

AMATHO

Additive MAnufacturing of Tiltrotor HOusing
Proposal #717194

Kick off Meeting

Politecnico di Milano
December 20th 2016

Innovation takes off

SUPSI



Prima
Power



AGENDA

Venue: December, 20th , 2016

Politecnico di Milano (via La Masa 1, Milano) plus teleconf.

- 9:30 Welcome participants (G. Sala)
AMATHO consortium & staff (partners)
Project description (Sala & WP leaders)
- 11:30 AMATHO-JU Relationship (Podsadovski)
- 13:00 End of meeting



Consortium Participants

1) Politecnico di Milano (coordinator)



2) SUPSI - Scuola Universitaria Professionale della Svizzera Italiana

SUPSI

3) PRIMA - Prima Industrie SPA



Participants - 1/3

Politecnico di Milano

Founded in 1863, is the leading University in Italy for Architecture, Design and Engineering



2 campuses in Milano:

← Leonardo

Bovisa



- 12 Departments
- Over 1,300 faculty
- Over 37,000 students
- 19% of Italian engineers graduate here



Other campuses in:

- Como
- Lecco
- Cremona
- Mantova
- Piacenza



Participates with **2 Departments**:

- **Dept. of Aerospace Science and Engineering (DSTA)** - <http://www.aero.polimi.it>
- **Dept. of Mechanics (DM)** - <http://www.mecc.polimi.it>

Participants - 2/3



SUPSI

Participates through its Department of Innovative Technologies (DTI), Institute of Systems and Technologies for Sustainable Production (ISTePS) .



Participants - 3/3



PRIMA

Participates with its machinery division having its main office at Via Antonelli 32, Collegno (TO), Italy.

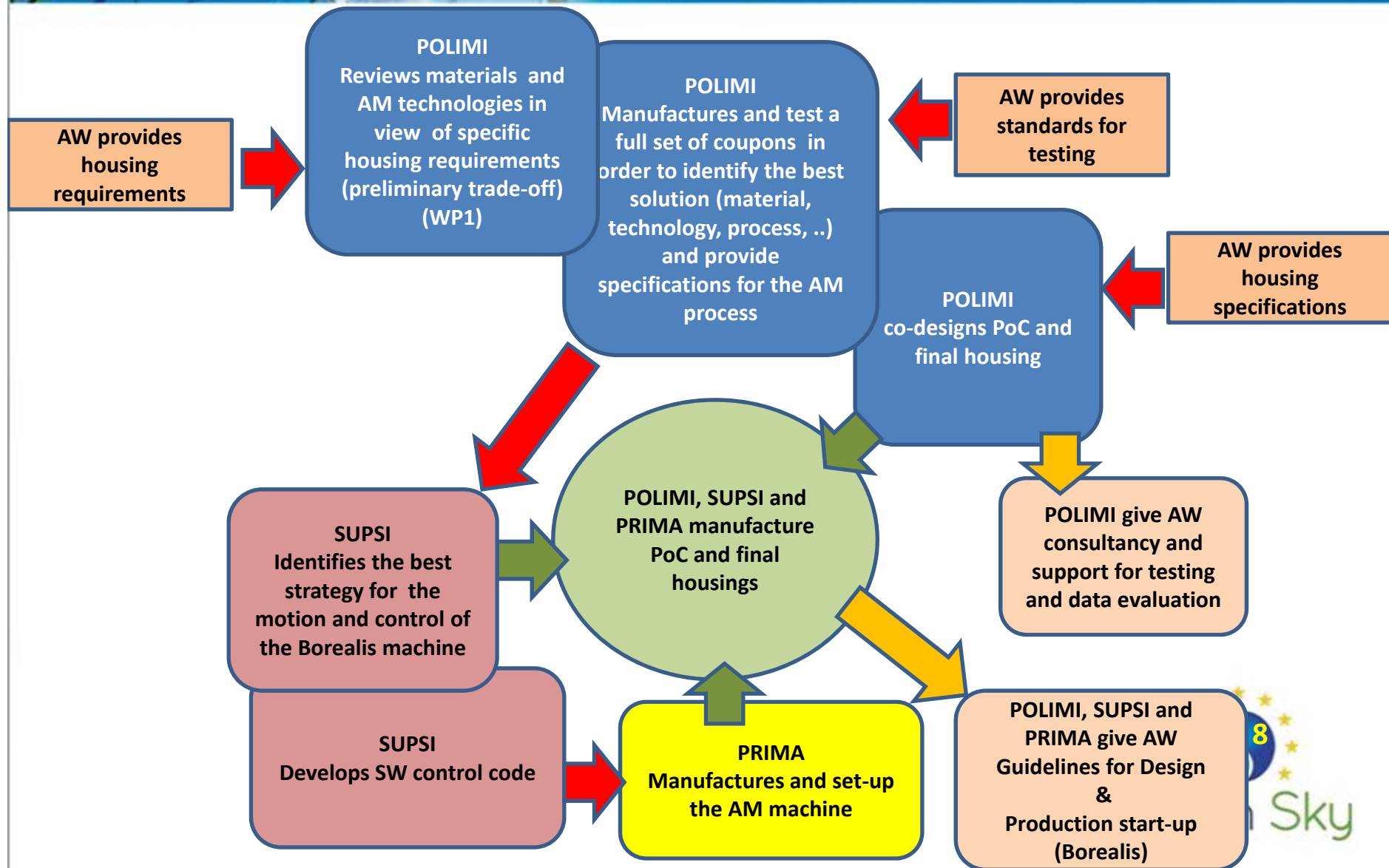


Project Objectives

- 1st: to develop, assess and produce a **tiltrotor main drive system housing** compliant to these requirements, exploiting the features of innovative AM techniques.
- 2nd: to set-up an AM DLD **process/machinery** able to produce a monolithic full-scale large-dimension housing made of the best-performing material large-dimension housing made of the **best-performing material**
- 3rd: to trade-off among production processes EBM, SLM, DLD and their joining and machining techniques, in view of the optimization process and **to allow** sound and reliable **mid-term industrial choices**
- 4th: to manufacture specimens, POCs and full scale components to allow experimental assessment to realize a fully reliable and repeatable manufacturing process optimized with regard to the process and machine parameters and behavior;
- 5th: to build a closed loop monitoring infrastructure running in-line with the machine CNC to persistently optimize the product quality by adapting the process and machine manufacturing strategy;
- 6th: to provide a decision support tool to support the realization of large and complex shape components designed as monoliths and assembly;
- 7th: to provide supporting guidelines about precursor powders choice, procedures and processes, materials characterization, testing and NDI techniques, structural design, optimization and substantiation tools, industrial engineering, flight clearance, in order to allow a complete technology transfer process towards the topic leader.



Description of Work



Project structure and Collaborating staff

AMATHO

WP1: Feasibility Study & Preliminary Design



WP2: Material Characterization



WP3: Detailed Design and Process Development



WP4: Prototype and pre-production evaluation



WP5: Communication, Dissemination and Exploitation



WP6: Project Management



Project organisation

WP1: Feasibility study and preliminary design

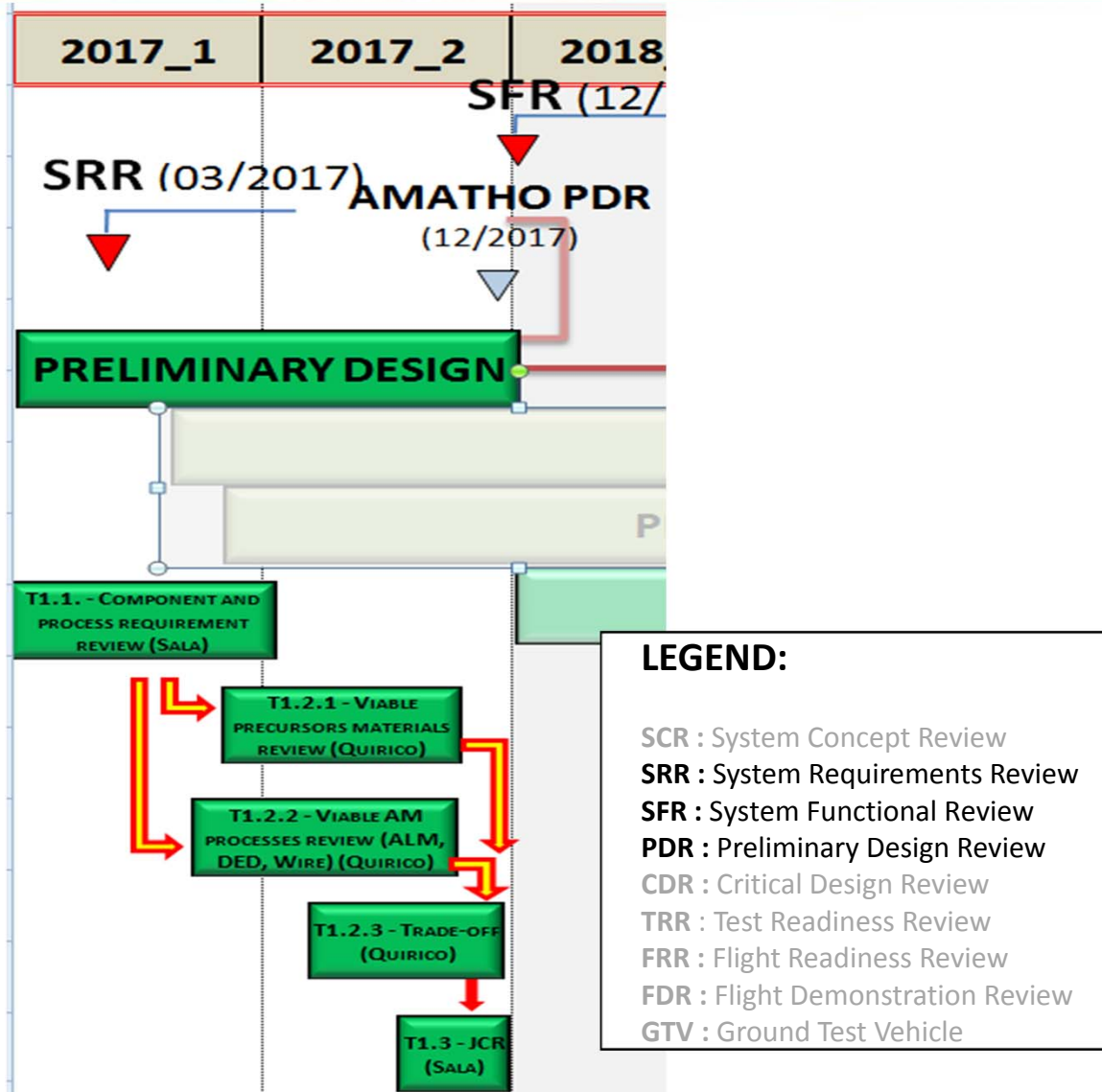
T1.1: Component and process requirement review (1)

T1.2: ALM process and material concept definition (1)

T1.3: Joint Concept Review (1)



Project organisation



WP2: Material Characterization

T2.1: Specimen Test Campaign (1)

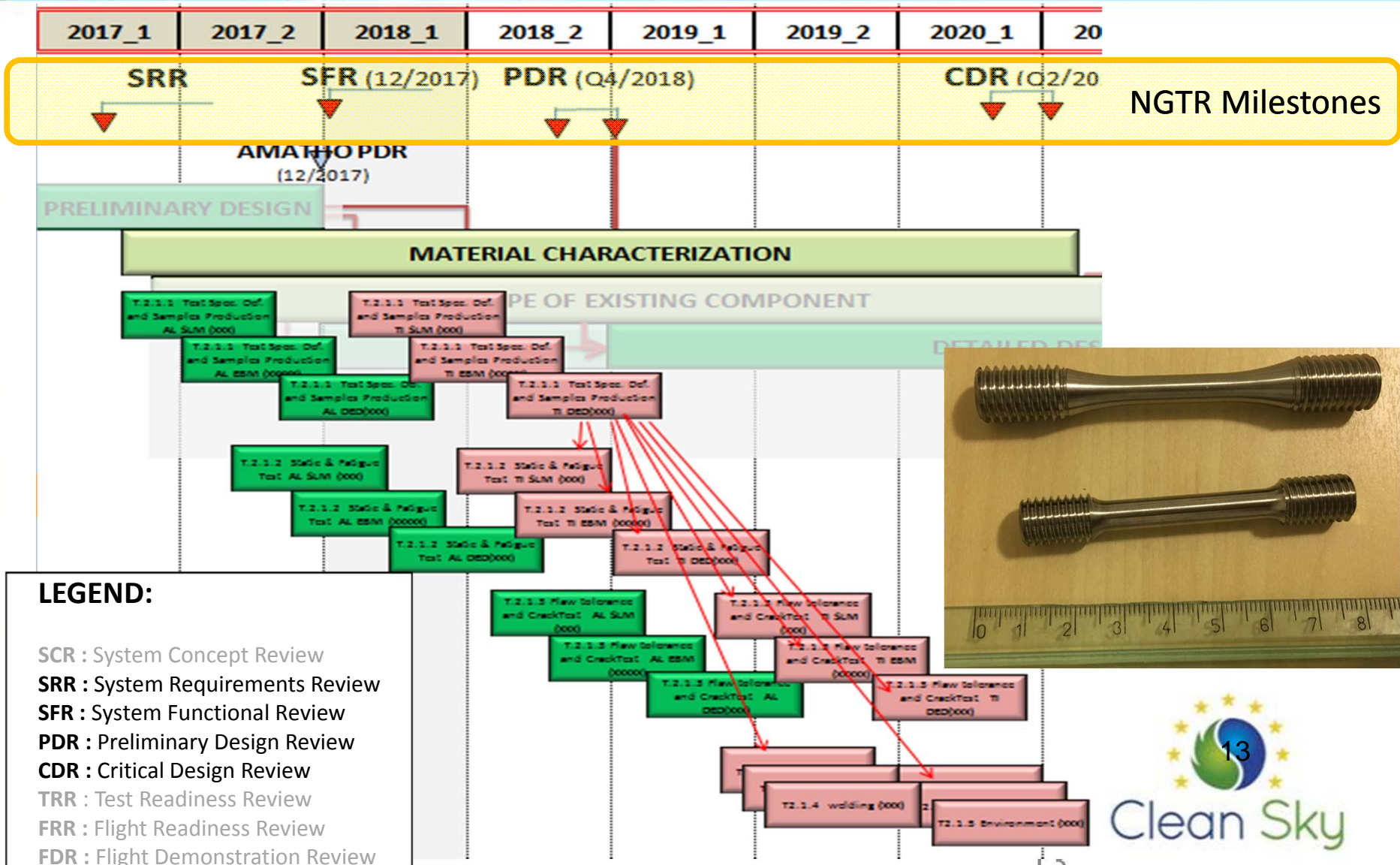
T2.2: Prototype and test of drive system POCs (1)

T2.3: Definition of design rules and supporting numerical tools (1)

T2.4: Joint concept review (1)



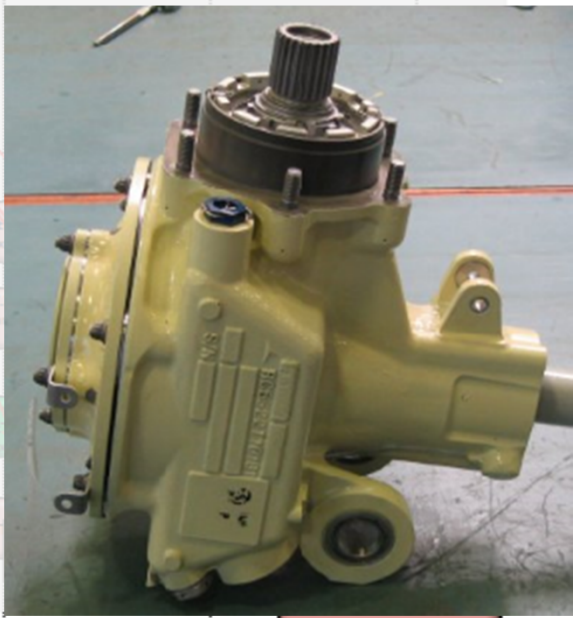
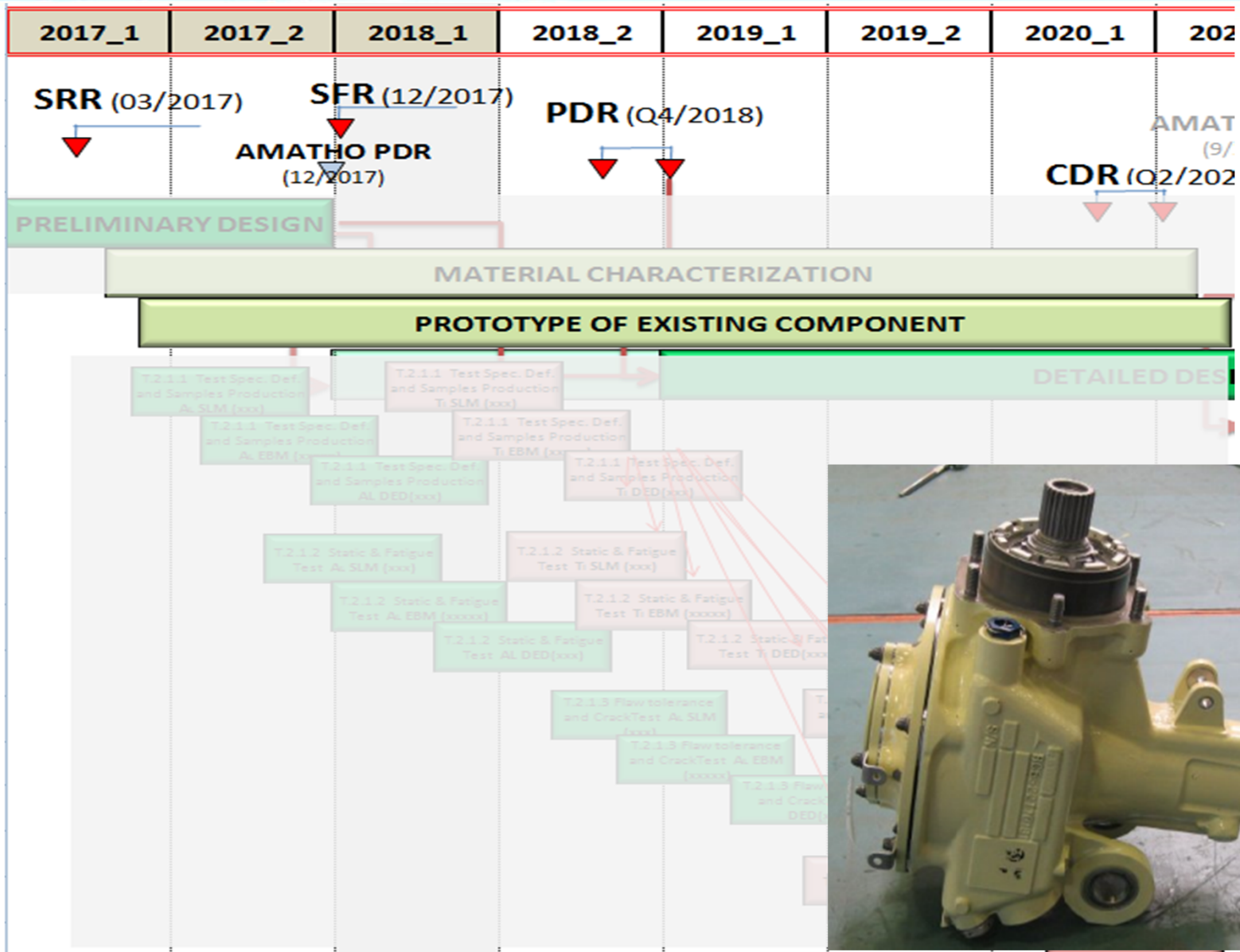
Project organisation



LEGEND:

- SCR : System Concept Review
- SRR : System Requirements Review
- SFR : System Functional Review
- PDR : Preliminary Design Review
- CDR : Critical Design Review
- TRR : Test Readiness Review
- FRR : Flight Readiness Review
- FDR : Flight Demonstration Review
- GTV : Ground Test Vehicle





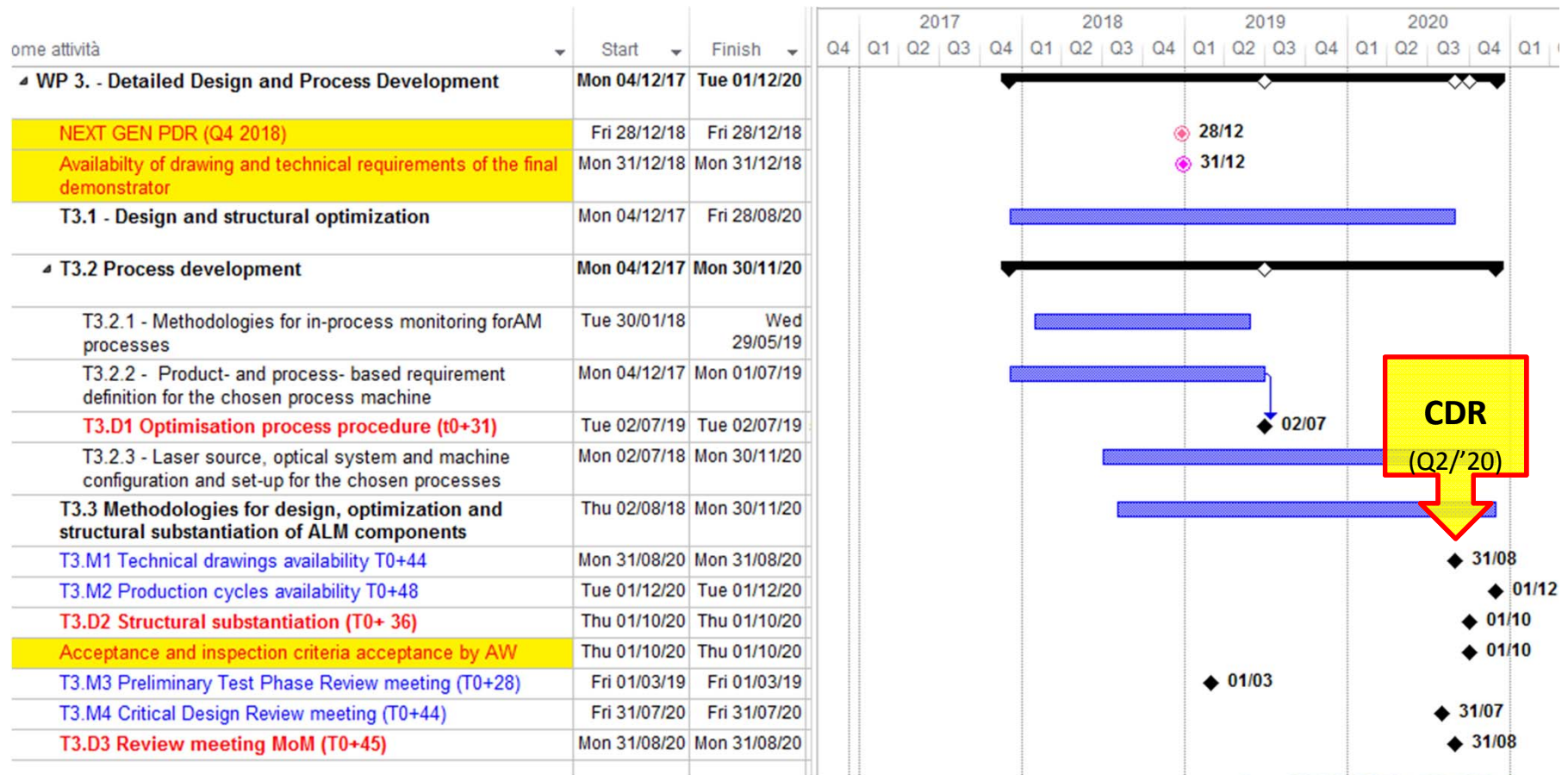
WP3: Feasibility study and preliminary design

T3.1: Design and structural optimization (2)

T3.2: Process development (3)

T3.3: Methodologies for design, optimization, structural substantiation of AM parts (1)

Project organisation



Project organisation

WP4: Prototype and pre-production evaluation

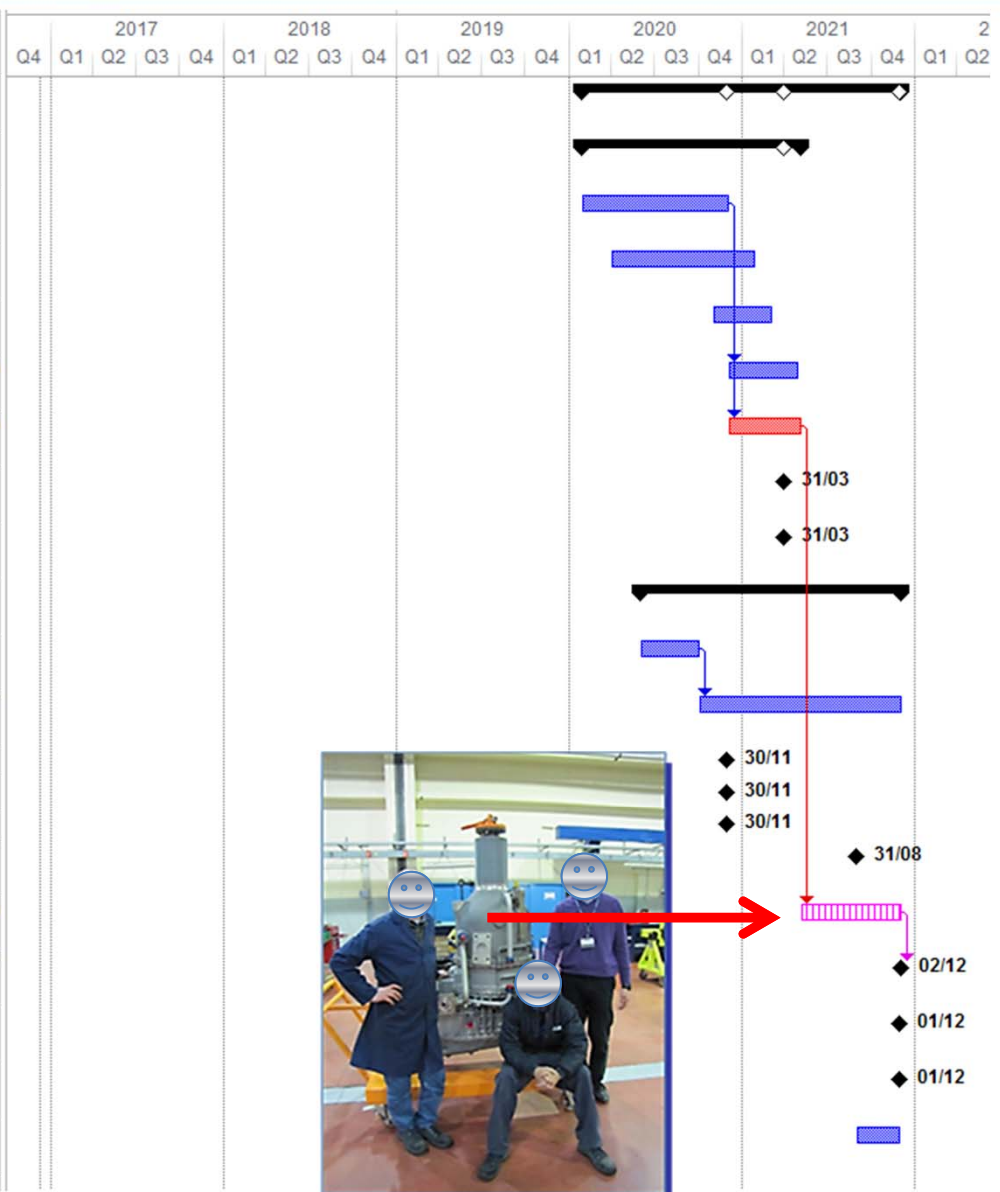
T4.1: Full-scale component manufacturing (3)

T4.2: Structural and Functional Tests support (1)

T4.3: Production start-up support (1)



Nome attività	Start	Finish
◀ WP 4. - Prototype and pre-production evaluation	Tue 28/01/20	Thu 02/12/21
▶ T4.1. - Full scale component manufacturing	Tue 28/01/20	Tue 04/05/21
T.4.1.1 Machine motion strategy design and path planning	Tue 28/01/20	Tue 01/12/20
T.4.1.2 Machine control strategy design and configuration	Tue 31/03/20	Thu 28/01/21
T.4.1.3 Machine in-line closed loop monitoring policy design and implementation	Mon 02/11/20	Tue 02/03/21
T.4.1.4 Machine and process optimization for the manufacturing of final product demonstrator	Wed 02/12/20	Thu 29/04/21
T.4.1.5 Manufacturing of final product demonstrator	Wed 02/12/20	Tue 04/05/21
T4.D1 ALM Prototypes(delivered to AW) (T0+52)	Wed 31/03/21	Wed 31/03/21
T4.M1 ALM Prototypes availability (T0+52)	Wed 31/03/21	Wed 31/03/21
▶ T4.2 Structural and Functional Tests support	Mon 01/06/20	Thu 02/12/21
T4.2.1 Test Plan Proposal	Mon 01/06/20	Thu 01/10/20
T4.2.2 Structural and Functional Tests support (AS TESTS WILL BE EXECUTED BY AW)	Fri 02/10/20	Thu 02/12/21
T4.D2 Test plan + Review meeting MoM (T0+48)	Mon 30/11/20	Mon 30/11/20
T4.M2 Test Phase Review meeting (T0+48)	Mon 30/11/20	Tue 01/12/20
T4.D3 Review meeting MoM (T0+57)	Mon 30/11/20	Mon 30/11/20
T4.M3 Tests Readiness Review meeting (T0+56)	Tue 31/08/21	Wed 01/09/21
Structural / Functional Tests execution (BY AW)	Wed 05/05/21	Wed 01/12/21
T4.M4 Structural / Functional Tests execution (COMPLETED BY AW) (T0+60)	Thu 02/12/21	Thu 02/12/21
T4.D5 Test Report (T0+60)	Wed 01/12/21	Wed 01/12/21
T4.M5 Flight clearance approved by AW T0+60	Wed 01/12/21	Wed 01/12/21
▶ T4.3 Production start-up SUPPORT	Wed 01/09/21	Tue 30/11/21



WP5: Communication, Dissemination & Exploitation

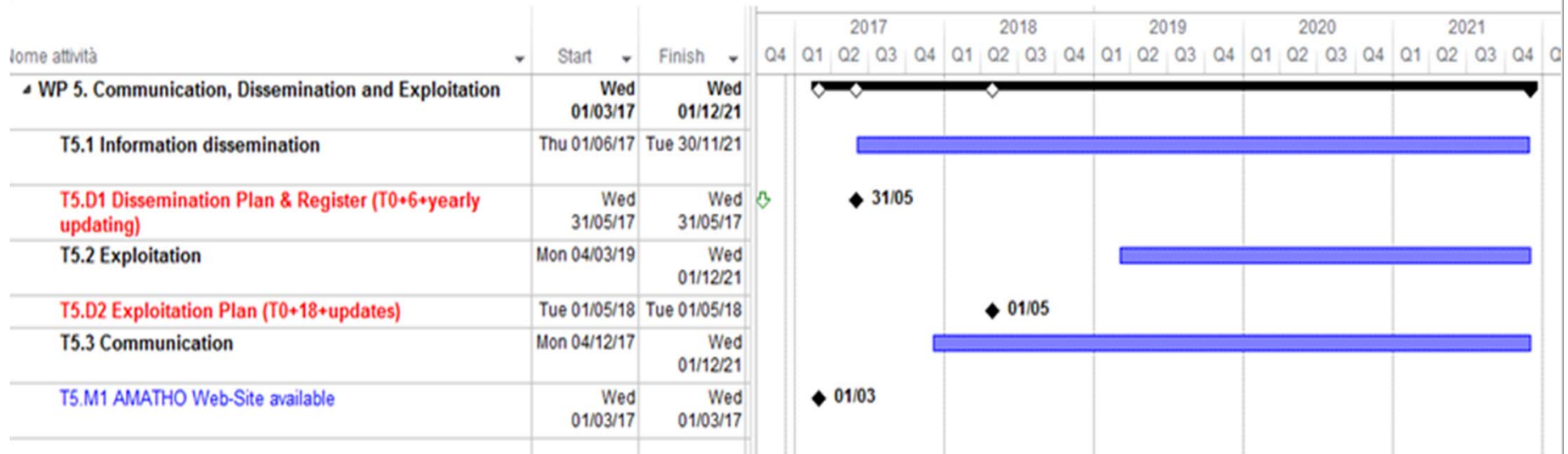
T5.1: Information dissemination (2)

T5.2: Exploitation (2)

T5.3: Communication (2)



Project organisation



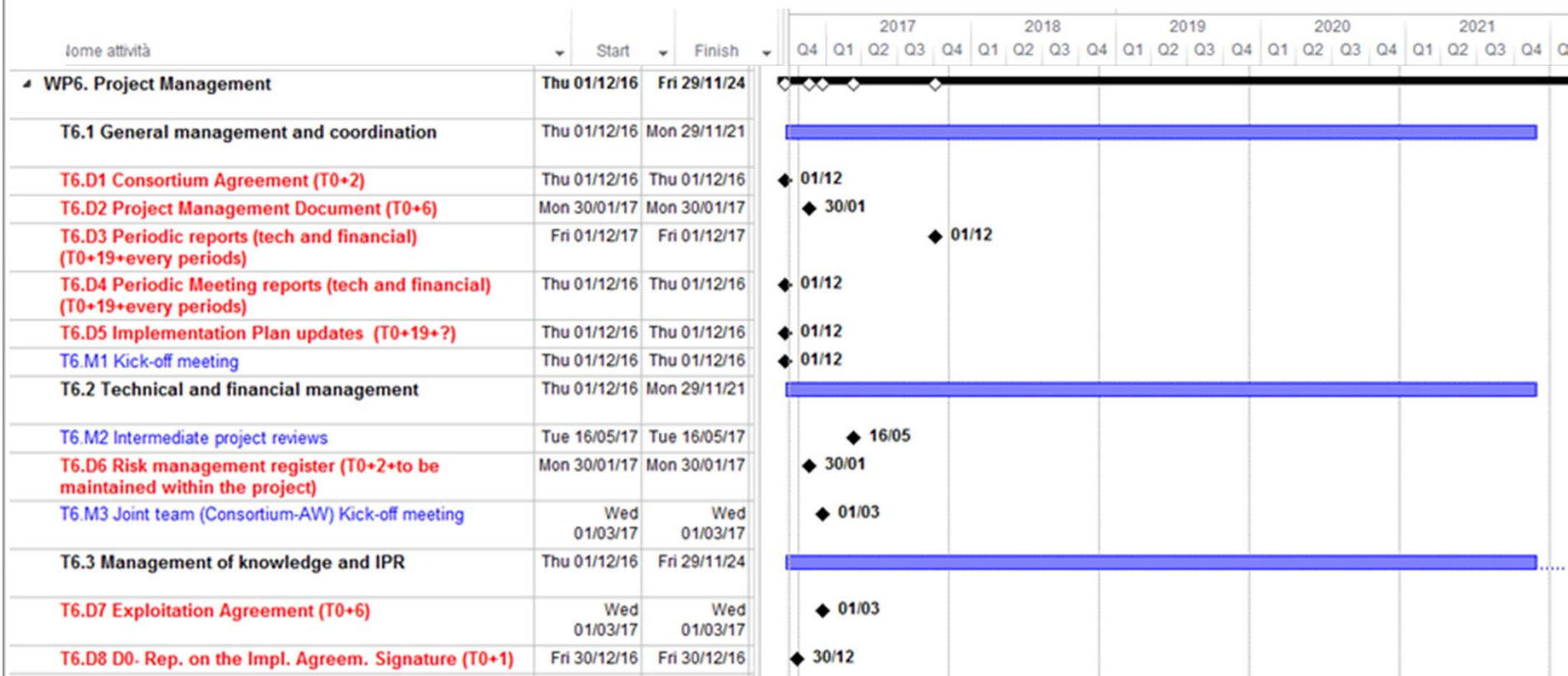
WP6: Project Management

T6.1: General management and coordination (1)

T6.2: Technical and financial management (1)

T6.3: Management of knowledge and Intellectual Property Rights (1)

Project organisation



Questions ??





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