

**H2020-NMBP-2019**

[DT-NMBP-08-2019 - Real-time nano-characterisation technologies \(RIA\)](#)

**Title:** Process Analytical Technologies for Industrial Nanoparticle Production

**Acronym:** NANOPAT

**Grant Agreement No:** 862583



**NANOPAT:**

<b>Deliverable 7.1</b>	Public project website online
<b>Associated WP</b>	WP7
<b>Associated Task(s)</b>	Task 7.2 – Dissemination and stakeholder engagement
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## Publishable Executive Summary

A website with the domain [www.nanopat.eu](http://www.nanopat.eu) was created and published for the EU project NanoPAT, which is an European Union's Horizon 2020 Research and Innovation Program, under the Grant Agreement number 862583.

The purpose of this website is to communicate and disseminate project relevant information (main ideas and objectives, work plan, beneficiaries, progress of the tasks, internal / relevant external events, activities, news, project outputs, etc.) to the general public

The contents of the website will be continuously updated until at least 1 year after project ends.

## Description of task

A project website was designed and will be updated during the life time of the project. Relevant content was collected and prepared for the webpage. BNN was responsible for developing the website.

The document makes a presentation of the project website and the logo that have been developed. The project website will be one of the main channels for communication and dissemination of the project objectives, activities and outcomes. Therefore, it will be regularly updated to provide continuous information about the project to the community.

The project website will be active for, at least, one year after the end of the project.

## Description of work and main achievements

### Background of the task

One of the objectives of Task 7.2 “Dissemination and stakeholder engagement” is the development and maintenance of the NanoPAT website ([www.nanopat.eu](http://www.nanopat.eu)).

### Description of the work carried out

These are the steps that were followed for the construction of the webpage of the NanoPAT project:

1. Meetings between BNN and IRIS (project coordinator) were on a regular basis in order to achieve the main aim of developing a webpage that represents the project.
2. Purchase of the three domains (www.nanopat.eu, .com and .org)
3. Purchase of webhosting & SSL certificate
4. Development of the “Coming soon” - website of NanoPAT
5. Image research for the webpage
6. Purchase of the website template
7. Development of the NanoPAT website structure:
  - Home
  - Project (subsections: Project summary, Objectives, Work plan, Case Studies and Process Analytical Technologies))

- Team
  - Events
  - News & Media
  - Contact
8. Adaptation of the website template to NanoPAT's objectives and the already existing corporate identity (created by the project coordinator, IRIS, during the proposal phase)
  9. Compilation of texts for the NanoPAT website
  10. Construction of the official NanoPAT website: [www.nanopat.eu](http://www.nanopat.eu)
  11. Regular updates of the NanoPAT website

In the next subsections, the main contents of the project website, as well as the project logo will be presented.

#### 1. NanoPAT's public website

Setting up the project website was the first phase of the project's communication, dissemination and exploitation strategy<sup>1</sup>. The NanoPAT website is the main dissemination reference and describes the project, its objectives and the project partners, providing also information about events and activities related to the project, as well as announces forthcoming news / conferences / workshops / events.

The project website is accessible at <https://www.nanopat.eu/> (the domains .com and .org are also reserved and link to the .eu domain).

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<sup>1</sup> [https://www.iprhelppdesk.eu/sites/default/files/EU-IPR-Brochure-Boosting-Impact-C-D-E\\_0.pdf](https://www.iprhelppdesk.eu/sites/default/files/EU-IPR-Brochure-Boosting-Impact-C-D-E_0.pdf)

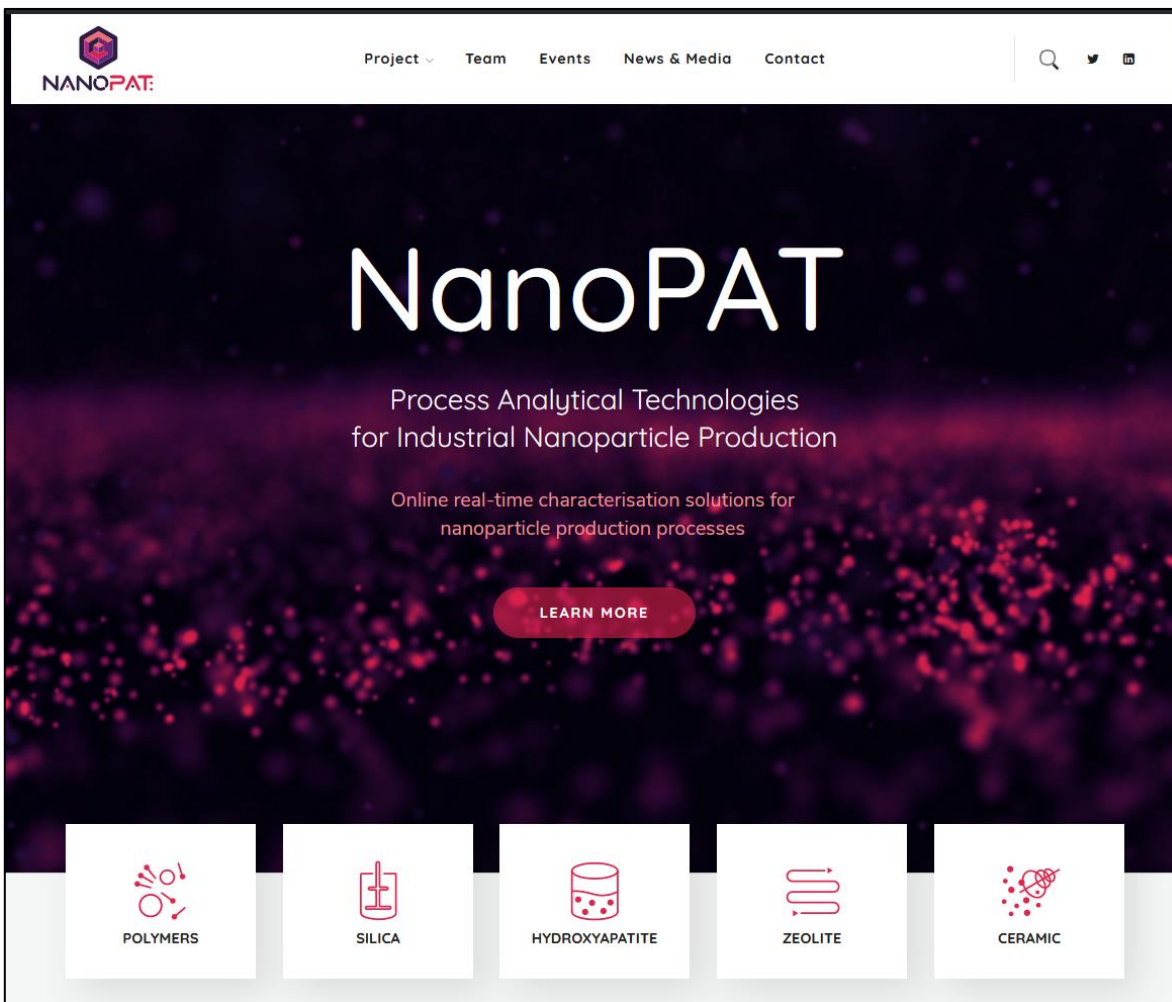


Figure 1: Screenshot of website homepage

The main purpose of the website is to provide the community easily accessible, up-to-date and accurate information about the project and therefore it will be one of the main communication and dissemination channels of NanoPAT.

More screenshots of the project website can be found in the “Results” section.

### 1.1 Public sections of the website

The website was created at the beginning of the project and officially launched in September 2020.

The purpose of the website is to serve as the main information gateway for the project. It will be regularly updated to provide continuous information about the project. Over time it will become the repository for all of the public dissemination materials, including presentations, posters, public deliverable reports, training materials, scientific publications, newsletters, etc.

Through the website, general and specialized information are stored, updated and permanently accessible to any interested audience. In addition, the website provides information on all project objectives, work packages, beneficiaries, activities and results, as well as upcoming events/workshops/conferences.

The public website is divided into six (five plus home) main areas, as follows:

- **Home** – Website main page: It gives an overview of the project with subsections linking to the webpage section project summary, objectives, team, as well as the five case studies and the three Process Analytical Technologies (PATs). There are also two banners: one with the partner logos and one with partner expectations/testimonial. At the bottom of the page, the 3 latest news are highlighted (see Figure 6 in the Results section).
- **Project section:** presents, in its five sub-sections, an overview about the project, its objectives, the work plan, the case studies and the PATs, with dedicated subsections for each case study and each PAT (see Figure 7 - 11 in the Results section).
- **Team section:** It gives an overview about the project partners. All project partners, their role in the project as well as the corresponding contact persons are shortly presented in the corresponding subsections. The pictures of the contact persons will be added to give a more personal character to the project and to show the community and the general public, that there are human beings behind the scenes (see Figure 12 in the Results section).
- **Events section:** This section is one of the main dissemination tools, as all conferences, meetings, workshops, events, training schools, networking events, webinars, etc. that NanoPAT is organising and/or attending with an active role are publicised. It is a constant reminder of our next dissemination events.
- **News & Media section:** All public deliverables and other project outputs are contained in this section (reports, press releases, newsletters, factsheets, posters, presentations, publications, etc.) (see Figure 13 in the Results section).
- **Contact section:** It gives contact details on the project coordinator, the possibility of contacting the project (coordinator), via a form, for any queries or simply to know more about NanoPAT, after agreeing with the Privacy Policy of the project (see Figure 14 in the Results section).

The *social media channels* used by the project as communication and dissemination instruments are also directly linked from the project website.

These are Twitter ([https://twitter.com/nanoPAT\\_project](https://twitter.com/nanoPAT_project)) and LinkedIn (<https://www.linkedin.com/company/nanopat/>) project accounts.

The two newest tweets are also displayed in the footer of the website, which is shown on every page at the bottom.

Additionally to the main sections, the website also has sections for *Download*, *Imprint* and *Privacy Policy*.

In the Download section, it is possible to download the project logo and the main background image in high quality for dissemination purposes.



The *project acknowledgement* is findable, as required by the European Commission, in the footer of the webpage through all the sections.

The website will be updated on a regular basis during the project lifetime and will be maintained for at least one year after the project end.

## 2. NanoPAT's Logo

Figure 2 shows the development process of the project logo and the two candidates that we had as final version. The consortium partners chose Option B.

The project logo (Figure 3) includes the name of the project (NanoPAT) and its consortium structure, represented as a hexagon: the nano-monitoring technology providers as nucleus of NanoPAT's approach; RTOs at a second level, between the PAT providers and the industrial end users; and all around, the digital technologies for data handling and elaboration, as well as dissemination and knowledge transfer activities.

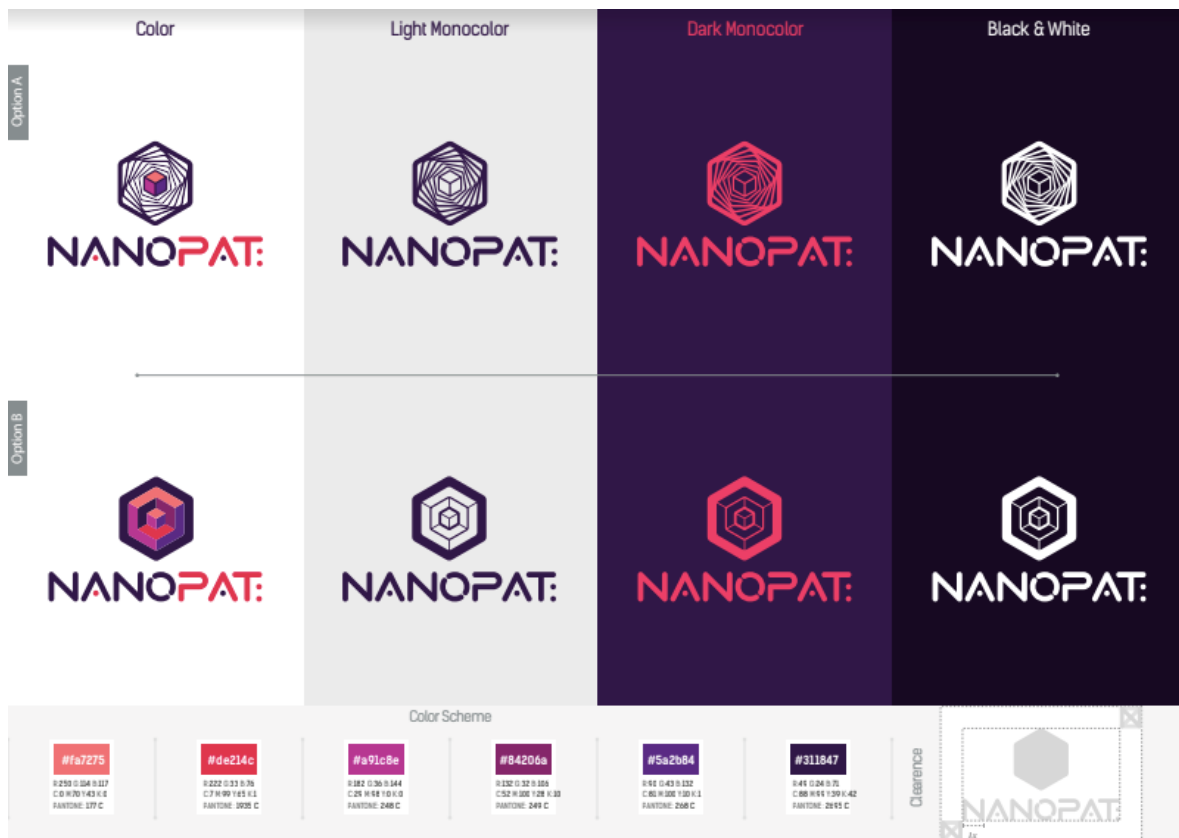


Figure 2: Final Project logo and candidates



Figure 3: Final Project logo

We have created a NanoPAT icon (favicon, for social media, for example) and different versions of the logo so it is applicable depending on the background where it is going to be used.



Figure 4: Project icon



Figure 5: Project Logo – Version with different colours

### 3. NanoPAT's Restricted Area

Initially, it was planned to have a private section at the webpage, only for project partners. Already in the very beginning of the project, this idea was changed and a confidential repository (Google Drive) was set up by IRIS, project coordinator, as project management tool.

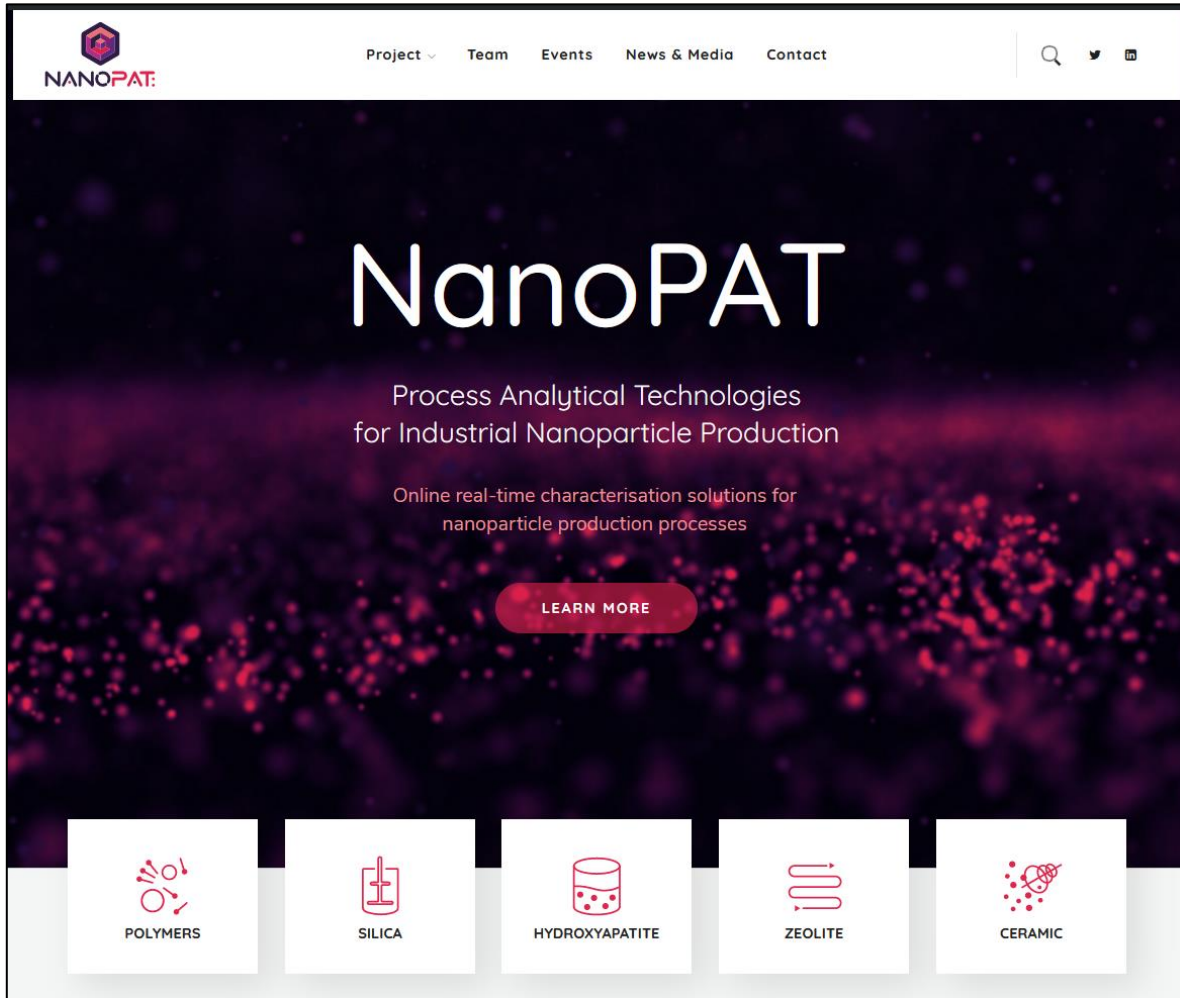
The purpose of this repository is to collect all relevant project documentation and information, in a confidential way. The documents are organized in different folders and it contains: official documentation (project documents as the Project Proposal, the Grant Agreement, the Consortium Agreement and all EC communications), templates, project meetings info (agenda, minutes and presentations), final versions of deliverables, activity reports, monitoring reports, dissemination and marketing material, etc.

The management of NanoPAT's intranet is carried out by the coordinator IRIS. More information about this project management tool can be found in *Deliverable 9.1 – Project Management Tool*.

### Results

The creation of the website was done in close collaboration with the coordinator IRIS. Some of the website sections (Team, Case Studies, PATs) were developed in close collaboration with all project partners. Everything went smoothly and worked well.

The next screenshots show the different sections of the NanoPAT webpage (in the *Annex* you can find screenshots of the whole pages):



**Figure 6: Website homepage**

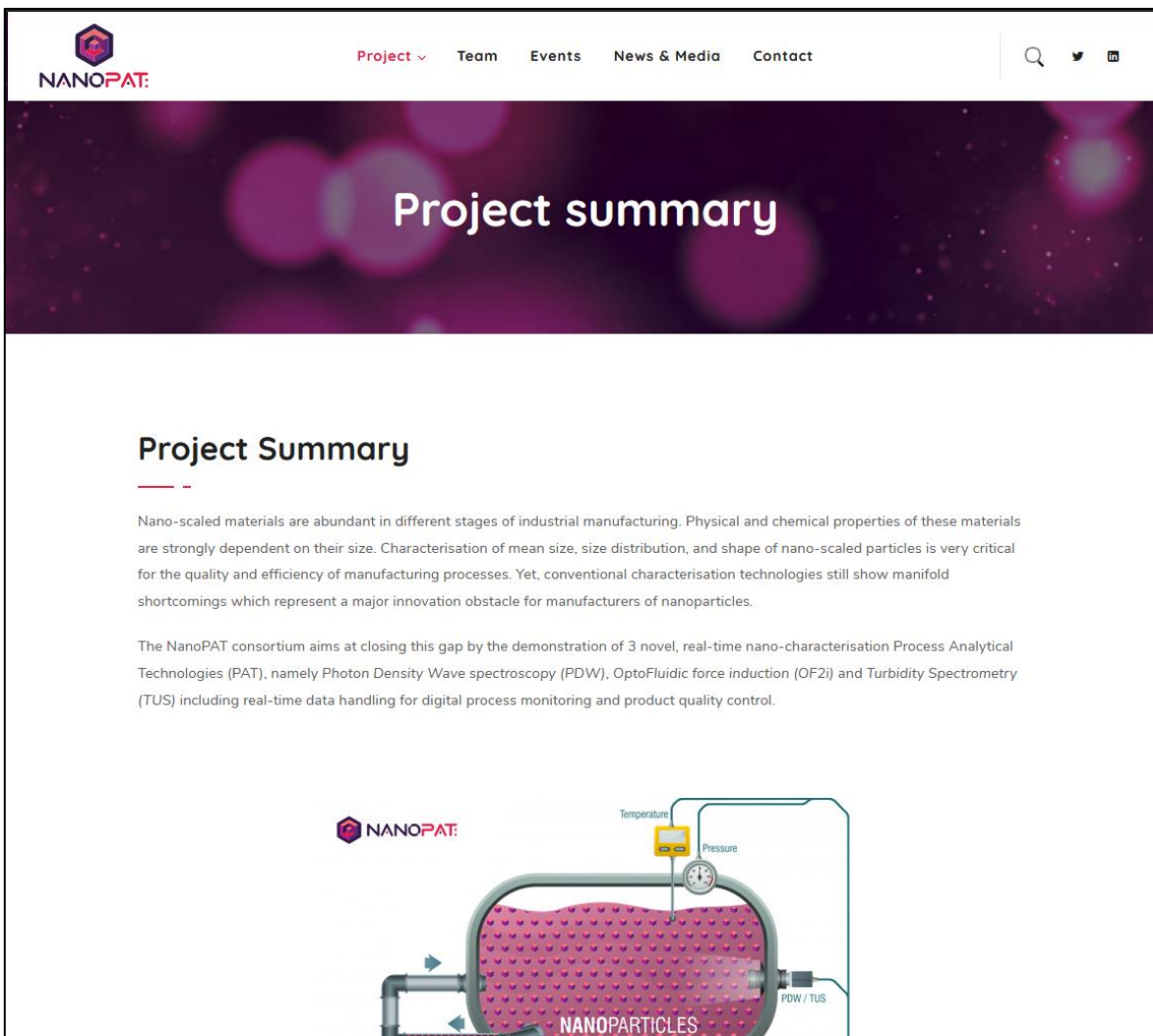
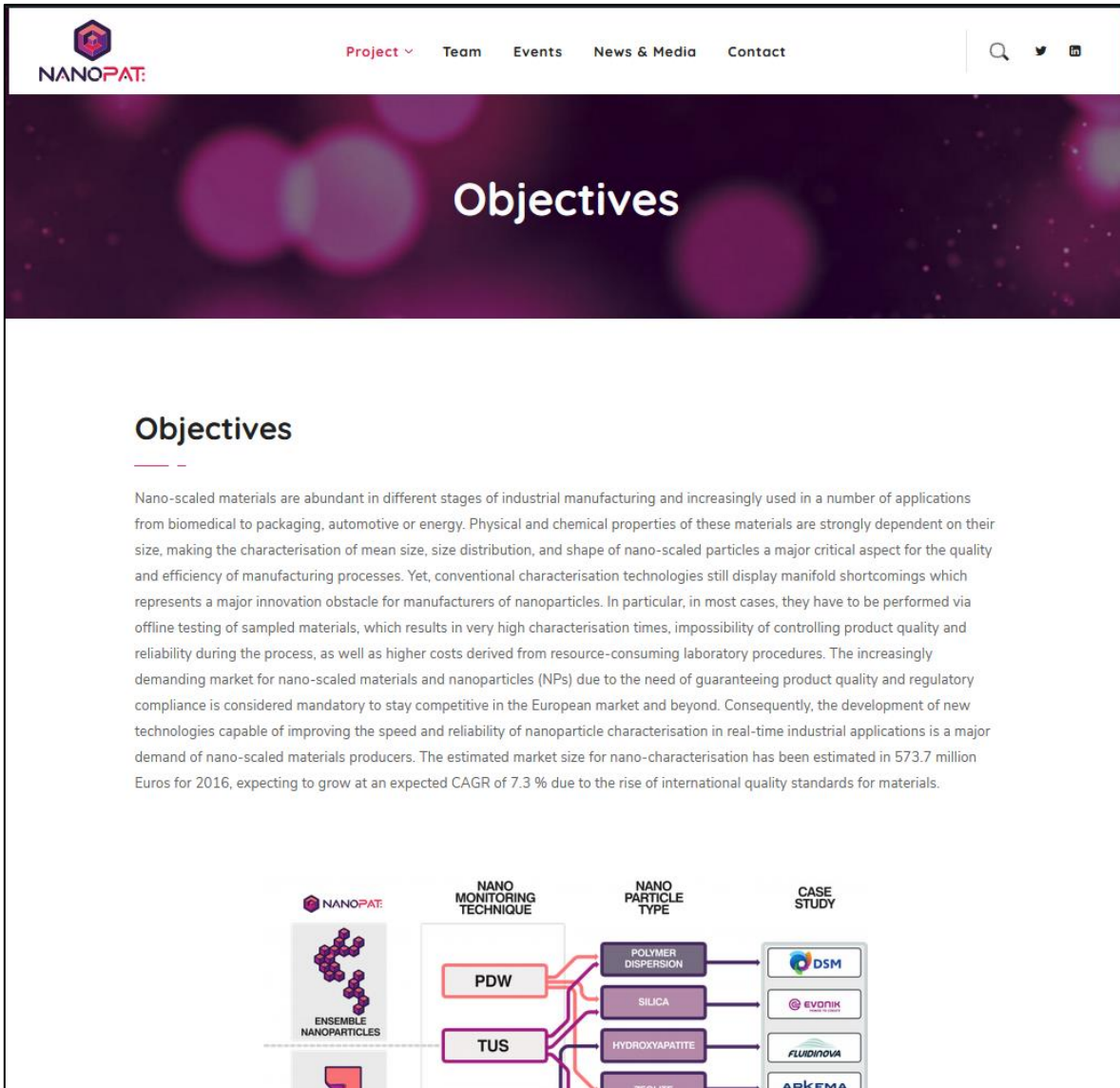


Figure 7: Project section – “Project Summary” subsection




**Objectives**

Nano-scaled materials are abundant in different stages of industrial manufacturing and increasingly used in a number of applications from biomedical to packaging, automotive or energy. Physical and chemical properties of these materials are strongly dependent on their size, making the characterisation of mean size, size distribution, and shape of nano-scaled particles a major critical aspect for the quality and efficiency of manufacturing processes. Yet, conventional characterisation technologies still display manifold shortcomings which represents a major innovation obstacle for manufacturers of nanoparticles. In particular, in most cases, they have to be performed via offline testing of sampled materials, which results in very high characterisation times, impossibility of controlling product quality and reliability during the process, as well as higher costs derived from resource-consuming laboratory procedures. The increasingly demanding market for nano-scaled materials and nanoparticles (NPs) due to the need of guaranteeing product quality and regulatory compliance is considered mandatory to stay competitive in the European market and beyond. Consequently, the development of new technologies capable of improving the speed and reliability of nanoparticle characterisation in real-time industrial applications is a major demand of nano-scaled materials producers. The estimated market size for nano-characterisation has been estimated in 573.7 million Euros for 2016, expecting to grow at an expected CAGR of 7.3 % due to the rise of international quality standards for materials.

ENSEMBLE NANOPARTICLES	NANO MONITORING TECHNIQUE	NANO PARTICLE TYPE	CASE STUDY
ENSEMBLE NANOPARTICLES	PDW	POLYMER DISPERSION	DSM
	TUS	SILICA	EVONIK
		HYDROXYAPATITE	FLUIDINOVIA
		ZINC OXIDE	ARKEMA

Figure 8: Project section – “Project Objectives” subsection


Project ▾ Team Events News & Media Contact

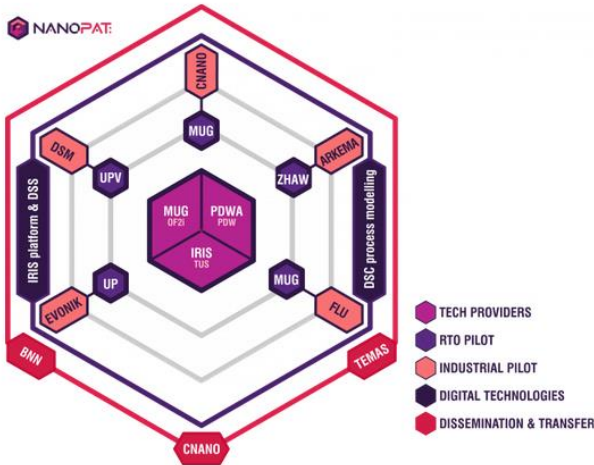
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# Work plan

## Work plan

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The project is divided into nine work packages covering the scientific and technical aspects of the project, exploitation and dissemination of results, knowledge transfer, market strategy and project management. Each work package is managed by a work package leader who is responsible for the timely delivery of deliverables to the Coordinator, who in turn represents the Consortium to the Commission.



**Figure 9: Project section – “Project Work Plan” subsection**

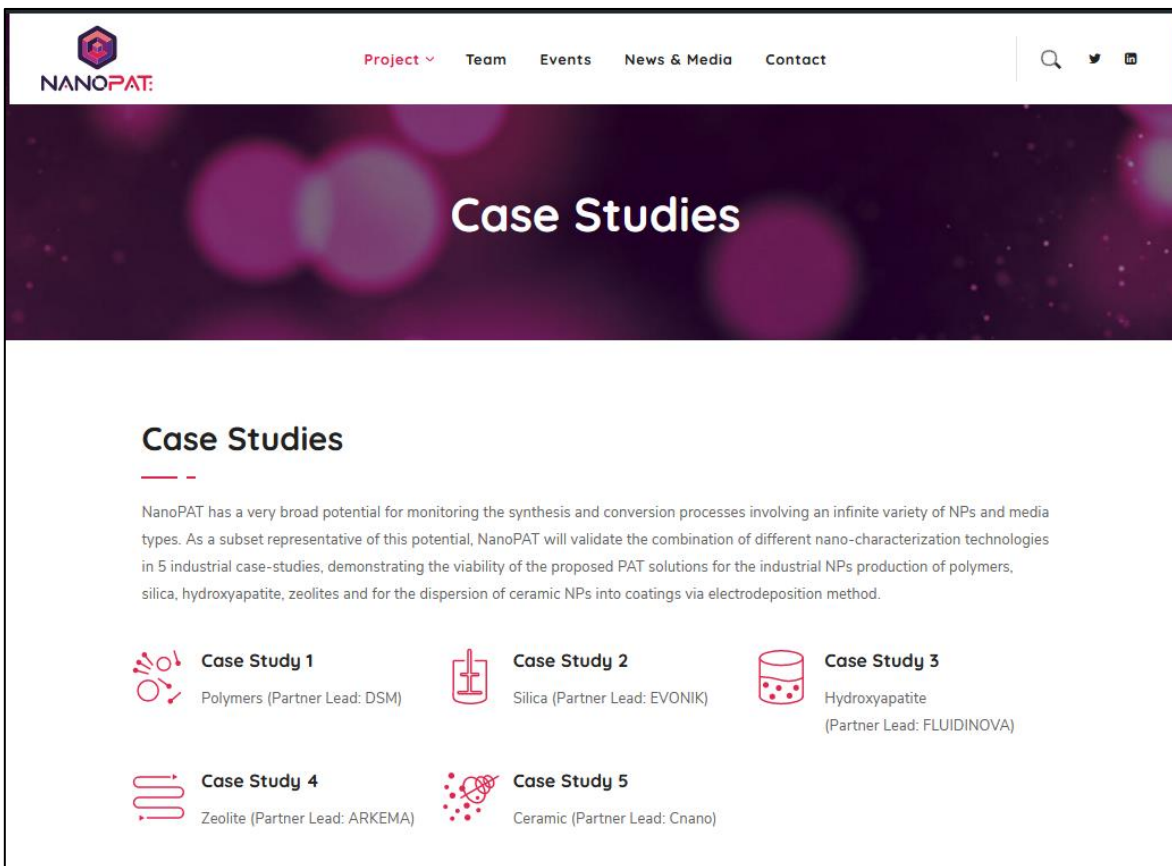
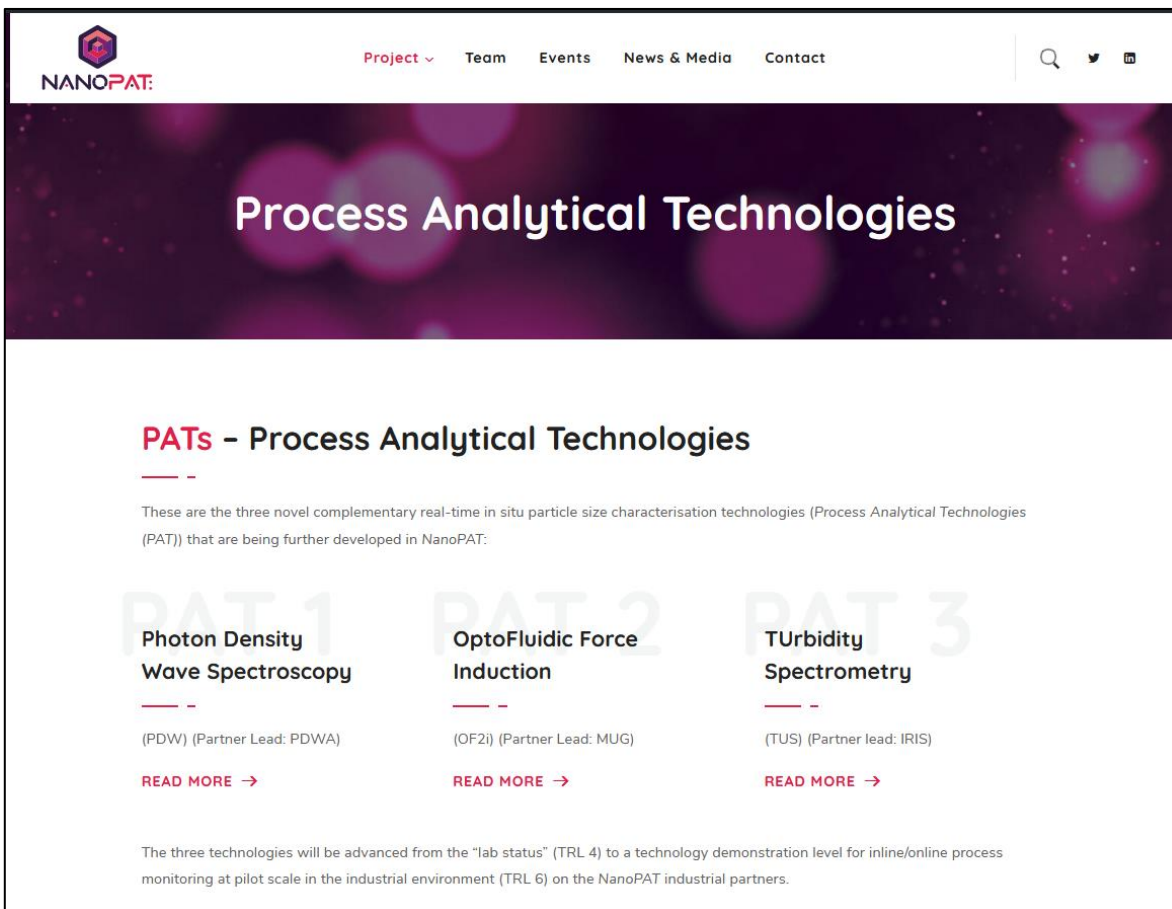


Figure 10: Project section – “Case Studies” subsection



**Process Analytical Technologies**

**PATs - Process Analytical Technologies**

These are the three novel complementary real-time in situ particle size characterisation technologies (Process Analytical Technologies (PAT)) that are being further developed in NanoPAT:

<p><b>PAT 1</b></p> <p><b>Photon Density Wave Spectroscopy</b></p> <p>(PDW) (Partner Lead: PDWA)</p> <p><a href="#">READ MORE →</a></p>	<p><b>PAT 2</b></p> <p><b>OptoFluidic Force Induction</b></p> <p>(OF2i) (Partner Lead: MUG)</p> <p><a href="#">READ MORE →</a></p>	<p><b>PAT 3</b></p> <p><b>TURbidity Spectrometry</b></p> <p>(TUS) (Partner lead: IRIS)</p> <p><a href="#">READ MORE →</a></p>
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The three technologies will be advanced from the "lab status" (TRL 4) to a technology demonstration level for inline/online process monitoring at pilot scale in the industrial environment (TRL 6) on the NanoPAT industrial partners.

**Figure 11: Project section – “PATs” subsection**



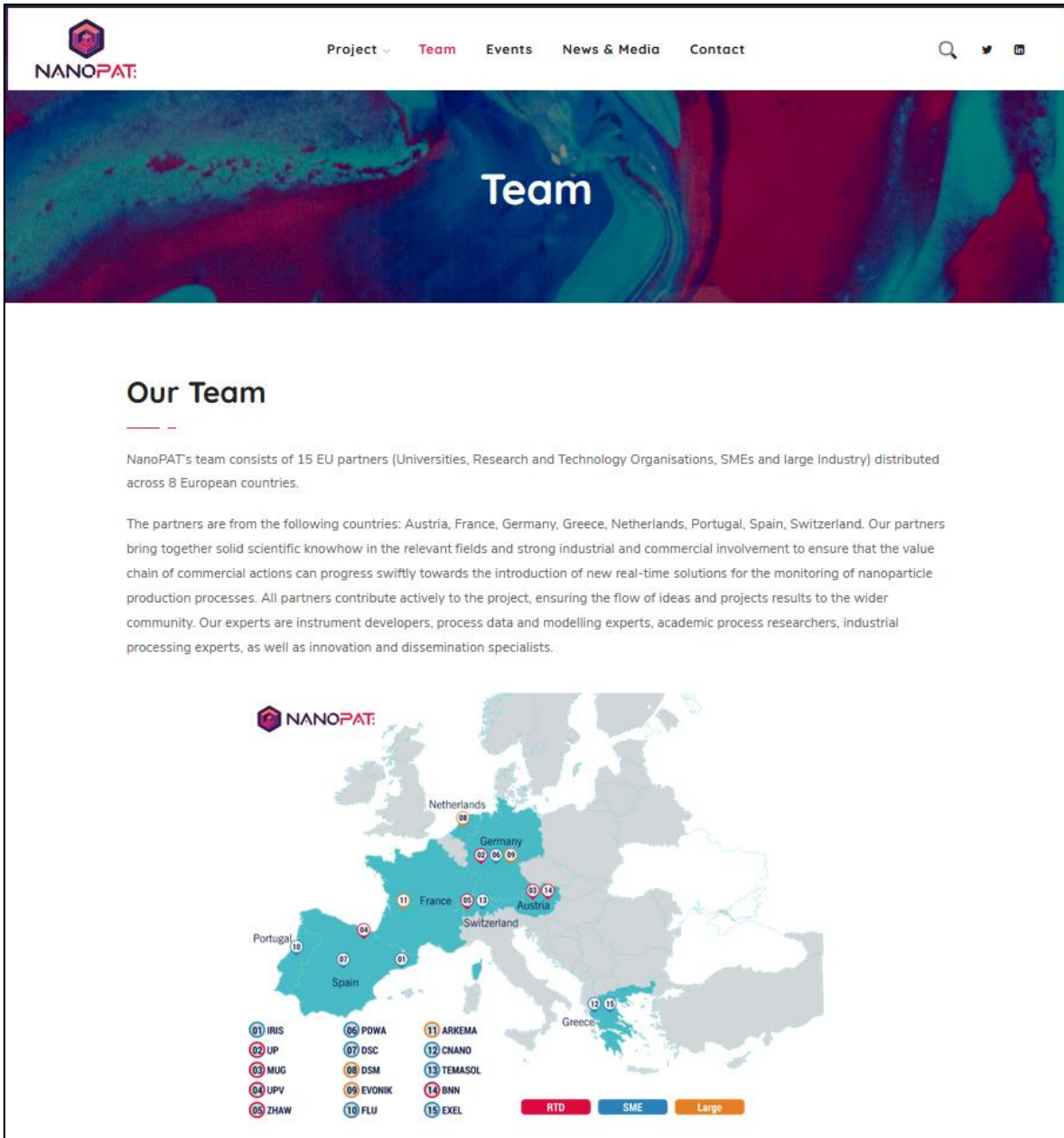


Figure 12: Team section

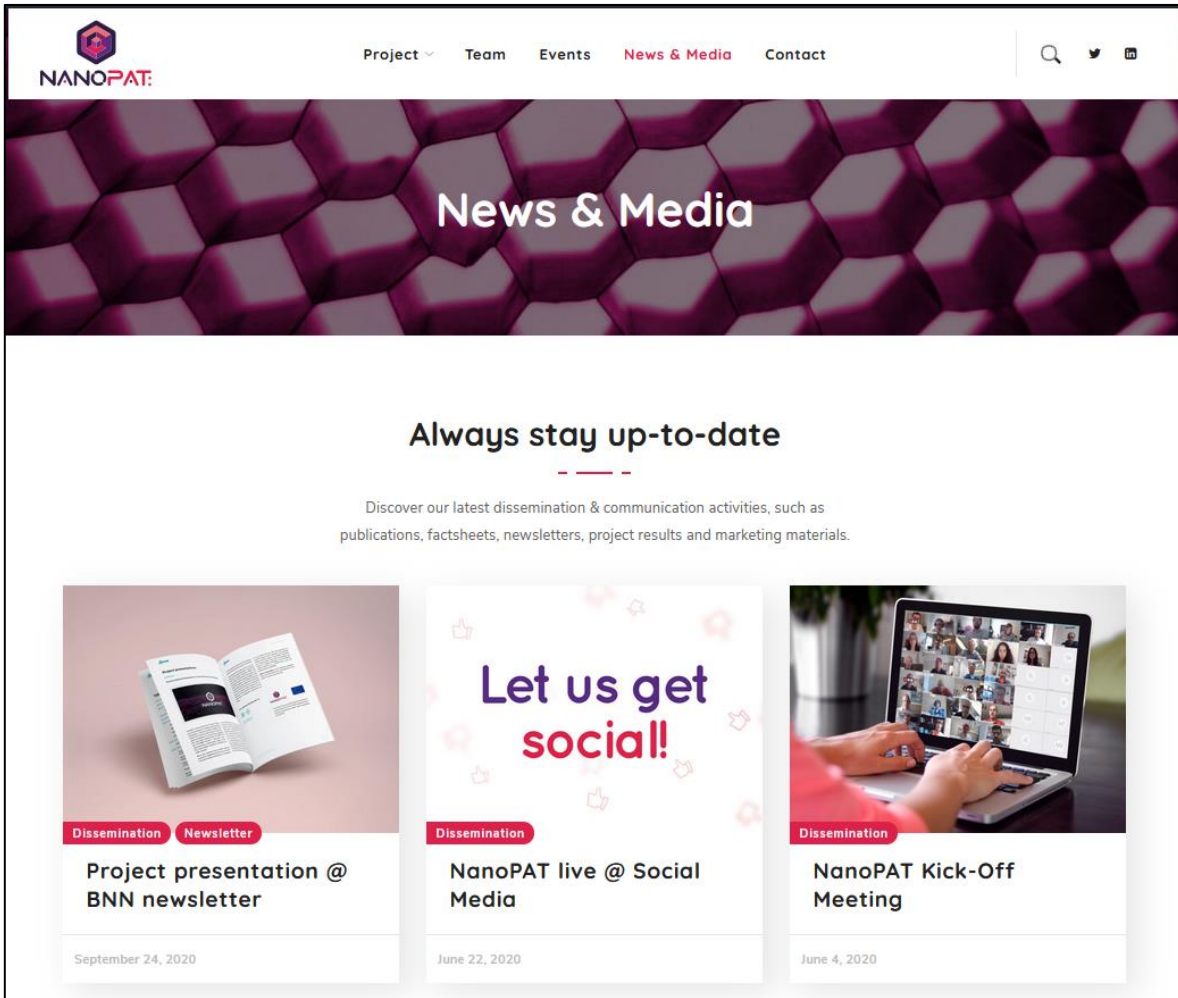
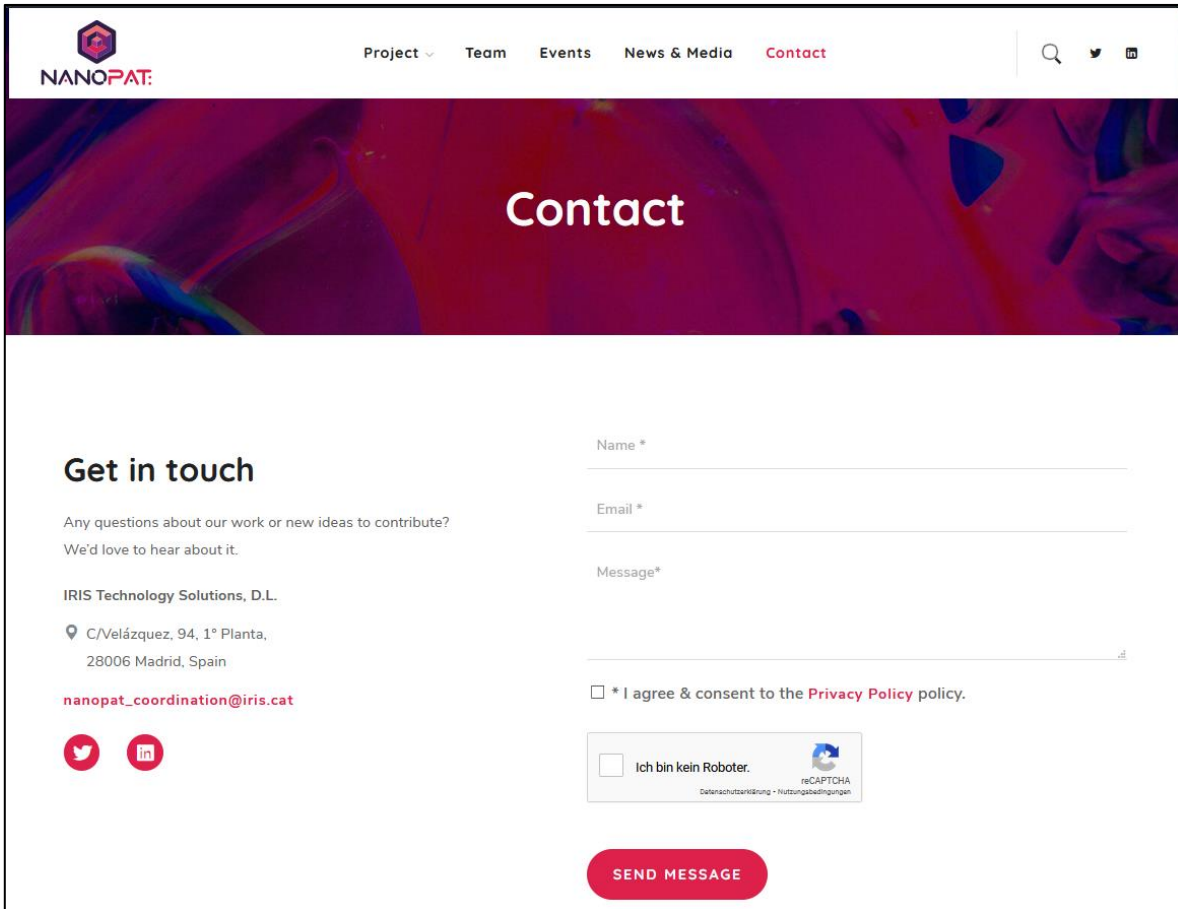


Figure 13: News & Media section



**Figure 14: Contact section**

Project dissemination is done also through partners’ websites, with an active link to the project website and the project logo and the reproduction of key information, objectives, news, events, etc.

An important channel for the dissemination of the project activities are its social media accounts in Twitter ([https://twitter.com/nanoPAT\\_project](https://twitter.com/nanoPAT_project)) and LinkedIn (<https://www.linkedin.com/company/nanopat/>).

### Deviations from the workplan

No deviations.



## Conclusions

The project website is online since September 2020, informing the wider scientific community and the general public about the project and its main activities, being therefore one of the main tools for communication and dissemination for the project.

The website will be updated regularly.

Annex

Screenshots of the whole pages of NanoPAT's website:

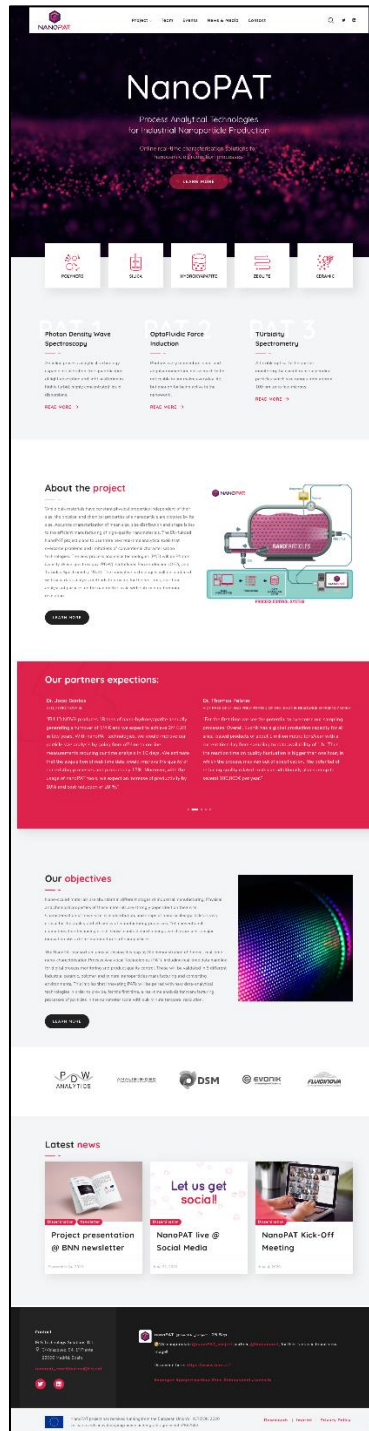



Figure 15: Website homepage


Project Team Events News & Media Contact

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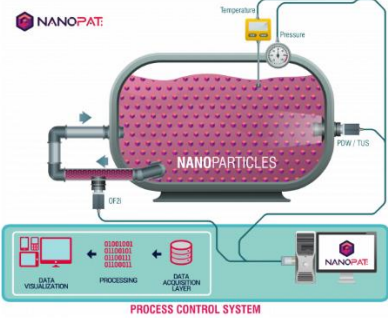
# Project summary

## Project Summary

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Nano-scaled materials are abundant in different stages of industrial manufacturing. Physical and chemical properties of these materials are strongly dependent on their size. Characterisation of mean size, size distribution, and shape of nano-scaled particles is very critical for the quality and efficiency of manufacturing processes. Yet, conventional characterisation technologies still show manifold shortcomings which represent a major innovation obstacle for manufacturers of nanoparticles.

The NanoPAT consortium aims at closing this gap by the demonstration of 3 novel, real-time nano-characterisation Process Analytical Technologies (PAT), namely Photon Density Wave spectroscopy (PDW), OptoFluidic force induction (OF2I) and Turbidity Spectrometry (TUS) including real-time data handling for digital process monitoring and product quality control.



**PROCESS CONTROL SYSTEM**


Those will be validated in 5 different industrial ceramic, polymer and mineral nanoparticles manufacturing and converting environments. This implies that innovating PATs will be paired with new data-analytical technologies in order to provide, for the first time, a real-time analysis for manufacturing processes of particles in the nanometer scale with sub minute temporal resolution. The NanoPAT consortium consists of 15 members, representing instrument developers, process data and modelling experts, academic process researchers, industrial processing experts, as well as innovation and dissemination specialists. The consortium profits from the broad involvement of its members in EU networks and ongoing H2020 projects. NanoPAT will intensively contribute to enhancing the innovation capacity of the European nanotechnology sector. As a result, the NanoPAT real-time nano-characterisation technologies will have reached TRL 6, promising valuable improvements in terms of quality, productivity and sustainability for the process industries in the EU and beyond.

**Contact**

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[Twitter](#) [LinkedIn](#)

 nanoPAT @nanoPAT\_project · 25 Sep

👏 We congratulate @nanoPAT\_project partner, @bionanonet, for their fantastic brand-new image!!

Discover it here: <https://www.bnn.at/>

#nanopat #projectpartner #bnn #bionanonet #website



NanoPAT project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n°862583.

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Figure 16: Project section – “Project Summary” subsection

**Objectives**

The overall objective of NANOPAT is to improve the efficiency of industrial manufacturing and processing based on a number of applications. This objective is supported by a series of specific objectives. The first objective is to improve the efficiency of the production process. This is achieved by the development of new technologies that improve the efficiency of the production process. The second objective is to improve the efficiency of the distribution process. This is achieved by the development of new technologies that improve the efficiency of the distribution process. The third objective is to improve the efficiency of the storage process. This is achieved by the development of new technologies that improve the efficiency of the storage process. The fourth objective is to improve the efficiency of the transportation process. This is achieved by the development of new technologies that improve the efficiency of the transportation process. The fifth objective is to improve the efficiency of the waste management process. This is achieved by the development of new technologies that improve the efficiency of the waste management process. The sixth objective is to improve the efficiency of the energy consumption process. This is achieved by the development of new technologies that improve the efficiency of the energy consumption process. The seventh objective is to improve the efficiency of the water consumption process. This is achieved by the development of new technologies that improve the efficiency of the water consumption process. The eighth objective is to improve the efficiency of the air consumption process. This is achieved by the development of new technologies that improve the efficiency of the air consumption process. The ninth objective is to improve the efficiency of the land consumption process. This is achieved by the development of new technologies that improve the efficiency of the land consumption process. The tenth objective is to improve the efficiency of the human resources process. This is achieved by the development of new technologies that improve the efficiency of the human resources process. The eleventh objective is to improve the efficiency of the financial resources process. This is achieved by the development of new technologies that improve the efficiency of the financial resources process. The twelfth objective is to improve the efficiency of the information resources process. This is achieved by the development of new technologies that improve the efficiency of the information resources process. The thirteenth objective is to improve the efficiency of the legal resources process. This is achieved by the development of new technologies that improve the efficiency of the legal resources process. The fourteenth objective is to improve the efficiency of the social resources process. This is achieved by the development of new technologies that improve the efficiency of the social resources process. The fifteenth objective is to improve the efficiency of the environmental resources process. This is achieved by the development of new technologies that improve the efficiency of the environmental resources process. The sixteenth objective is to improve the efficiency of the cultural resources process. This is achieved by the development of new technologies that improve the efficiency of the cultural resources process. The seventeenth objective is to improve the efficiency of the spiritual resources process. This is achieved by the development of new technologies that improve the efficiency of the spiritual resources process. The eighteenth objective is to improve the efficiency of the overall resources process. This is achieved by the development of new technologies that improve the efficiency of the overall resources process.

- Objective 1: To define the use cases of the project to be implemented in the industrial sector.
- Objective 2: To develop an in-line monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.
- Objective 3: To develop an online monitoring tool based on CoD/EuL1 since reduction of CoD/EuL1 for the production of high quality and energy efficient.
- Objective 4: To develop an online monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.
- Objective 5: To develop an online monitoring tool based on CoD/EuL1 since reduction of CoD/EuL1 for the production of high quality and energy efficient.
- Objective 6: To develop an online monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.
- Objective 7: To develop an online monitoring tool based on CoD/EuL1 since reduction of CoD/EuL1 for the production of high quality and energy efficient.
- Objective 8: To develop an online monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.
- Objective 9: To develop an online monitoring tool based on CoD/EuL1 since reduction of CoD/EuL1 for the production of high quality and energy efficient.
- Objective 10: To develop an online monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.
- Objective 11: To develop an online monitoring tool based on CoD/EuL1 since reduction of CoD/EuL1 for the production of high quality and energy efficient.
- Objective 12: To develop an online monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.
- Objective 13: To develop an online monitoring tool based on CoD/EuL1 since reduction of CoD/EuL1 for the production of high quality and energy efficient.
- Objective 14: To develop an online monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.
- Objective 15: To develop an online monitoring tool based on CoD/EuL1 since reduction of CoD/EuL1 for the production of high quality and energy efficient.
- Objective 16: To develop an online monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.
- Objective 17: To develop an online monitoring tool based on CoD/EuL1 since reduction of CoD/EuL1 for the production of high quality and energy efficient.
- Objective 18: To develop an online monitoring tool based on FDM Spectroscopy for the real time detection of product deviations.

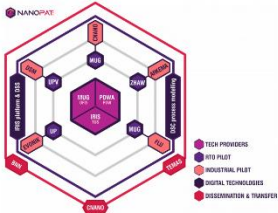
Figure 17: Project section – “Project Objectives” subsection

Project - Team - Events - News & Media - Contact

## Work plan

### Work plan

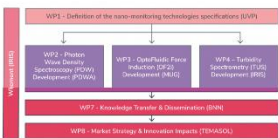
The project is divided into nine work packages covering the scientific and technical aspects of the project, exploitation and dissemination of results, knowledge transfer, market strategy and project management. Each work package is managed by a work package leader who is responsible for the timely delivery of deliverables to the Coordinator, who in turn represents the Consortium to the Commission.



The figure above displays the consortium structure, having the nano-monitoring technology providers as nucleus of NanoPAT's agreement. ITCs are placed at a second level, positioned between these providers and the industrial and users where the three technologies will be tested. They will act as open access test beds in the project and beyond allowing the long-term ability for companies handling NPIs to pre-validate the novel monitoring techniques developed in the project in representative downstream processes. Finally, the digital technologies for data handling and elaboration, as well as technology dissemination within and beyond the consortium ensure successful and multilateral transfer of the knowledge related to novel nano-characterization technologies, are considered as complementary actions to this central technological and industrial oriented core.

### Work packages

- WP1** - Definition of the nano-monitoring technologies requirements (WP Leader: Universidad pol País Vasco / Fiskal Herriko Unibertsitatea)
- WP2** - Photon Wave Density Spectroscopy (PDW) Development (WP Leader: PDW Analytics GmbH)
- WP3** - Optofluidic Force Induction (OFI) Development (WP Leader: Medizinische Universität Graz)
- WP4** - Turbidity Spectrometry (TUS) Development (WP Leader: IRIS Technology Solutions SL)
- WP5** - Monitoring Technologies Integration, Data Analysis and Simulation software (WP Leader: Dynamic & Security Computations SL)
- WP6** - NanoPAT Industrial Pilot Plant Demonstration (WP Leader: Universidad Píndaro)
- WP7** - Knowledge Transfer & Dissemination (WP Leader: RuhrKunheit Forschungsgesellschaft mbH)
- WP8** - Market Strategy & Innovation Impacts (WP Leader: Temax Solutions GmbH)
- WP9** - Project Management (WP Leader: IRIS Technology Solutions SL)



In the **first phase** (WP1) we will translate industry-led PAT challenges into a catalogue of its specifications to guide the following innovation work. The **second phase** (WP2-4) deals with the laboratory and TRL5 K1C pilot scale testing and validation of the three nano-monitoring PAT technologies, whereas the **third phase** (WP5) deals with the integration of monitoring technologies and data analysis for each case study. In a fourth stage (WP6), testing and validation at demonstration scale (TRL6) for our monitoring technologies is performed in the pilot plants of our industry partners. To complement the first 6 WPs, in the **fifth phase** (WP7 and WP8), the project is dedicated to knowledge transfer, dissemination (WP7) as well as market strategy and innovation impacts (WP8) with transversal activities like value chain study, exploitation, business planning and dissemination of the results to prepare the market uptake and maximize the project impact. WP9, running in parallel to all other activities is dedicated to project and innovation management.

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**NanoPAT @innofirstpartner 35 Sep**

[We congratulate @nanopat\\_project partner @blomaxsai for their fantastic brand-new slogan!](#)

Discover it here <https://www.blomax.it/>

[@nanopat @projectpartner @bms @blomaxsai @zevaco](#)

NanoPAT project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°852953. [Downloads](#) | [Imprint](#) | [Privacy Policy](#)

Figure 18: Project section – “Project Work Plan” subsection





[Project](#) [Team](#) [Events](#) [News & Media](#) [Contact](#)

[🐦](#)
[📺](#)

# Case Study 1



## Polymers (Partner Lead: DSM)

---

### Monitoring Particle Formation of Polyurethane dispersions and Polyacrylate emulsions

In this case study, process analytical techniques are applied to follow and control the (nano-)particle formation in the production of polymer dispersions and emulsions. Two types of polymers are of interest: polyurethanes and polyacrylates. Both types of polymers, and their particles, are used in the various resins and (latex) coating solutions of DSM Resins and Functional Materials. Particle size (distribution) determines the quality of a coating both during, and after application. Therefore, the monitoring and control of the particle size during the process is of paramount importance for the polymer dispersion industry.

Various partners collaborate to prepare and execute the key activity of this case study: the inline characterization of particle and particle size distribution, as well as concentration, in a DSM pilot process. The scale of the pilot will lie between 10 and 200 liters. The type of process will be batch radical emulsion polymerization. Initially, scientists at the Universidad del País Vasco (UPV) will implement photon wave density spectroscopy (PDW; Analytics GmbH) and turbidity spectrometry (TUS, IRIS) technologies in their downscaled process, a one liter batch reactor. These experiments should result in a correlation between the PAT outputs (size, shape and concentration) and process parameters (pH, temperature, solids content, monomer feeding strategies). Together with product, process and data specifications, enabling the installation of the PAT in the pilot reactor; the correlations from the one liter experiments will form the ground work for eventual real time control in the pilot scale reaction process, with respect to (nano-) particle size (80-350 nm) and distribution.

Key challenges to be addressed by PAT's, such as PDW and TUS, include the characterization of a latex with a bimodal particle size distribution. Another key challenge is related to hybrid acrylic-polyurethane dispersions. They are created in a two-step process, each step being performed in its dedicated reactor vessel. An additional challenge is to work with complex reaction media, including those that are heterogenous or turbid.

PAT's addressing some or all of this challenges, will allow convenient, inline monitoring over time, thus eliminating the need for additional batch time to allow for incumbent off-line monitoring techniques such as dynamic light scattering (DLS), specialized chromatography techniques, or electron microscopy methods. These techniques require additional sample preparation, dilution, time and/or costs. With PAT, we expect the overall batch times to be reduced, which includes costs-saving in terms of heating costs, manufacturing, and the like. These will sum up to substantial savings with an increased batch-to-batch control and coating quality.




Figure 1: Typical examples of water-borne polymer emulsions

ALL CASE STUDIES

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Figure 19: Project section - "Case Study 1" subsection


Project ▾ Team Events News & Media Contact

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# Turbidity Spectrometry

## TUS (Partner lead: IRIS)

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Turbidity Spectrometry (TUS) is a flexible optical technique for monitoring the evolution of suspending particles which size ranges from approx. 100 nm up to few microns. The term "turbidity" describes the relative clarity of a sample due to particulates. The cloudiness or haziness of a fluid caused by individual particles (suspended solids) are generally invisible to the naked eye. The degree of turbidity can be measured from the amount of light scattered (i.e. diffused) by the materials in the sample using, for example, a UV-visible spectrophotometer in transmission or reflexion mode depending on the concentration's level of nanoparticles. Multiple physical properties contribute to the collected signal, including scattering and absorption, so that with careful modelling of the optical interaction, including a comprehensive understanding of the material properties of the nanoparticles and the medium, and calibration to offline reference measurements, a wide range of particle sizes, material types and concentrations can be characterised. By establishing a close correlation between turbidity spectral features acquired from inline optics, and the nanoparticle synthesis processes under study, real-time process monitoring can be achieved.

In NanoPAT project, TUS will be applied for the nano-characterization of ceramic nanoparticle suspensions in electrolytes, silica nanoparticles and polymers dispersion. Following the nature of the materials and their refraction index behaviour, simultaneous characterization of the size, size distribution and concentration of the selected nanoparticles will be determined. Its suitability to measure individual diluted particles above 100 nm, as well as the size distribution of agglomerates up to several hundred nm, within less than 5 seconds (including data treatment time) will be demonstrated.

TUS has been selected as one of the three particle monitoring techniques in the project, because, being contactless and without sample preparation, it is suitable for inline processes. Furthermore, it can give access to the real-time analysis of various particle parameters.

As expected results, we want to be able to measure the nanoparticle parameters expected by each end user within their process duration, percentage of solid content, pH range, temperature and viscosity.

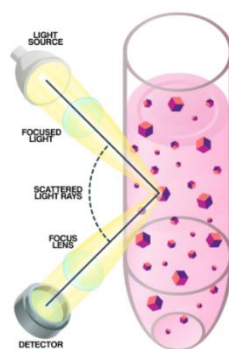




Figure 1: Turbidity Spectrometric system scheme


BACK TO ALL PATS

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Figure 20: Project section - "PAT 1 – Turbidity Spectrometry" subsection



**Our Team**

NanoPAT's team consists of 15 EU partners (Universities, Research and Technology Organisations, SMEs and large Industry) distributed across 8 European countries.

The partners are from the following countries: Austria, France, Germany, Greece, Netherlands, Portugal, Spain, Switzerland. Our partners bring together solid scientific knowhow in the relevant fields and strong industrial and commercial involvement to ensure that the value chain of commercial actions can progress swiftly towards the introduction of new real-time solutions for the monitoring of nanoparticle production processes. All partners contribute actively to the project, ensuring the flow of ideas and projects results to the wider community. Our experts are instrument developers, process data and modelling experts, academic process researchers, industrial processing experts, as well as innovation and dissemination specialists.

**Partner Logos:**

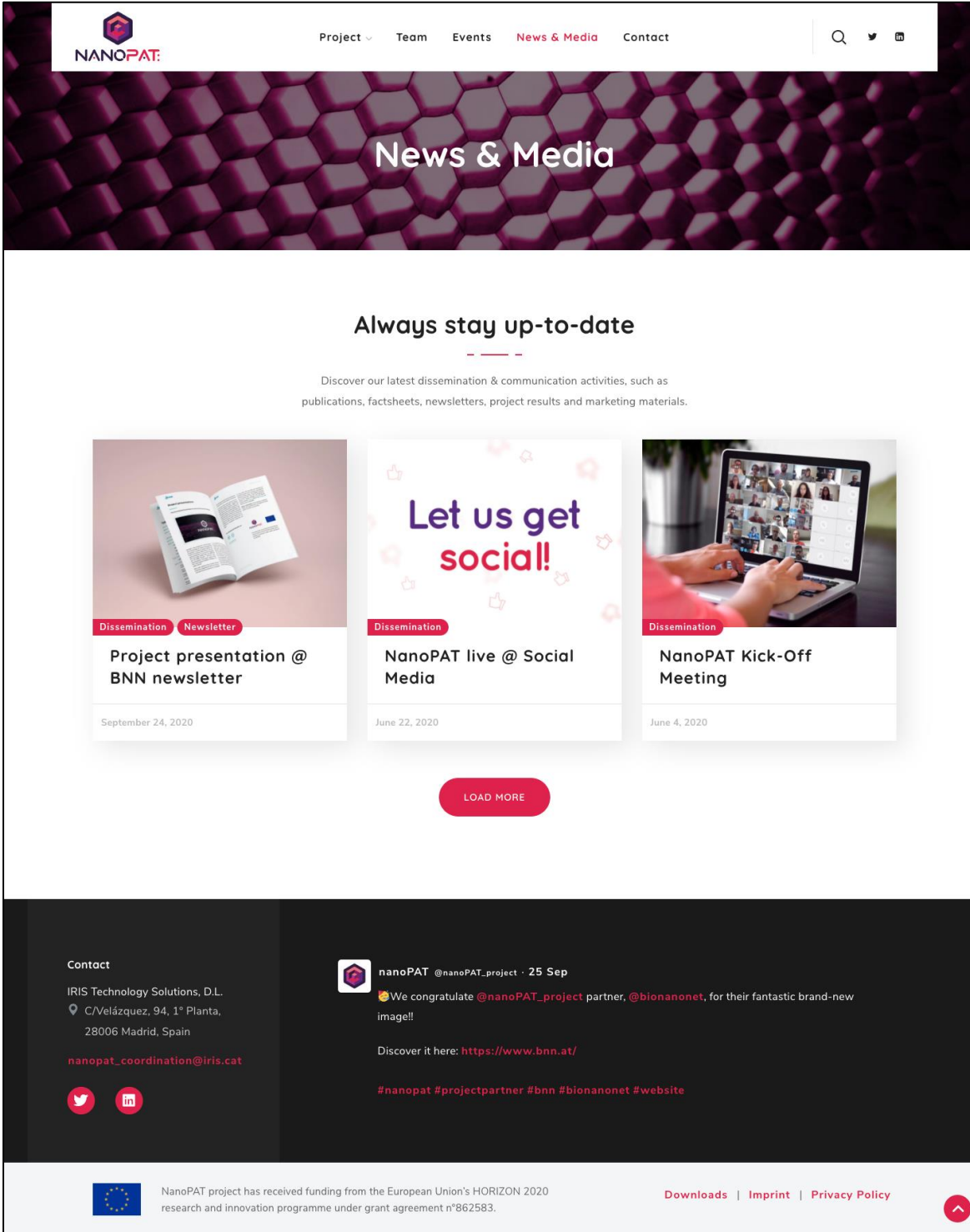
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- UP
- AMS
- ZHAW
- PDWA
- DBC
- DSM
- FLU
- ARKEMA
- OLINDO
- TEMA SOL
- ANALISIS-DBC
- DSM
- EVONIK
- FLUIDINOVA
- ARKEMA
- creative nano
- TEMAS SOLUTIONS GMBH
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Figure 21: Team section



The screenshot shows the 'News & Media' section of the NANO PAT website. At the top, there is a navigation bar with links for 'Project', 'Team', 'Events', 'News & Media', and 'Contact'. Below the navigation bar is a large header with the text 'News & Media' on a dark purple background with a hexagonal pattern. The main content area features the heading 'Always stay up-to-date' and a sub-heading 'Discover our latest dissemination & communication activities, such as publications, factsheets, newsletters, project results and marketing materials.' Below this are three featured articles:

- Project presentation @ BNN newsletter**: Includes a thumbnail of a newsletter, a 'Dissemination Newsletter' tag, and a date of September 24, 2020.
- NanoPAT live @ Social Media**: Includes a thumbnail with the text 'Let us get social!', a 'Dissemination' tag, and a date of June 22, 2020.
- NanoPAT Kick-Off Meeting**: Includes a thumbnail of a laptop displaying a video conference, a 'Dissemination' tag, and a date of June 4, 2020.

A 'LOAD MORE' button is located below the featured articles. The footer contains contact information for IRIS Technology Solutions, D.L., and a social media post from nanoPAT (@nanoPAT\_project) dated 25 Sep, congratulating a partner and providing a link to the BNN website. The footer also includes the European Union logo, funding information, and links for Downloads, Imprint, and Privacy Policy.

Figure 22: News & Media section