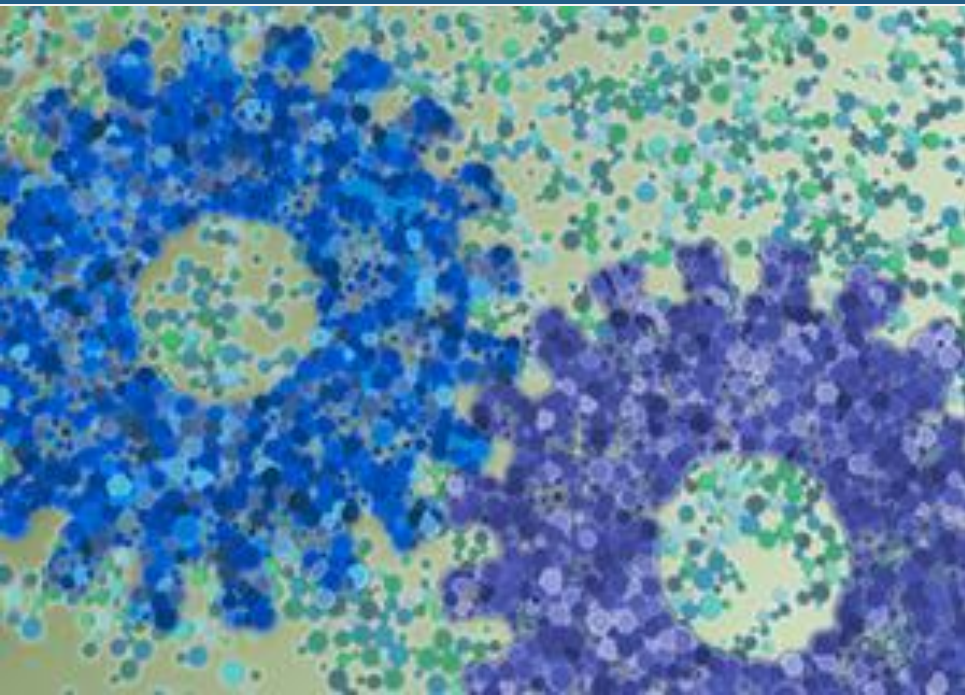


Data analysis and visualization framework in the manufacturing decision support system of COMPOSITION project



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CERTH/ITI

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- d. Nextworks Srl*
- e. Istituto Superiore Mario Boella (ISMB)*



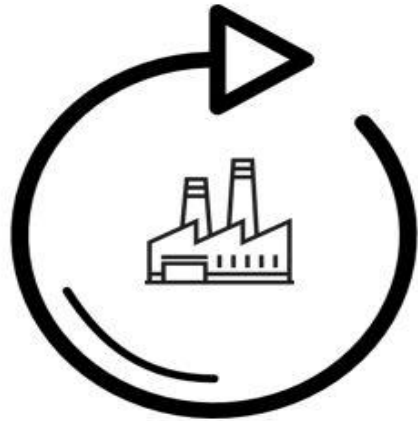
Co-funded by the
European Union





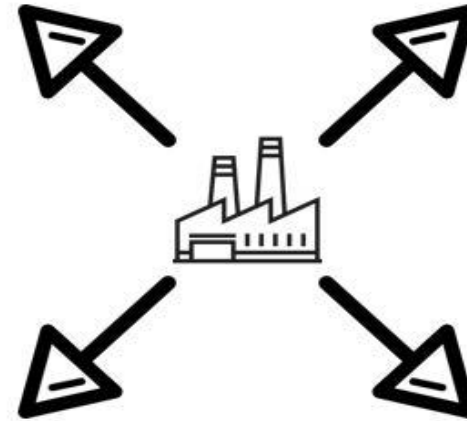
Introduction

- Integrated Information Management System (IIMS)
- Agent Based Ecosystem



Intra Factory

Value Chain

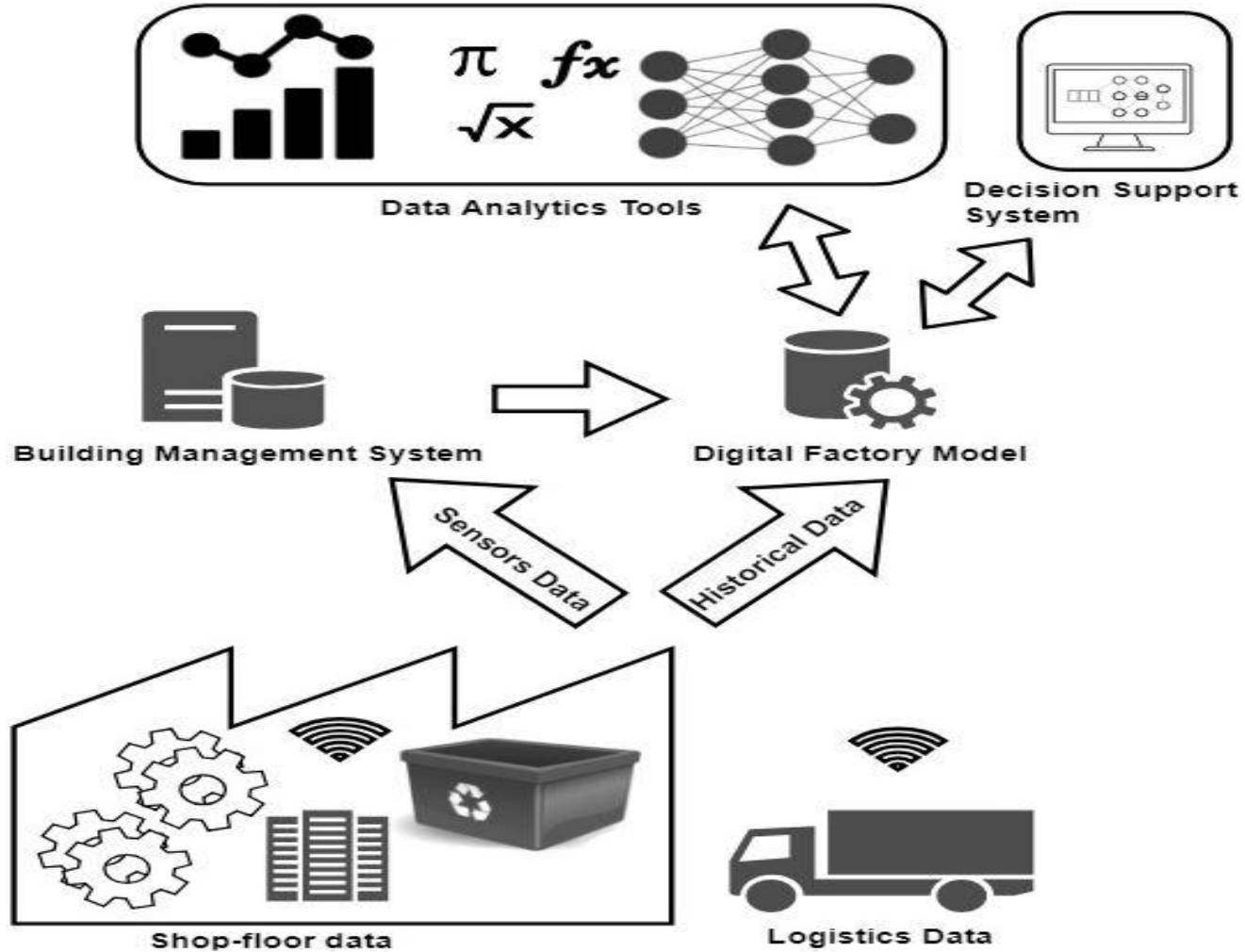


Inter Factory

Supply Chain



IIMS Information Flow





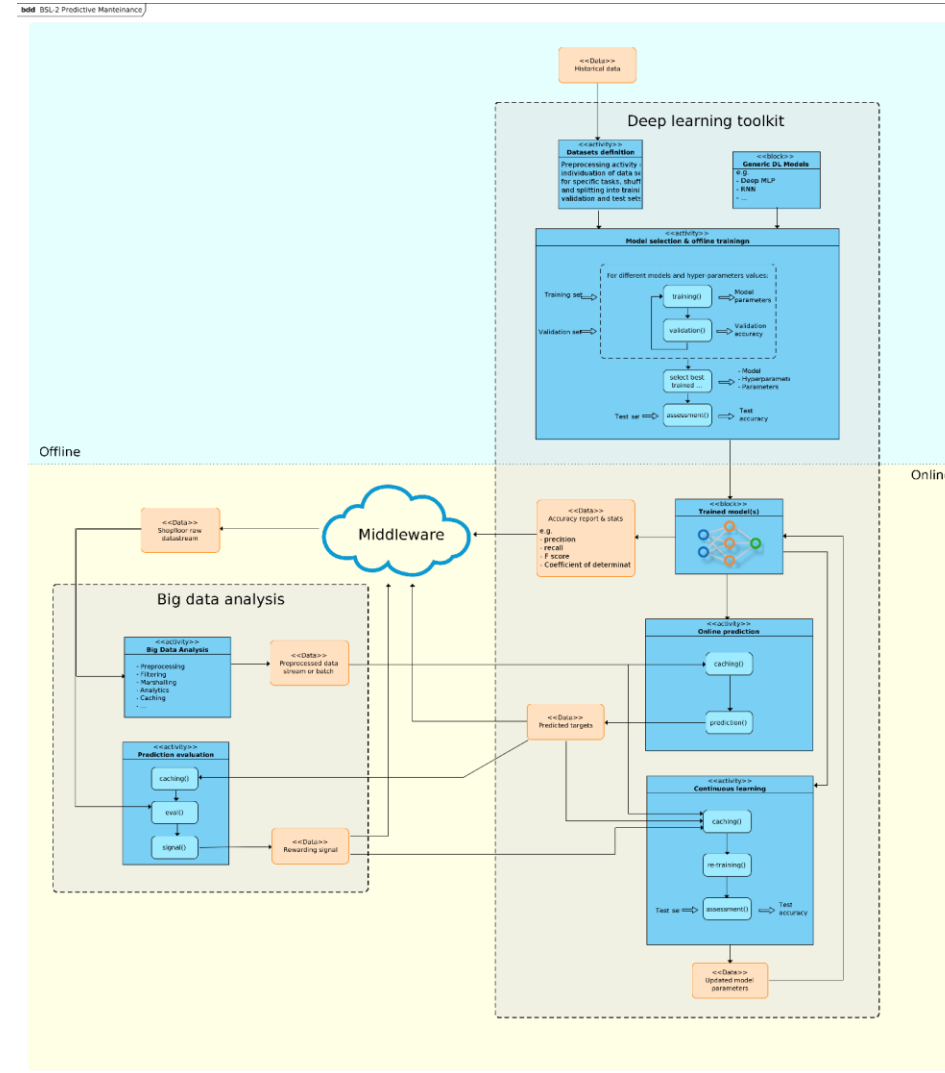
Big Data Analytics Toolkit

- Complex-Event Processing (CEP) for real time processing
 - Extract the maximum value
 - Reduce latency
 - Provide reactivity
 - Avoid the need of archiving unnecessary data
- Provided by the LinkSmart[®] Learning Agent (LA)
 - Stream Mining service that provides the utilities to manage real-time data. LA provides a set of tools to collect, annotate, filter, aggregate, or cache the real-time data incoming from the production facilities
 - LA provides a set of APIs to manage the real-time data lifecycle for continuous learning.



Deep Learning Toolkit

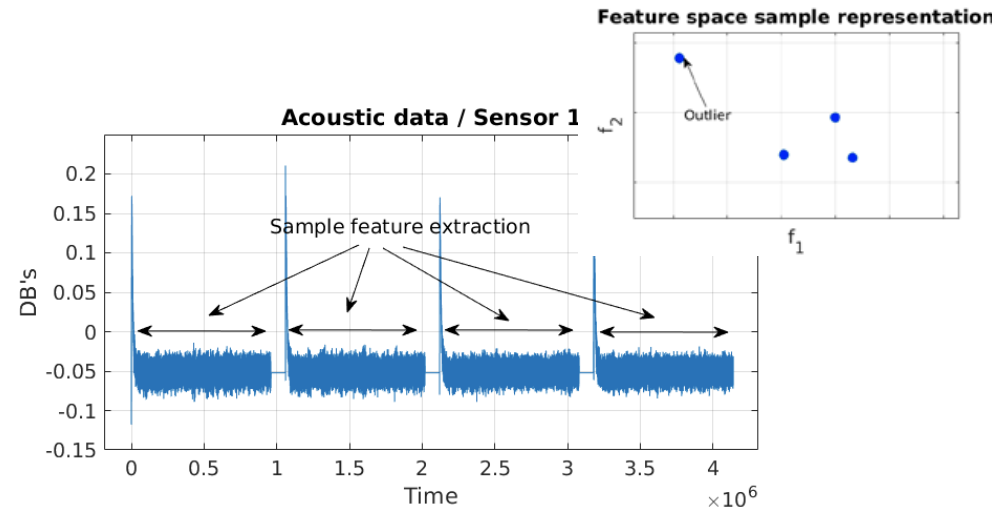
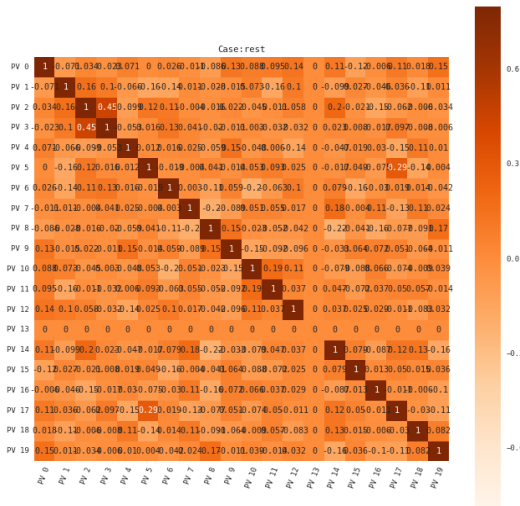
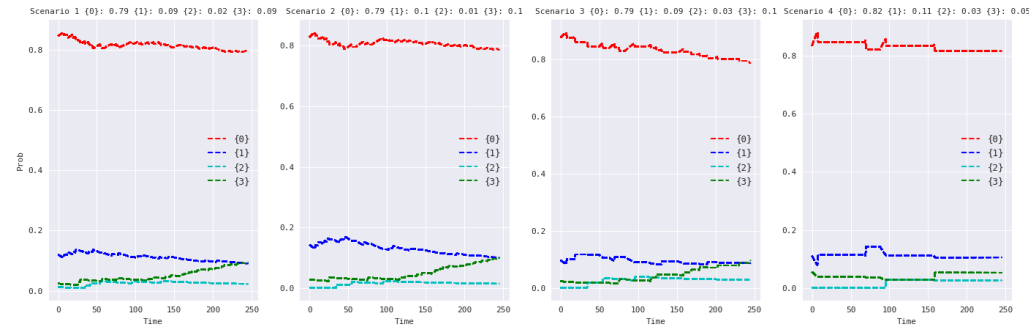
- Web-based deep learning toolkit
- Machine learning algorithms include
 - single and multi-layer perception networks
 - recurrent neural networks
 - Long/short term memory networks
- LA enables the online real-time learning process and data deliverable for training the model. Deep learning toolkit provides external learning models





Simulation and Forecasting Toolkit

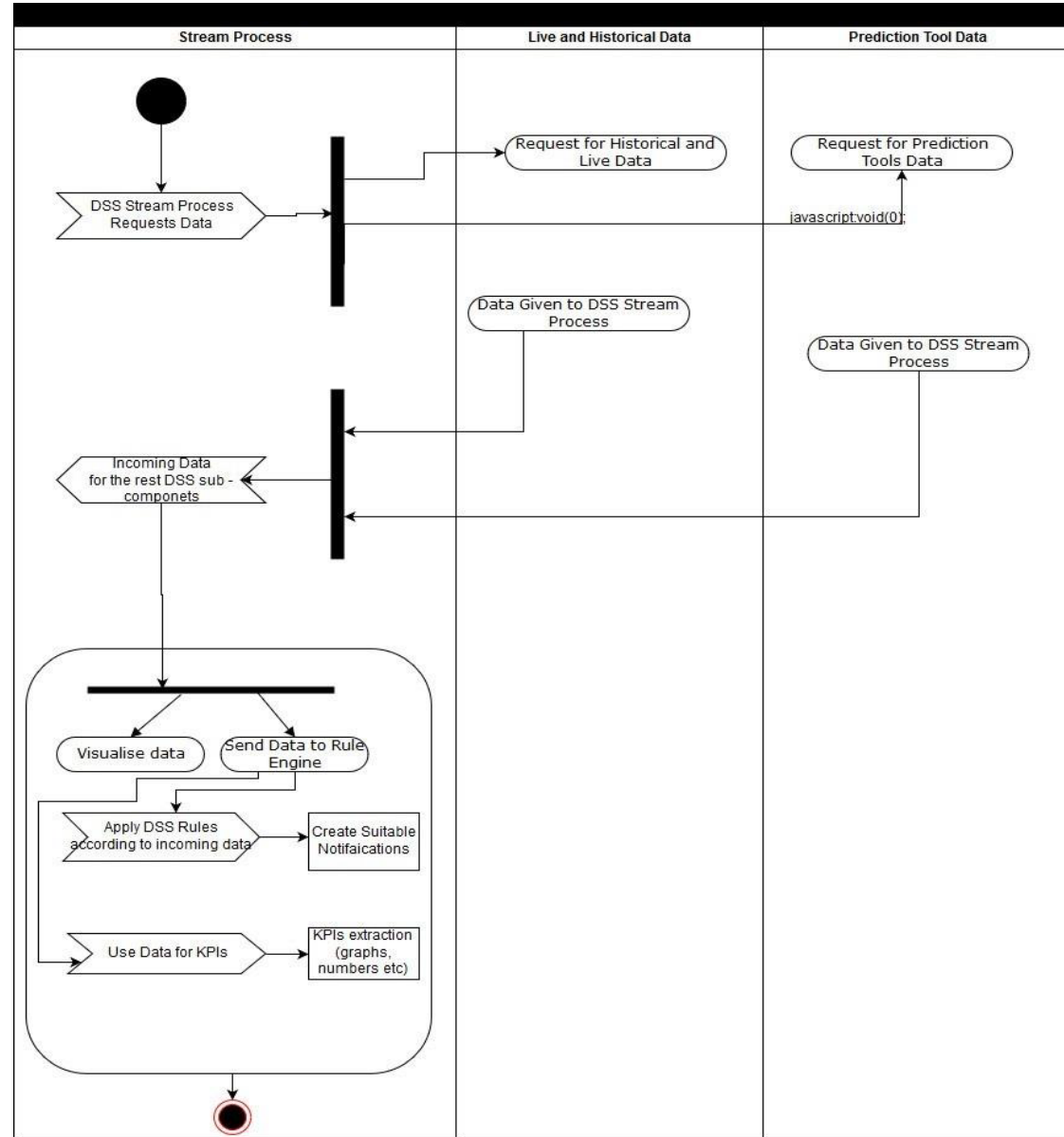
- Correlation heatmaps
- Regression analysis (linear, logistic, polynomial, stepwise ridge lasso and elastic regression)
- Probability theory
- Real-time Local Outlier Factor
- Genetic algorithms





Decision Support System

- DSS implements a rule engine based on Finite State Machines
- Data Mining Process
 - classifications trees, generic algorithms, support vector machine, Naïve Bayes
- Decision Support Process
 - Nondeterministic Finite – state Automata (NFA)





Decision Support System (2)

COMPOSITION DSS

- Maintenance Board >
- KPIs
- Links >
- Fault Diagnosis
- Personnel
- Tasks
- SUPPORT
- Documentation
- COMPOSITION Project

Bossi Machine Probabilities

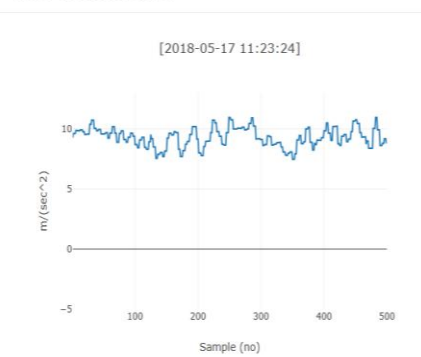
Normal Operation Current Probability : 36.32%	Mechanical Failure Current Probability : 50.47%	Electrical Failure Current Probability : 32.41%	Hydraulic Failure Current Probability : 70.44%
---------------------------------------------------------	-----------------------------------------------------------	-----------------------------------------------------------	----------------------------------------------------------

Vibrometer graphs

Bossi - Acceleration



Bossi - Acceleration (X)



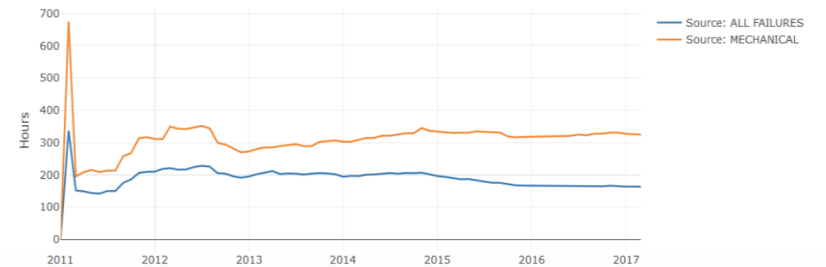
Collect Events

Cumulatively

 Plot Level: Month

 Period: 01/01/2011 - 25/07/2018

Plot



COMPOSITION

Optimal Routes Calculator

Routes: Min 10, Max 17

 Weight (tons): Min 25, Max 49

 Target: 0.2

Calculate Optimal

Route Constraints Max: 17	Load/Weight Constraints Max: 49tons	Simulated Solution Max load weight: 33tons
Min: 10	Min: 25tons	Min number of routes: 13



Thanks for your attention

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