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IMPAQT

Intelligent Management System for Integrated Multi-trophic Aquaculture

MEDIA KIT

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Please note this document will be updated to reflect progress through each phase of the IMPAQT project.

TABLE OF CONTENT

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WHAT IS IMPAQT?

Intelligent Management Systems for Integrated Multi-Trophic Aquaculture

IMPAQT is a project funded by the European Horizon 2020 programme aimed at promoting and supporting the eco-intensification of aquaculture production systems based on IMTA: inland (including fresh water), in coastal zone and offshore. IMTA is acknowledged as a promising solution for the sustainable development of aquaculture. The project will last for 36 months (1 May 2018 – 1 April 2021).

Basic concepts:

What is IMTA? Integrated Multi-Trophic Aquaculture is a different way of thinking about aquatic food production that is based on the concept of ´food chain´. Instead of growing only one species (monoculture) and focusing primarily on the needs of that species, IMTA mimics a natural ecosystem by combining the **farming of multiple, complementary species from different levels of the food chain where the by-products (including waste) of one species can be used as inputs (fertilizers, food) for another**. For example, one form of IMTA is to grow fish, invertebrates (e.g. mussels) and seaweeds close together for the benefit of each crop and the environment.

What is the rationale behind the project? The management of large-scale IMTA areas remains difficult due to limited knowledge of mutual interaction among components and understanding of impact at ecosystem level. This project aims at addressing the lack of **data availability** in the field, the lack of sufficient tools to assess the factors affecting IMTA production and to enable a real-time response to production challenges, including environmental impact and fish and seafood quality.

The overall **project's objective** is to **develop** and validate in-situ a multi-purpose (inland, coastal and offshore productions), multi-sensing (heterogeneous sensors and new/emerging technologies) and multi-functional (advanced monitoring, modelling, data analytics and decision making) **management platform for sustainable IMTA production**. The high level ambition is to drive a paradigm shift in the European Industry and its acceptance of IMTA as a viable approach, by paving the way to both a more environmentally friendly and more efficient/higher yielding European Industry.

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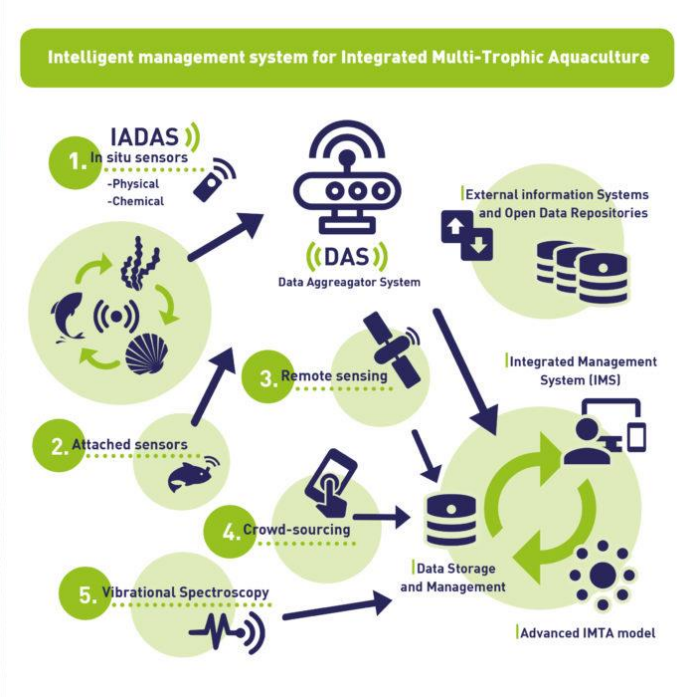
HOW DOES THE PROJECT WORK?

IMPAQT will enable a more efficient IMTA practice

IMPAQT will adopt a holistic approach addressing the complete system view. This compromises three main interacting subsystems: the **autonomous data acquisition and communication system**, the **advanced IMTA model** and the **Integrated Management System (IMS)** that together constitute IMPAQT´s Intelligent Management System for Integrated Multi-Trophic Aquaculture.



The autonomous data acquisition and communication system compromises five categories of **data sources**:

1. Physical and Chemical sensors for in situ determination of water quality.
2. Attached in species sensors for measuring vital parameters of animals.
3. Remote sensing algorithms and products derived from satellite observation for monitoring water quality, growing conditions and environmental impact.
4. Crowd-sourcing via smart application for observations linked to water quality and farming environmental conditions and threats.
5. Vibrational spectroscopy for in vitro species characterisation.

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How is this information transferred to the Data Storage and Management Infrastructure?

- In situ physical and chemical sensors (1) are integrated in **IADAS**: modular autonomous smart sensing units entitled Integrated Autonomous Data Acquisition Systems (IADAS). These systems incorporate the necessary technologies for long term, autonomous deployment of sensors in operational environments.
- The data collected by the different IADAS (1) and the attached in species sensors (2) is gathered by the Data Aggregator System (**DAS**). The DAS provides these validated datasets (information) to the **Data Storage and Management Infrastructure.**
- Remote sensing (3), Crowd-sourcing (4) and vibrational spectroscopy (5) data is sent to the Data Storage and Management Infrastructure through the appropriate Application Programming Interfaces (APIs).

During the duration of the project, IMPAQT will develop two set of tools that will work on different scales and will be used by stakeholders for different purposes:

IMTA Model: this yields spatially explicit information on how the different farm components interact with the environment on the scale of an ecosystem. Model scenarios can be used for planning decisions by both farmers and regulators. At **planning phase**, the advanced IMTA model will allow the selection of the optimal site and the optimal spatial configuration for various aquaculture components. Impacts and interactions will be specifically assessed at an ecosystem scale, rather than just at the scale of individual farms. A generic IMTA model blueprint will be also developed and tested.

Integrated Management System (IMS): is a system, operating at the scale of an IMTA farm, online integrated with sensors and comprising novel technologies (data and predictive analytics, decision making for alert notification and actuation) to enable improved operational decisions for animal welfare, production optimization, environmental protection, food quality and consequently sustainable productivity. At the **operational phase**, IMS will enable assessment of the current status, and a timely response to production and environmental challenges at the scale of an IMTA farm. The scenario studies performed with the IMTA model can serve as input to set up the IMS for specific sites.

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The Data Storage and Management Infrastructure will take care of handling data for both IMTA model and operational IMS. IMPAQT will also rely on an **External Information System** and **Open Data Repositories** to enable data federation and knowledge exchange between different systems.

WHAT DOES THE IMPAQT PROJECT HAVE TO OFFER?

IMPAQT aims at providing 6 main advantages for the future of, not only the European aquaculture sector, but also the overall European economy, environment and food-chain:

High-quality fish and seafood

Long-term food security

Minimize the environmental impact

Towards a circular economy model business

Sustainability of EU aquaculture industry

Secure EU markets

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WHAT ABOUT THE PILOT SITES?

IMPAQT systems and models will be validated in 6 pilots in Scotland, The Netherlands, Ireland, Turkey and China

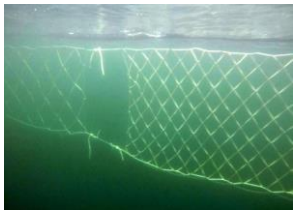
During the project, IMPAQT will deploy novel sensors and data sources, together with the smart systems required for long term autonomous monitoring in the field in 6 pilot sites addressing inland, coastal and offshore aquaculture.

Impaqt will demonstrate the eco-intensification of EU aquaculture, by demonstrating the eco-efficiency and the environmental impacts minimized, the socio-economic benefits and ecosystem services enabled, as well as the transition towards a circular economy business model.

PILOT IN THE UNITED KINGDOM

Location: Port-a-Bulin, West Coast of Scotland
Type: Coastal aquaculture production
Size/scale: The site at Port-a-Bulin is 30 hectares and has one grid system in place with permission to apply for a licence for another system
Species and product: *Alaria esculenta, Saccharina latissima, Laminaria hyperborea, Palamaria palmata* and *Ulva sp*.

Expected benefit from the project: IMPAQT will provide cost effective and efficient technologies for data acquisition, especially for water parameter monitoring and benthic sampling, as well as for improving biomass productivity. The project will address requirements related to hydrodynamics which links directly to stocking density, biogeochemical cycling of carbon and nutrients, benthic-pelagic coupling and biodiversity.



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PILOT IN THE NETHERLANDS

Location: 15km of the coast of Scheveningen
Type: Offshore aquaculture production
Size/scale: Current size roughly 10ha. Permit to be extended to an area of size 500mx500m (25ha) as of mid-2017. As of October 2016 two test modules are operational, the larger module is intended to test feasibility of multi-use with seaweed production and mussel seed collection
Species and product: Seaweed (*Saccharina latissima*) and blue mussel (*Mytilus edulis*)

Expected benefit from the project: The benefit from IMPAQT will be the ability to assess the interactions between of the various activities on the site (seaweed, shellfish, nature) as well as the interaction with the environment (currents, waves, nutrients and phytoplankton).

PILOT IN IRELAND (1/2)

Location: Bertraghboy Bay, Connemara, Co. Galway
Type: Coastal aquaculture production
Size/scale: The site is of 23 hectares. Currently, it has 3x 20m circular cages on-site with a provision for more. The site is currently licensed for 100 tonnes of fin-fish
Species and product: Atlantic salmon (*Salmo salar*), Lump suckers (*Cyclopterus lumpus*), Wrasse (*Labrusbergylta*), Blue mussel (*Mytlus edulis*), Seaweed (*Laminaria spp.* (Brown sea-weed)

Expected benefit from the project: Real time detailed monitoring and early warning and alarm systems will provide better insights into the fish health and behaviour and more reliable and better quality environmental information allowing for the intelligent use of feeds and feed waste management functions, developing a better-quality, more efficient IMTA methodology.

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PILOT IN IRELAND (2/2)

Location: Cloonloo, Co. Sligo
Type: Inland (Freshwater) aquaculture production
Size/scale: The farm site is of 1.5 hectares situated in rural farmland. It is licensed to produce 10 tonnes of perch. The site consists of a hatchery, nursery system and three split ponds with associated reed-bed and duckweed bioremediation system. The split ponds are of approximately 10m x 40m each
Species and product: European Perch (*Perca fluviatilis*), Common Duckweed (*Lemna minor*), Tench (*Tinca tinca*),
Algae – various species

Expected benefit from the project: Real time detailed monitoring and early warning and alarm systems will provide better insights into the fish health and behaviour and more reliable and better quality environmental information allowing for the intelligent use of feeds and feed waste management functions, developing a better-quality, more efficient IMTA methodology.

PILOT IN TURKEY

Location: Ildırı Köyü Cesme/ Izmir
Type: Offshore aquaculture production
Size/scale: 77 cages of 20 m in diameter and 82 cages in 30 m in diameter and 7500 tone/year production capacity
Species and product: Sea bass and sea bream (70% to 30%) and meagre. Sea bass, *Mytilus edulis* and *Ulva* multi-trophic cultivation will implemented during the project

Expected benefit from the project: Continuous monitoring and early warning systems will be implemented to gather and access real-time information on animal health and food safety, for instance, in the case of accidents (e.g. oil spoilage and mechanical impacts from sea accidents). Other benefits from these monitoring systems are disease control and prevention, reduction of mortality and overfeeding control. Similarly, stock management will help to increase production and improve the overall fish health and welfare.

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PILOT IN CHINA

Location: Sanggou Bay, Shandong province
Type: Coastal aquaculture production
Size/scale: Bay-scale commercial IMTA site
Species and product: Seaweed (*Saccharina japonica* and *Gracilaria lemaneiformis*), Oyster (*Crassostrea gigas*), Scallop (*Chlamys farreri*). Currently no fish is cultured in Sanggou bay due to latest policy

Expected benefit from the project: Water and benthic parameter monitoring can be made more cost effective and efficient with IMPAQT solutions. More efficient production systems can be trialled to minimise environmental risk and demonstrate more effective approaches to progress the development of IMTA.

BACKGROUND

Aquaculture is the fastest growing animal food producing sector in the world and is an increasingly important contributor to economic growth and global food supply.

The global aquaculture operations in 2014 supplied over one half of the fish and shellfish that is directly consumed by humans. In contrast, the EU aquaculture has seen little or no volume growth (estimated at 0.5%) over the last decade, comparing poorly to estimated global aquaculture growth of approximately 7% over the same period. EU28 contribution to world aquaculture production represents only 1.7% in volume and 3.2% in value of global production in 2014. Therefore, although Europe represents the largest market for fish in the world with steadily increased sea food consumption, EU's self-sufficiency is currently estimated to around 47.5% and is therefore highly dependent on imported sea food. The fact that the production value increased between 2008 and 2014 can be interpreted as an indication that the industry has increased the unit value and quality of its product. IMPAQT aims at a high level of ambition to drive a paradigm shift in the European Industry and its acceptance of IMTA as a viable approach, by paving the way to both a more environmentally friendly and more efficient/higher yielding European Industry.

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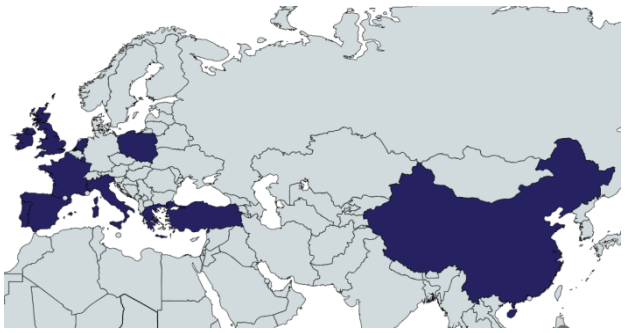
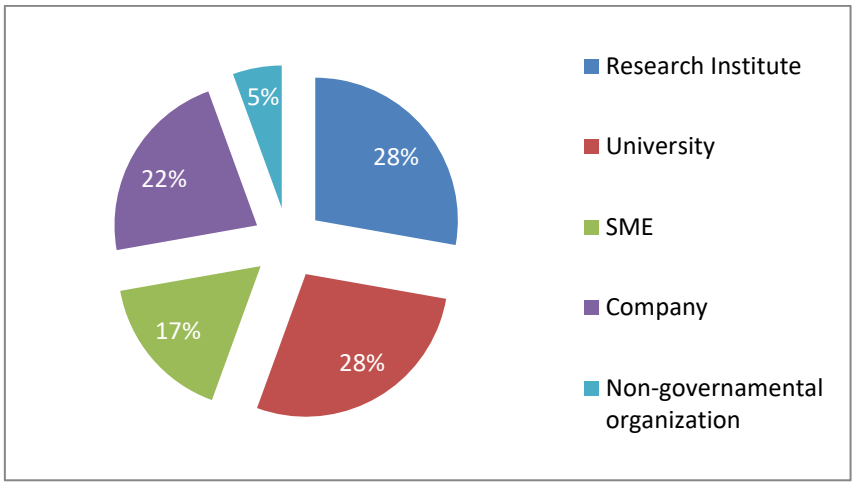
THE CONSORTIUM

IMPAQT is possible thanks to the collaboration and joined efforts of a consortium comprised of 21 partners from 12 different countries.



Type of organizations:



Project coordinator:

The Marine Institute is a statutory government agency tasked to undertake, coordinate, promote and assist in marine research and development and to provide such services related to marine research and development, which will promote economic development, create employment and protect the marine environment.

Contact: Frank Kane | Team Lead **|** frank.kane@marine.ie

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Partners per country:

(To be filled in as per need of each organization)

China

Yellow Sea Fisheries Research Institute of CAFS (YSFRI) is a multidisciplinary marine and fisheries research institute. It was inaugurated in Shanghai as 'the Central Fisheries Laboratory, Ministry of Agriculture and Forestry' in January 1947, and moved to Qingdao in December 1949.

France

Easy Global Market SAS is a French SME, providing solutions and services to develop market confidence in technologies making the global market "easy" for companies looking for globalisation.

ARGANS Limited is a recognised provider of services and software in the fields of satellite remote sensing, Earth Observation and applied space research.

Greece

WINGS is a dynamic SME which focuses on the development of products/platforms for various vertical sectors (namely, water, energy, smart cities, food safety, health, transportation, finance) through advanced wireless, cloud/IoT, big data and security technologies.

The Agricultural University of Athens (AUA) was established in 1920 and produces scientific knowledge on Greek Agriculture and Economy since 1920.

Harokopio University is a public higher education institution and was founded in 1990. The university aims at obtaining high international standards in its scientific research.

Italy

The University of Rome Tor Vergata was founded in 1982 and it is the second largest public university in Rome. The University is organized in 6 macroareas with a total of 43000 students and 1538 teachers.

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Ireland

The Marine Institute is a statutory government agency established in 1991 reporting to the Irish Department of Agriculture Food and Marine and is tasked by statute "to undertake, to co-ordinate, to promote and to assist in marine research and development and to provide such services related to marine research and development that in the opinion of the Institute will promote economic development, create employment and protect the marine environment".

Tyndall National Institute at University College Cork is one of Europe's leading research centres in integrated ICT hardware and systems, and the largest facility of its type in Ireland.

Luxembourg

INTRASOFT International is a leading European IT Solutions and Services Group with strong international presence, offering innovative and added-value solutions of the highest quality to a wide range of international and national public and private organisations.

Poland

The Institute of Oceanology Polish Academy of Sciences (IOPAN) conducts scientific research in the shelf seas and coastal regions including the Baltic and European Arctic Seas.

Portugal

UNPARALLEL Innovation is a high-tech spin-off company created by experienced researchers (with 25+ years of combined experience) to bring ICT research to the market aiming for unparalleled innovations.

Spain

LEITAT is a Technological Centre specialized in production technologies. LEITAT develops R&D activities in the areas of materials sciences, environment, surface treatments, biotechnologies and renewable energies with deep knowledge and experience in technological transfers to several industrial sectors.

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Spain

The Enterprise and Galician University Foundation (FEUGA) is a non-profit private foundation with more than 30 years of experience fostering technology transfer between the university the industry and society.

The Netherlands

North Sea Farm Foundation (NSF) is a non-profit organization that aims to establish, promote and accelerate the seaweed sector in the North Sea region.

Deltares is a leading international research institute for applied geophysical, ecological and policy related research and development applied to delta areas (marine, coastal, estuarine, and riverine) based in the Netherlands.

Turkey

Netas Telecommunications Inc., established in 1967, is the oldest private telecom R&D Company in Turkey/Istanbul. Netas provides innovative end-to-end value added technology services

Çamlı is a fully integrated agriculture group of Yasar Holding. Çamlı is the pioneer of modern and integrated fish farming in Turkey which has been established as the first marine aquaculture facility in 1985.

The institute of Marine Sciences and Technology (IMST) of Dokuz Eylul University (DEU) have been established in 1975 as a research institute and graduate school.

United Kingdom

The Open University (OU) is the UK's largest university, with 250,000 students per year studying its courses. This number comprises 22% of all part-time higher education students in the UK.

SAMS is a UK registered charity and owns two UK-registered subsidiary companies limited by guarantee. The organisation has an international reputation in marine science with active research in microbial & molecular biology, ecology, biogeochemistry and physics.

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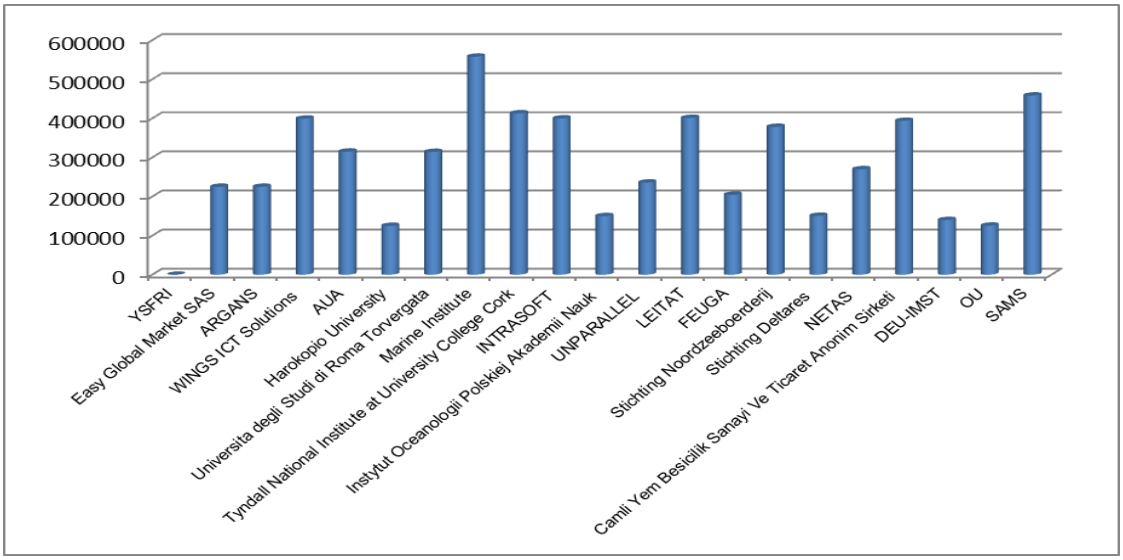
HOW IS IMPAQT FINANCED?

IMPAQT is a Horizon 2020 project.

Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness.

By coupling research and innovation, Horizon 2020 is helping to achieve this with its emphasis on excellent science, industrial leadership and tackling societal challenges. The goal is to ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation.

IMPAQT has been granted an overall budget of 6.218.180M€ of which 5.883.180M€ come from the European Union H2020 programme under the agreement Nº 774109 along the total duration of the project (36 Months).



Budget allocation per partner.

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MEDIA PRESENCE

IMPAQT has a strong social media presence through its own website, Twitter and LinkedIn networks.

The news published on IMPAQT´s social medial will follow a snow-ball effect: they will be published on its platforms (website, twitter and LinkedIn) and members of the consortium are encouraged to share the news using their own accounts to increase reachability. Several social media campaigns will take place to support key project events.

WEBSITE (www.impaqtproject.eu)

Published Content: project results, project related news (exclusively) and events (IMPAQT events and events with IMPAQT presence)

IMPAQT´s website is currently available in English but it will be soon translated to other EU languages.

TWITTER

Account: @IMPAQTproject

Hashtag: #IMTA

Published Content: project results (linked to the website), project related news and other news related to the topic and relevant events.

LINKEDIN

Account: IMPAQT project

Hashtag: #aquaculture

Published Content: project results (linked to the website), project related news (exclusively) and events (IMPAQT events and events with IMPAQT presence)

BROCHURE

The English version of the IMPAQT´s brochure is available to download online here.

Soon it will also be available in other EU languages.

ABOUT IMPAQT´S IDENTITY

Four short points to maintain the project´s brand:

1. IMPAQT´s logo:

The project has two official logos (below). The selection of one logo over the other is up to the users depending on the layout of their publication.

2. EU emblem:

It is mandatory that all publications covering IMPAQT include the EU emblem with the following acknowledgement:

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774109

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The selection of the logo in its vertical or horizontal form is up to the user.

3. IMPAQT´s pantone colours:

For layout purposes please find the project´s pantone colours below:

Navy Pantone:	RGB (for screens)	Hex (web reference)	CMYK (for printing)
2768C	R:38 G:34 B:97	#262261	100% 98% 30% 19%
Cyan Pantone 306C	RGB (for screens)	Hex (web reference)	CMYK (for printing)
	R: 0 G:173 B:238	#00ADEE	72% 13% 0% 0%
Green Pantone 802C	RGB (for screens)	Hex (web reference)	CMYK (for printing)
	R:139 G:197 B:63	#8BC53F	53% 0% 88% 0%

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CONTACT

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For more information you can visit IMPAQT´s website or follow the project's social media accounts on twitter and linkedIN:

www.impaqtproject.eu