PASSION project

H2020 Call ICT30-2017 Photonics KET

PASSION

Photonic technologies for progrAmmable transmission and switching modular systems based on Scalable Spectrum/space aggregation for future agIle high capacity metrO Networks

ABSTRACT:

The PASSION project aims at sustaining bandwidth requirements in metro networks supporting a highly connected and communication society by developing a photonic platform based on the integration of vertical cavity surface emitting lasers (VCSELs) and Silicon Photonics (SiPh) and of highly functional multichannel coherent receivers for the high bandwidth, low cost, reduced footprint and low power consumption.
PASSION will develop transmitter/receiver (TX/RX) and switch modules for 100 Tb/s capacity per link and a metro network architecture handling Pb/s per node.

- **PASSION date of start** December, 1st 2017

Project budget

PASSION

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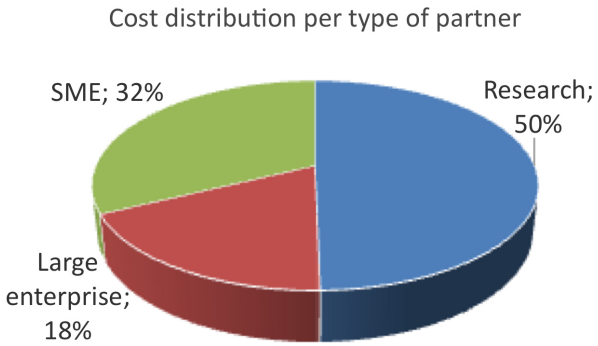
Total budget: ***8.393.076,25 €***

Requested contribution: ***7.535.747,50 €***

(the two non-EU partners participate through their own funds)



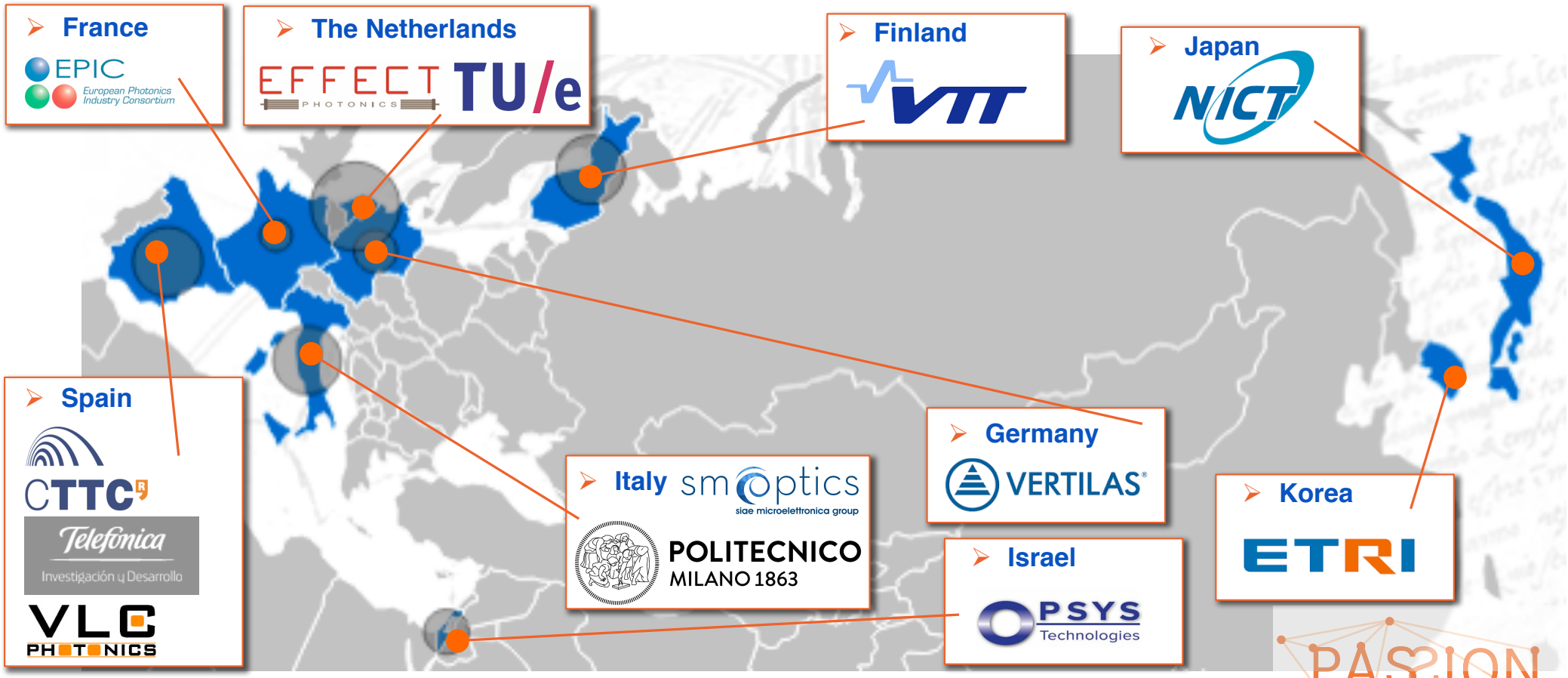
50.3% of the project budget for industrial companies (***32%*** for SMEs)

Total staff effort: ***702.2 person months*** ***(≅ 58.5 years)***

PASSION partners

Participant no. *	Participant organisation name	Part. short name	Country
1 (Coordinator)	Politecnico di Milano	POLIMI	Italy
2	Centre Tecnològic Telecomunicacions Catalunya	CTTC	Spain
3	Technische Universiteit Eindhoven	TUE	Netherlands
4	VTT Technical Research Centre of Finland Ltd	VTT	Finland
5	Vertilas GmbH	VERT	Germany
6	VLC Photonics S.L.	VLC	Spain
7	OpSys Technologies	OPSYS	Israel
8	Effect Photonics BV	EFP	Netherlands
9	SM Optics S.r.l.	SMO	Italy
10	Telefónica Investigación y Desarrollo SA	TID	Spain
11	European Photonics Industry Consortium	EPIC	France
12	National Institute of Information and Communications Technology	NICT	Japan
13	Electronic and Telecommunications Research Institute	ETRI	Korea

PASSION partners



PHOTONICS21
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

PASSION

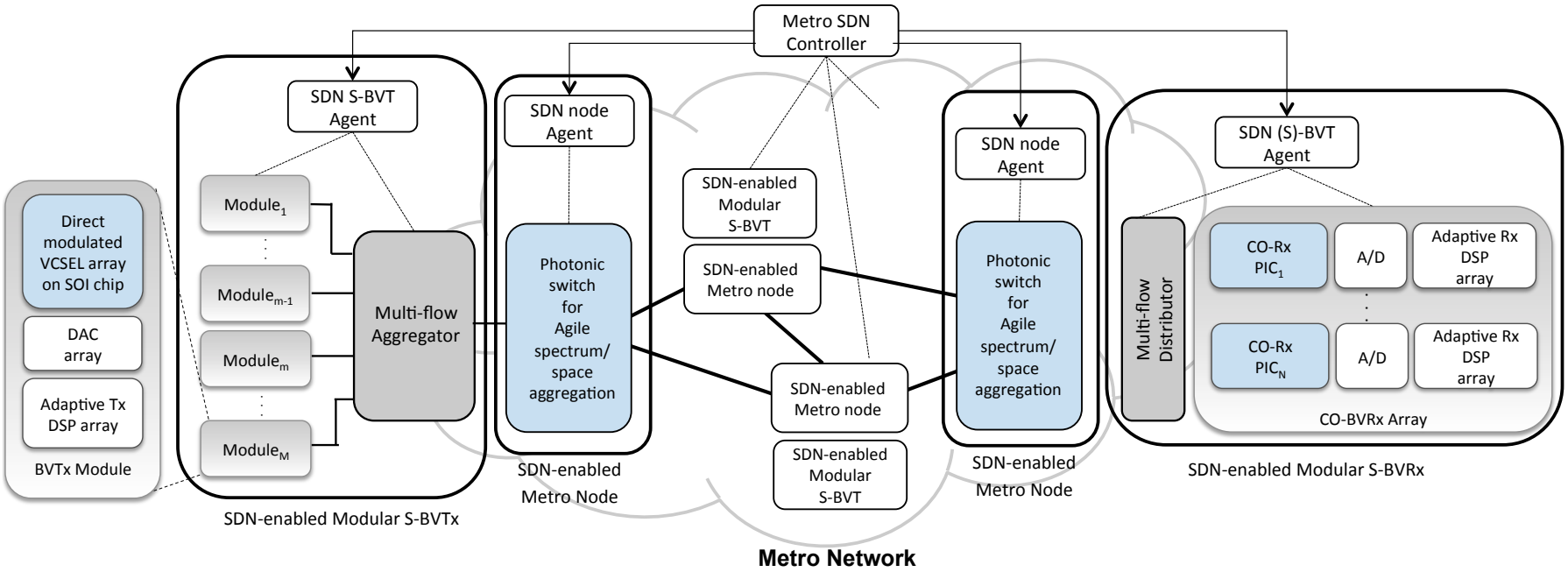
PASSION partners and logo

PASSION logo design

- the ***network*** embracing the project name symbolises the aim of the project, finalized to support the future connected and communicating society;
- the ***nodes*** of the network represent the innovative technologies developed in the project. They are 13, as the ***13 partners*** of the project, connected to work together and to share their experience and research;
- the ***heart*** (shaped by the two S) is at the center of the project name and of the network, representing the passion followed in the challenging approach to the project research;
- the ***orange colour*** used for the logo is creative, youthful, and enthusiastic, as the PASSION project team is.

PASSION GOAL

PASSION GOAL: the development of application driven photonic technologies supporting an innovative transceiver and node featuring different levels of aggregation (in spectrum, polarization, space) for the future metro network



PASSION GOAL

TECHNOLOGICAL TX/RX CONCEPTS:

- InP directly-modulated WDM VCSEL sources emitting in the whole C band
- coherent detection
- SiPh platform for dense integration to achieve modular design with more than **1 Tb/s capacity per channel**

➢ *Low power consumption:*
10-fold reduction with respect to 100-Tb/s solution implemented aggregating present commercial transceivers based on externally-modulated WDM sources

➢ *Reduced footprint*:
3 orders of magnitude improvement compared to currently available WDM solutions

PASSION GOAL

TECHNOLOGICAL SWITCHING CONCEPTS:

- suitable compact WSSs and WDM multicast switches (MCSs) adopting monolithic integration on InP platform and hybrid integration on SiPh circuits
- functional aggregation/disaggregation and switching at different levels, as in spectrum and in space, in order to improve effective and agile usage of the traffic pipes

➢ *Node full flexibility*

network node flexible in terms of spectrum slicing, selecting, broadcasting, shuffling and aggregating, in order to add-drop channels when requested and handle up to **1-Pb/s capacity**

PASSION GOAL

NETWORK CONCEPTS:

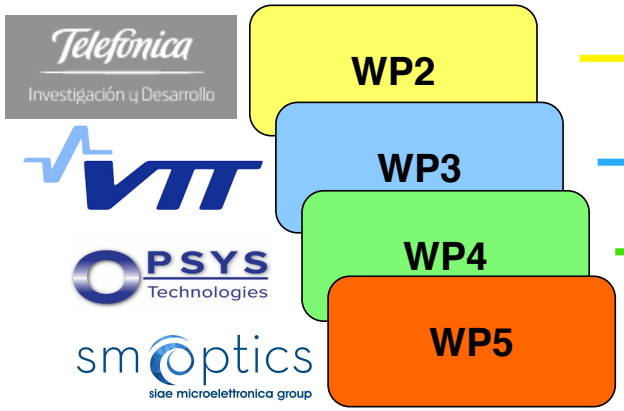
- sliceable bandwidth/bitrate variable transceiver (S-BVT) architecture for the metro network
- aggregation of multiple flows with subwavelength granularity, enabling up to more than **100 Tb/s per link** exploiting multicarrier modulation, and multiple dimensions including the spectrum (the whole C band), the polarization and the space (by means of multi-core fibers or fiber bundles).

➢ *Network programmability*

SDN-enabled platform ensuring metro programmability and connectivity, subsystems sharing and functional reuse, fitting network operator requirements and roadmaps.

Work packages

4 Technical Work Packages



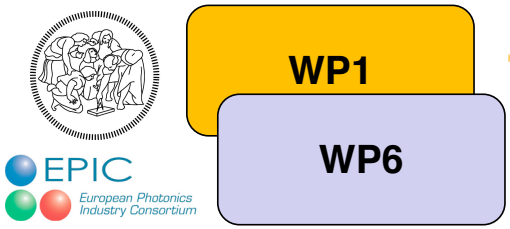
Network and system architecture, requirements and features

Photonic technologies for Tx

Switching, aggregation and Rx photonic technologies

Integration and demonstration of photonic devices and technologies

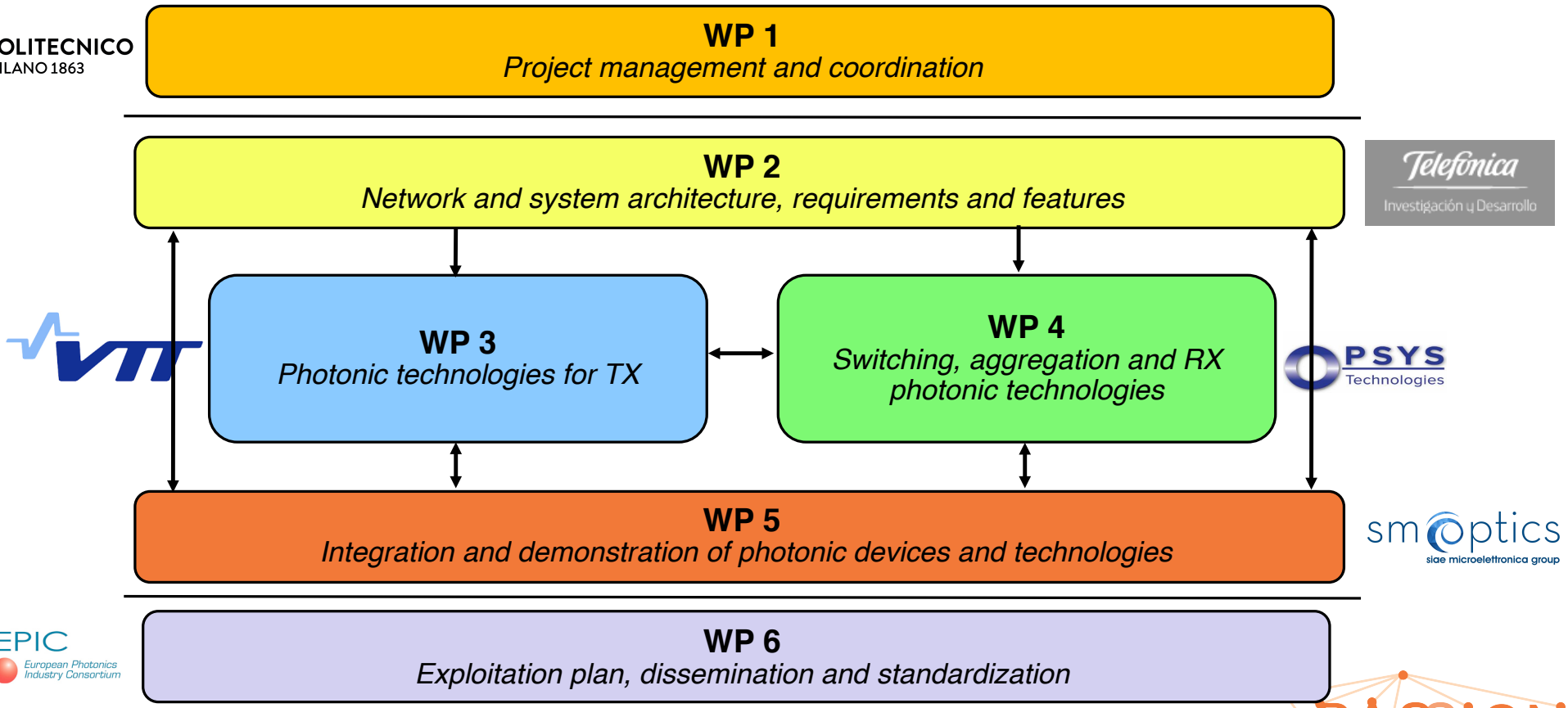
2 Organizative-Dissemination Work Packages



Project management and coordination

Exploitation plan, dissemination, and standardization

Work packages



Objectives

Objective 1

Design and development of photonic technologies for a new generation of **energy-efficient and compact Tx modules** for the metro network @ **Tb/s capacity per PIC**

Objective 2

Design and development of photonic technologies for a new generation of **compact, flexible Rx modules** for the metro network, able to sustain the PASSION **sliceable-bandwidth/bitrate approach**

Objective 3

Development of **energy-efficient and small-footprint switching technologies** for a aggregation/ disaggregation node, w **space/ wavelength switching domain for 1-Pb/s capacity**

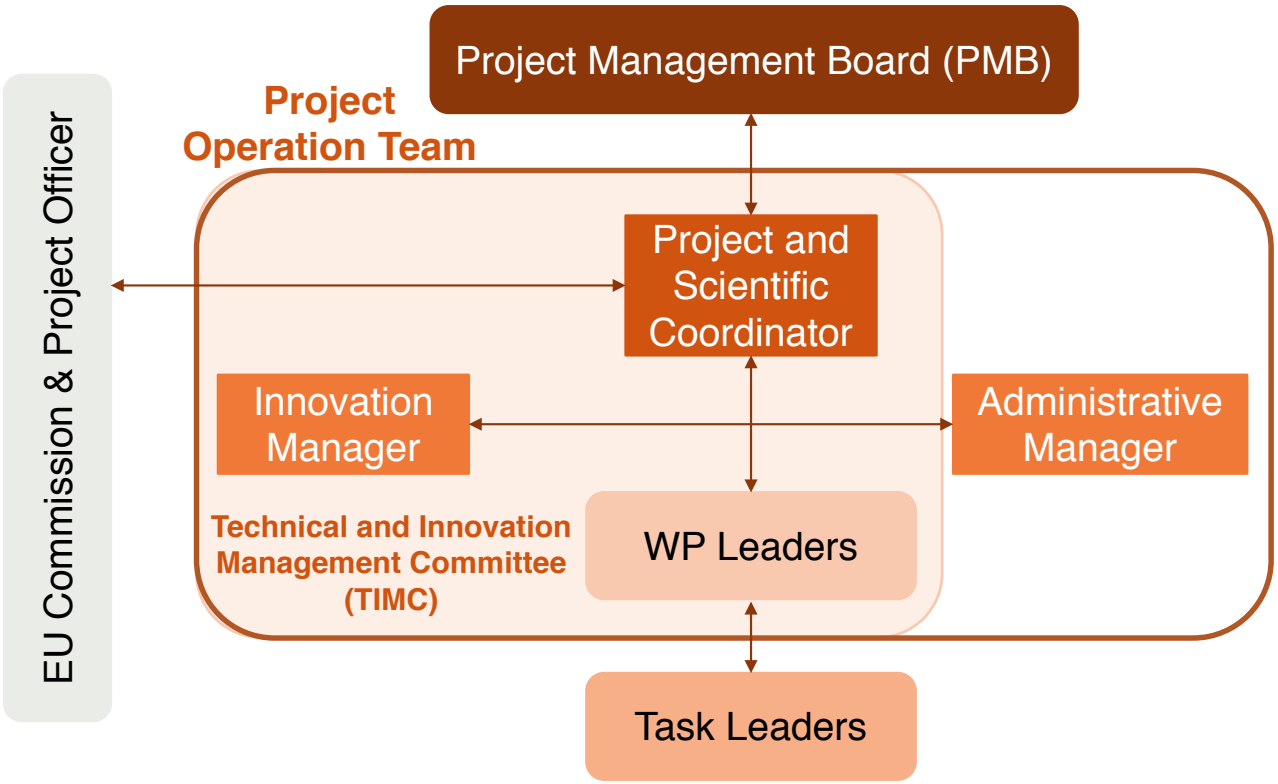
Objective 4

Design and development of **scalable and modular S-BVT architectures**, allowing to adaptively generate multiple flows of **Tb/s capacity** and enabling up to **100 Tb/s aggregated capacity per link**

Objective 5

Development of **scalable and modular metro network architectures** for subsystem sharing and functional reuse to support **flexible agile spectrum/spatial switching** addressing capacities of **Pb/s per node**

Management structure



Management structure: PC, PMB, TIMC, POT

The **Project and Scientific Coordinator** **(PC)** serves as the single point of contact with the EC for all the matters and is assisted by the:

- **Project Manager** for the day-by-day coordination activities
- **Administrative Manager** for the administrative tasks and financial matters
- **Innovation Manager** **(IM)** for innovation management.

The **Project Management Board** **(PMB)** chaired by the PC includes one member per partner - makes decisions on contractual matters, such as the budget, timeline, deliverables, PM shifts, adding/deleting partners.
The PMB is in charge of risk management.

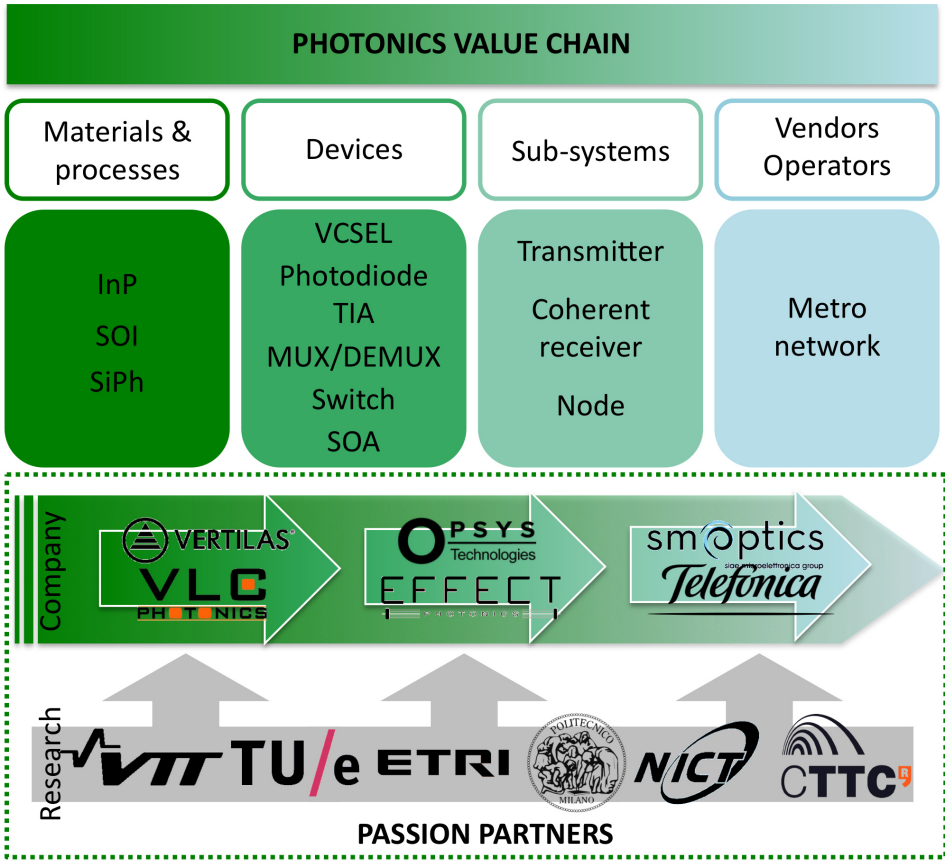
- Decision is made by simple majority.
- PMB meets at least every six months.

The **Technical and Innovation Management Committe** **(TIMC)** - coordinated by the PC and including each WP leader - ensures that the technical developments and general progress are well coordinated.
The TIMC in sessions chaired by the IM will analyze and review promising ideas collected through the Idea section (in the private area) of the Website.

- TIMC meets at least every six months

The **PC, IM and WP Leaders** constitute the **Project Operation Team** **(POT)** which is responsible for the planning, execution and control of the project.

Photonics value chain



PASSION consortium covers the entire photonics value chain and offers to industrial partners and in particular to the SMEs the opportunity to benefit of advance research by top European Universities and Research Centres through technology transfer processes and to have access to shares in the metro market through collaboration with EU vendors and network operators.

PASSION IMPACT

- The rapid evolution of the ICT infrastructure is progressively **enabling new opportunity** to implement **innovative services** for people. Among the key ingredients of such evolution, it is worth to highlight the capability to manage **mission critical services**. Autonomous driving, remote surgery, security monitoring, are examples of application than cannot be supported by today networks.
- **Bandwidth, QoS,** and **flexibility** are part of the PASSION goals and will greatly contribute to this evolution. In fact, optical metro network constitutes the fundamental infrastructure driving the future communicating society and providing virtually ubiquitous, ultra-high bandwidth "**connectivity**", not only to individual users, but also to connected objects.
- PASSION metro network approach can support future connected society thanks the development of novel **enabling photonic technologies** and **devices**. In fact, these technology developments will be the key to the envisioned **high-capacity, scalable, modular, SDM sliceable bandwidth/bitrate variable transport**; which will enhance system capacity and reach
- Space and spectrum aggregation and switching, enabling the **agile generation and routing of high-capacity channels** with different levels of aggregation, will be the basis for an autonomous and agile optical network, capable to dynamically deliver services with a guaranteed QoS. Thus, an important part is the SDN-based network control to ensure high-capacity and dynamic connectivity and smooth deployment of the services.

Social media and web accounts

LinkedIn group PASSION H2020 project

PASSION website
http://www.passion-project.eu

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https://www.facebook.com/H2020PASSION/
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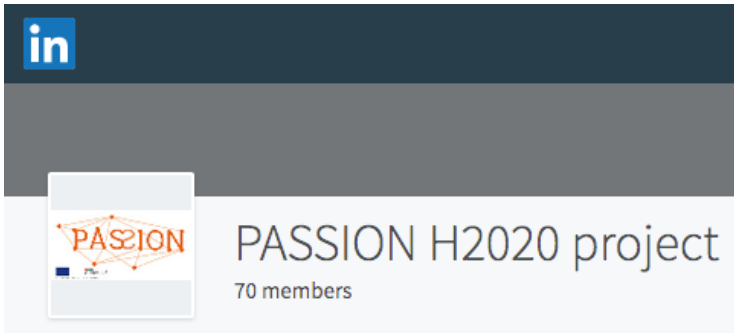

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