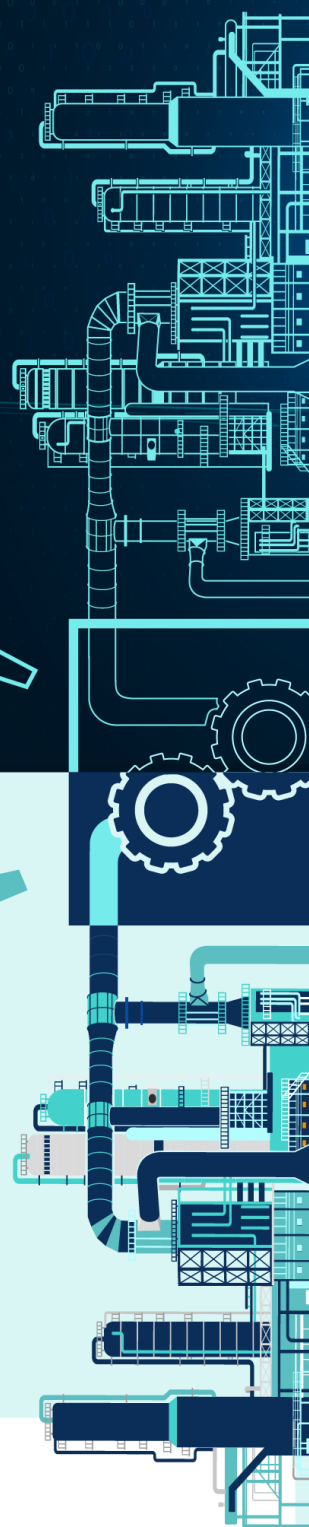




ENERGY-AWARE FACTORY ANALYTICS PROCESS FOR INDUSTRY



Deliverable D8.1

Project Website

Version
Final

Lead Partner
Unparallel

Date
31/01/2020

Project Name
FACTLOG – Energy-aware Factory Analytics for Process Industries



Call Identifier H2020-NMBP-SPIRE-2019	Topic DT-SPIRE-06-2019 - Digital technologies for improved performance in cognitive production plants
Project Reference 869951	Start date November 1 st , 2019
Type of Action IA – Innovation Action	Duration 42 Months

Dissemination Level

X	PU	Public
	CO	Confidential, restricted under conditions set out in the Grant Agreement
	CI	Classified, information as referred in the Commission Decision 2001/844/EC

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Executive Summary

This document provides an overview of the initial version of the FACTLOG project website. This includes the structure of the website, as well as some screenshots as to show the project visual image and how it's used in the official FACTLOG webpage.

The work related to the website will continue throughout the project's lifetime, with the publishing of new content along the way. The website will follow-up the activities carried out during the project implementation and will inform our target audience about the results achieved.

The FACTLOG page is available in www.factlog.eu. It will also be linked with the twitter page of the project, which can be found using “@Factlog_EU”.

Revision History

Revision	Date	Description	Organisation
0.1	18/01/2020	Initial structure defined	Unparallel
0.2	28/01/2020	Content added	Unparallel
1.0	31/01/2020	Final version released	Unparallel

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1 Introduction

1.1 Purpose and Scope

The purpose of this document is to provide an overview of the first version of the project website. It shows the structure of the website, and the looks for the initial version of the FACTLOG Webpage, which is hosted in the www.factlog.eu domain.

1.2 Relation with other Deliverables

As this deliverable provides the FACTLOG website, it will be used as a dissemination and communication tool, and as an outreaching tool for all the results of the project.

1.3 Structure of the Document

This document has a simple structure with a section for FACTLOG.eu and a section for FACTLOG Website.

- **FACTLOG.eu** – FACTLOG official home on the web.
- **FACTLOG website** – section presenting the structure of the FACTLOG website and examples of the pages.

2 FACTLOG.eu

The FACTLOG project website is available online and can be found using the following link:

www.factlog.eu

2.1 FACTLOG.eu placeholder

This version of the project website is being officially launched in the end of M3 of the project, and it will be continuously updated. However, the FACTLOG.eu domain was purchased during the first month (M1) of the project, and while the consortium was working on the current version of the website, a placeholder was published in www.factlog.eu, so that FACTLOG had a virtual presence in the online world.

This placeholder can be seen in figure below, where you can see that the idea was that our visitors could understand that the factlog.eu was in fact FACTLOG official home, but that the official website was being “manufactured”.

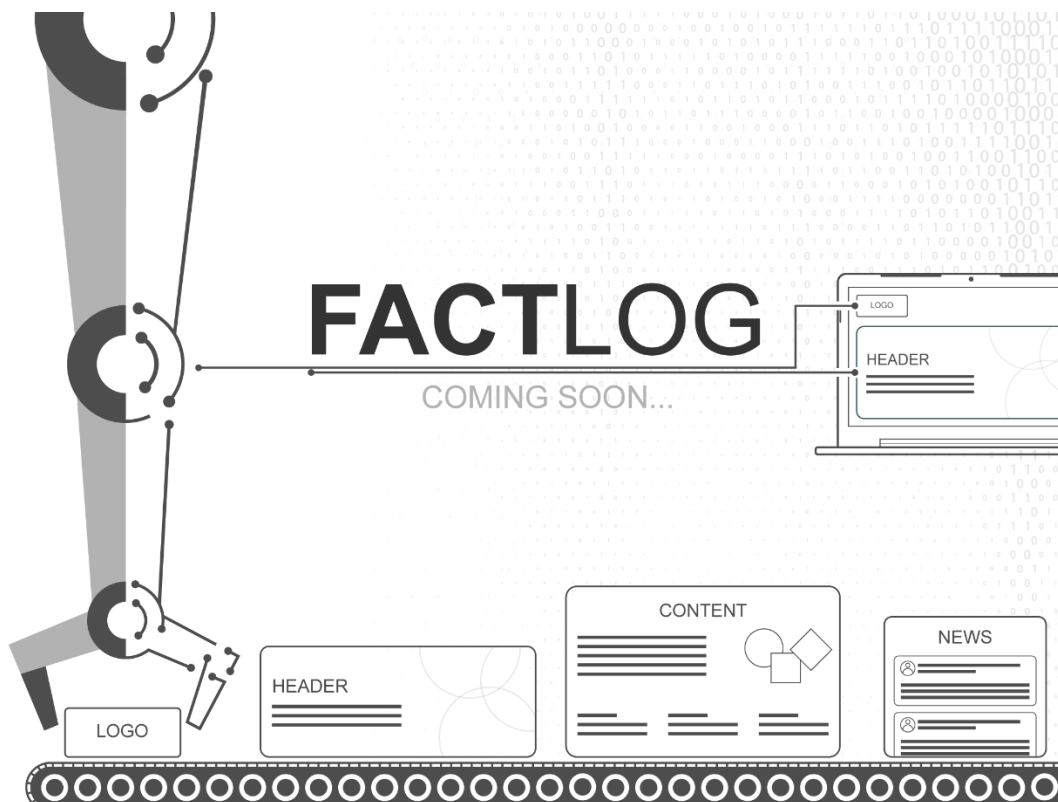


Figure 1 - FACTLOG - Placeholder

3 FACTLOG Website

The project website was created in order to provide external stakeholder with information related to FACTLOG project, results and also providing the capability of externals to contact the consortium.

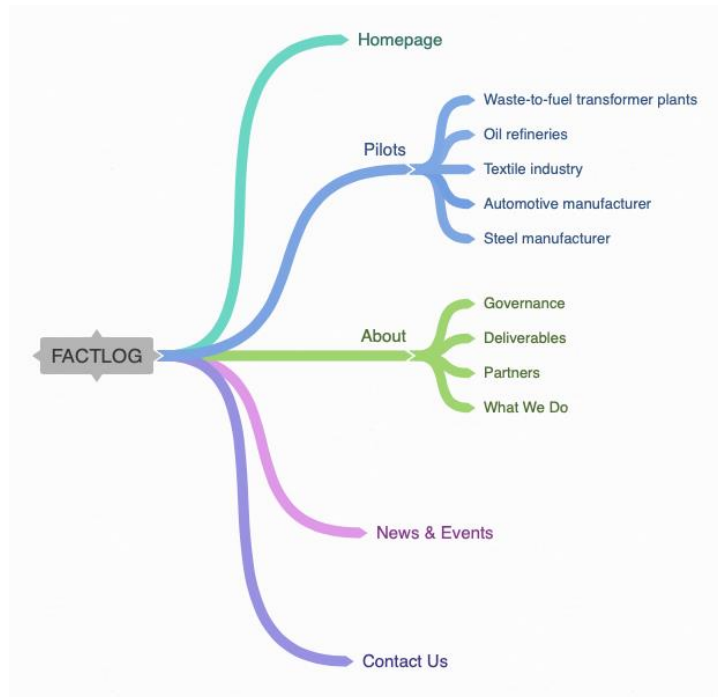


Figure 2 - FACTLOG Website mind-map

Figure 2 provides a mind-map with the structure of the portal that includes a **Homepage**, a **Pilots** section, an **About** section, **News & Events** and a **Contact Us** section. These pages can be accessed through the main menu:

- **Homepage** – Entry page of the FACTLOG website. Provides an overview of the website content;
- **Pilots** – Provides all the necessary information about each Pilot;
- **About** – The project context;
- **News & Future Events** – A dedicated page for news and events related to the project;
- **Contact Us** – Area that allows the users to contact the consortium.

3.1 Homepage

The FACTLOG Homepage can be seen as an interactive page. This page, Figure 3, allows easy access to other pages, while providing information regarding the project's activities, namely:

- **What We do:** Overview of the project's idea and objectives
- **Pilots** – Overview of the Project pilots. The "Read More" allows access to the pages dedicated to each Pilot;

- **News & Future Events** – overview of the news related to FACTLOG (direct connection to the project’s Twitter account), and list of the future events being targeted by the project.
- **Our Partners** – Consortium partners

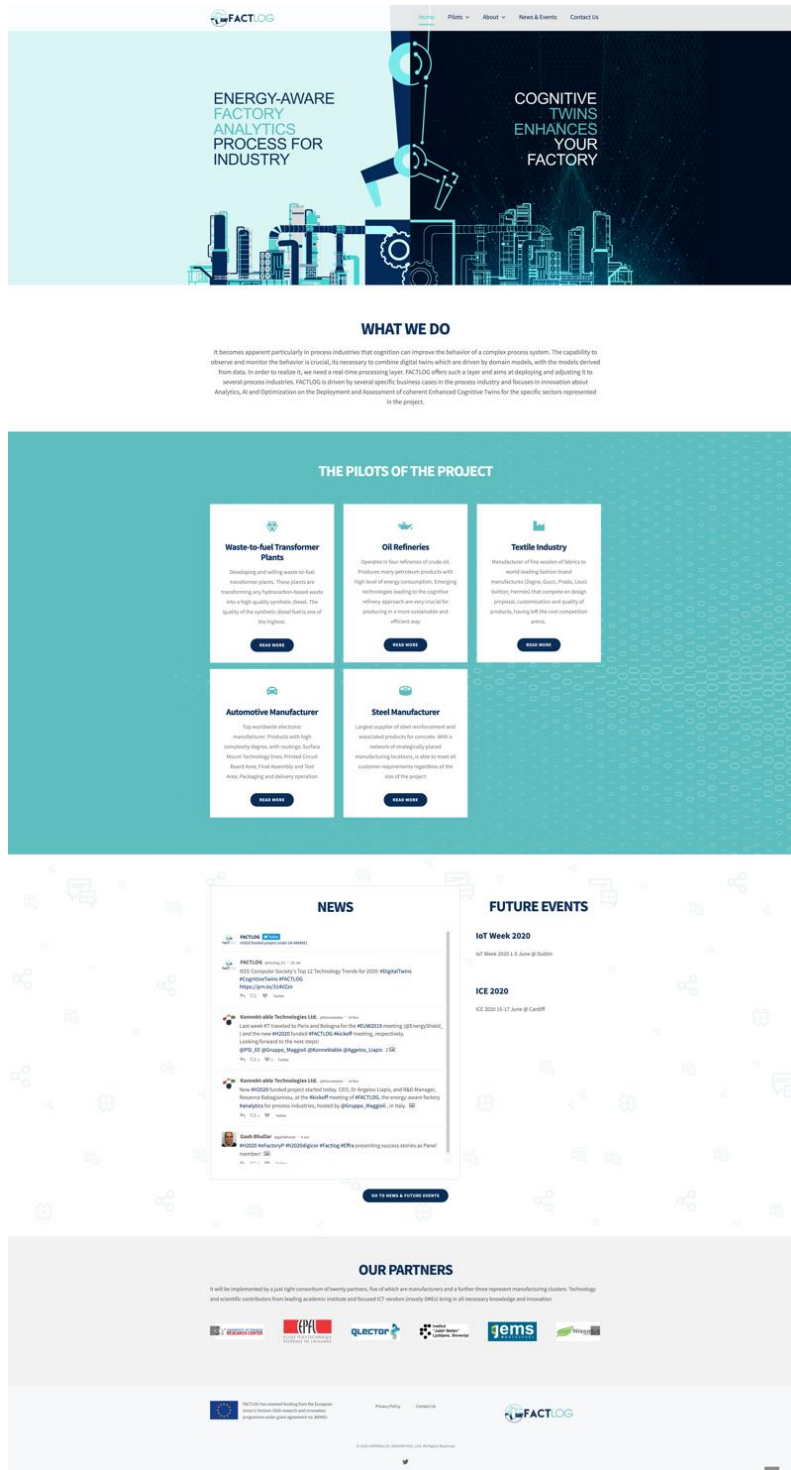


Figure 3 - FACTLOG Home page

3.2 Pilots

The Pilots section is dedicated to the pilots of the FACTLOG project. In the main page, depicted in Figure 4, it's possible to find a reference to each of the pilots. Through each image it is possible to access the page dedicated to the respective pilot. However, the user has direct access the pilot's page, via the main menu.

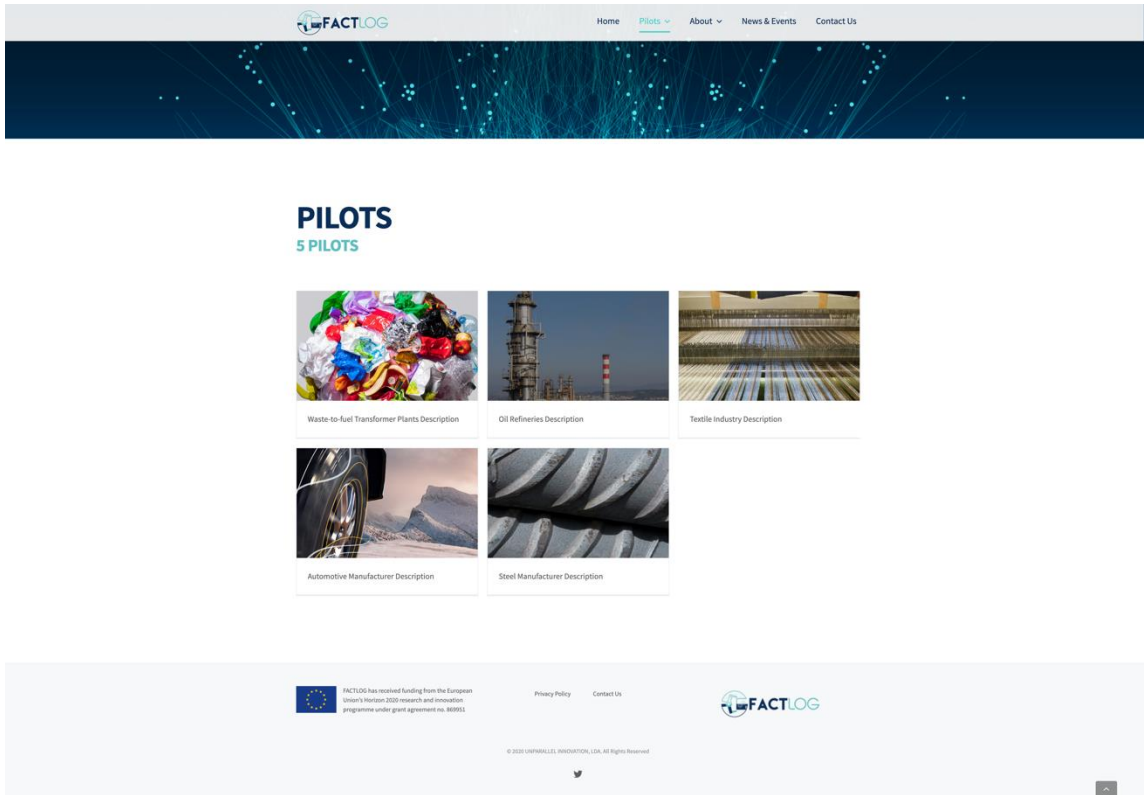


Figure 4 - FACTLOG Pilots page

The following sub-sections provide a screenshot of each of the FACTLOG pilots.

3.2.1 Waste-to-fuel Transformer Plants

FACTLOG Home Pilots About News & Events Contact Us

Waste-to-fuel Transformer Plants

Description

JEMS is developing and selling waste-to-fuel transformer plants. These plants are transforming any hydrocarbon-based waste into a high-quality synthetic diesel. In these plants, JEMS uses a chemical-catalytic de-polymerisation process that runs on low temperature and low-pressure. Due to the low temperature, no harmful gasses (like dioxins or furans) are produced as by-products. More specifically, the process temperature of this technology is a few hundred degrees lower than the threshold to produce carcinogenic gasses. Organic waste that can be used includes wood, paper, waste fuel & oil, plastics, textile, rubber, agricultural residues, weed, yard trimmings, cultivated plants, food leftovers, coal, crude oil, and others. The quality of the synthetic diesel fuel is one of the highest. Due to the high cetane index, flash point, low Sulphur content and low clouding point, the synthetic fuel can be used in any modern diesel engine or electricity generator without any negative technical or mechanical impact. It can be used for any modern or older diesel engine for transportation and/or electricity generation as well as for heating. As a result of a chemical process, the chemical composition is stable and can therefore be also used for long-term storage. Furthermore, such diesel can be used as an additive for low temperature use due to its very low clouding point.

The latest such transformer plant is an industrial rate machine for the chemical transformation of organic waste material into high-quality synthetic fuel. The transformer plant has been designed and built for continuous operation. This plant is already using the latest available software and hardware technology allowing remote control and maintenance of each part of the plant and the process itself. However, it does not include any analytics, anomaly detection, prediction or optimisation features. There is a high need for better understanding, optimisation and decision making given the availability of data.

Within FACTLOG, JEMS wishes to upgrade the existing plant with management, predictive and proactive features that will be deployed at the test machine. For this purpose, JEMS will be using the existing and proven intelligent big data processing platform D2Lab developed by NISSA for the creation and management of the cognitive digital twins and Qminer from Qlector for large scale data analytics. This approach is based on a novel integration of the data- and model-based approaches (analytics and deductive reasoning, respectively) enabling the so-called data-model continuum (data analytics generates models, reasoning produces implicit data) that is the basis for achieving the requested self-improvement. It belongs to the novel trend of data-enabled AI, which connects Big Data, HPC and AI, enabling the realisation of the computation intensive AI methods on high performing computation architectures (including edge resources, like GPUs).

Note that such plants are typically installed in rural and remote areas, for various feedstocks and run under different conditions across the globe. Currently they are being operated with highly qualified personnel and with high cost of personnel training. Introducing automation, remote control, optimisation and interconnectivity between the plants, would significantly ease the operation. JEMS intends to install more than 1500 of such plants across the globe in short time which would be impossible in traditional context.

Details




Pilot Type
Manufacturing

Partners
JEMS

Local
Slovenia

Supported By
Nissatech
Jožef Stefan Institute
Qlector

Gallery

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FACTLOG

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Figure 5 - Pilot Waste-to-fuel Transformer Plants

3.2.2 Oil Refineries

The screenshot displays the FACTLOG website interface for the 'Oil Refineries' pilot. At the top, there is a navigation menu with links for Home, Pilots, About, News & Events, and Contact Us. Below the navigation is a large banner image of an oil refinery. The main content area is divided into three columns: a wide 'Description' column, a narrower 'Details' column, and a 'Gallery' column at the bottom. The 'Description' column contains several paragraphs of text detailing the refinery's operations and the project's goals. The 'Details' column lists key information such as Pilot Type (Large Manufacturing), Partners (TUPRAŞ), Local (Turkey), and Supported By (Maggioli, Athens University of Economics and Business). The 'Gallery' column features three images: a refinery tower, an oil pumpjack, and industrial storage tanks.

Figure 6 - Pilot Oil Refineries

3.2.3 Textile Industry

FACTLOG Home Pilots About News & Events Contact Us

Textile Industry

Description

PIA is a manufacturer of fine woollen fabrics, supplier of fabrics to world-leading fashion brand manufacturers (Zegna, Gucci, Prada, Louis Vuitton, and Hermès, among others) that compete on design proposal, customisation and quality of products, having left the cost competition arena.

The organisation of the plant floor in PIA reflects the peculiarities of typical EU textile SMEs. In its machine fleet, especially in those parts of the process which have a direct impact on quality, like finishing or weaving, machines coexist with ICT infrastructure tracing back to 10 years or more. However, in order to address the continuous pressure towards deep customisation of fabrics and the fast reduction of lot dimension, PIA has dedicated significant efforts in the renewal of its ICT infrastructures in order to collect and exploit the produced data and to optimize its complex and inhomogeneous production. The participation in FP7 and H2020, 8 projects has supported the development of an advanced SoA for data collection and management, integrating sensors, MES, ERP and a production scheduler into a single architecture based on Case Base Reasoning.

The Production Unit Controller (PUC) provides a first starting set up to be implemented based on previous cases of the same fabric or similar ones. During the production process, a continuous flow of information comes from the machines and, in case of unexpected events, necessary action suggestions are provided based on previous cases. Data collected by the PUC are also shared with the MES, ERP and production scheduler and with the factory coordinator, at company level. The structure is designed to be open to inputs from outside sources of information, in particular with regards to the quality of input materials (e.g., yarn for weaving) and from inside sources, including incremental output (e.g., fabric quality) and performance data (e.g., machine speed) which can enrich the case database. The latter is critical to provide an action indication contextual with the event detection.

In most parts of PIA's production facilities, the existing infrastructure is suitable for obtaining data to enable the FACTLOG approach; nevertheless, in specific process steps where older equipment is used, the introduction of additional low-cost sensors may be required for process and product data. The use of cognition to resolve 'unknown unknowns', as proposed by the ECT concept, is highly relevant to the production needs, especially with regard to processes like finishing, in weaving, for example, given that all other parameters are constant, an increase in energy use reveals a wearing of components which can lead to an expected stop of production, this being a continuous process. In finishing, on the other hand, where the process is typically "one shot" and the characteristics of the fabric change per each design, this direct data interpretation is not possible; the behaviour of the production elements and their complex relations must be revealed in order to capture the realities of this process. The extension of this pilot test case will also be examined in the final part of the project, exploring the validity of the FACTLOG concept in other departments of textile production as well.

Details

Pilot Type
Textile Industry

Partners
Fratelli Piacenza

Local
Italy

Supported By
Domina
UNPARALLEL

Gallery

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FACTLOG

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Figure 7 - Pilot Textile Industry

3.2.4 Automotive Manufacturer

FACTLOG Home Pilots About News & Events Contact Us

Automotive Manufacturer

Description

Continental is among the top worldwide electronic manufacturer. Its products are manufactured in Electronic plants such as the plant in Timisoara. Our plant is producing high electronic products, design by the group of development within different worldwide locations. Products are from design phase customized for our final customer, automotive OEM's. Although these products (e.g. airbag control units, chaises controllers, hand brake controllers etc.) have a high complexity degree, their routings can be described (in brief) as follows.

- **SMT (Surface Mount Technology) lines.** High automated lines where electronic components are placed on the PCB boards.
- **PCBA (Printed Circuit Board Area).** PCB area, where the electronic built in SMT will be separated in smaller parts (PCB's) and tested electrically (In Circuit Test). Additional processes can also take place in this area like Press Fit, Handling, Flashing of Microcontrollers and Temperature functional tests.
- **FA (Final Assembly) and Test Area.** This is the step of production where the electronic is connected to the mechanical part and finally tested and labelled. The processes in this area are in the area of connecting the mechanical parts: Screwing, Press Fit, Gluing, Riveting, Snap In. The testing area consists of tests line Functional test of the product, Automatic Optical Inspection, Force monitoring for the snap in, air leakage test.
- **Packaging and delivery operation.** Within this step of manufacturing we are packing the products in customer specific boxes and link all the information needed by customer to the unique number of each box.

To maximize lifetime of equipment's involved in production process (Process equipment but also Test equipment), Continental maintenance & repair departments perform different maintenance techniques. Also, workers from the shop floor play an important role through the information provided about equipment's behavior in operations. In this regard, valuable information is gathered and interpreted in order to detect early possible failures or defects. Inspection, maintenance and repair activities are performed daily to annually, in conjunction with the technical prescriptions and machine age. Mainly process characteristics that are tracked are: (i) Process parameters e.g. torque, pressing forces, (ii) measured values of the electronic components, (iii) product reaction in different temperatures, (iv) wearing of the tools during production phase (v) deviations from accuracies machining / processing. Maintenance operations must be further combined with advanced analytics and robust optimization methods to effectively coordinate maintenance (predictive or reactive) with production planning and scheduling.

Details

Pilot Type
Automotive Manufacturer

Partners
Continental Automotive Romania SRL

Local
Romania

Supported By
SIVECO Romania SA
Konnekt-able

Gallery

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Figure 8 - Pilot Automotive Manufacturer

3.2.5 Steel Manufacturer

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Steel Manufacturer

Description

Founded in 1908, BRC is the UK's largest supplier of steel reinforcement and associated products for concrete. With a network of strategically placed manufacturing locations, BRC is able to meet all customer requirements regardless of the size of the project. Moreover, it complies with the highest quality and sustainability standards and can be found in iconic projects such as the second Severn Crossing, the Principality Stadium, Wembley Stadium, Merseylink Gateway, CrossRail, Falkirk Wheel and Aberdeen Western Peripheral Route.

BRC strives to reduce the environmental impact of its operating processes. In that regard, BRC ensures that its reinforcing steel main raw materials have been responsibly sourced. This reinforcing steel is produced via the Electric Arc Furnace (EAF) method, giving a 98% recycled content to the finished product. Producing steel by utilizing this method can reduce its carbon footprint by nearly four times when compared to the Basic Oxygen Steelmaking (BOS) process. BRC couples its production processes with robust supply chain traceability and favorable carbon footprint in order to ensure its customers meet all requirements related with modern construction projects.

With respect to its production facilities, BRC connects to shop floor systems via a rudimentary communications' system which allows barcodes to be printed on the shop floor detailing customer orders. From there, on the shop floor system there is a continuous laborious process with the steel required for the concrete reinforcement transferred to the required processes using the operator's knowledge of interpreting the drawings and setting the machines to bend the material to the required specification. Within FACTLOG, BRC wishes to optimize its machinery operational capacity and maintenance processes via predictive machine analytics (interrelating oil levels, greasing requirements, drive wear, temperatures, vibration etc.), also incorporating cognitive characteristics to further capture unresolvable situations, thus leading to predictive fault prevention. In that regard, FACTLOG needs to enable integration with a knowledge-share solution enabling the automation of maintenance alerts to all responsible parties. Moreover, BRC wishes to utilize machine learning and artificial intelligence to support work order handling and to offer dashboards that enable situational-awareness from high level KPIs down to operator/machine/shift/breakdown data; this information must then be used to facilitate resource-aware mid-term production planning.

Details

Pilot Type
Steel Manufacturer

Partners
BRC

Local
United Kingdom

Supported By
Control 2K Limited

Gallery

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Figure 9 - Pilot Steel Manufacturer

3.3 About page

The section About, depicted in Figure 10, provides the FACTLOG context. This section, is divided in different sub-sections, mainly:

- **Governance** – The project’s structure;
- **Deliverables** – The project’s documentation;
- **Partners** – Partners information;
- **What we do** – Detailed information about FACTLOG project: the context, the aims and the objectives.

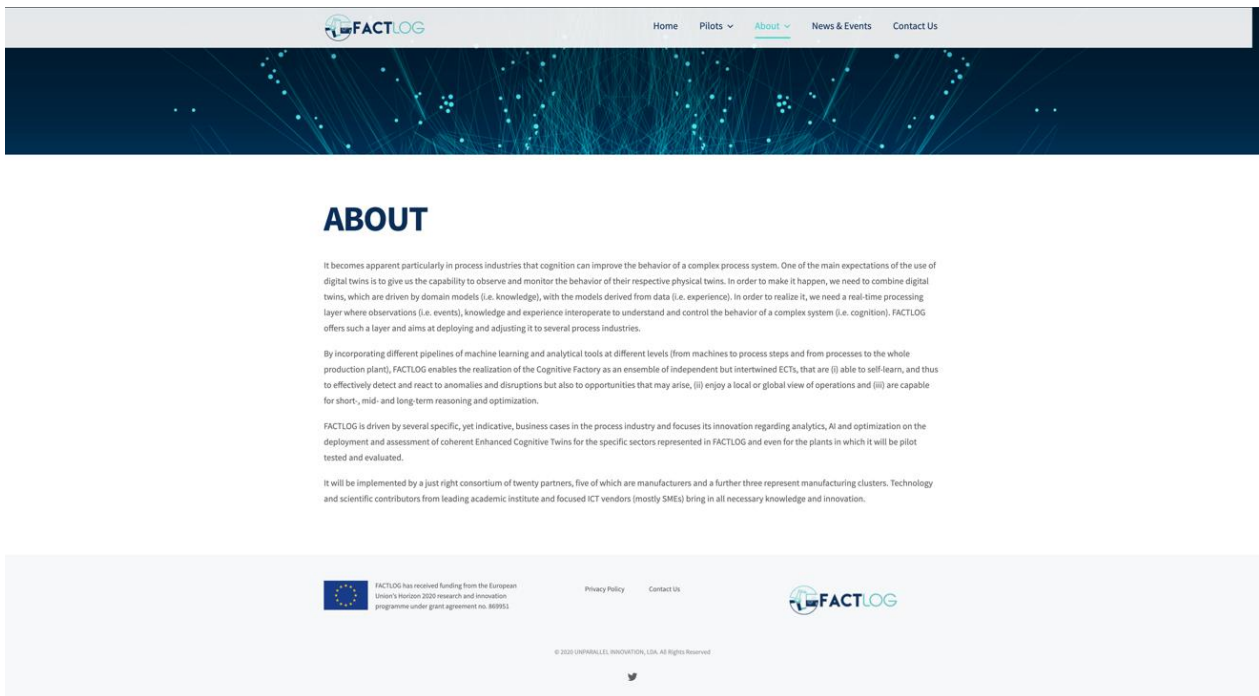


Figure 10 - FACTLOG About page

3.3.1 Governance

GOVERNANCE
1 PROJECT . 9 WORK PACKAGES

Factlog is structured in 9 Work Packages:

The flowchart illustrates the structure of the 9 Work Packages (WPs):

- WP1: Cognitive Requirements, Use Cases and Data
- WP2: Analytics and AI for Cognitive Factories
- WP3: Enhanced Cognitive Twins
- WP4: Knowledge Graphs and Process Modelling
- WP5: Robust Optimization Methods
- WP6: Integration and Toolset Creation
- WP7: Cognitive Retrofitting of Process Plants
- WP8: Dissemination, Business Innovation and Impact Creation
- WP9: Project Management

Work Package 1
Cognitive Requirements, Use Cases and Data
Definition of all the requirements and respective KPIs is, the use cases are formulated, the specifications are developed and lastly the overall cognitive architecture is developed

Work Package 2
Analytics and AI for Cognitive Factories
Development of the methodologies, infrastructure and modelling to support data-driven analytics within the process industries

Work Package 3
Enhanced Cognitive Twins
Design, development and lifecycle management of the Enhanced Cognitive Twins

Work Package 4
Knowledge Graphs and Process Modelling
Development of a KG-based solution for process modelling and analytics

Work Package 5
Robust Optimization Methods
Creation of the algorithms for Enhanced Cognitive Twins to conduct real-time optimization of production plans and schedules in the new Cognitive Factory.

Work Package 6
Integration and Toolset Creation
Outputs on the development are transformed into respective toolsets for the new cognitive factories

Work Package 7
Cognitive Retrofitting of Process Plants
Cognitive transformation of the process industry plants is enabled, and the innovations are evaluated and in two iterations and experimentation rounds

Work Package 8
Dissemination, Business Innovation and Impact creation
Dissemination and communication activities are orchestrated, business models for the cognitive factories are developed and sustainability and standardization actions are executed

Work Package 9
Project Management
Management of the project

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Figure 11 - About - Governance

3.3.2 Deliverables

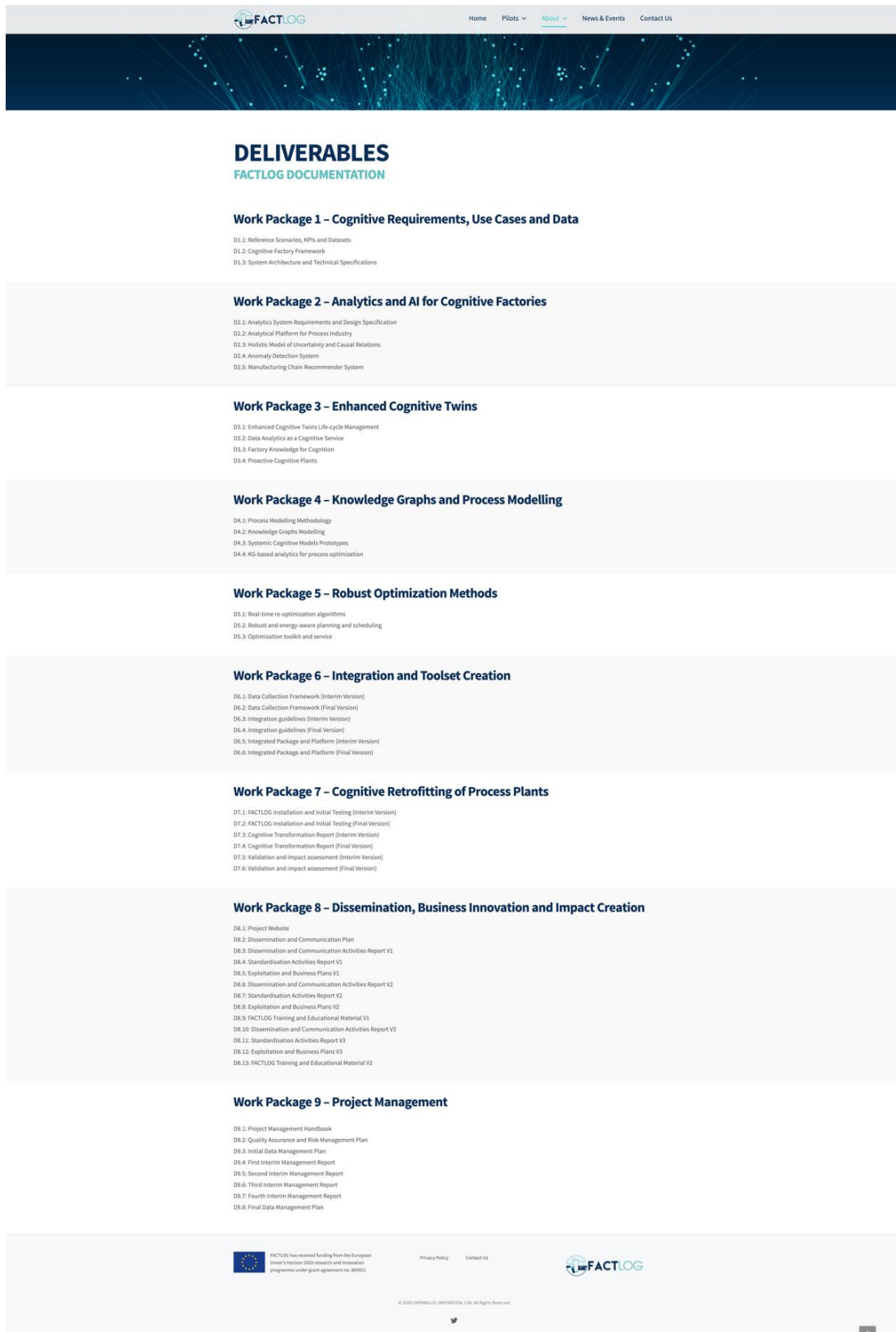


Figure 12 - About - Deliverables

3.3.3 Partners

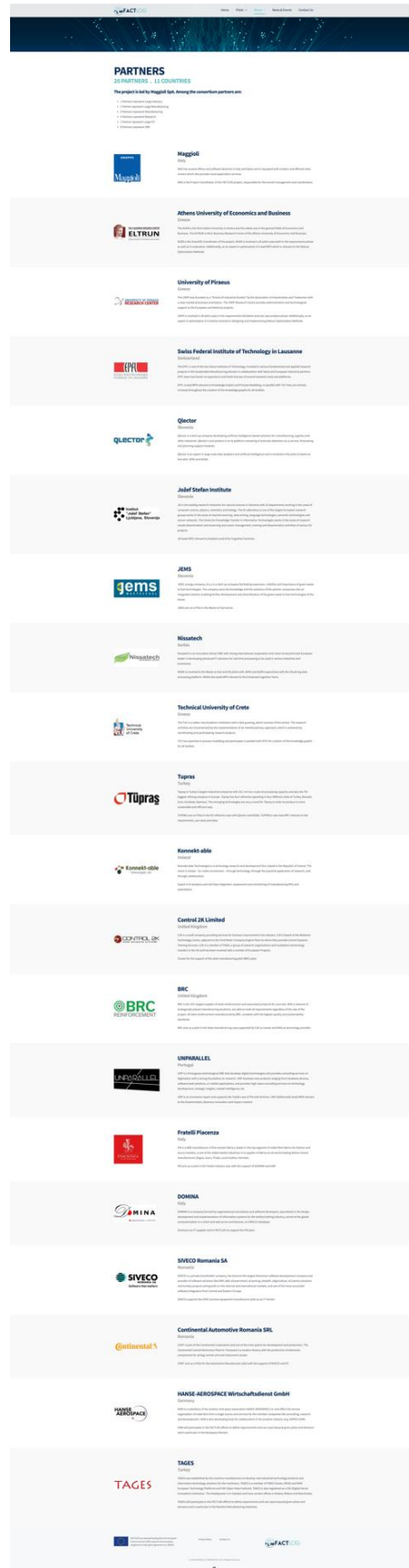


Figure 13 - About - Partners

3.3.4 What we do

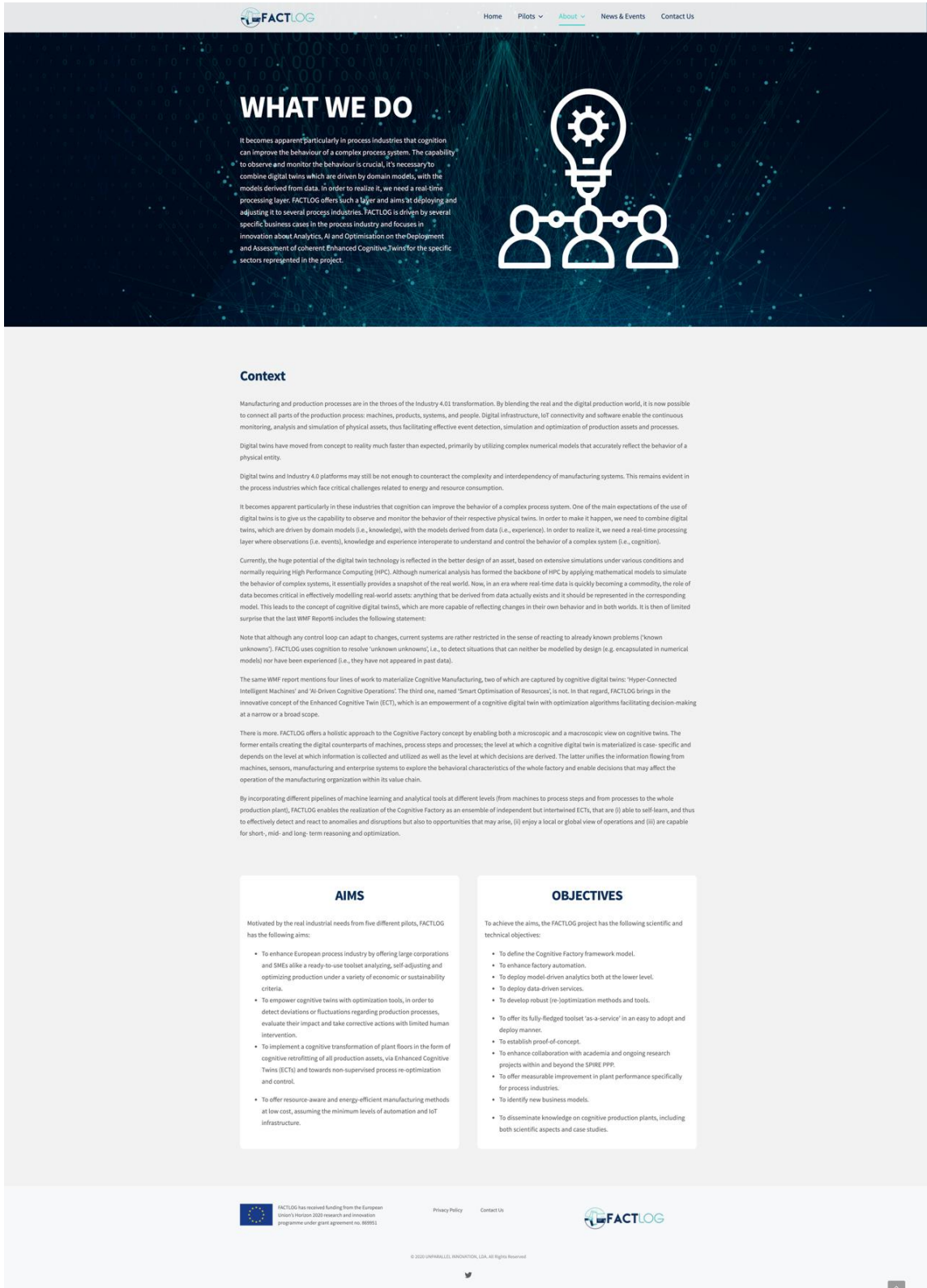


Figure 14 – About - What we do

3.4 News & Events page

In the section News & Events, illustrated in Figure 15, the user can follow the FACTLOG updates about the project. This page is divided in News, and Future Events.

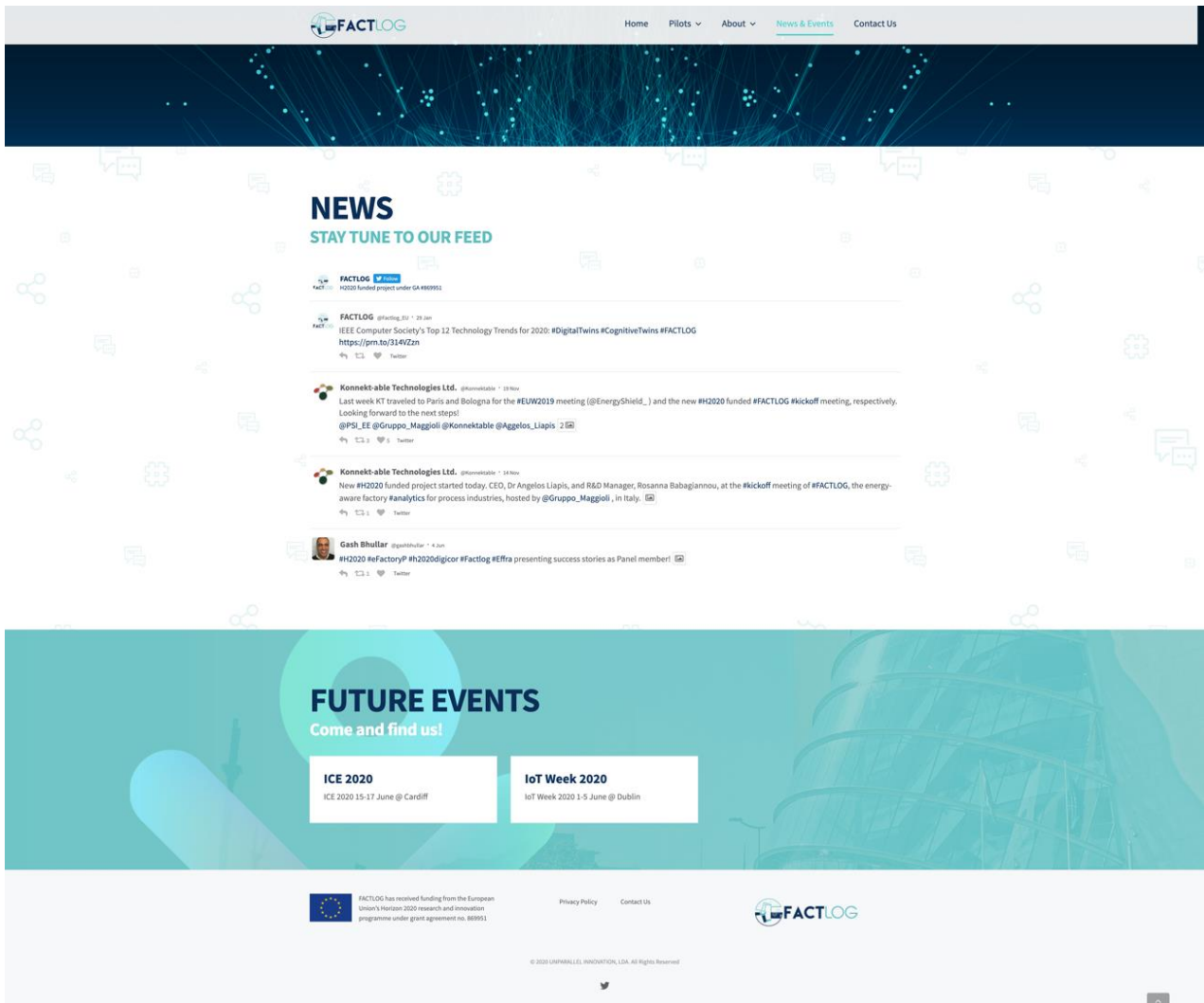


Figure 15 - FACTLOG News & Events page

3.5 Contact Us page

The FACTLOG webpage purpose is to share information and knowledge about areas related to the project. This page allows any person with interest to contact the consortium with questions about FACTLOG or get involved in FACTLOG activities.

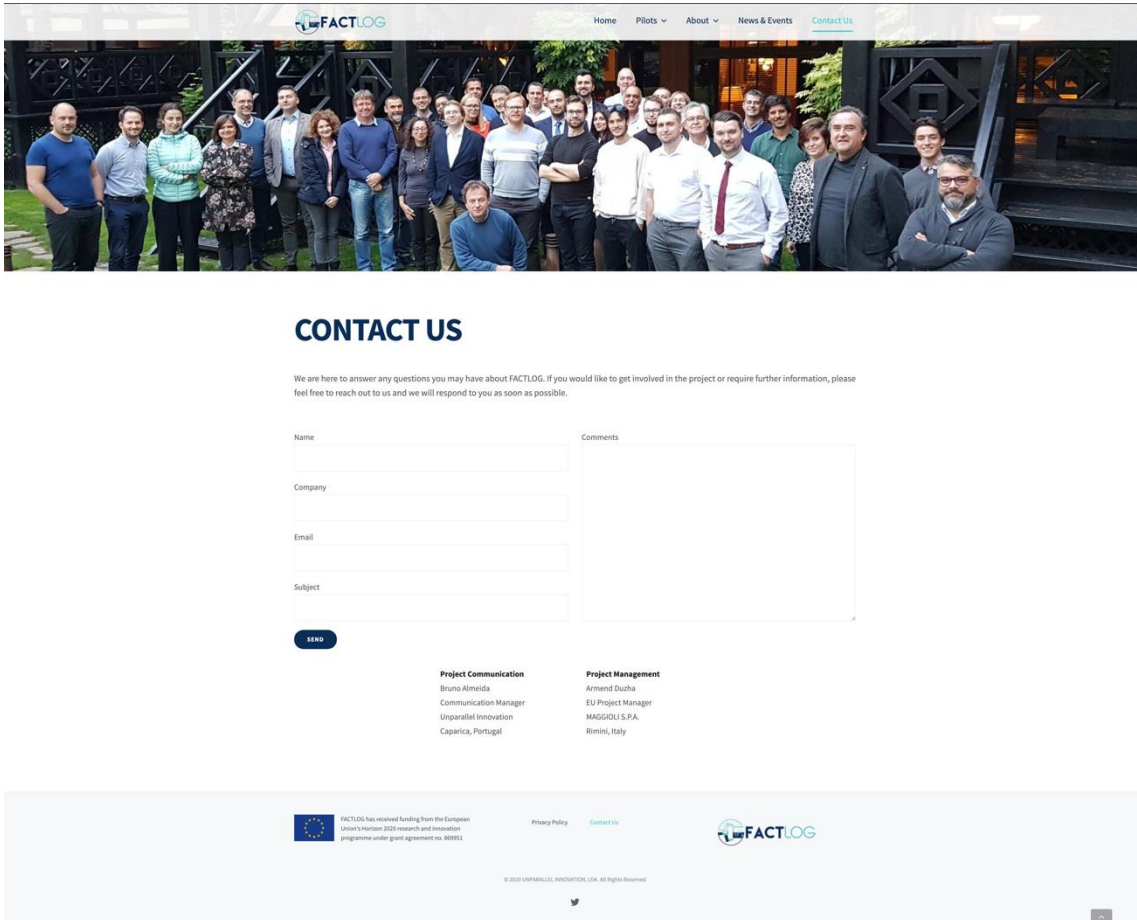


Figure 16 - FACTLOG Contact Us page