MAINTENANCE 4.0

Intelligent and Predictive Maintenance in Manufacturing Systems

INSTITUTO POLITÉCNICO DE BRAGANÇA

Catraport — P&C automotive — STAMPING TECHNOLOGIES & ASSEMBLY

IPCA INSTITUTO POLITÉCNICO DO CÁVADO E DO AVE

Instituto Politécnico de Viana do Castelo

Problem and Motivation

- Manufacturing is a stochastic, dynamic and often chaotic environment.
- **Maintenance is crucial to ensure production efficiency**, since the occurrence of failures causes the loss of productivity and business opportunities.
- Maintenance **costs are extremely significant**, but unfortunately necessary to ensure the required productivity levels.
- Traditionally, maintenance strategies are not taking into consideration the huge amount of data being generated in the shop floor and the available emergent ICT technologies.
- Innovative-value explicitly extracted from the needs of the industrial partner (i.e. Catraport) given its daily experience in the field of industrial production.

Objectives

- Develop an intelligent approach for industrial maintenance that:
  ➢ Considers **advanced analysis** of the collected data to **monitor and detect earlier the occurrence of disturbances** and consequently the need to implement maintenance interventions;
  ➢ Provides an **intelligent decision support,** articulated with HMI technologies, to the technician during the maintenance interventions;
- Aligned with Industrie 4.0.
- Prototype in an industrial metal stamping unit addressing **TRL 4.**

Approach
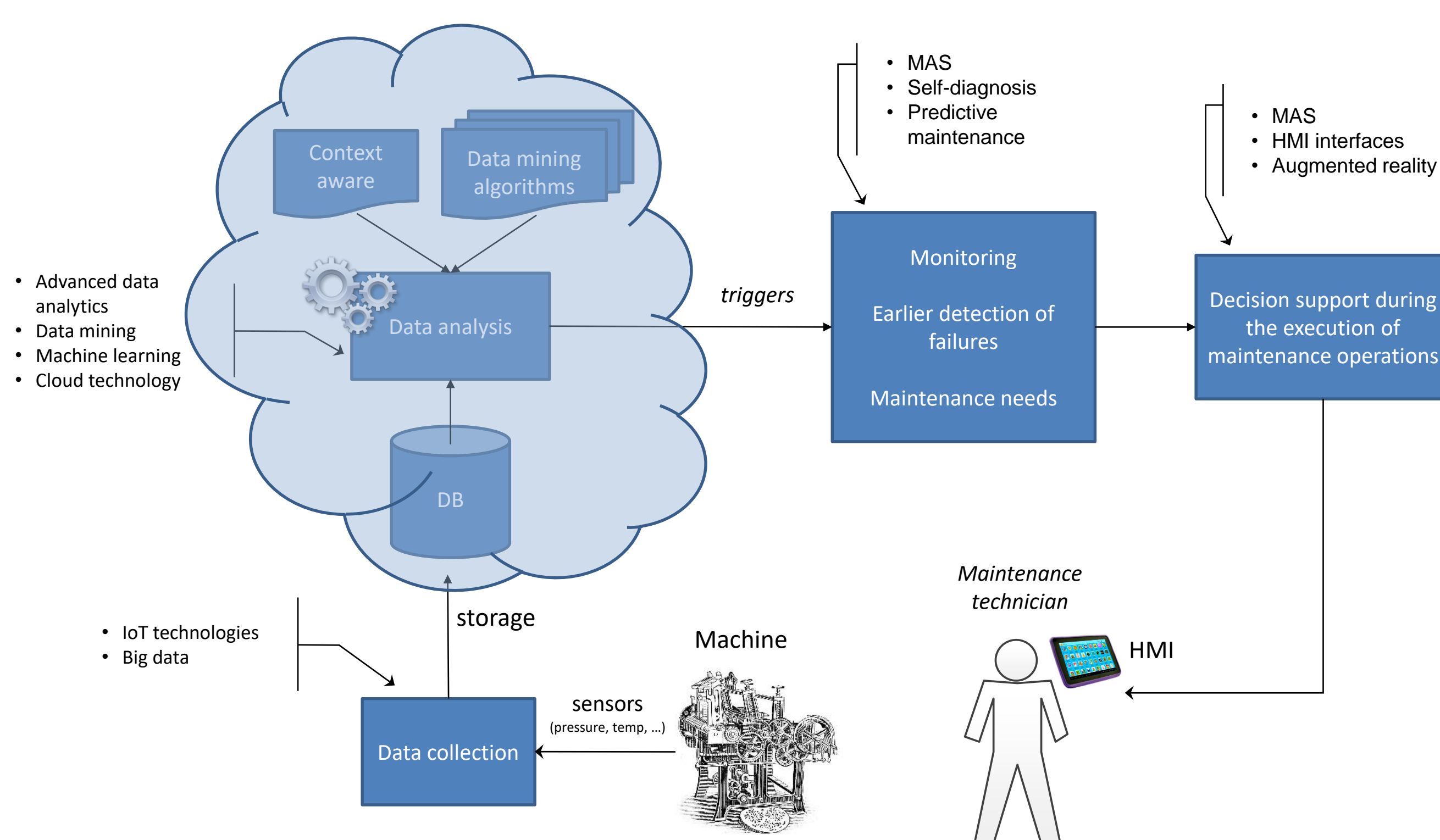
Work Plan
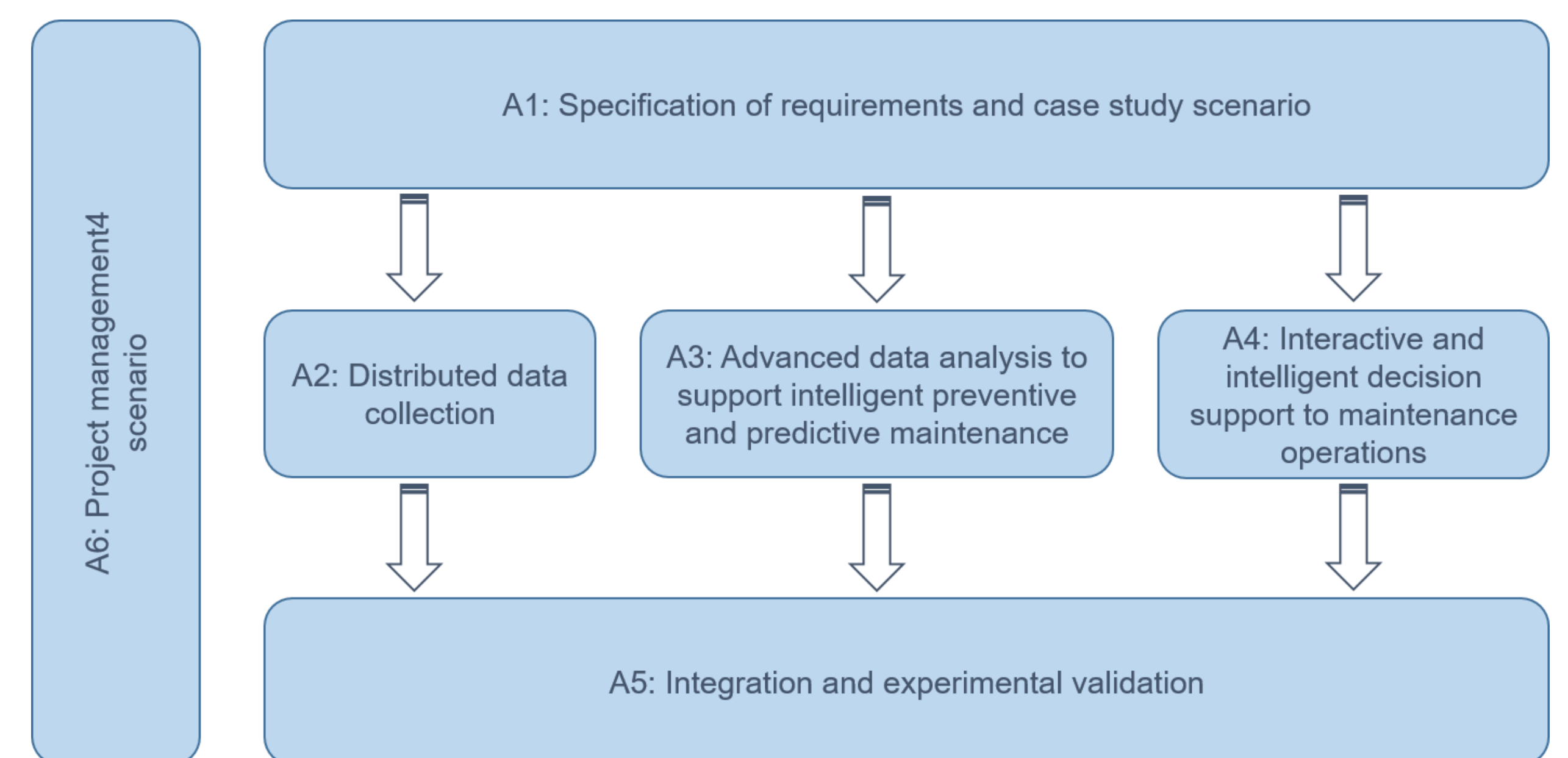
Activity n.	Activity Denomination	Person*month	Acronym of the Leader participant	Acronyms of partners involved in the activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Specification of requirements and case study scenarios	8,50	Catraport	IPB, IPVC, IPCA																		
2	Distributed data collection	11,90	IPB	IPVC																		
3	Advanced data analysis to support intelligent preventive and predictive maintenance	17,80	IPB	IPCA, Catraport																		
4	Interactive and intelligent decision support to maintenance operations	23,30	IPVC	IPB, IPCA																		
6	Integration and experimental validation	17,00	Catraport	IPB, IPVC, IPCA																		
7	Project management	1,40	IPB	Catraport, IPVC IPCA																		
		79,90																				

M1 1st Progress Report — 2nd Progress Report — M2 — M3 3rd Progress Report

Alignment with R&I priority domains

- Framed with **"Advanced Production Systems"**, considered nuclear to the NUTS II Norte region, and focused on the development of applied technological R&D activities with potential impact on the industrial manufacturing sector.
- Focused in the topic of **"Industria 4.0"**, which program was recently launched by the Portuguese government after the initial promotion in April 2013 by the German government.

Strategic impact of the project

- **Great improvement of the maintenance process**, increasing the OEE and the shop-floor throughput.
- **Improvement of the productivity and the profitability** by Catraport, by reducing machine downtimes and maintenance costs.
- **Several axes of the Operational Programs (POs) are covered.**

Research team (IPB)

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