

<https://exarchproject.com/>

EXARCH: sErvitization of Industry X.0 Assets powered by secure, Resilient and immersive digital twin teCHnologies

Project Information



EXARCH
Grant agreement ID: 101236244

DOI ⓘ
[10.3030/101236244](https://doi.org/10.3030/101236244) ⓘ

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Marie Skłodowska-Curie Actions (MSCA)

Total cost ⓘ
No data

EU contribution ⓘ
€ 1 803 600,00

Investment in EU policy priorities ⓘ
<https://cordis.europa.eu/project/id/101236244>

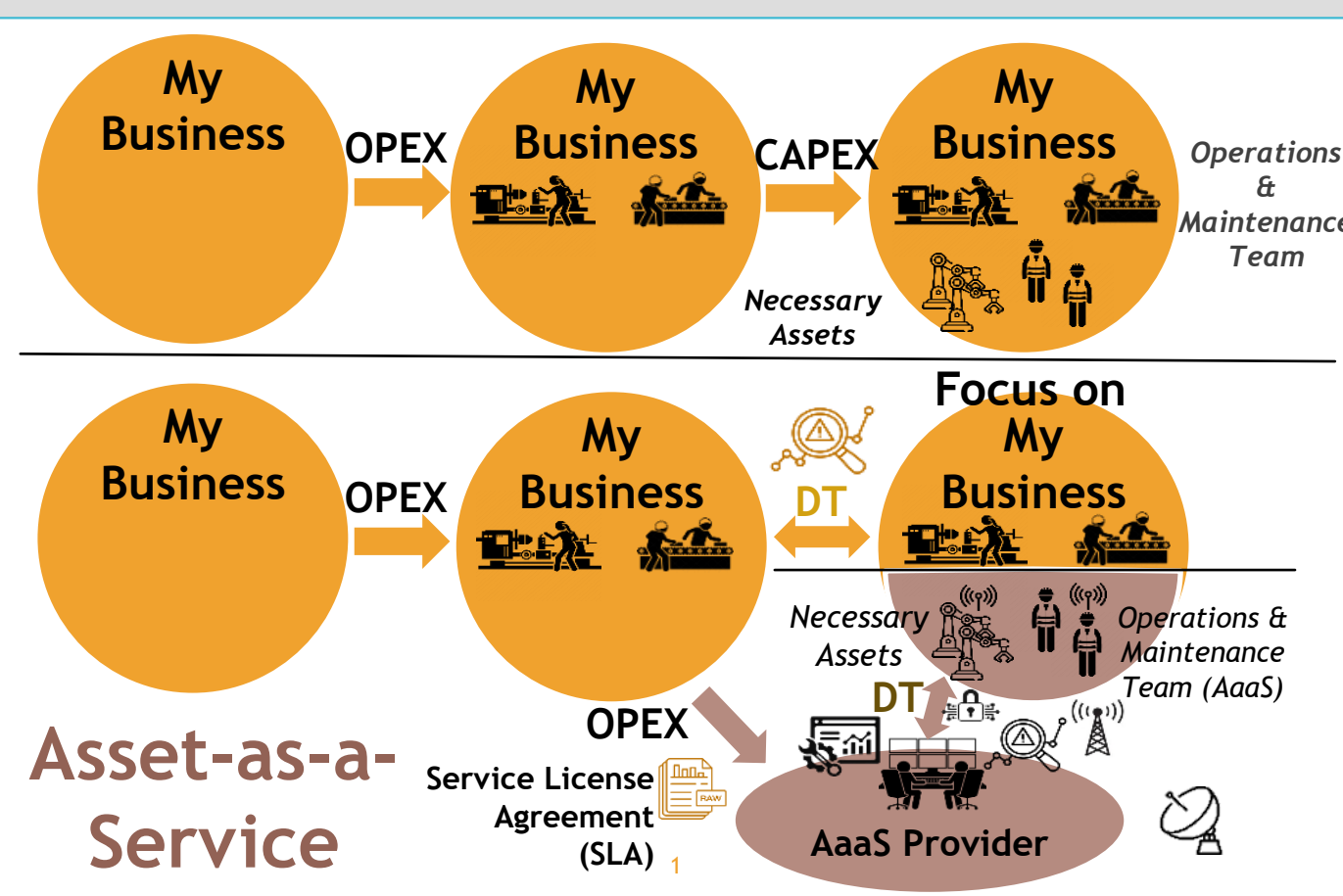
Climate action ⓘ

Digital twin technologies are a key component of the EU's twin transition by 2030 strategic approach to optimise economic growth through the digitalisation of infrastructures and industry in a responsible and environmentally sustainable manner. **EXARCH** project aims to design, construct and demonstrate a **fully modularised end-to-end digital twin platform** to support emerging **Asset-as-a-Service (AaaS)** business models. This platform will enable the design of cloud-native AaaS microservices, exploiting the capabilities of 6G mobile data networks and advances in semantics-aware computer vision. It will develop an immersive user-centric service suite that facilitates automated AaaS management, while addressing the cybersecurity challenges of remote monitoring of industry assets.



9
Partners
8
Countries

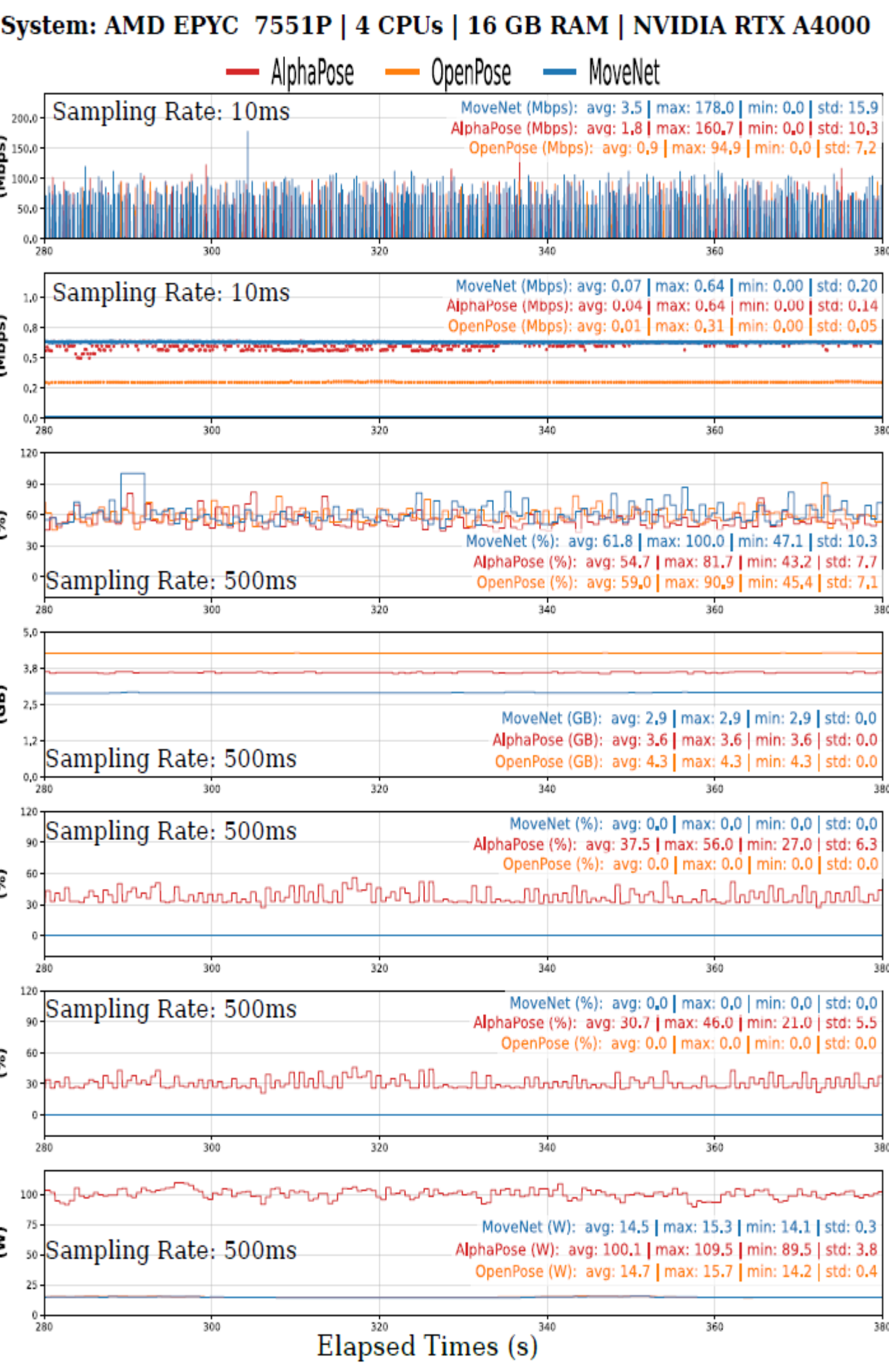
- **Servitization** empowers organizations that lack the know-how, technical staff, or resources for purchasing and operating high-end assets to **immediately benefit** from the utilization of specialized machinery, equipment and software, *through pay-as-you-use services* offered by **Asset-as-a-Service (AaaS)** providers
- **AaaS** allows enterprises to start their operations **immediately** and at **predictable costs**, scaling their production to the market / customer needs, while maintaining the right to upgrade their equipment
- AaaS distincts the **ownership** of assets **from** their daily usage, operation and maintenance and transforms **CAPEX** to **OPEX**



EXARCH Measurable Performance Objectives

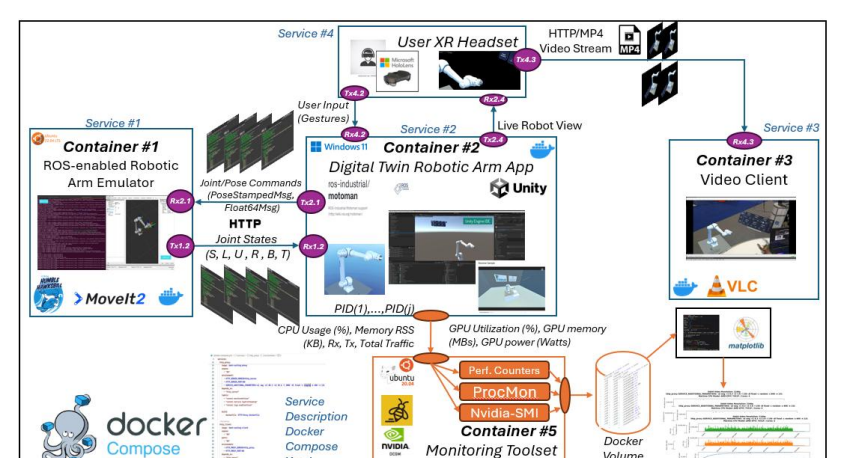
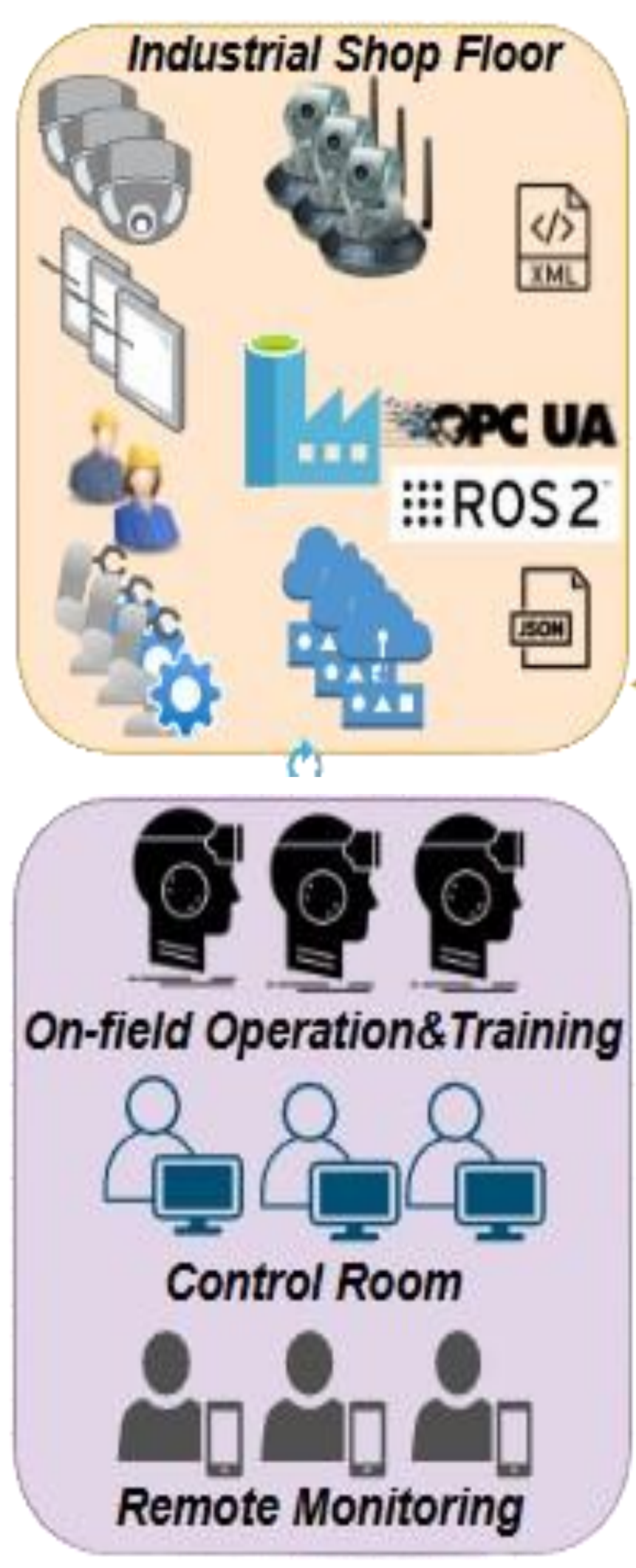
- MPO1.** Setup new AaaS subscriptions (including instantiation of AaaS modules) in sub-minute scales
- MPO2.** 20-fold reduction of transport data and 15% lower energy consumption vs. SotA XaaS platforms
- MPO3.** <10ms inference time, >10% absolute improvement in the mean Average Precision (mAP)
- MPO4.** Sustain <5 minutes detection latency with >95% detection rate and >90% mitigation success
- MPO5.** Reduce annualized loss expectancy (ALE) by 15%, sustain mean absolute error (MAE) below 5%
- MPO6.** >80% output understanding with <1min response validation time for AaaS management services

EXARCH Performance Evaluation Tools



Research and Innovation Objectives (RIOs)

- RIO1.** Conceptualize a 6G-ready microservice-based architecture for resilient secure and Digital Twin-backed Asset-as-a-Service (AaaS)
- RIO2.** Develop an immersive 3D digital twin that digests real-time IoT/camera data from multiple sources
- RIO3.** Create a multi-layer cross-domain cybersecurity framework to address unique challenges of AaaS
- RIO4.** Develop a user-friendly human-understandable management framework tailored to AaaS



WP2: AaaS Service Architecture, Requirements and Data

- XAI modules, scenarios and business models
- Multi-tiered cross-silo FL-driven edge/cloud orchestration framework (NBC)
- 6G-enabled ISAAC module for high-resolution imaging of IX.o assets (UAQ)

WP3: IX.o-tailored Digital Twins digesting multi-source multi-modal data in real-time

- DT platform, 3D models for IX.o assets (FOG)
- Disaggregated semantics-aware information processing framework (FOG/LIU)
- Semantics-aware 3D reconstruction innovations (FOG/LIU)
- Hybrid 6G ISAC / LiDAR 3D SLAM (UAQ/FOG)

WP4: Multi-layer Cross-domain Cybersecurity Framework for DT-backed AaaS

- 6G-enabled friendly jamming (UOA)
- Waveforms/beamforming technique for PHY layer security in IX.o (IT)
- IX.o-tailored identity management protocol with DIDs and VCs (IOB/IT)
- Provably secure Role- and Attribute-based access control for IX.o assets (IOB/CUT)
- DT deception mechanism (CUT/FOG)
- Adversarial IPS infrastructure (CUT/IOB)

WP5: Automated User-Friendly AaaS Management

- Asset health management driven by visual analytics and multimodal IIoT data (NBC/UOA)
- Cybersecurity-informed risk assessment (IOB/UOA)
- Immersive DT-backed virtual commissioning microservice (INC/UOA)
- Explainability (NBC/UOA)

WP6: DT-backed AaaS Platform Integration, Testing and Performance Assessment

- E2E system integration & testing (PoC DT-backed AaaS platform)
- Platform assessment, optimization and documentation