COGNITWIN

Cognitive plants through proactive self-learning hybrid digital twins

DT-SPIRE-06-2019 (870130)

Deliverable Report

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Lead beneficiary	Fraunhofer (FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.)		
Editor	Ljiljana Stojanovic (Fraunhofer)		
Contributors	Ljiljana Stojanovic (Fraunhofer), Stevan Sokolovic (NST), Aylin Demircioglu (NOKSEL), Enso Ikonen (UOULU), Mika Liukkonen (SFW), Urlike Faltings (SAG), Peter Singstad (CYB), Iñigo Unamuno Iriondo (SIDENOR), Are Dyrøy (Hydro), Frode Brakstad (SINTEF), Kjetil Hildal (ELK), Perin Unal (TEKNO), Pierre Gutierrez (Scortex), Tim Dahmen (DFKI)		
Reviewer	Frode Brakstad (SINTEF), Till Christopher Lech (SINTEF)		
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Executive Summary

The objective of the WP7 is to disseminate and communicate the results of the COGNITWIN project across the industrial, scientific and technical communities and push forward the standardization activities. The deliverable "D7.2: Dissemination and communication plan and tools" is the result of two COGNITWIN tasks "T7.1: Communication plan and tools" and "T7.2: Industrial and scientific dissemination procedures and activities". It defines a strategic plan for efficient and effective dissemination and communication to achieve the planned impact on the different stakeholders.

The main results are (1) the COGNITWIN communication plan that includes the objectives (why), audience (to whom), messages (what), the method (how), timing (when), responsibilities (who) and the validation metrics; (2) the identification of the tools that will be used for dissemination and (2) the description of the initial dissemination and communication results.

The dissemination and communication activities will be organised based on the plan defined in this deliverable and will be revisited during the project to adjust its relevance according to the defined qualitative and quantitative indicators of success.

The results of these activities will be reported in the deliverables "D7.3: Intermediate report on dissemination activities" in M18 and in "D7.6: Final report and outreach and dissemination activities" in M36.

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1 Introduction

1.1 Context

According to the COGNITWIN Grant Agreement, the objective of the work package “WP7: Communication, Dissemination, Standardisation” is to “ensure that the COGNITWIN results will have a maximum impact and that the consortium reaches its ultimate objective through communication activities". Besides communicating the results of the project to relevant stakeholders, WP7 efforts will also pursue various standardization activities that will help COGNITWIN leave a long-lasting imprint on the European industrial sectors.

Dissemination and communication in COGNITWIN is a strategically planned process, which started at the beginning of the project and will continue throughout its entire lifetime. The deliverable “D7.2: Dissemination and communication plan and tools“ defines a strategic plan for the efficient and effective dissemination and communication to achieve the planned impact on the different stakeholders.

The deliverable D7.2 is the result of two COGNITWIN tasks: “T7.1: Communication plan and tools” and “T7.2: Industrial and scientific dissemination procedures and activities”. It defines an initial communication and dissemination plan. If needed, the plan will be revisited during the project to adjust its relevance according to the defined qualitative and quantitative indicators of success. The initial list of indicators is included in the Description of Work (DoW).

1.1.1 Communication of COGNITWIN

According to the COGNITWIN Grant Agreement, the goal of communication in COGNITWIN is to ensure that the consortium reaches its ultimate objective through communication activities.

The communication activities in COGNITWIN are seen as a continuous effort involving all consortium partners to inform the target audience about the developments and achieved results. The communication strategy specified in this deliverable includes all actions to publish information about the project. While dissemination focuses on research and industrial audiences, providing them with knowledge of the project’s results, communication widens the public audience. It is about involving stakeholders in a dialogue with the project (online, social media, newsletters, etc). The communication task started by elaborating a comprehensive strategy covering the complete project duration, but also after it ends.

1.1.2 Dissemination of COGNITWIN

According to the COGNITWIN Grant Agreement, the dissemination activities are dedicated to sharing the project results towards selected target audiences: industry, academics and (where relevant) policy makers. The main goal of COGNITWIN dissemination is to create value within the targeted European industrial sectors by leveraging the results of the project.

Dissemination activities are expected to have impact mainly on the industrial sector (e.g. demonstrations at industrial exhibitions, COGNITWIN workshop, targeted demonstrations, face-to-face meetings and presentations to selected stakeholders, etc.). In order to support the uptake of the project results within the end users, we will ensure high visibility at important events such as the Hannover fair (HMI). Finally, we want to promote the innovative use of cognitive, hybrid and digital

twins in the European process industry and for society by sharing popular science articles and newsletters in social media and by interviews and notes in public media.

1.2 Goal

The deliverable D7.2 “Dissemination and communication plan and tools“ provides a framework for all activities needed to promote and sustain all results to be developed within the COGNITWIN Project. The goal is to define a plan for publicizing the project results among different external stakeholders for maximizing the impact of the communication efforts. This plan will be set up on four basic pillars:

(1) Definition of the objectives;
(2) Identification of the relevant target audiences;
(3) Description of the actions to be undertaken; and
(4) Identification of the specific tools to be developed in order to support effective communication.

The result of this deliverable is a plan with a set of activities that should be undertaken to efficiently reach the audiences as well as the tools for doing so. The dissemination and communication plan is a live document and will be constantly reviewed during all of the project lifetime under the leadership of the dissemination leader (Fraunhofer). The strong collaboration of all partners is expected in order to ensure that dissemination targets are met for all project results.

1.3 Structure of the deliverable

The deliverable is structured as follows:

- Section 1 clarifies the context of the deliverable and presents the goals.
- In section 2 we define the COGNITWIN communication plan that includes the objectives (why), audience (to whom), messages (what), the method (how), timing (when), responsibilities (who) and the validation metrics.
- Section 3 identifies the tools that will be used for communication and dissemination and contains the description of the initial results.
- Section 4 summarizes the results and defines the next steps.

2 Communication plan

Communication is a process of transmitting information, ideas, facts, etc. from one place, person or group to another. The goal of this deliverable is to define a methodology and the tools to promote the results of the COGNITWIN project, by ensuring effective communication of innovations, results and benefits, to be produced by COGNITWIN towards external stakeholders. This also includes the management of the internal communication to guarantee the optimal outcomes of the project results and activities.

The COGNITWIN communication plan takes into account several aspects:

- Why to communicate?
- To whom to communicate?
- What to communicate?
- How to communicate?
- When to communicate?
- Who will do the communication?
- How to measure impact/success of the communication plan?

The goal of the COGNITWIN dissemination and communication plan is to ensure that the right message is communicated by the right partner to the right target audience at the right time through the most effective means.

It is important to note that before starting to communicate, it is mandatory to create a common understanding within the COGNITWIN consortium. One of the results of this internal communication process is the COGNITWIN glossary which can be downloaded from the COGNITWIN website.

In the rest of this section we described our approach to deal with all communication aspects introduced above.

2.1 Why?

The main objective of the communication activities is to increase visibility of COGNITWIN towards the external world and to brand awareness of the COGNITWIN results and the benefits that appeal the stakeholders' needs. By sharing the project's results beyond the consortium, we want to attract a wide range of stakeholders who are invited to embrace and benefit from the project's advancements. This will allow us to maximize the project's contribution to innovation.

2.2 To whom?

The initial stakeholders for dissemination and communication were identified during the proposal preparation phase and are included in DoW. We have extended and refined this list by clarified the interest of different target groups. This will allow us to adjust the communication strategy to the needs of each target group.

The extended and refined list is shown below.

Target group	Reason	Interest
A - Process industry professionals	They should know about developments that will affect the industry in the near future	Utilisation of the COGNITWIN services/platform in everyday operations

(including use case providers and Industry 4.0 stakeholders)		Enhance industrial innovation by blending with in-house artefacts Training on the COGNITWIN results regarding different types of digital twins Participation in the workshops/ events organised by COGNITWIN
B- ICT industry (consultants, systems integrators and service providers) e.g. providers of ML/AI services and digital twins	They should be aware of the COGNITWIN results and should look for synergies for technology enhancements and further collaboration. E.g. learn how to exploit synergy between ML/AI and physics-based approaches for modelling, simulation and control in traditional and emerging markets or how to integrate COGNITWIN services into external platforms	Participation in the COGNITWIN events Exploitation of the COGNITWIN open source results Contribution to the COGNITWIN open source results Inspiration for new ideas and applications
C- Industry Associations (e.g. SPIRE) & Technology Clusters (e.g. IDS, BDVA)	Technology providers and stakeholders in e.g. SPIRE and other EC networking mechanisms should be aware of the impact that the COGNITWIN results will have on their systems, technologies and research.	Inclusion of COGNITWIN results to collaborative research activities (roadmaps, white papers, etc.) Dissemination of project's results to the members of associations/ clusters/ communities Bilateral participation in events for knowledge exchange
D - ICT and FoF Program Stakeholders	Participants, project partners and relevant stakeholders active in the H2020 projects funded under the ICT and FoF program	Identification of common research topics Synergies and collaborations for promotion of results Enhancing innovation through results combination Co-organisation of events Joint research proposals
E - Researchers and Academia	Individuals engaged in research initiatives and/or working in research/academic institutes	Further advance the project's research Extension / reuse of the project's innovative technologies to other application domains Inspiration for future research initiatives/proposals based on the COGNITWIN results Participation in the events organised by COGNITWIN
F - Policy Makers & Standardization Organizations	Policy-makers at any level like EC Directorates and Units, Ministries and Governments, Regulatory Agencies, Standardization Organizations (e.g. ISO, etc.)	Definition of future research and innovation directions for the EC initiative "Digitizing the European Industry" by taking into account the knowledge and experience acquired in the COGNITWIN Inputs for standardization activities

H - Schools /Universities	The objective is to attract the university students to try a research career and also raise interest of high school students towards scientific, technology, engineering and mathematics (STEM) disciplines.	Evaluation of the project's Social-Technological- Economic-Environmental- Political (STEEP) aspects

COGNITWIN will target all the above-mentioned target groups (A-H). Thus, the communication strategy should be defined in a way to address all of them.
However, we note here that the target group H (Schools/Universities) will be considered in context of WP6 and the task "Task 6.4: Impact on education" by providing a platform for masters and PhD projects in metallurgy, computer science, mechatronics, physics, and chemistry and mathematics and by providing input to undergraduate programmes so that they incorporate the changing digitalization landscape in their study programmes.
The key stakeholders will be early engaged to ensure their active participation to the various project's implementation phases.

2.3 What?

A very important part of each communication plan is the message that will be communicated. It is the main point of information that the target audience should not only hear, but most importantly understand, adopt and act. On the one hand, the message has to be clear and simples. On the other hand, it has to cover what the COGNITWIN does, how it is different, and what value the COGNITWIN results bring to stakeholders.
The COGNITWIN project will create several messages for different types of audiences. All communication activities and marketing materials will consider these messages.
To create messages, we applied three successive steps:

(1) Identification of keywords
(2) Grouping of keywords into slogans
(3) Messages

The results of each step are described below.

2.3.1 COGNITWIN keywords

The initial keywords were defined during the proposal preparation phase and are included in the DoW:

- Fixed EC Keywords: Chemical engineering (plants, products), Systems engineering, Automation
- Free keywords: Cognitive Plants, Digital Hybrid Twins, Self-Adaptive Models, Artificial Intelligence, Big Data, IIoT, Sensors

These keywords were refined in order to identify the most common phrases that people will use to find information about COGNITWIN.
The COGNITWIN project started by creating a set of keywords, which identify the most common phrases that people will use to find information about COGNITWIN. The most relevant keywords are:

- Cognitive plants
- Hybrid digital twin

- Cognitive digital twin
- Synergy between physics-based and AI models
- Self-aware production plants
- Resolving unpredicted behaviour

2.3.2 COGNITWIN slogans

Slogans are powerful and elegant way to attract potential customers. They have to ensure easy understanding and remembering. The COGNITWIN keywords are grouped into clear and catchy slogans that highlight the key benefit and differentiate the COGNITWIN results from potential competitors.
Our slogan is:

Cognify the process industry

We have also paired this slogan with an alternative illustration.

Figure 1: Alternative COGNITWIN illustration

Alternative slogans are also available:

- Achieving improved performance in production plants through the use of hybrid and cognitive digital twins
- Empowering the process industry with cognitive technologies to find new answers to emerging questions
- Symbiosis between ML/AI and physics-based approaches for holistic optimization in the process industry
- Towards cognitive augmentation for process industry
- Creating cognitive services for the process industry
- Affordable continuous improvement based on cognitive digital twins for the process industry

2.3.3 COGNITWIN messages

The initial message was created during the proposal preparation phase. It can be summarized as follows:

- The H2020-funded project “Cognitive Plants Through Proactive Self-Learning Hybrid Digital Twins” or “COGNITWIN” is working on a new cognitive standard for the design, development and maintenance of the European process industry by introducing a platform for virtual component-based architecture that integrates IoT, Big data, AI, smart sensors, machine

learning and communication technologies, all connected to a novel paradigm of self-learning hybrid models with proactive cognitive capabilities.

Since we have identified different target groups, we decided to prepare different messages tailored to each target group. By communicating well-tailored messages (through the most effective channels) to reach targeted audiences, we will ensure results are presented to them in the most accessible, understandable and usable ways and thus maximize effectiveness of engagements with stakeholders. Our strategic, high-level objective is:

- to establish the fully digitalized concept of self-learning and proactive next generation of digital twins, which operate in the hybrid world and can
  - recognize, forecast and communicate less optimal process behaviour well before these occur and
  - adjust itself in order to keep the process continuously close to or at optimum and
- to apply it in 14 COGNITWIN pilots with the aim to scale up the impact to the entire Europe.

This objective can be split into several messages:

- COGNITWIN message towards process industry and industry associations (Target Audiences - A and C):

Highlight the potential of the process industry in Europe by creating and validating a new approach for cognitive digital twins affordable for any type of process industry by marrying the AI and physics-based models.

- COGNITWIN message towards research community, ICT industry, and ICT and FoF Program Stakeholders (Target Audiences – B, D, E):

Revolutionize digital twin concept by incorporating hybrid services for anomaly detection and prediction and by creating its cognitive capabilities to enable self-adjustment.

- COGNITWIN message towards policy makers (Target Audience – F):

Bringing the process industry to a new level of Industry 4.0-driven operation by introducing proactivity and self-learning through application of cost-efficient hybrid and cognitive digital twins.

2.4 How?

After finalising the communication plan in month six, the communication tools specified in the DoW will be developed. The communication tools will include project image, project website, newsletter, brochure, templates, social media content, etc. The focus will be on the relevant audiences and objectives to which these tools should serve as supporting materials.

We will implement a modern communication strategy, accompanied by a realistic plan to reach the objectives and the targeted audience. The dissemination content will be prepared in a way to convince the audience for the benefits of the (expected) project outcomes. The communication and dissemination material will be prepared in English. However, partners from different countries may provide translations of core information in languages other than English.

The initial results are shown in section 3. For general public communication activities and for all target groups, website has been prepared and will be duly updated. We will prepare newsletters, posters, brochures, flyers and other types of supporting material. The dissemination material will be provided online on the project website and/or will be distributed during the different type of events, in which COGNITWIN partners will participate.

Videos (e.g. a generic video demonstrating the CognitTwin idea and results in a way that general public can easily relate and understand) will be prepared. They will be available for download from the project website. Additionally, YouTube will be also used for the publication of the COGNITWIN videos.

Next, social media (e.g. LinkedIn and Twitter) will be activated and will be also promoted through the partners' social media channels. Messages will focus on overall COGNITWIN concept written in clear, non-technical language (see section 2.3.3). The COGNITWIN website has direct access to these social networks. This increases the chance that the visitors of the COGNITWIN website will participate in these social networks.

The table below summaries the tools that will be used to approach different target groups.

Target group	Approach
A - Process industry professionals (including use case providers and Industry 4.0 stakeholders)	We will foster the wide adoption of the COGNITWIN results in industry. Key messages will focus on business and exploitation opportunities, implementation steps, as well as customized technical information and the practical experience of others. Webinars and specific demos (coming from the pilot cases lessons learnt) will be created and will be available online to all interested parties. A video showing the project's results and testimonies from the pilots will be also prepared and will be available for download on the COGNITWIN website. Presence on social media will be profiled on LinkedIn. We will upload public material, monitor relevant hashtags, follow influencers, etc.
B- ICT industry (consultants, systems integrators and service providers) e.g. providers of ML/AI services and digital twins	The technical information will be made available to this target group. We will prepare the Webinars, tutorials, examples, etc. how to integrate external services into the COGNITWIN toolbox or how the COGNITWIN solution can be deployed both at greenfield and extend brownfield systems. All dissemination material will be available for download on the COGNITWIN website. We will tweet about new developments of interest. LinkedIn will also focus on the ICT industry. Each talk, achievement, experience and each software release will be included on the COGNITWIN LinkedIn profile. We will pose questions and/or respond to queries regarding the COGNITWIN aspects in order to became a leader in the field of (cognitive) twins in general and for the process industry.
C- Industry Associations (e.g. SPIRE) & Technology Clusters (e.g. IDS, BDVA)	Our primary goal is to ensure the knowledge transfer of results and experiences from the COGNITWIN project to the SPIRE Process industry community. Therefore, we will focus on active participation in the new SPIRE DG7 Digitalisation group and in

	SPIRE organized events. Impact will be measured through the influence on SPIRE members and association communities. Additionally, we will participate in BDVA WG "Smart Manufacturing Industry", PI4.0 events, IDS events, etc. We will provide input on roadmaps and white papers and initiate discussions on COGNITWIN related topics.
D - ICT and FoF Program Stakeholders	We will create awareness of the COGNITWIN among relevant projects and create a maximum synergy with them. The joint workshops will be organised. We will build a twitter network of research projects to keep the community up to date. We will promote COGNITWIN results and events in relevant groups on LinkedIn.
E - Researchers and Academia	The dissemination activities will deal with the diffusion of scientific and technological results of the COGNITWIN, aiming to ensure both a mid– and long-term impact. The main goal is to achieve good scientific reputation. We will tweet and update the COGNITWIN LinkedIn page about each new publication, presentation, event, etc. We will also use ResearchGate.
F - Policy Makers & Standardization Organizations	Messages will focus on the strategic importance of COGNITWIN for European process industry, esp. SMEs, its contribution to the European development agenda, policy requirements and business opportunities. We will use Twitter to reach out to external audiences such as practitioners in public policy, business and government. A video for the general public will be prepared at the beginning of the project.

2.5 When?

The COGNITWIN strategy to reach all target audiences will start by letting the general public know of the beginning of the project. During the first year, the focus will be on a scientific audience, using publications and conferences, progressing towards year 2, and shifting to a more industrial audience, as more results come available to show using demonstrators. The project ends in its third year, continuing to address industrial and ICT audiences, as means to exploitation, and also schools and general public again.

The industrial and technical audiences will be addressed by the dissemination activities. The more general audiences will be addressed in the communication activities, which are also responsible for developing the overall communication channels.

The initial dissemination material in form of comics has already been prepared in order to ensure that general public understand the project vision. More information is included in section 3.3. After finalizing the project technical approach (in WP4 and WP5) as well as the use case descriptions (in WP1-WP3) in month 6, we will start with disseminating the project results to both scientific and industrial communities and other target groups in the EU. The social media campaign will start in M7 when the initial project results will be available.

Figure 2 shows how the COGNITWIN dissemination and communication activities will be intensified as soon as the first results will be created.

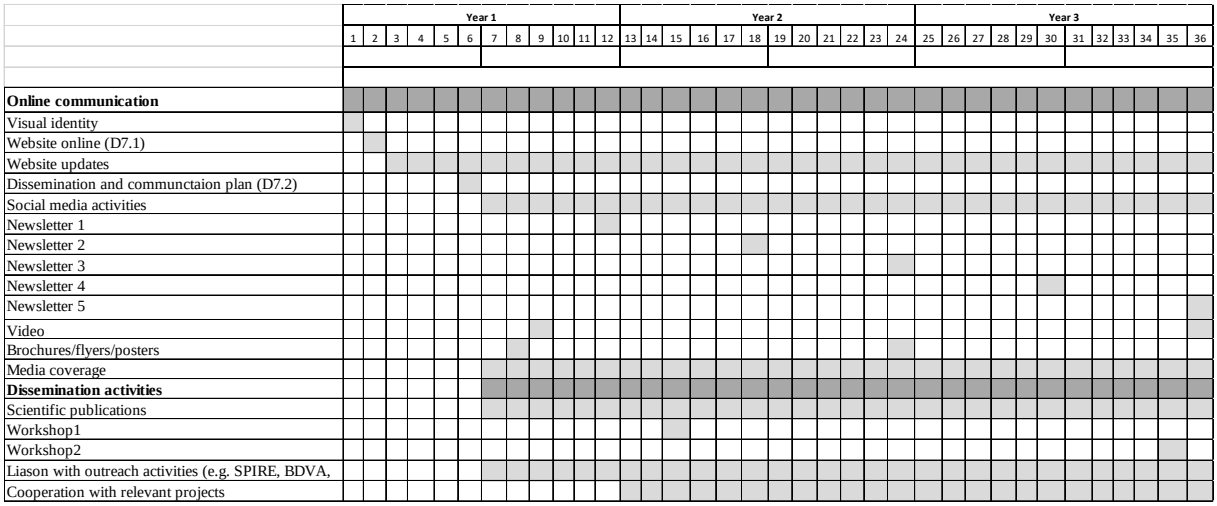

Figure 2: Gantt chart of the COGNITWIN communication and dissemination activities

2.6 Who?

The COGNITWIN consortium aims to implement effective dissemination and communication activities from the very early stages of the project implementation. All partners are committed throughout the project to approach the appropriate stakeholders in order to multiply the effects of dissemination and communication activities. The partners will contribute by actively disseminating the project's results through their networks. They will ensure that dissemination activities will be carried out nationally, and if applicable will contribute to dissemination internationally.

Although dissemination activities will be performed by all project partners, they will differ according to the partner type and their role in the project. Fraunhofer is the leader of "WP7: Communication, Dissemination, Standardisation" and is responsible for communication activities ("Task 7.1: Communication plan and tools"), networking activities ("Task 7.3: International networking") and standardization activities (Task 7.4: Standardisation). Dissemination activities ("Task 7.2: Industrial and scientific dissemination procedures and activities") will be led by SINTEF.

The industrial partners focus on creating channels for marketing the project results. The research and technology partners will focus on publishing the research results and contributing towards extension of advancements in the focused industrial sectors.

We note here that since the communication plan will be agreed at the early project phase, the risk of a lack of newsworthy content provided for dissemination by the project partners is reduced.

2.7 Impact

The COGNITWIN Consortium will closely monitor the impact of the communication and dissemination activities and their achievement in order:

- to apply corrective actions whenever necessary and
- to identify opportunities that can maximize visibility.

To evaluate the impact of the COGNITWIN dissemination and communication activities, we set specific metrics. The effectiveness of the dissemination and communication activities will be assessed during the whole project duration. The results of these assessments will be documented in WP7 deliverables.

The concrete and measurable objectives (linked with the appropriate target groups) were defined during the proposal preparation phase and they are shown below.

Dissemination Activity	Target Audience(s)	KPI
White Papers	All stakeholders	>=3
Demonstrator	Industry	>=7
Participation in Exhibitions	Industry, IT service providers	>=2
Participation in Workshops	Industry, IT service providers	>=4
Participation in Conferences	Industry, IT service providers	>=4
Organisation of Workshops with External Exploitation Partner	Industry	>=2
Presentations to Potential Customers	Industry	>=10
Organisation of Workshop, Conference, Special Session	Research community	>=3
Journal Publications	Research community	>=5
Conference Publications	Research community	>=20
Dissemination outside EU	Industry, IT service providers	>=3
Participation in Clusters	Members of EU Projects in process industry and AI/ML	>=10
Liaisons with National Initiatives (e.g., I4.0, IDS, etc.)	Manufacturers, Policy Makers, Integrators of Industrial Solutions	>=10

Table 1: Dissemination activities and their KPIs

3 Communication/dissemination tools and initial results

This section describes the concrete results achieved during the first six months of the projects and the initial plans for the next years. The intention is not to provide the list of actions and their delivery dates, but to set up the internal procedures and tools to perform the planned activities during the project.

3.1 Visual identity

The COGNITWIN project developed a corporate identity for the project, to create a common image for all dissemination, communication and exploitation efforts, enabling the audience to identify the project immediately.

The COGNITWIN visual identity was created at the beginning of the project. This includes a project logo as well as templates for deliverables and presentations with the project logo, fonts, etc. All dissemination materials will include the project and will refer to Horizon 2020 according to the EC guidelines[1].

Figure 3: COGNITWIN Logo

Whereas the document template will be used for all COGNITWIN deliverables, the presentation template will is used for all external and internal presentations. Additionally, a COGNITWIN presentation will be prepared for the events where the COGNITWIN concept, results, etc. will be presented. This presentation will be updated as soon as new results will be available.

Figure 4: The COGNITWIN presentation template

[1] http://ec.europa.eu/dgs/communication/services/visual_identity/pdf/use-emblem_en.pdf

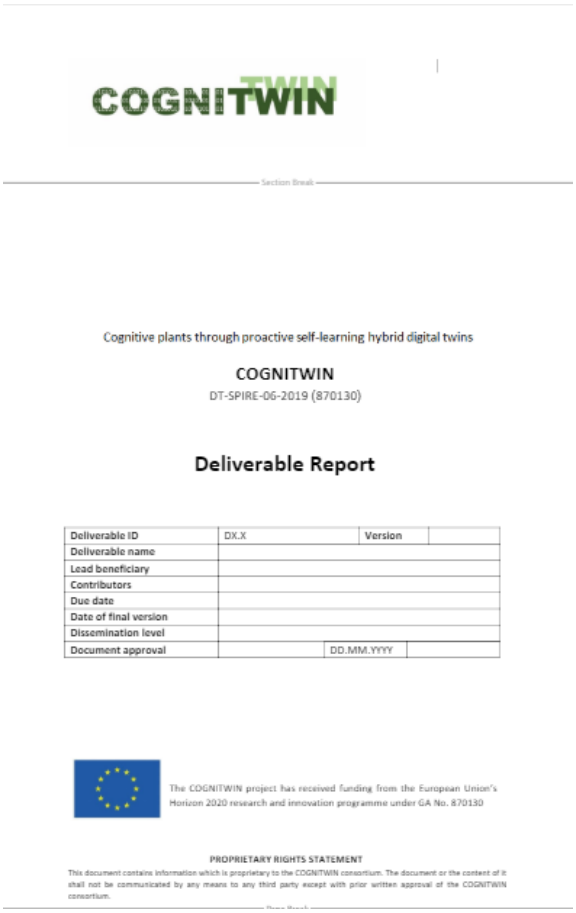

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Figure 5: The COGNITWIN deliverable template

3.2 Website

The COGNITWIN website (https://www.sintef.no/projectweb/COGNITWIN/) is the main tool for dissemination during the project duration and beyond. It was launched in November 2019 and it will be maintained during the project and at least two years after the project completion.

The website is organised in following way:

- Objectives
- Public Reports
- Publications
- Consortium
- News and events

Figure 6: The COGNITWIN website

The content (e.g. news, events, reports, publications, etc.) will be regularly updated. On the website news are reported in order to engage and inform the readers. Figure 7 shows the news about COGNITWIN plenary meetings organized since the project beginning.

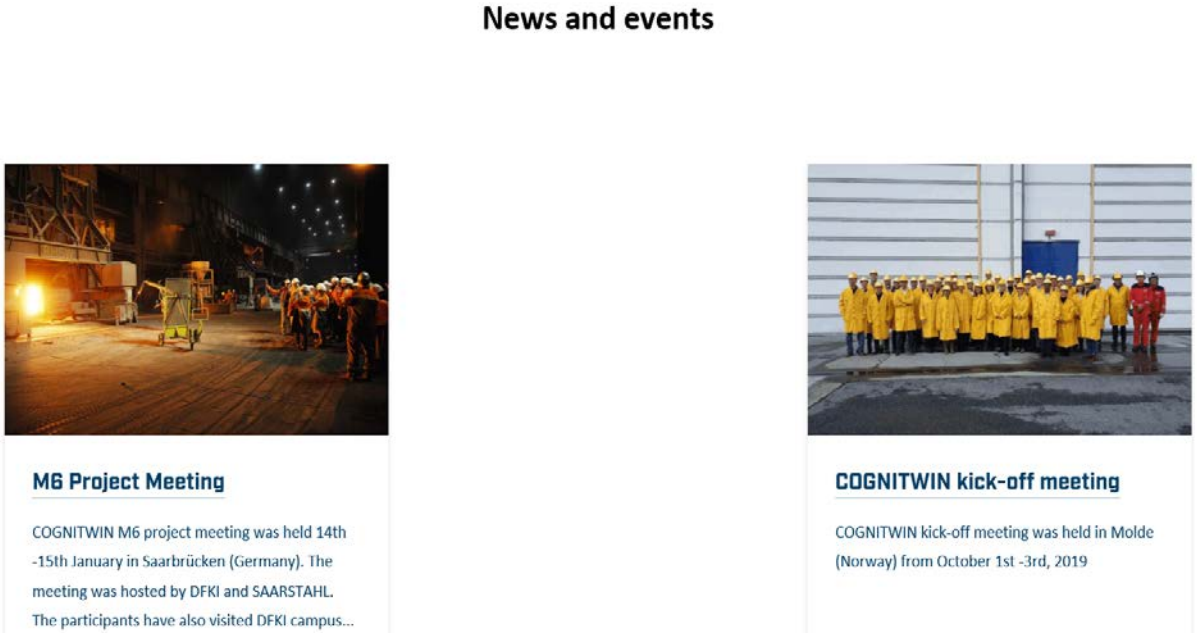


Figure 7: The COGNITWIN news page

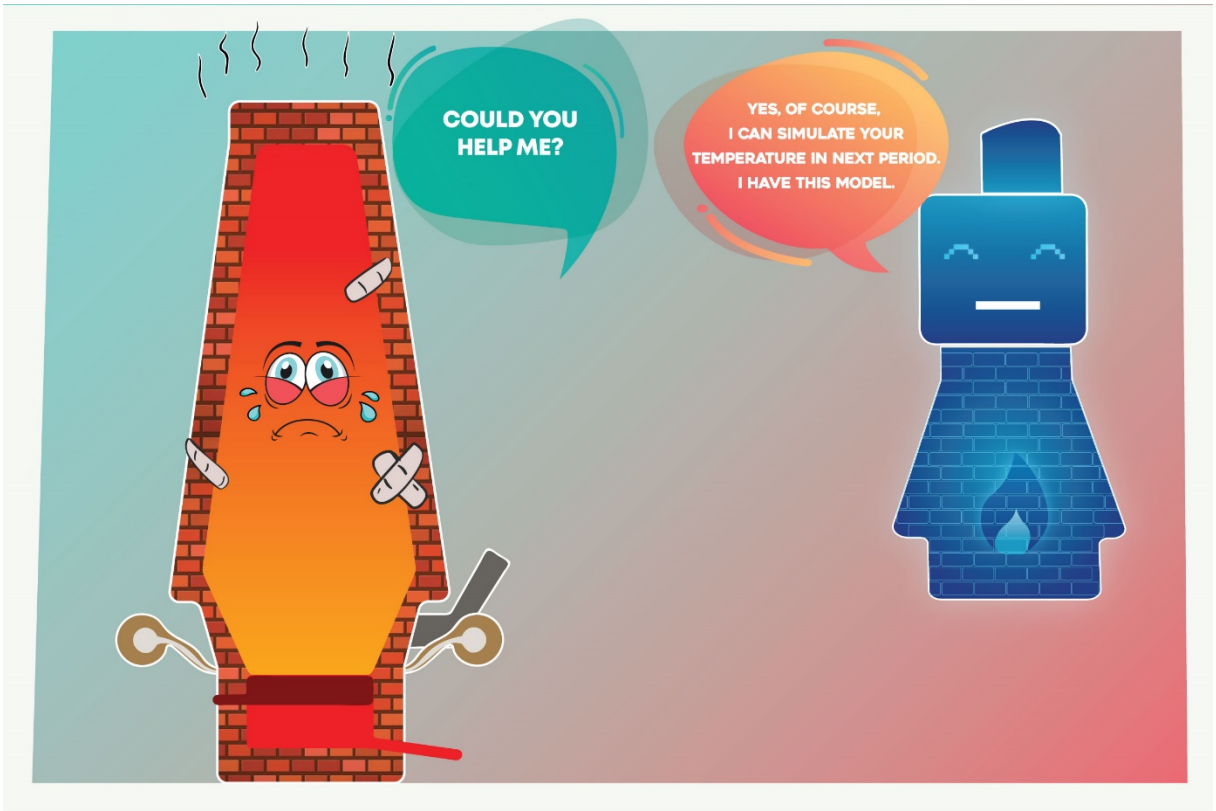
3.3 Comics

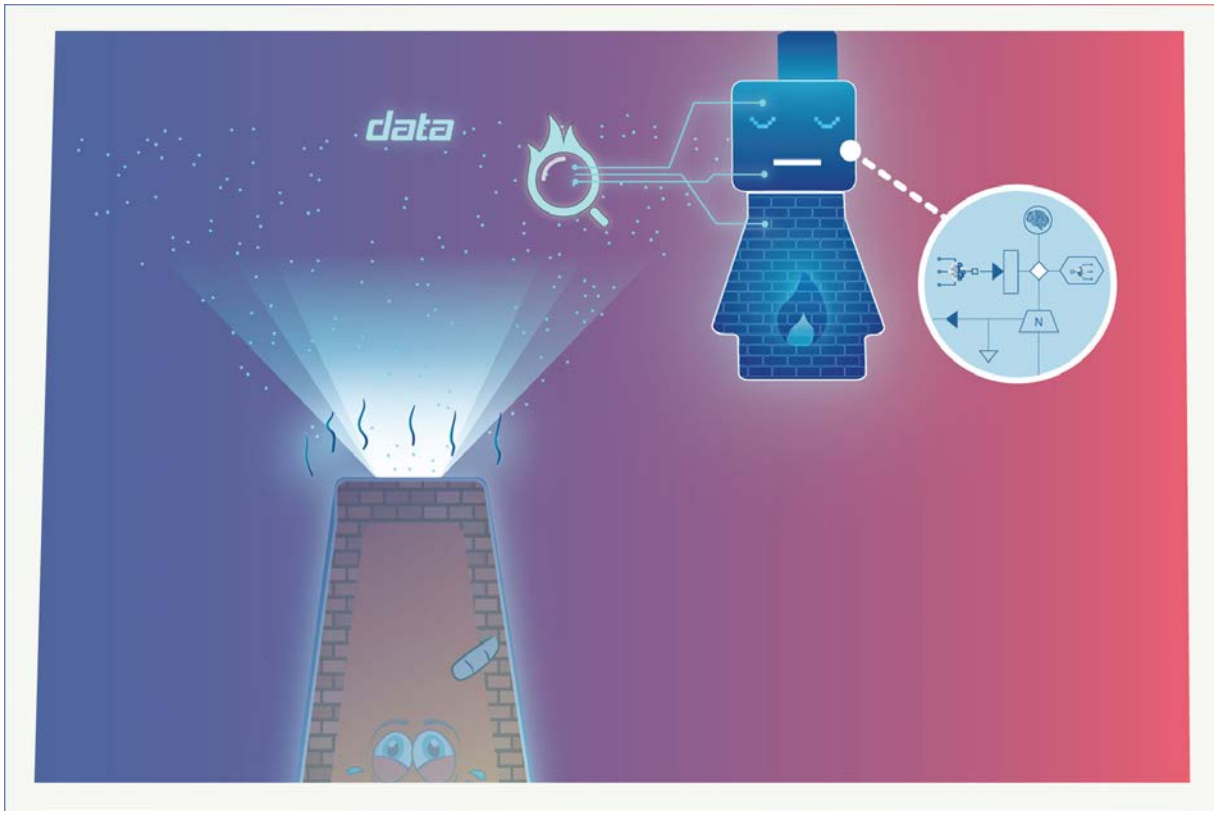
The COGNITWIN dissemination and communication activities started by letting the general public know of the beginning of the project. This has been done by the project website (see section 3.2).
The next step is to explain the general public what the project is about. To quickly attract as wider audience as possible and to improve the possibilities for COGNITWIN to influence public policy, we decide to start with comics.
We believe that the comics are a powerful and efficient way to communicate the vision of the COGNITWIN project. They allow us to explain the project vision without going into technical/research details. The visual representation of different types of the COGNITWIN twins could help a wider range of readers to understand the key COGNITWIN message and the potential contributions.
The next subsection shows the evolution of a digital twin over a hybrid twin towards a cognitive twin. For each type a twin, we created three images in order to show how the "pains" can be transformed into "gains":

- 1st image with a typical problem a digital twin can solve
- 2nd image with the sources the twin uses for solving problems and
- 3rd image with the still unsolved problems by the twin.

Currently, the comics are used as print and/or online publications. However, we will use them to create an initial project video.

3.3.1 Digital Twin

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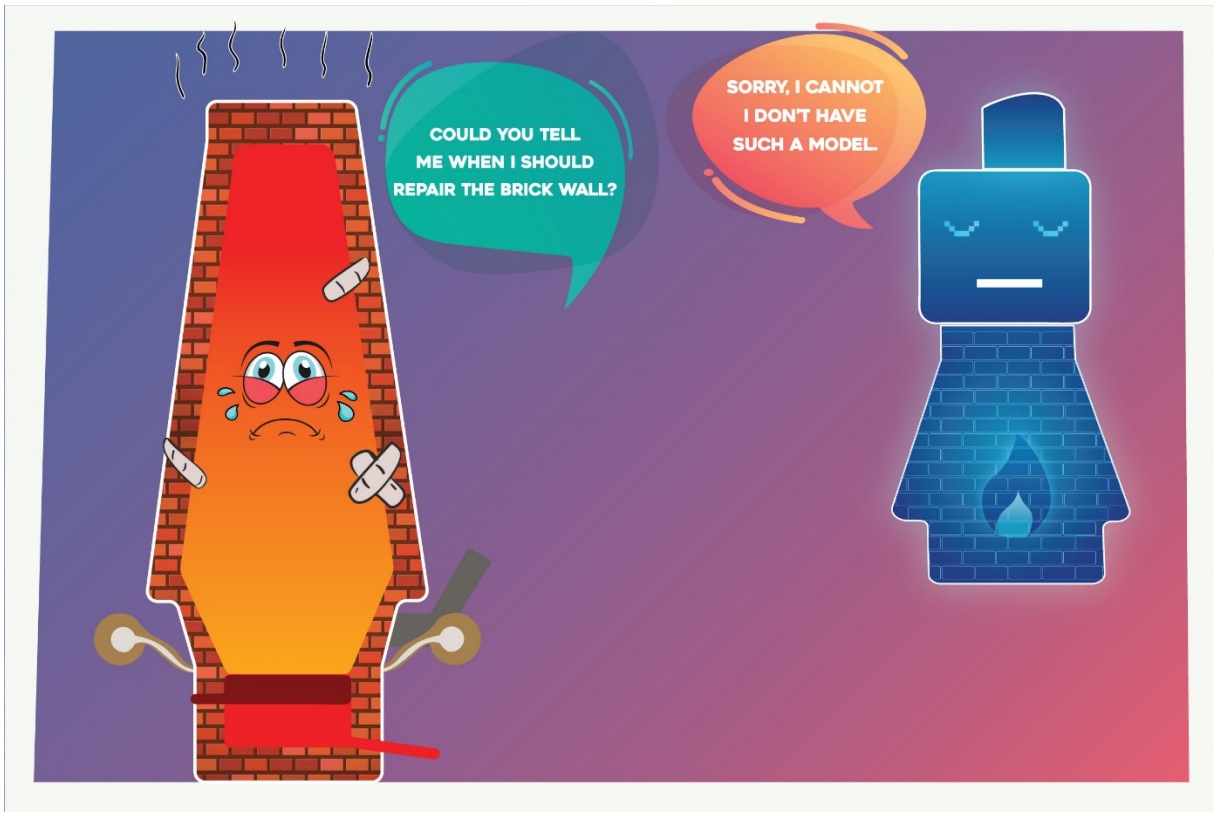
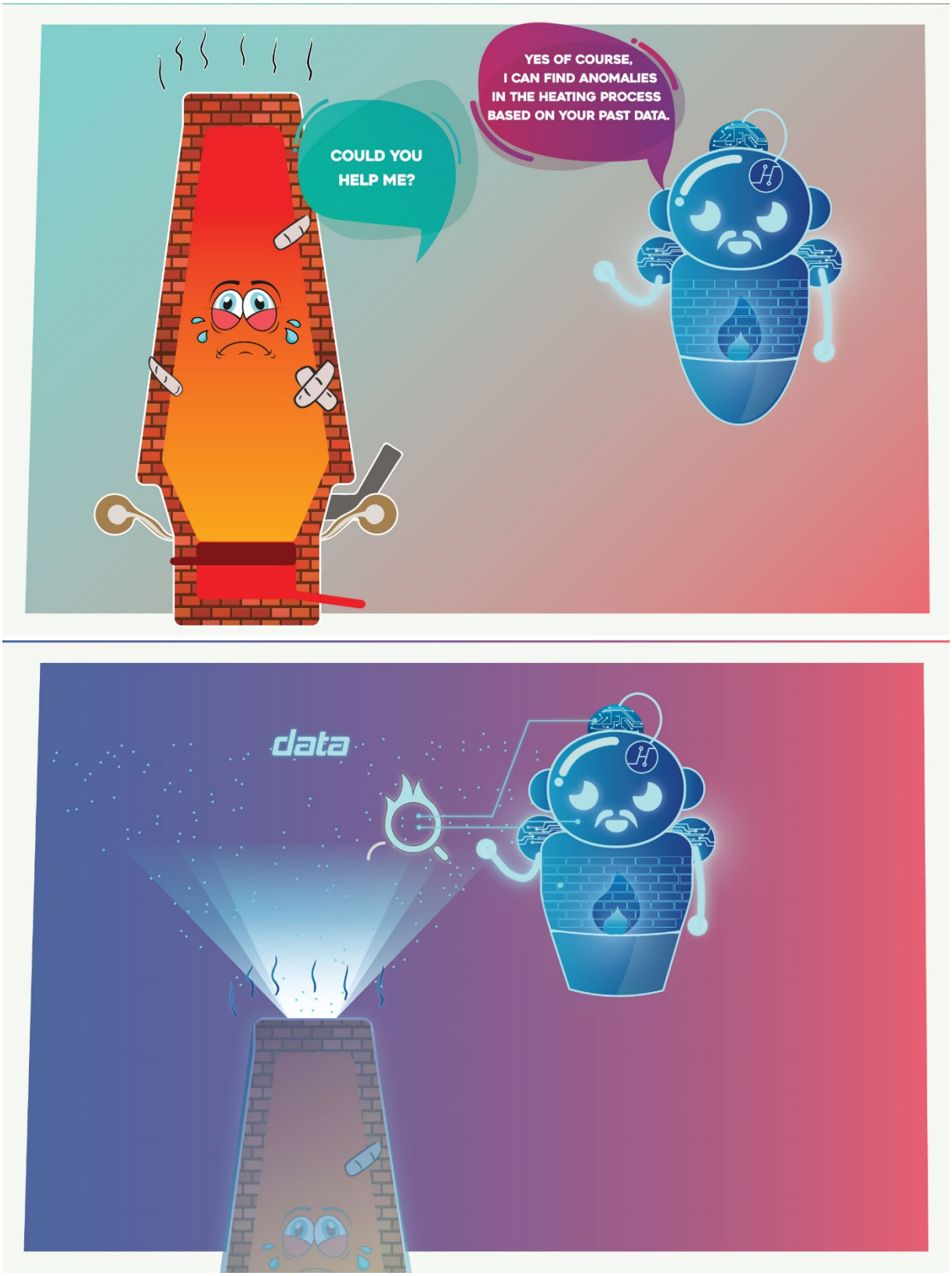
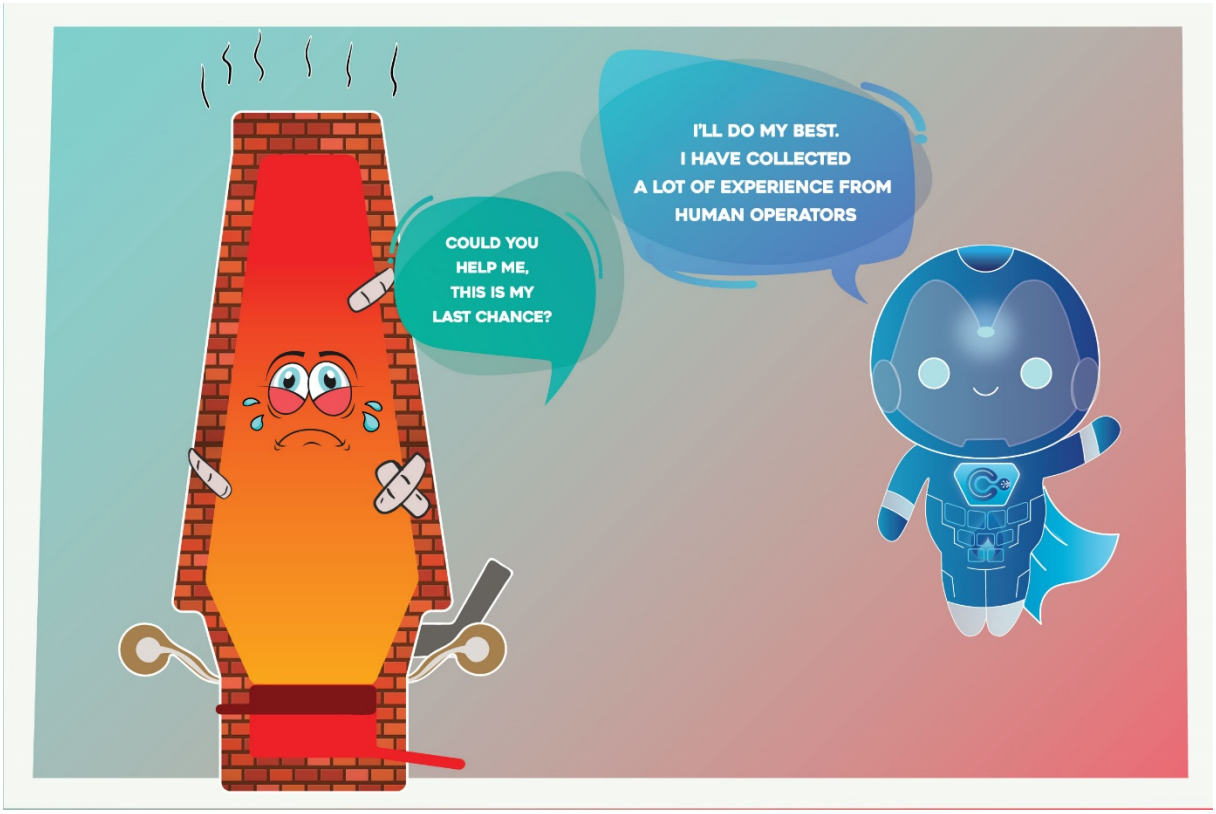
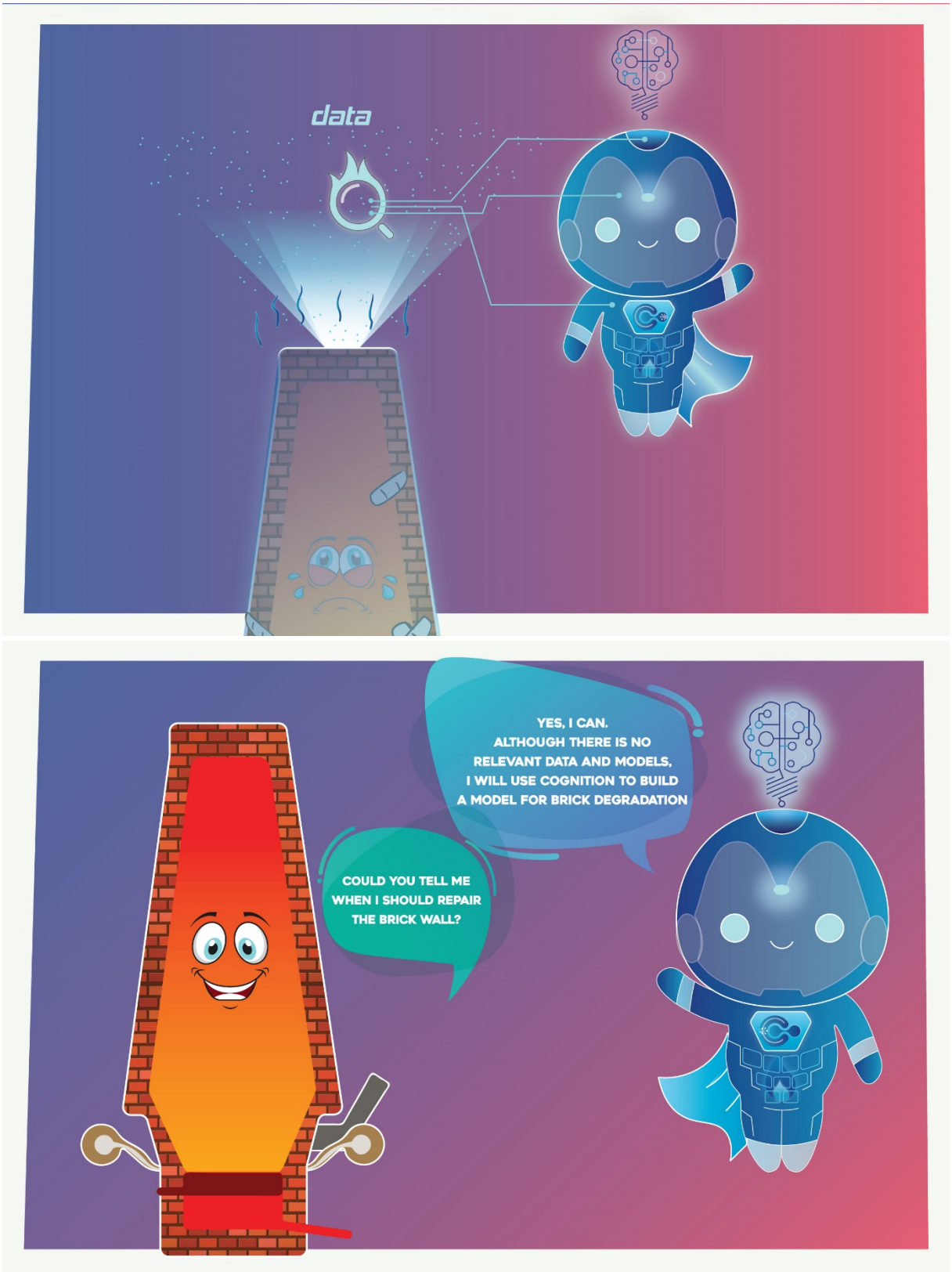

COULD YOU TELL ME WHEN I SHOULD REPAIR THE BRICK WALL?
SORRY, I CANNOT I DON'T HAVE SUCH A MODEL.

3.3.2 Hybrid Twin



3.3.3 Cognitive Twin

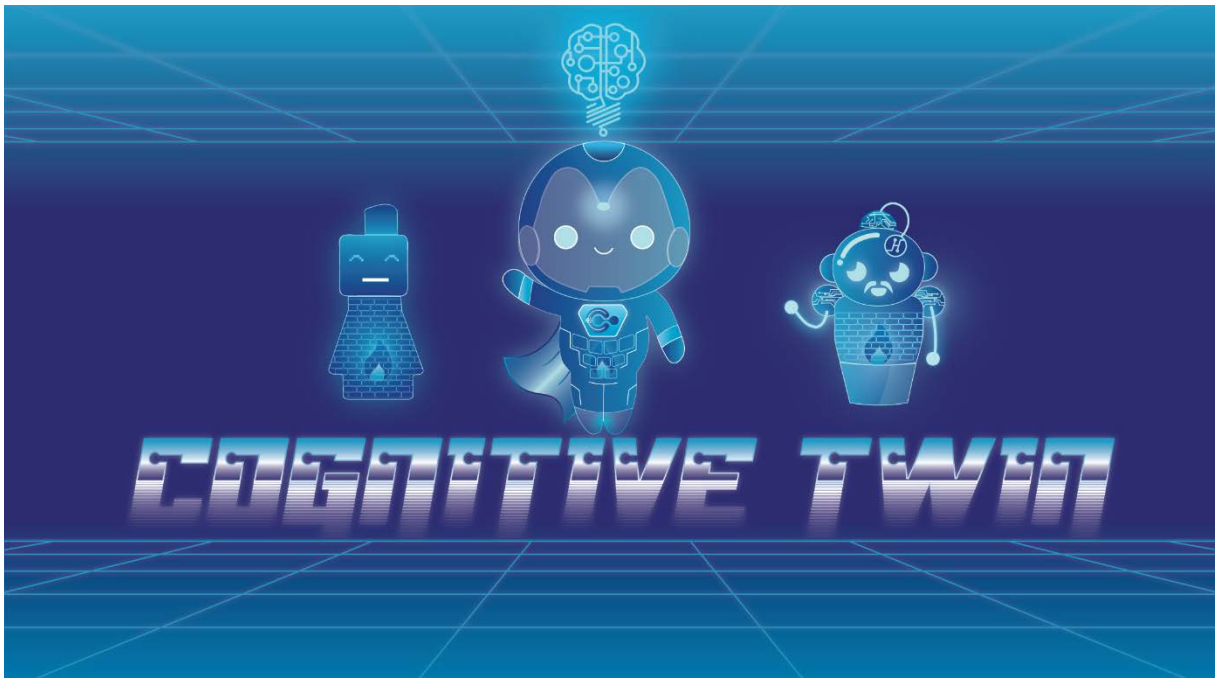




3.3.4 Summary

The visual representation of different types of twins indicates their intelligence. Whereas the digital twin has the same form as its physical counterpart, the hybrid twin is more human-like and has certain intelligence. The level of intelligence by the cognitive twin is significantly increased and it has some

strong and elevated capabilities. This visual representation should help readers to understand the COGNITWIN aspects which are less obvious when reading the same information.



3.4 Publications/presentations

During the first year of the project, the focus of the dissemination activities will be on a scientific audience, using publications and conferences. For these scientific activities, some target scientific conferences and journals have been identified.

The goal of this deliverable is to provide means for realizing "*excellence in science*". We have created a list of relevant conferences including the information about the submission deadline. This list was created based on the initial list included in DoW and based on the information provided by the partners using the dissemination template (see Annex 2 - D7.2 Template). We also created a list of journals to disseminate the COGNITWIN results.

A non-exhaustive list of **candidate academic conferences and industrial events** includes: IEEE International Conference on Control & Automation (ICCA), IEEE Conference on Decision and Control (CDC), CIRP Life Cycle Engineering (LCE); CIRP International Conference on Changeable, Agile, Reconfigurable and Virtual Production (CARV), CIRP Conference on Manufacturing Systems, IEEE Conference on Emerging Technologies and Factory Automation (ETFA), IEEE Conference on Industrial Informatics (INDIN),International Conference on Advanced Information Systems Engineering (CAiSE), IEEE International Conference on Data Engineering (ICDE), IEEE International Conference on Factory Communication Systems (WFCS), European Control Conferences (ECC), IFAC World Congress, Nordic Flame Days 2021, International Conference on Future Internet of Things and Cloud (FiCloud), International Steel Rolling Symposium (ISRS), Future Steel Forum, International Conference on Fluidized Bed Conversion, Light Metals; The Minerals, Metals & Materials Society (TMS) 2022 Annual Meeting, etc.

A non-exhaustive list of **candidate journals** includes: CIRP Annals of Manufacturing Technologies, CIRP Journal of Manufacturing Science and Technologies, Journal of Intelligent Manufacturing, Computation Intelligence, Journal of Manufacturing Systems, IEEE Transactions on Industrial Informatics, International Journal of Computer Integrated Manufacturing, IEEE Transactions on Neural Networks and Learning Systems, Journal of Machine Learning Research, Engineering Applications of Artificial Intelligence, Computers & Chemical Engineering, Applied Soft Computing, etc.

The partners will be encouraged to publish articles in peer reviewed journals and in other publications to disseminate the COGNITWIN results.

The business-oriented communication activities will start in 2nd project year and will include participation in fairs and organisation of specific workshops for the target process industries. The most relevant fairs are:

A non-exhaustive list of fairs includes: Hannover Fair, Vision, Measurement World, VivaTech, Global industry, Wire & Tube Fair, etc.

The COGNITWIN consortium aims to present the project results in at least one trade fair.

3.5 Presentations

Scientific conferences are important means to reach scientific community. In these events the communication activities include oral presentations, posters or booths and networking. The COGNITWIN partner will be encouraged to promote COGNITWIN at various conferences and meetings. The following scientific presentations have already been planned:

1. COGNITWIN presentation "Cognitive and Hybrid Digital Twins" in BDVA – Smart Manufacturing Industry (SMI) event on 27.02.2020, to be presented by Till Christopher Lech, SINTEF.
   The idea was (1) to explain the COGNITWIN extensions of the foundational digital twins in the context of process industry/SPIRE and (2) to highlight links with the SMI paper (see section 3.6.2) and open points that stimulate the discussion and can be elaborated by the SMI group. Unfortunately, the session was cancelled on 24.02.20, because the chairs cannot come to Brussels due to coronavirus travel restrictions.

2. Invited talk "Hybrid Analytics: Challenges and opportunities", 2nd International Conference on Big Data Analytics and Data Mining (Big Data 2020)[2], July 15-16, 2020, Amsterdam, to be given by Nenad Stojanovic, Nissatech

3. Invited talk "Cognitive Digital Twins: Challenges and opportunities for semantic technologies" at International Workshop on Semantic Digital Twins (SeDiT 2020)[3], Co-located with the 16th European Semantic Web Conference (ESWC 2020), Heraklion, Crete, Greece - 31 May 2020, it.linkeddata.es/ , to be given by Ljiljana Stojanovic, Fraunhofer IOSB

[2] https://bigdata.alliedacademies.com/

[3] https://sedit.linkeddata.es/

3.6 Networking activities

An important instrument during dissemination will be the existence of external networks in which consortium partners are involved both in European and national level.

3.6.1 SPIRE

COGNITWIN will seek opportunities given trough the SPIRE network for dissemination of results. The lead will have two COGNITWIN partners (SINTEF and Cybernetica):

- SINTEF is an active member of SPIRE both in the board and in the strategic planning. SINTEF is also an active member of the group developing SPIRE's strategy for digitalisation.
- Cybernetica is a member of A.SPIRE, the organisation hosting SPIRE through at public-private partnership contract with the EU.

The COGNITWIN project will seek to participate and contribute to events around Process industry digitalisation organised by SPIRE. SPIRE's 150 members will further be informed and invited to relevant events organised by the COGNITWIN project.

3.6.2 BDVA

Many members of the COGNITWIN consortium belong to BDVA as active members, being leaders of Task Forces and subgroups, such as the Technical Task Force collaboration subgroups. They will bring the results of COGNITWIN into future updates of the Strategic Research and Innovation Agenda (SRIA) of BDVA and will strive for technology transfer of the COGNITWIN results to BDVA members.
Additionally, Fraunhofer IOSB is one of the editors of the “Big Data Challenges in Smart Manufacturing”, the discussion paper for BDVA and EFFRA Research & Innovation roadmaps, aligning Research Agendas from the Big Data Value Association and Factories of the Future partnerships with a 2030 perspective to future Industrial IoT and AI for Manufacturing, which will appear in March 2020. Other project partners (e.g. NST and SINTEF) also contributed to this paper.
Next, TEKNO is involved in activities of Technical Task Force (TF6) especially on Data Science/AI and Standardisation.
Finally, we have already started to inform the BDVA community about the COGNITWIN concept and the approach to achieve its vision (see subsection 3.5).

3.6.3 Industrie. 4.0

The COGNITWIN partners will disseminate the project results in events organized by the Plattform Industrie 4.0. We will take advantage of these events and introduce industrial partners to COGNITWIN technologies and results during the course of these events.
Fraunhofer is a member of expert panel of the Standardization Council Industrie 4.0 and contributes to several working groups of the German Platform Industrie 4.0, e.g. on reference architectures, etc. E.g. Fraunhofer IOSB has actively contributed to Platform Industrie 4.0 regarding the Asset Administration Shell, which is considered as the implementation of the digital twin for smart manufacturing. This active participation will ensure that the COGNITWIN approach is based on the state-of-the art technology in the domain.

The German Platform Industrie 4.0 launched Asset Administration Shell[4] as the implementation of the digital twin for smart manufacturing, IEC PAS 63088. Within this project, all models will be standardized according to the I4.0 guidelines and thus will be Asset Administration Shell complaint, in order to ensure interoperability. Note that already in 2017[5] it was seen that the concepts of digital twin and asset administration shell are evolving in the same direction. But only in 2019 this lead to the statement of the Plattform Industrie 4.0 community that the asset administration shell "is the implementation of the 'Digital Twin' for Industry 4.0"[6].

3.6.4 IIC

Fraunhofer is involved in the IIC activities and participates in the IIC working groups related to digital twins: TG 'Digital Twin Interoperability' and the Joint Contributing Group IIC/PI4.0 "Digital Twin I4.0 Component ". Additionally, Fraunhofer IOSB is one of the co-authors of an Industrial Internet Consortium and Plattform Industrie 4.0 Joint Whitepaper "Digital Twin and Asset Administration Shell: Concepts and Application in Industrial Internet & Industrial 4.0, to appear soon.
We note here that the COGNITWIN Consortium will attend the IIC meeting in Athens in order to foster collaboration with the IIC working groups related to digital twins.

3.6.5 5GTRForum

TEKNOPAR has been and will continue to be the Chairman of the Industry Sector for Services and Applications Advisory Group. The envisioned COGNITWIN contribution includes development of high value-added products, services, and technologies in 5G and beyond new generation mobile communication systems.

3.7 Cooperation with other projects

Inter-project activities will be addressed by the COGNITWIN project. The focus will be on the projects related with the COGNITWIN scope. This includes all projects selected for the funding in the same call as the COGNITWIN project. These projects are shown in the table below.

Project	Description
INEVITABLE Optimization and performance improving in metal industry by digital technologies	The INEVITABLE innovative action aims to realize a fully digitalized monitoring technology for an optimized and improved performance of manufacturing processes. Real-time machining process control at shop floor can significantly improve machining efficiency and the quality of

[4] Details of the Administration Shell. Federal Ministry for Economic Affairs and Energy (BMWi). ZVEI & Plattform Industrie 4.0. Online: https://www.plattform-i40.de/I40/Redaktion/EN/Downloads/Publikation/2018-details-of-the-asset-administration-shell.html

[5] C. Wagner; et al. The role of the Industry 4.0 Asset Administration Shell and the Digital Twin during the life cycle of a plant. In: Proceedings of the 2017 IEEE Conference on Emerging Technologies Factory Automation (ETFA 2017), Limassol, Cyprus, 2017.

[6] Details of the Administration Shell - from idea to implementation Available: https://www.plattform-i40.de/PI40/Redaktion/EN/Downloads/Publikation/vws-in-detail-presentation.html

	finished parts. It will also reduce resource consumption and CO2 emissions for a more competitive and sustainable metallurgic industry.
FACTLOG Energy-aware Factory Analytics for Process Industries	One of the main expectations of the use of digital twins is to give us the capability to observe and monitor the behaviour of their respective physical twins. In order to make it happen, we need to combine digital twins, which are driven by domain models (i.e. knowledge), with the models derived from data (i.e. experience). In order to realize it, we need a real-time processing layer where observations (i.e. events), knowledge and experience interoperate to understand and control the behaviour of a complex system (i.e. cognition). FACTLOG offers such a layer and aims at deploying and adjusting it to several process industries.
COGNIPLANT COGNITIVE PLATFORM TO ENHANCE 360º PERFORMANCE AND SUSTAINABILITY OF THE EUROPEAN PROCESS INDUSTRY	COGNIPLANT project will develop and demonstrate an innovative approach for the advanced digitization and intelligent management of the process industries. The COGNIPLANT solution will provide a hierarchical monitoring and supervisory control that will give a comprehensive vision of the plants' production performance as well as the energy and resource consumption. Advanced data analytics will be applied to extract valuable information from the data collected about the processes and their effect on the production plant's overall performance enabling to design and simulate operation plans in digital twin models based on the conclusions. As a result, optimal operation plans will be obtained that will improve the performance of those cognitive production plants.
HyperCOG Hyperconnected Architecture for High Cognitive Production Plants	HyperCOG project addresses the full digital transformation of the process industry and cognitive process production plants through an innovative Industrial Cyber-Physical System (ICPS). It offers a hyper-connected network of digital nodes that can receive considerable streams of data in real-time. As a result, it can supply industrial plants with awareness and cognitive reason.

We note here that some COGNITWIN partners (DFKI, Nissatech and Sidenor) have been involved in three projects mentioned above and will help to establish collaboration.

We have already made a contact with the FactLog project. The result of this initial cooperation is a proposal for a joint workshop on the ICE/IEEE ITMC 2020[7]. The workshop proposal is included in 5Annex 1 - Workshop proposal. The conference will focus on the topic: "Digitalization through Digital Twins – Innovation in the analysis and management of environmental and physical engineered complex systems". The idea of the workshop is to clarify the notion of cognition for digital twins and to start building a community that connects researchers and practitioners (industry) to understand the opportunities for improving industrial processes as well as the challenges for realizing affordable solutions. The workshop pretends to open a series of similar meetings going deeper in this emerging topic. The workshop will decide on topics for a whitepaper, including a problem to be solved along

[7] https://www.ice-conference2020.org/

with the solution to this problem. The whitepapers will be used to convince potential customers to learn more about the cognitive digital twin technology.
Additionally, the COGNITWIN project plans to cooperate with other relevant projects related to digital twins, Big Data and AI technologies, etc.

3.8 Public dissemination material

Different kind of printed and digital materials (such as brochures, flyers, posters, etc.) will be created. The content of these materials will be tailored to specific audiences and the type of dissemination activity as, for example, conferences, exhibitions etc. The materials will be updated regularly and they will be available online, possibly translated into a number of different languages depending on the audience.

3.9 Social media

Various social networks will be used as a marketing tool in order not only to promote results of the project but also to encourage a wider discussion on digital twins. The COGNITWIN already has the LinkedIn and Twitter accounts to approach business and research communities and general public, respectively. Both accounts are linked to the project's website. The social media campagna will start in M7 when the initial project results will be available.

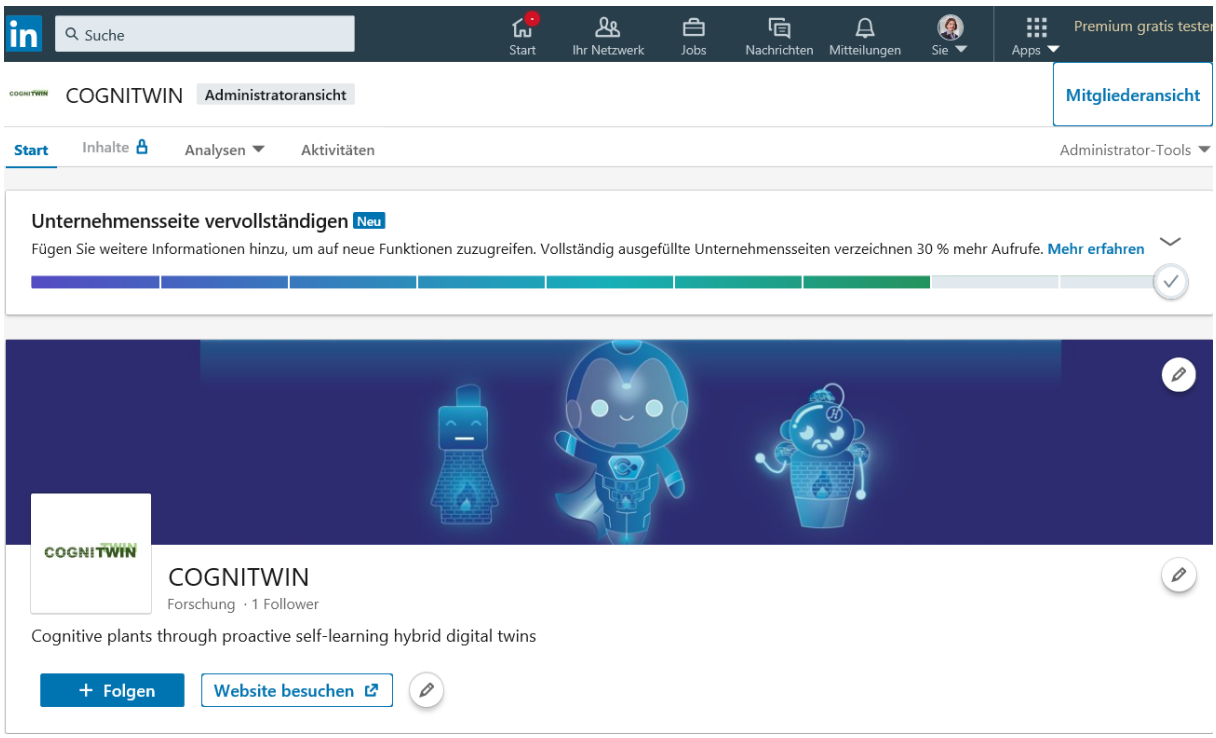


Figure 8: COGNITWIN LinkedIn account

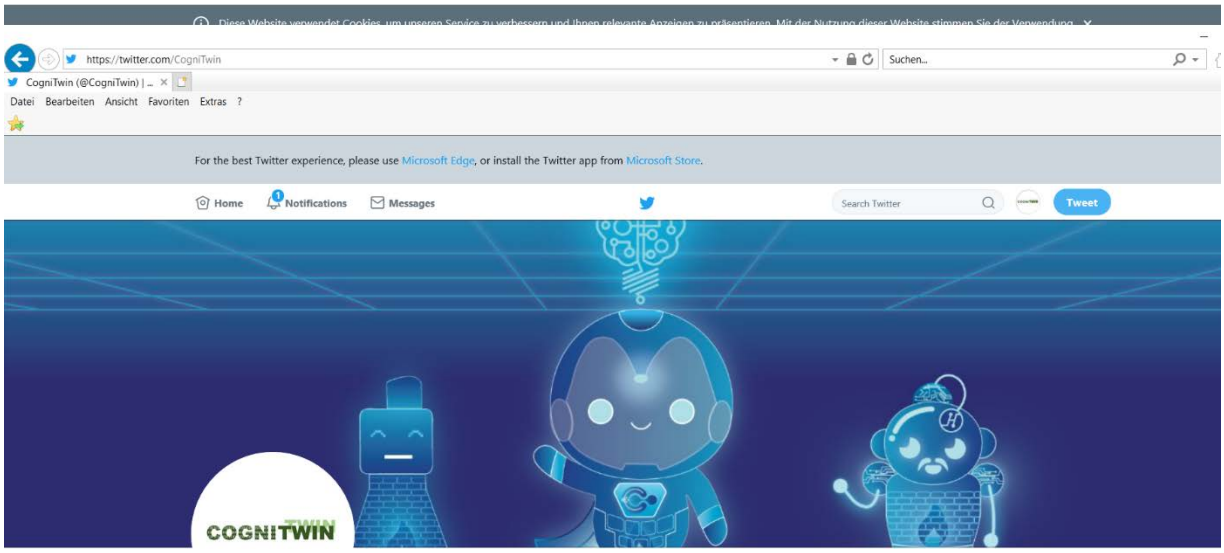


Figure 9: COGNITWIN twitter account

Fraunhofer as the dissemination manager will coordinate the activities. However, all partners are expected to actively contribute by providing content and by stimulating the discussion about the project results.
Additionally, we will use ResearchGate to scientific publications and the YouTube channel for presentations and videos.

3.10 Initial dissemination plans

This section includes initial dissemination plans of the COGNITWIN partners.

3.10.1 SINTEF

SINTEF plans to disseminate to both scientific and industrial communities. The planned activities include:

- Presentations and paper for the Minerals, Metals & Materials Society (TMS) annual meetings, Light Metals section (https://www.tms.org/UpcomingMeetings)
- Presentations of project and results at the SFI Metal Production bi-annual meetings (https://www.sintef.no/en/projects/sfi-metal-production/)
- Two papers at the joint (CSIRO/SINTEF) conferences on Computational Fluids Dynamics for the Industry (https://www.sintef.no/cfd2020/ & http://www.cfd.com.au/cfdconf/)
- At least one paper in journal Met Trans B
- At least one paper in ISIJ journal

SINTEF will also be included in standardisation and networking activities e.g.:

- BDVA, Big Data Value Association, Lead of TF6 Technical Priorities, Reference Architecture for AI and Big Data
- SPIRE Digitalisation Group

3.10.2 Hydro

The dissemination objectives are to:

- Inform and lecture in future Gas Technology Centre internally through the organization and units with GTc responsibility
- Generate minimum viable standard for modernization of brown field and design basis for green field

The dissemination activities will include:

- General dissemination through operational support from Technology dept. to operation
- Seminar on Gas Technology Centre development and future perspective

3.10.3 SFW

The dissemination goals are:

- to increase the awareness of Digital / Cognitive Twin modeling possibilities within the SFW company.
- to evaluate the potentiality and benefits of the developed toolbox and COGNITWIN pilots from the service business point-of-view.

The dissemination activities will focus on internal dissemination and evaluation of project results by presentations / workshops within the SFW company.

3.10.4 SIDENOR

In the case of Sidenor, dissemination aspects will include technical papers and press-releases; participation in events, such Technical Conferences, Trade-Fairs, technical seminars/workshops; contribution with technical content and implementation of the most interesting obtained results for employees;
For example, initial dissemination has started including the creation of a post in the Web of Sidenor:
https://www.sidenor.com/en/sidenor-will-participate-in-the-COGNITWIN-project/

3.10.5 ELK

The results of the COGNITWIN project will be communicated both internally and externally.

- Internal: Presentations in process expert groups, which are made up by representatives for all plants in Elkem. The COGNITWIN project is most relevant for the post taphole team, but principles, toolboxes and models may also find relevance in other parts of the production process. Memos and reports will be shared over the corporate document platform. The project will also be presented in management and strategy meetings.
- External: Elkem will use channels like conference proceedings, meeting with stakeholders, social media platforms, news releases, scientific articles and industry trade fairs and workshops to communicate results and achievements from the COGNITWIN project. Also, participation in relevant EU-meetings and workshops will be emphasized.

3.10.6 SAG

The dissemination goals are to:

- Raise awareness for potential of cognitive production plants Saarstahl and Stahl-Holding-Saar (SHS)-wide
- Evaluate potential usages of attained toolbox and realized prototypes from the project Saarstahl and SHS-wide.

The planed activities include internal presentations or workshops. An article on COGNITWIN project and M6 meeting in Saarbrücken will be published in the employee newspaper (which is also sent to SAGs costumers).

3.10.7 DFKI

The dissemination goals are twofold:

- Publications in scientific journals will aim to maximize the impact of the project on the scientific community.
- Dissemination to a wider will aim to draw attention to the project, motivate the activity and create awareness for the role of the EU as a driver of industrial innovation.

To reach these goals, we plan the following activities:

- We will publish a journal paper with the title “Adaptive Sampling of Parameter Spaces for the Synthetic Generation of Training Data in Deep Learning”, or similar. The publication will be submitted to a core machine learning journal.
- We will create a conference poster with the title “Neuroscope: a Visual Debugger for Convolutional Neural Networks”.

3.10.8 Cybernetica

Cybernetica plans to disseminate results from COGNITWIN in scientific communities, in industrial meeting places and in direct communication with corporations that may benefit from using the results. The plan includes participation at and contributions to the Minerals, Metals & Materials Society annual meetings. Prospective paper: «Online Model of Gas Treatment Centre in Aluminium Smelter for Control of Fluoride Emissions and Recycling»; Light Metals; The Minerals, Metals & Materials Society (TMS) 2022 Annual Meeting; February 27-March 3, 2022; Anaheim, California.
A member of A.SPIRE, Cybernetica will seek opportunities given trough the SPIRE network for dissemination of results.
Cybernetica will support standardisation in COGNITWIN:

- As member of OPC Foundation (https://opcfoundation.org/), Cybernetica may support the use of the OPC standard for exchange of process data.
- Cybernetica supports the Functional Mock-up Interface (FMI) Standard (https://fmi-standard.org/), a free standard that defines a container and an interface to exchange dynamic models.

3.10.9 NST

The main goal of NST is to disseminate the achievements of the COGNITWIN to community involved in Industry 4.0, mainly to the interested stakeholders. The D2Lab is a fast growing platform that is currently being used in several companies in Serbia, but expansion of the system is planned in global levels in the upcoming years. The solution provided by COGNITWIN shall put D2Lab in the front of the market regarding integration of simulations, data-driven and knowledge-based models, which should benefit a wide variety of production companies.
This goal will be achieved by participating in I40 events at the national, EU and global level and by practical demonstration of the system (e.g. at industrial fairs, customer visits, etc.) in order to create awareness and interests.
Additionally, NST will utilize the following dissemination channels: dissemination via social media, blogs and forums, announcements on the company's website, active participation in selected EU events, conferences and trade fairs, publications in bulletins and newsletters, press releases and media announcements. Finally, the NST research team plans to present/publish research results in international conferences and scientific journals, targeting to at least 2 scientific publications.

3.10.10 Fraunhofer

Results of COGNITWIN will be presented to national and international research communities, i.e. at conferences, workshops or in journals on the area of digital twins, where Fraunhofer IOSB is already present and active since many years. Fraunhofer plans also to carry out a conference workshop with focus on COGNITWIN technologies and methodologies. Additionally, as Fraunhofers is often called upon to collaborate in many European-wide projects, increased visibility through our participation to COGNITWIN and wide dissemination of the project results, as well as use of COGNITWIN's research results in follow-up research and innovation projects, would be an additional primary value creation mechanism for Fraunhofer and allow us to adapt or re-direct our scientific methodologies and extend our research basis.
Next, the results of the project will be disseminated among regional and national partners and companies. In the first year of the project, the industrial-related activities will focus on "in-house" lab demonstrations and presentations of the project to industrial partners. Towards the end of the project, the COGNITWIN results will be presented at large fairs, where Fraunhofer IOSB has its own booth (e.g., Hannover Messe or SPS). In addition, the software developed within the COGNITWIN project will be demonstrated in our demo factories, where industry and research come together to develop manufacturing of the future.
Finally, Fraunhoher will dissemination the results of the COGNITWIN project in the BVDA, PI4.0, IDS and IIC communities.

3.10.11 UOULU

In dissiminating the COGNITWIN research outcomes, University of Oulu will target the scientific community of process control and our students in process and automation engineering. The planned activities include publishing in international scientific forums, emphasizing rated journals and conferences. In the area of process control the role of forums organized by IEEE and IFAC is important.

The project outcomes will develop further the know-how of the research unit in the field of control of dynamic energy systems. The methodological results of COGNITWIN are to be applied further in future research projects, in both academic work and in joint projects with local companies.

3.10.12 TEKNO

The primary disseminetaion goal of TEKNO is to promote its industry 4.0 platform STEEL4.0, and innovative application of cognitive digital twins in manufacturing industry. TEKNO plans to disseminate the results of COGNITWIN to industrial communities (i.e. partners, potential customers, competitors), scientific communities, and to the general public. TEKNO also aims to demonstrate how digital twins, and cognition can be used in manufacturing industry.

To achieve the dissemination goals, TEKNO will participate in industrial exhibitions related to i4.0 applications, both generic and specific to manufacturing industry and steel manufacturing. The planned exhibitions are both national and international, and include but not limited to Tube Dusseldorf 2020 International Tube and Pipe Trade Fair (https://www.showsbee.com/fairs/35870-Tube-Dusseldorf-2020.html). The experiences and knowledge gained during the COGNITWIN project will be demonstrated at conferences and related workshops by presenting papers at international conferences and events.
Publishing at least two scientific publications is aimed and presentations titled as “What are cognitive twins and what we do to generate them” will be given at selected universities. Public announcements, news and progress regarding the COGNITWIN project will be published on company website, and using social media such as Twitter, LinkedIn.
TEKNO will also be involved in standardisation and networking activities: BDVA, Big Data Value Association, TF6 Technical Priorities, Reference Architecture for AI and Big Data (http://www.bdva.eu), EFFRA and 5GTRForum (https://5gtrforum.org.tr/en).

3.10.13 NOKSEL

The dissemination objectives are to:

- Promote cognitive digital twins use in steel pipe production
- Call attention to this new technology together with its advantages in this targeted Turkish steel Pipe Manufacturer Sector via sectorel Turkish Association like Turkish Steel Pipe Manufacturer Association, Turkish Employers Association of Metal Industries (MESS) .

The dissemination activities will include:

- Organisation of Informative technical face to face meetings and making presentations to the targeted Sectorel Association;
- Announcement of the COGNITWIN new technologies at our company’s web site;
- News article about the use of cognitive digital twin technology in steel pipe production in Turkish news papers or sectorel journals (If possible);
- Participation in “Wire & Tube Fair in Dusseldorf”: E-Presentations for informative purposes about Cognitive Digital Twin in SWP Production at Noksel’s stand will be prepared:

Additionally, Noksel will sett up the same system in their Hendek facilities in Turkey and in their subsidiary company’s Noksles Espana factory in Lorca in Spain.

3.10.14 Scortex

Scortex plan to disseminate COGNITWIN global results in various communication settings as part of the company's regular marketing and industry presence. New developments on integration between cameras sensors and hardware for machine learning, such as FPGAs, will be integrated into Scortex platform. This technology will be at the core of Scortex inference pipeline and will be deployed to all existing and future Scortex clients. This also means that the technology can be shown as part of a demonstrator. Scortex will thus communicate:

- At trade show, by demonstrating the FPGA platforms. Such trade shows could be: Vision, Measurement World, VivaTech, Hannover Messe, Global industry, etc. The goal is marketing: bring new leads to the company and generate awareness. The target audience of trade shows is mostly: quality experts and quality directors, computer vision experts, factory directors.
- Scortex employees regularly participate in conferences and meetups (Paris machine learning meetup for example). There, the goal is more to raise awareness about what Scortex does, position Scortex as a leader in its field and improve recruiting. The target audience is expert in computer vision, deep learning, machine learning or computer science.
- Scortex intends to communicate some insights on its blog. The goal is similar to meetups (positioning, awareness) but the target audience can vary from computer vision experts (meetup audience) to quality directors (trade show audience).

4 Conclusion and next steps

This deliverable describes the COGNITWIN dissemination and communication plan. The goal is to define the methodology and tools for raising awareness of the project results, reaching a wider audience and for paving the way to new business opportunities.

If needed, the plan will be revisited during the project to improve its performances and to ensure the impact of the dissemination and communication activities by facilitating the uptake of the project results.

This deliverable also reports on the major achievements during the first six months. It is naturally that the dissemination activities were performed slowly at the beginning of the project. However, it is expected a significant increase on dissemination and communication activities, after the initial technical results and the use-case description will be available at month six.

The dissemination and communication activities will be organised based on the plan defined in this deliverable. The results of these activities will be reported in the deliverables “D7.3: Intermediate report on dissemination activities” in M18 and in “D7.6: Final report and outreach and dissemination activities” in M36.

5 Annex 1 - Workshop proposal

Cognitive Digital Twins: Challenges and opportunities for industrial applications

A digital twin is a formal digital representation of an asset (e.g. sensor, machine, process, product, etc.) that captures attributes and behaviors of that asset suitable for communication, storage, interpretation or processing within a certain context. The digital twin model includes the data (e.g. master data, time-series data, etc.), the models (e.g. 3D models, physics-based model, data-driven models, etc.) and services (e.g. visualization).

The cognitive twin is the evolution of the digital twin concept in the AI era by incorporating aspects associated with cognition, such as reasoning, planning, and learning. It extends the "standard" digital twins in three ways:

- the digital twin model is extended by formalizing expert knowledge, since the today's systems still require substantial human intervention when faced with novel and unanticipated situation i.e. situations that have not been considered at the design stage;
- the digital twin data and models are intertwined with an ontology/knowledge graph, which allows to understand root causes by inferring explainable hypothesis from complex relationships between individual models that cannot simply be detected by a single model;
- the advanced analytics and AI services are part of a digital twin, making it an intelligent and self-contained entity, which does not only recognize a problem, but rather has deep understanding of a given situation, supporting the decision if, how and when to react.

This workshop will be co-organised by two H2020 projects: CogniTwin (870130) and FactLog (869951), both working on applying digital twins for cognitive production plants. It will bring together experts from manufacturing, computer science, AI and cognitive science, with the goal to explore the key market and technology innovation challenges to be addressed. The result will be published as a white paper.

One of the main objectives is to start building a community that connects researchers and practitioners (industry) to understand the opportunities for improving industrial processes as well as the challenges for realizing affordable solutions. Therefore, this workshop pretends to open a series of similar meetings going deeper in this emerging topic.

This workshop is best suited for individuals (researchers, developers and industry stakeholders) who are not only actively researching and implementing digital twins, but also want to find out more about all of the features that the technology can provide for them.

Co-chairs

CogniTwin project
Dr. Ljiljana Stojanovic, Fraunhofer IOSB, Germany
Dr. Arne J. Berre, SINTEF, Norway

FactLog project
Armend Duzha, Maggioli SPA, Italy

Dr. Stavros Lounis, Athens University of Economics and Business, Greece

6 Annex 2 - D7.2 Template

Scientific dissemination

Conferences/workshops to publish papers about the COGNITWIN results

Even if you do not yet know the title of the paper(s) to be submitted, please identify relevant conferences and indicate the possible topics of the contributions.

Conference	URL	Location	Date (D/M/Y)	Title/Topic	Responsible Partner(s)

Journals to publish papers about the COGNITWIN results

Even if you do not yet know the title of the paper(s) to be submitted, please identify relevant journals and indicate the possible topics of the contributions.

Journal	URL	Submission date (D/M/Y)	Title/Topic	Responsible Partner(s)

Conferences/Events to be considered to organize a COGNITWIN workshop/session

Name of conference/ event	URL	Location	Date (D/M/Y)	Call for workshops/sessions	Responsible Partner(s)

Industrial dissemination

Industrial-oriented events/fairs to be officially visited by COGNITWIN (via presentation, exhibition)

Name of event	URL	Location	Date (D/M/Y)	Key themes	Responsible Partner(s)
				What will be presented / exhibited?	

How to leverage on the existing professional networks of project partners in order to raise awareness of the project and obtain involvement?

Key stakeholders	Contact person	Email	Primary goal and approach	Responsible Partner(s)
Potential users				
Service providers				
Technology experts				
Researchers				
Partners				

Academic activities

Lectures and courses

Title	Presenter	Participants	Location	Responsible Partner(s)

Bachelor, MSc and PhD works that will be conducted under the COGNITWIN project during the first reporting period

Title	Degree	Author	Supervisor(s)	Responsible Partner(s)
	Bachelor / Master / PhD			

Inter-project activities: Relevant projects we can cooperate with

Some COGNITWIN partners are involved in the projects selected for funding in the same call:

- INEVITABLE: Sidenor
- FastLog: Nissatech
- HyperCOG: DFKI and Sidenor

These projects have to be included in the table below.

Project	Funding agency	Synergy potential	Contact person	Responsible Partner(s)	Contact already made?
	H2020, local government, etc.				Yes/No

Relevant standards, associations (e.g. SPIRE, BDVA, etc.) and initiative (e.g. I4.0, IDS, etc.)

Standard / Association/ Initiative	Description of standard / association/ initiative	Envisioned adoption/ contribution	Description of the planned adoption/ contribution	Responsible Partner(s)

Individual dissemination plans

Partner	
Dissemination goals and target groups	
Planed activities	