MANTIS

Cyber Physical System based Proactive Collaborative Maintenance

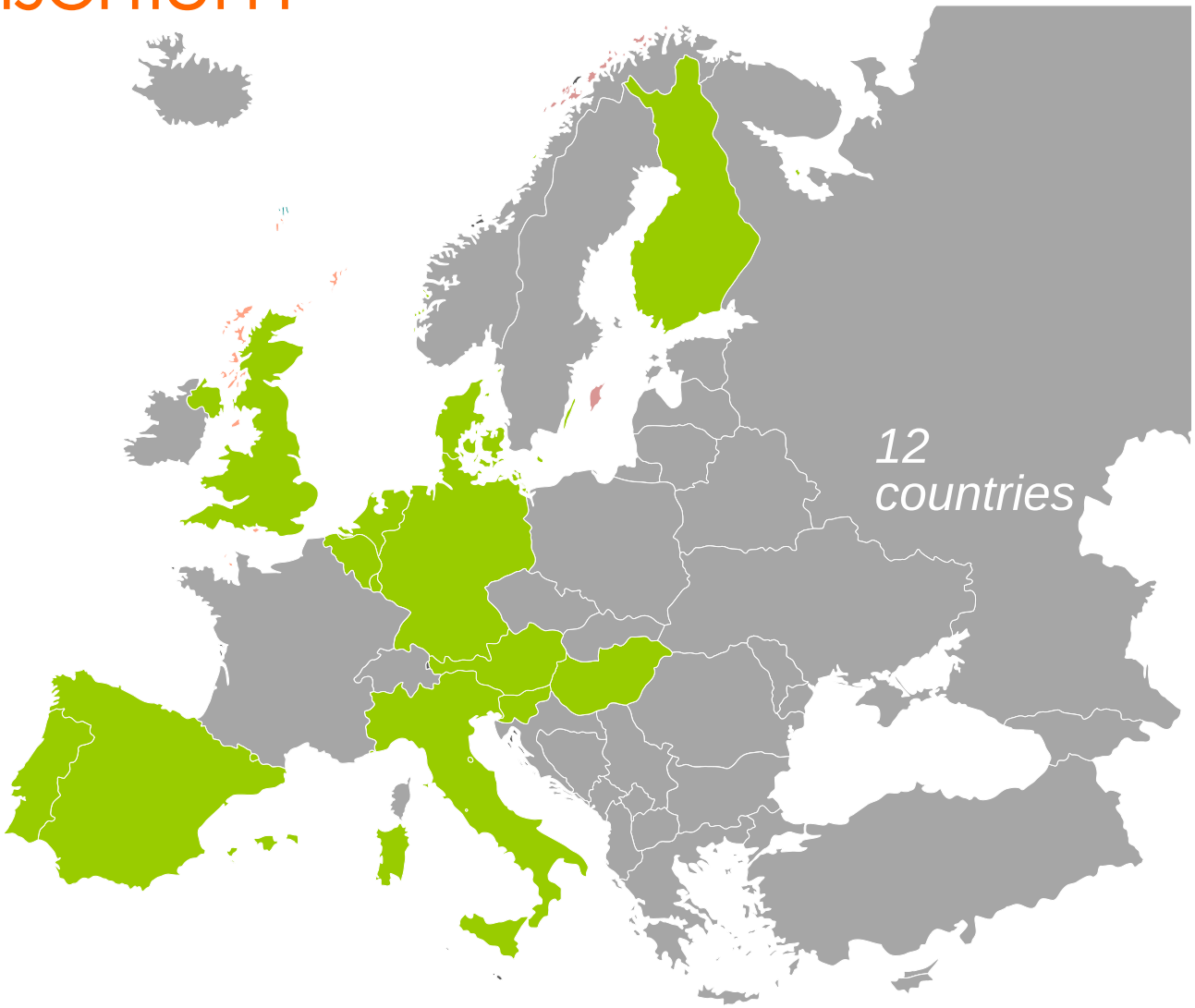
ECSEL-2014-1 Project – MANTIS

Project number: 662189

“Maintenance is no longer a necessary evil that costs what it costs, but an important function that creates additional value in the business process”

“New business models with a stronger service orientation are seen as an instrument to react to the upcoming competition and future challenges”

Consortium



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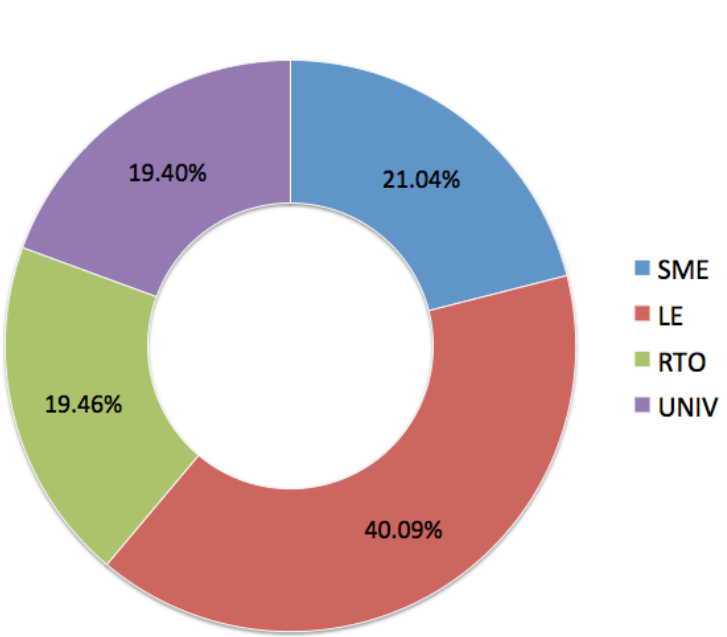
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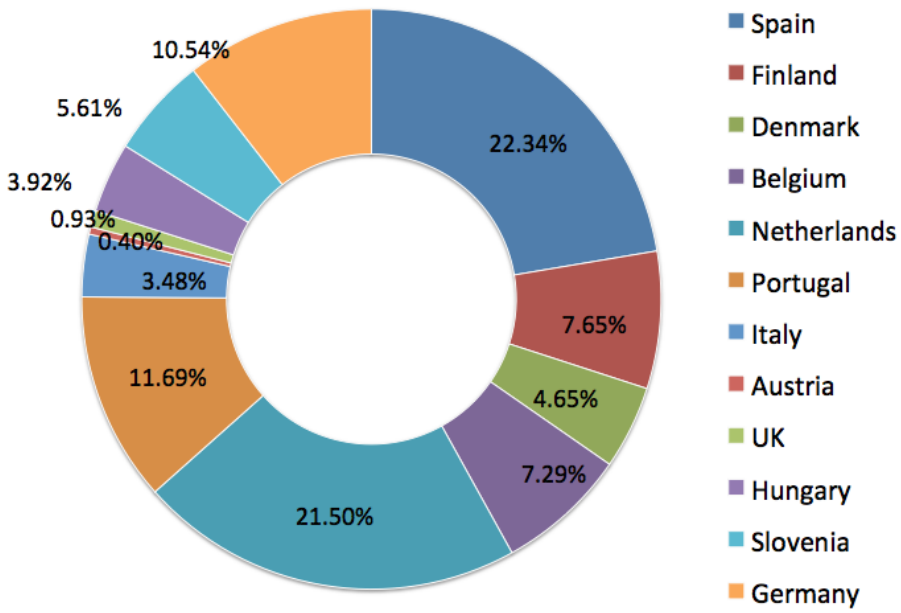
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What is the life expectancy of an asset's component or part?

How can I perform in depth root cause failure analysis on my process and equipment?

How can I predict an impending equipment failure and the cause?

How can I reduce unscheduled maintenance and its high costs?

How can I optimize my maintenance plan?

How can I detect warranty issues sooner?

How do I achieve optimal equipment efficiency and availability?

Objective

The main objective of MANTIS is to develop a

Cyber Physical System - based

Pro-active Maintenance Service Platform Architecture

enabling

Collaborative Maintenance Ecosystems

Objective

- Reduce the adverse impact of maintenance on productivity and costs
- Increase the availability of assets
- Reduce time required for maintenance tasks
- Improve the quality of the maintenance service and products
- Improve labor working conditions and maintenance performance
- Increase sustainability by preventing material loss (due to out-of-tolerance production)

Embedded solutions

- New sensing CPS to capture maintenance relevant/critical information
- Virtual Plug & Play
  - Easy to configure and deploy complex maintenance services
- Secure wireless solutions
  - Increasing the possibility to reach inaccessible places for a wired network
- Remote access that facilitate access to new geographic markets
- Distributed (local) decision making
- Connection to the Cloud enabling new capabilities for data aggregation and complex computing
- Distributed Big Data analysis with focus on critical data sources

Knowledge management

- For an enhanced advanced analytics methodology
  - Proactive asset maintenance
  - Root cause failure analysis
  - Remaining useful life identification
  - Simulation, prediction and scenario tools

- Information sources
  - Asset maintenance history
  - Condition monitoring
  - Inventory and purchasing transactions
  - Labor, craft, skills, certifications and calendars
  - Safety and regulatory requirements
  - ERP, sensors, CMMs, SCADA,…
  - New CPS will provide relevant/critical data/information
  - Simulations

HMI

Analysis and decision making
(Distributed & Cloud)

Data sources
(On-premises & Cloud)

Open Data CRM CMMS

MES Geo Information ERP

Communications in
challenging environments

Analysis and decision making
(Local)

Smart sensors Smart sensors Smart sensors

Smart sensing and data
acquisition technologies

Use cases

- Production asset maintenance will be validated in:
  - Shaver production plant
  - Pultrusion line
  - Press machine maintenance
  - Sheet metal working machinery
  - Compressor maintenance
- Vehicle maintenance management will be validated in:
  - Off-road and Special Purpose Vehicles
  - Railway systems
- Energy production asset management will be validated in:
  - Wind mills
  - Photovoltaic plants
  - Conventional energy production
- Health equipment maintenance will be validated in:
  - Health imaging systems

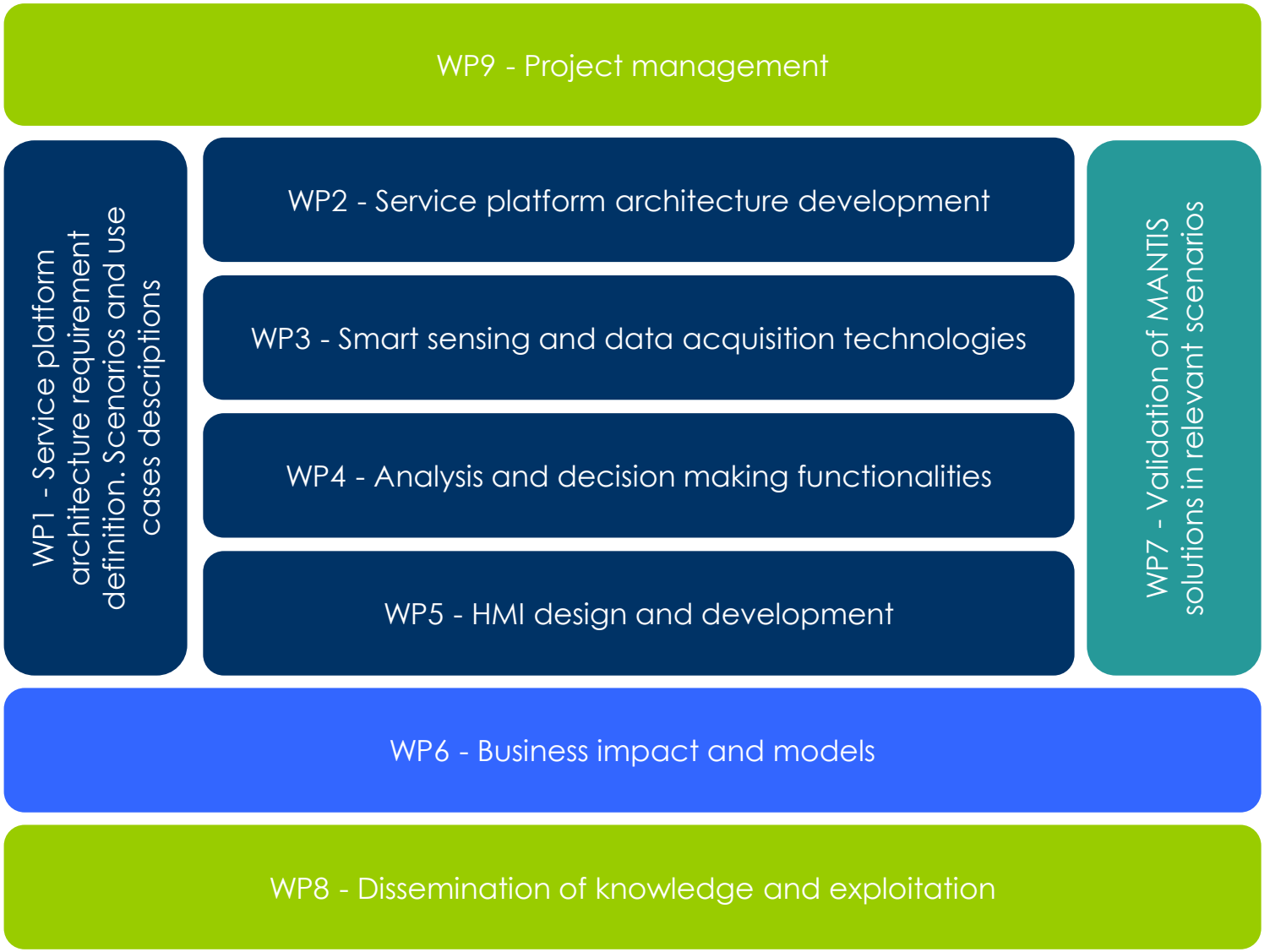
Impact

- Competitiveness (C)
  - Reduction of unscheduled maintenance and its high costs
  - Optimised maintenance windows to reduce operating expense
  - Avoid unnecessary investments in redundancy
  - Minimise parts inventory
  - Increased equipment lifetime
- Assets Availability (A)
  - Unexpected failures reduction
  - Repair and overhaul time reduced
  - Improved reliability and uptime of assets

Impact

- Sustainability (S)
  - Lower energy and raw materials need
  - Lower CO2 footprint through full life cycle use and components re-use
  - Reduction in spare part consumption thus, smaller stock of spares
  - Increased plant safety
  - Work orders down
  - Efficient assignment of labour resources
  - More friendly and attractive working environments
  - Preparing the next generation of knowledge-workers
  - Improved competitiveness
  - Employment sustainability and new job creation based on new business models and opportunities
  - Stimulating societal cohesion by value added production instead of price competition
  - Increased life expectancy of ageing factories
  - Internationalisation opportunities
  - Key components re-use (rental or second-hand asset market)

Implementation



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Thank you