepliMap** converts this data into simulation-ready, semantically enriched digital twins. Together, these technologies offer an end-to-end solution for generating real-world replicas for testing, training, and validation in automotive, smart cities, logistics, infrastructure, and defense.

Critically, this collaboration breaks a key economic barrier: enabling high-definition, simulation-ready data for **less than three-digit euros per kilometer.** This cost-efficiency unlocks scaled adoption across industries, allowing for previously unattainable digital twin programs to become a business reality.

Figure 1: Pegasus TRK & AAI-RepliMap | HD Map workflow

Joint Solution: Capture-to-Simulation in Days, Not Weeks

Stage	Hexagon TRK500/700 Neo
Capture	High density, multisensory mobile mapping
Positioning	GNSS, SLAM, IMU, odometry
Preprocessing	Live Preview, blur anonymization
Output formats	Industry standard exchange formats for point cloud and imagery
Deployment	Rugged Hardware with easy Software UI
App Domains	Road, Rails, Logistics

Stage	AAI RepliMap
Modelling	Semantic modelling, lane topology, barriers, road rules
Editing & Enrichment	Lanes, markings, signs, attributes, network refinement
Validation	Geometry checks, topology consistency, change comparison
Output formats	ASAM OpenDRIVE®, Lanelet2
Deployment	Desktop App, cloud library, optional on-prem support
Integrations	Simulation toolchains (dSPACE, IPG, CARLA etc), custom pipelines, API/SDK ready
App Domains	Roads, Rails, Logistics, Simulation, City Planning
Service	Map conversion, enrichment, customization, onboarding & support
Value	100% automation, faster map production, fewer simulation errors, scalable workflows

Turning Raw MMS Data into Deliverables

Leica Pegasus Office

Automation of:

- Trajectory processing
- Cloud2Cloud Matching
- Control Point Recognition
- Anonymisation of Imagery.

Figure 2: High-Precision Mobile Mapping Rig; capturing accurate 360° road and environment data for HD map creation.

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Sector Use Cases and Business Advantages

Automotive & Mobility

Use Cases: ADAS and AV validation, Euro NCAP and GSR compliance, behavioral model training

Advantages:

- ❖ Reduce physical testing requirements by up to 80%
- ❖ Accelerate virtual test scenario creation
- ❖ Reuse simulation-ready maps across vehicle programs

Smart Cities & Infrastructure

Use Cases: Traffic flow simulation, infrastructure digital twins, environmental modeling

Advantages:

- ❖ Plan urban mobility using real-world data
- ❖ Simulate pedestrian and cyclist interactions
- ❖ Drive investment decisions with accurate city-scale replicas. Fast data capture and processing allow MMS data to be updated frequently (e.g., annually).

Heavy Logistics & Last-Mile Delivery

Use Cases: Route planning, obstacle simulation, autonomous delivery trials

Advantages:

- ❖ Optimize routes with real-environment constraints
- ❖ Model delivery behavior in densely populated or complex areas
- ❖ Lower operational risk by testing virtually before deployment

Defense & Public Safety

Use Cases: Mission rehearsal, emergency response training, terrain simulation

Advantages:

- ❖ Train in realistic, virtual environments that match actual terrain conditions
- ❖ Update digital twins in response to environmental or security changes
- ❖ Simulate multi-agency coordination in crisis situations

Rail & Infrastructure Inspection

Use Cases: Track mapping, structural validation, corridor modeling

Advantages:

- ❖ Reduce downtime through virtual inspections, and improve employee safety during data capture
- ❖ Ensure asset accuracy for planning and maintenance
- ❖ Identify hazards through semantic data layers

Figure 3: One platform. Multiple sectors. Real-world data turned into simulation-ready digital twins.

Strategic Business Benefits

- ❖ Scalable Pricing Model: Simulation-ready HD maps for less than three-digit euros per kilometer
- ❖ Rapid Turnaround: From data capture to simulator in under 144 hours
- ❖ Cross-Industry Reusability: Single digital twin can serve multiple departments or use cases
- ❖ Standards Compliance: Supports OpenDRIVE, Lanelet2, OpenSCENARIO, ASAM OpenODD, and TRK output data formats (LGSx, E57, LAS, JPG, etc)
- ❖ Cloud-Native Flexibility: Deploy on-prem, cloud, or hybrid based on business constraints

Conclusion: A Blueprint for Scalable World Replication

Hexagon and AAI bring together **precision**, **automation**, and **intelligence** to address one of the most pressing needs across industries: turning the physical world into simulation-ready assets at scale. From automotive safety to smart city planning, from logistics optimization to national security, this joint offering provides an operationally efficient, cost-effective path forward.

This is more than just data capture. It's about transforming how we **simulate, plan, and operate cost-effectively, accurately, and at scale**.

Let's build the world again, smarter.

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