



ForeSee

European Cluster for Predictive
Operations in Manufacturing

www.foresee.eu

The ForeSee Cluster



CLUSTER

11 innovative H2020 and HE projects



VISION

Sustainable and Smart Factories through **Predictive Operations**



MISSION

Roadmap for Predictive Operations



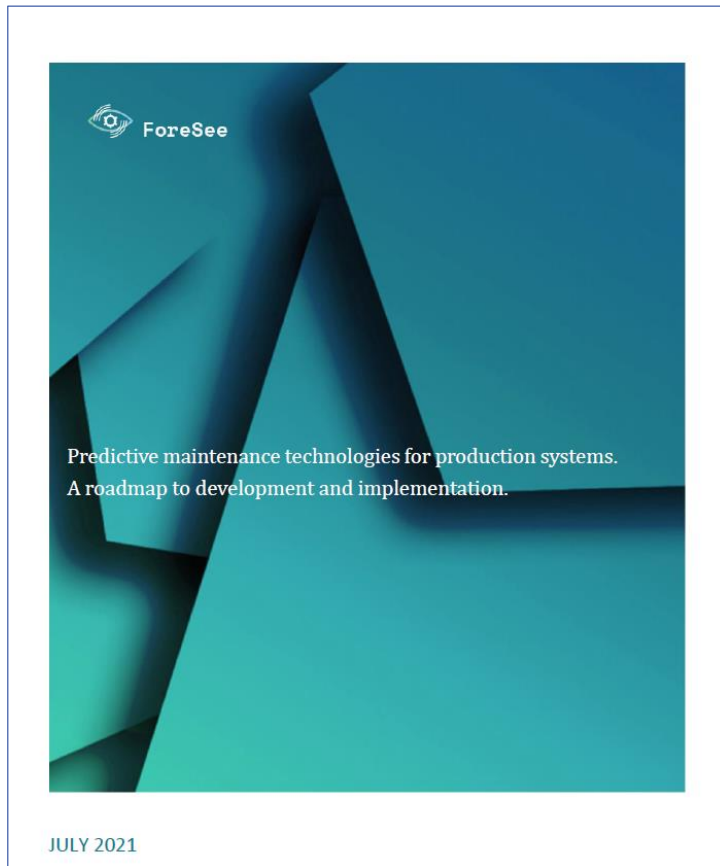
ForeSee Cluster Thematics

- Predictive Maintenance
- Predictive Quality
- Predictive Analytics
- Predictive Energy
- Skills and Competencies
- Standards

ForeSee Cluster objectives

- Introducing **predictive operations paradigm** in the manufacturing industry
- **Skills** requirements and development for the future factory
- Contribution to the **future research agenda**
- Development of roadmap for predictive technologies adoption
- Enhance European industry **innovation capacity**
- Joint **communication** and **dissemination activities**
- Joint **standardization** considerations

ForeSee cluster white paper



Predictive maintenance technologies for Production systems
A roadmap to development and implementation

Table of Contents

1	Introduction	10
2	A vision for predictive maintenance in manufacturing	11
2.1	Background – Current Trends in Maintenance.....	11
2.2	Technological Drivers of Maintenance Strategies	12
2.3	Incentives and Barriers to Predictive Maintenance Adoption in Industry	13
2.4	Data Acquisition - Digital Transformation Strategies for Predictive Maintenance	16
2.5	Detection as a Cornerstone of Predictive Maintenance	17
2.6	Prediction – Forecasting the Future State of Assets.....	19
2.7	Actionable Decisions on all Levels of Maintenance.....	20
2.8	Standardisation and Interoperability	22
2.9	ForeSee Predictive Maintenance System Reference Architecture	24
3	Key-enablers for predictive maintenance in manufacturing.....	28
3.1	IIoT (Sensors, gateways, platform).....	29
3.1.1	IIoT Sensors and Conditioning Systems	29
3.1.2	IIoT Gateways.....	30
3.1.3	IIoT Platforms	31
3.1.4	Data-driven analytics for predictive maintenance	32
3.2	Digital Twins.....	36
3.3	Proactive computing	37
3.4	VR/AR.....	40
3.5	Linked Data	41
3.6	Skilling of personnel	43
4	Industrial use-cases.....	45
4.1	SERENA system and pilot cases.....	45
4.1.1	Robotics use case	45
4.1.2	Steel industry use case	46
4.1.3	Metrology equipment use case.....	47

Published in July 2021

ForeSee new white paper

**Technologies for Predictive operations in manufacturing systems.
Current status, challenges and future outlook**

- 1. Introduction
- 2. Predictive operations in manufacturing
- 3. Key-enablers for predictive operations in manufacturing
- 4. Industrial pilots
- 5. Standardization aspects of predictive technologies
- 6. Recommendation for future research directions and innovation policy



Expected in summer 2023

IndTech 2022





ForeSee European Cluster for Predictive Operations in Manufacturing
www.foresee-cluster.eu

ForeSee cluster objectives

- Introducing predictive operations paradigm in the manufacturing industry
- Skills requirements and development for the future factory
- Contribution to the future research agenda
- Development of roadmap for predictive technologies adoption
- Enhance European industry innovation capacity
- Joint communication and dissemination activities
- Joint standardization considerations

JOIN US !



www.foresee-cluster.eu

Contact
 Dr. Kosmas ALEXOPOULOS
 Laboratory for Manufacturing Systems and Automation (LMS)
 University of Patras, Patras 26504, GREECE
 Tel.: +30-2610-910160, Fax: +30-2610-997314
 Email: alexk@lms.mech.upatras.gr



Gaps and challenges regarding digital technologies for manufacturing that should still be addressed in future work

- Complexity of implementing and interpreting AI
- Skill gap in the manufacturing workforce
- Quantity and quality of data for accurate AI solutions
- Capital investment for required infrastructure
- Mindset

Thank You!

Dr. Kosmas Alexopoulos

Laboratory for Manufacturing Systems and Automation (LMS)

University of Patras, Greece

Tel.: +30-2610-910160

Email: alexokos@lms.mech.upatras.gr

