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DayTiME

Digital Lifecycle Twins for Predictive Maintenance

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Author

Author	Company	E-mail
Mark van Helvoort	Philips	mark.van.helvoort@philips.com

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	Name: Mark van Helvoort Partner: Philips Medical Systems Nederland BV Address: Veenpluis 6, 5680 DA Best Phone: +31 6 10523330

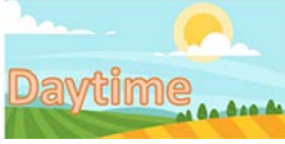
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Table of Contents

DOCUMENT INFO	2
EXECUTIVE SUMMARY	4
0 INTRODUCTION	5
1 DISSEMINATION STRATEGY	5
1.1 Means of communication	6
1.2 Target groups	6
1.3 Timing	7
1.4 Internal dissemination strategy	8
1.5 External dissemination strategy	8
2 DISSEMINATION RULES	9
2.1 Presentation and publication guidelines	9
2.2 Graphic identity	9
2.3 Layout and templates	9
2.4 Logos	9
2.5 Compulsory acknowledgements	9
3 DISSEMINATION TOOLS	10
3.1 Internal dissemination tools	10
3.1.1 PROJECT MEETINGS	10
3.1.2 INFORMATION SHARING	11
3.1.3 WORKSHOPS.....	11
3.1.4 OTHER TOOLS.....	11
3.2 External dissemination tools	12
3.2.1 PUBLICATIONS AND PRESENTATIONS	12
3.2.2 PRESS RELEASES	14
3.2.3 ALIGNMENT WITH OTHER EUROPEAN PROJECTS	14
3.2.4 EDUCATION AND INNOVATION	15
4 STANDARDIZATION	16



Executive summary

The document describes the plan for using and disseminating the knowledge in the context of the DayTiMe project, through various means including internal and external communication channels, the distribution of dissemination material and participation in dissemination activities. More specifically, the document includes the DayTiMe dissemination strategy, describing the target audience active in digital twins for predictive maintenance and smart services, and the means for communicating with them. Furthermore, the planned and performed dissemination activities are presented, including the participation in conferences and other relevant events and the publications in scientific journals.



1 Introduction

Dissemination is an important element of the DayTiMe project. It will be carefully planned and implemented in order to spread awareness about this ITEA3 labeled project to a wide audience, including its end-users. This will help guarantee an optimal exploitation of the project results and the long-term sustainability of the DayTiMe vision. For this reason, the DayTiMe participants have formulated an initial dissemination plan that describes the objectives and foreseen channels for the dissemination of the knowledge generated by the project.

This plan is in compliance with the DayTiMe full project proposal CR#3¹ (ITEA3 17030), the DayTiMe Project Consortium Agreement², and the ITEA Rules and Regulations version 18, August 2019. This plan will be revised as the need arises and on Month 42 of the project a final report on the dissemination activities will be published (D6.4 Final Dissemination and Standardization Plan).

Table 1: List of DayTiMe Participants

No	Partners	Country
1	Centre for Factories of the Future	GBR
2	Datenna	NLD
3	Eindhoven University of Technology	NLD
4	Havelsan	TUR
5	Mangoda	TUR
6	Philips Electronics Nederland	NLD
7	Philips Consumer Lifestyle	NLD
8	Philips Medical Systems Nederland	NLD
9	PS-Tech	NLD
10	Simeks	TUR
11	Target Holding	NLD
12	Tazi	TUR
13	Triatech	TUR
14	Turkcell	TUR
15	University Groningen	NLD
16	VAS	TUR
17	Yazzoom	BEL

¹ CR#3 is in preparation in parallel to this deliverable.

² PCA is works in progress.

2 Dissemination strategy

2.1 Means of communication

In order for dissemination to be effective, multiple communication channels are used in order to be able to effectively reach the desired target audiences. In this section an impression of the dissemination strategy and results over the M1-M18 period (see Figure 1) will be given while in the remainder of this deliverable a more detailed account will be presented.

One focus of dissemination will be on scientific publications and to address the academic research community. Publications within the area of interest of the project include both technology oriented journals and conferences. Results to be published will naturally tend to fall into one of the two categories, with some overlap between the two in case conference proceedings are published as journal paper.

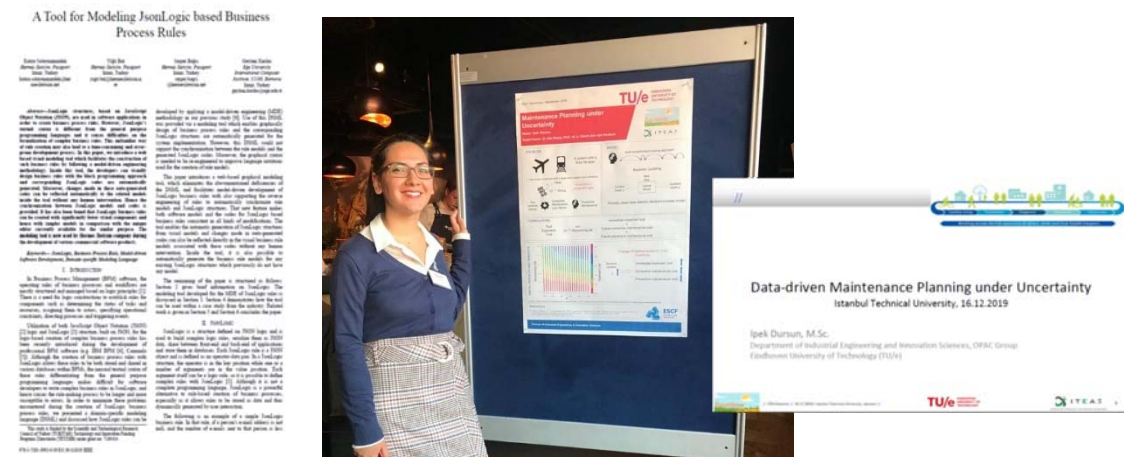


Figure 1: Impressions of external dissemination activities during M1-M18

2.2 Target groups

As mentioned, the communication and dissemination approach of DayTiMe is implemented at different levels. It is based on solid project-level sharing of knowledge and communication patterns and it extends gradually to different target-users groups, from the DayTiMe network to the general lay public. This approach is illustrated in Figure 2.

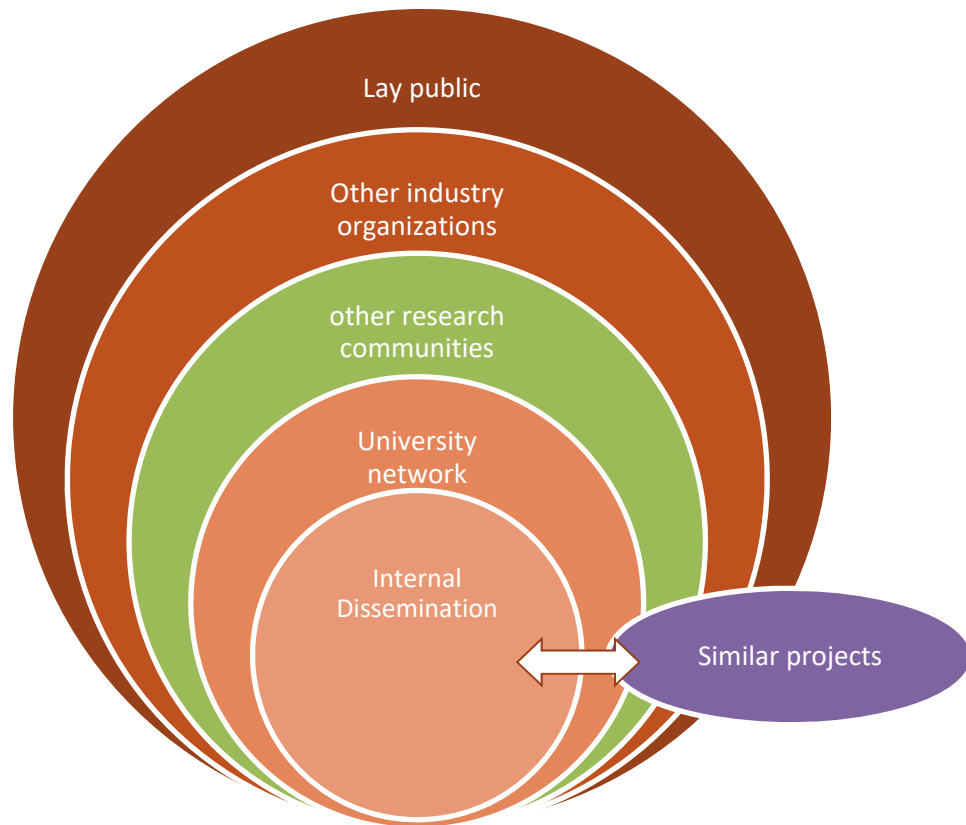


Figure 2: DayTiMe dissemination strategy

Several important target audiences for dissemination activities have been identified; these include academic researchers, manufacturers, maintenance providers, service providers as well as the general public. Different dissemination products are expected to appeal differently to each of these categories, and therefore it is necessary to be aware of what the focus of dissemination is expected to be during the different stages of the project, and how the results to be disseminated are to be best tailored to their target audience.

2.3 Timing

Concerning the timing of our dissemination strategy, three distinct phases of implementation can be identified (Figure 3). Year 1 is considered to be the first 18 Months of DayTiMe (on the total of 42 Months).

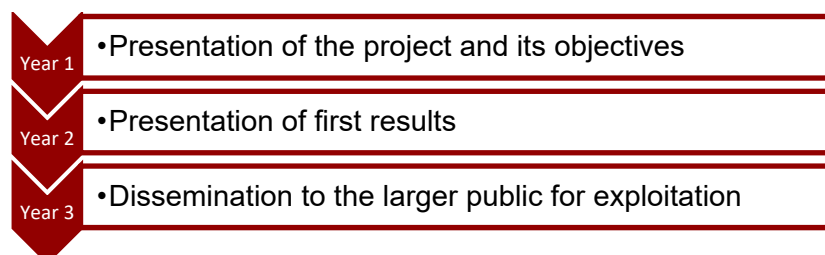


Figure 3: Focus of dissemination activities shifts over time.



Early on, focus will lie on building general awareness among industry and the general public, including potential customers, generating interest by communicating application scenarios that appeal to a broad audience. As the project progresses, focus will also encompass the predictive maintenance, smart services and tools that are being developed.

2.4 Internal dissemination strategy

Continuous and effective internal communication is key to the success of international projects such as DayTiMe. For this reason, internal dissemination is considered as an essential part of the dissemination strategy as a whole, in particular because partners joined to learn from each-other. Internal communication allows to:

- Keep track of project-related decisions and action points;
- Clearly communicate the role and responsibility of each project participant;
- Communicate on WP and demonstrator progress;
- Disseminate the right level of information to project participants;
- Identify problems and provide solutions.

2.5 External dissemination strategy

Much of the effort is aimed at 'external communication' to promote the project, and disseminate results. The major external dissemination objectives are to:

- Effectively use these communication channels to present the DayTiMe project's results;
- Establish links and encourage synergies with similar projects and initiatives;
- Provide the foundation of a comprehensive exploitation strategy.

Details of each dissemination activity/tool are provided in the section 4 ("Dissemination Tools")



3 Dissemination rules

3.1 Presentation and publication guidelines

All Partners will actively contribute to the publication policy, both at own initiative and upon request of other partners, work package leaders and the project managers.

When another partner is mentioned in a publication, written permission shall be requested from this specific partner. If a partner wishes to publish information generated in the DayTiMe project the approval of all partners has to be requested:

- This request shall be made preferably per e-mail;
- Reactions should be sent within 10 days;
- Without reaction permission is automatically granted after 10 days;
- In case of non-unanimous reactions the PM will take the final decision;
- A copy has to be send of the final publication to the project office for central archiving.
- The document will be published on the website until written indication is given that this is not allowed (e.g. due copyright rules from journals). In this case only the reference will be added;

3.2 Graphic identity

This section describes the features that contribute to giving a common graphic identity to all dissemination activities allowing for a better visibility and recognition of the project.

3.2.1 Layout and templates

Common/similar **layouts** are used for DayTiMe dissemination materials. **Templates** for project meeting minutes, deliverables and PowerPoint presentations were made available at the end of Month 2 of the project by the project coordinator, Philips.

3.2.2 Logos

In addition to the DayTiMe project logo the ITEA3 logo should be used when possible (both are shown on the frontpage of this document).

3.3 Compulsory acknowledgements

Any partner in the DayTiMe project will in their dissemination activities clearly acknowledge the ITEA3 Program with reference to the project "DayTiMe" and the grant number 17030.

Preferred reference:

*"This work was labelled by ITEA3 and funded by local authorities under grant agreement
"ITEA-2018-17030-Daytime"
+include link to the project website*

4 Dissemination tools

4.1 Internal dissemination tools

The project coordinator, Philips, together with the respective work package leaders, has put in place a variety of mechanisms to optimize the communication workflow.

4.1.1 Project meetings

As detailed in the DayTiME FPP CR#3, there are several types of project meetings:

- General Assembly meetings taking place at least three times a year;
- Regular project management team meetings;
- Regular work package meetings;
- Technical workshops;
- Additional telephone when needed for day-to-day coordination of the project.

At the moment of writing of this document so far 3 general assembly meetings³ have been organized. An impression of these meetings is given in Figure 4. Figure 1The General assembly meetings serve to update each other on project results, and to align the activities for the next period.



Figure 4: Impression from General Assemblies

³ Due to lack of national funding the first two assemblies were incomplete.

4.1.2 Information sharing

DayTime consortium members use a file sharing and storage system to safely share project information, presentations and even photos. A link is given on the public website. Access is shielded by a user code and password. The user-friendly file transfer environment is structured around Documents (frozen) and Workspace (works in progress). The Documents section contains o.a. the current project plan and approved deliverables. Within the Workspace section different work packages (WPs) each have their own space.

4.1.3 Workshops

In addition to the general assemblies two smaller workshops were held (see Figure 5), one with Dutch and funded Turkish partners and one with Belgium and Dutch partners.



Figure 5 Impression from workshops

Furthermore bilateral workshops have been held. An impression is given in Figure 6.



Figure 6: Impression from bilateral workshops (left: PS-Tech at Philips; right: Yazzoom at Philips)

4.1.4 Other Tools

Other internal communication tools include mailing lists (participant, WP and at the consortium levels), internal staff meeting and meeting minutes, web conferencing etc.



4.2 External dissemination tools

External dissemination designates actions aiming at ensuring the visibility and awareness of the results outside the Consortium borders, i.e., in the scientific community, in academic institutions, in other research organizations, or among the lay public. These tools include:

4.2.1 Project Public Website

The DayTiMe public website presents general project information, participant information, downloadable publications and deliverables . Furthermore, it informs viewers about previous and forthcoming events and activities of the project as well as of other relevant projects and collaborations. Additional features can be added as needed.

Philips Healthcare (NLD) initially designed the website of DayTiMe, but this will shift to a new design by Mangoda (TUR). The website will be updated on a continual basis by Mangoda who as the WP6.1 leader is responsible for the website content until end of the project. Other DayTiMe participants' contributions will be requested throughout the project.

Link to the DayTiMe public website:

<https://daytime-project.weebly.com/> (temporary)

<http://daytimetr.com/> (new, works-in-progress)

Home Events Dissemination Contact DayTime-Turkey Members



Digital Lifecycle Twins for predictive maintenance

Industry 4.0 describes an important technological advancement driving automation and data exchange in the manufacturing environment to provide smart production with its efficiency improvements, while setting the requirements and needs for necessary and essential tools to specifically enable the change. In smart production, improvements and adjustments to the production processes can be achieved with effective Internet of Things (IoT) tools that analyse and manage the sensor-collected data using Predictive Maintenance (PdM) techniques. PdM is a right-on-time maintenance strategy designed to determine the condition of in-service equipment to help predicting and deciding when maintenance actions should be performed. Maintenance tasks are performed only when warranted, leading to cost savings over routine or time-based preventive maintenance.

/ Data acquisition
/ Data analysis
/ Digital twin models
/ Smart services

DayTime

[Anasayfa](#) [DayTime Hakkında](#) [Konsorsiyum](#) [Etkinlikler](#) [Duyurular](#) [İletişim](#)

DayTime Hakkında



The concept of digital twin can provide solutions for the challenges faced in Smart Manufacturing, e.g. for Predictive Maintenance (PdM) techniques. Even though predictive maintenance and digital twins expected to have a high impact on future smart manufacturing and engineering, there are still very few functioning examples of digital twins being used for predictive maintenance in actual industrial practice. It is the gap DayTiMe is about to fill, integrating findings and solutions from 14 industrial use cases and using a generic value chain model.

Konsorsiyum

Figure 7: Initial (temporary) and final DayTiMe (WIP) public website

4.2.2 Publications and presentations

DayTiMe project results will be submitted for publication in scientific journals, conferences, and workshops. The submission of papers jointly written by project participants is encouraged.

Given the diversity of use cases and tools being addressed in DayTiMe, a wide variety of national and international journals, conferences and workshops can be targeted to disseminate DayTiMe results. The selection of a certain dissemination platforms will, apart from the topic, also depend on the timing. Not all conferences are held every year, and also the timing within the year may vary.

Journals targeted by DayTiMe include:

- ACS Applied Materials and Interfaces
- Applied Materials Today
- Applied Soft Computing
- European Journal of Operations Research
- IEEE Computer Society
- IEEE Industrial Applications
- IEEE Industrial Informatics
- IEEE Sensors Journal
- Industry 4.0
- Information Fusion
- International Journal of Advanced Manufacturing Technology
- International Journal of Data Science and Analytics
- Journal of Manufacturing Technology Management



- Operations Research
- Manufacturing and Service Operations Management
- Mechanical Systems and Signal Processing
- Reliability Engineering and System Safety

Conferences:

- BNAIC/BENELEARN The reference AI & ML conference for Belgium, Netherlands & Luxemburg
- Data Science Summit
- European Alliance Summit
- European Safety and Reliability Conference (ESREL)
- European Supply Chain Forum
- IEEE MEMS Conference
- IEEE NEMS Conference
- IEEE Sensors Conference
- IMA International Conference on Modelling in Industrial Maintenance and Reliability (MIMAR)
- International Conference in Manufacturing Research(ICMR)
- International Conference on Product-Focused Software Process Improvement (PROFES)
- International Conference on Software Engineering (ICSE)
- International Conference on Sustainable Design and Manufacturing (KES International)
- International Symposium on Empirical Software Engineering and Measurement (ESEM)
- Probabilistic Safety Assessment and Management Conference (PSAM)
- Production and Operations Management Society Conference (POMS)
- Reliability and Maintainability Symposium
- The association of European Operational Research Societies Conferences (EURO Conferences)
- The Institute for Operations Research and the Management Sciences Conference (INFORMS)
- VR Days Europe

4.2.3 Press releases and social media

Press releases will be organized on an ad hoc base to disseminate special milestones and/or project results. Very often media coverage cannot be orchestrated but “happens” as a result related dissemination activities.

Social media gives more control over dissemination timing. Mangoda will establish and maintain a LinkedIn account for DayTiMe.

4.2.4 Alignment with other European Projects

DayTiMe builds on the results of the ECSEL Mantis project and the ITEA3 REFLEXION project. Close contacts are maintained with the ITEA3 IVVES project which focusses on verification and validation of artificial intelligence algorithms in evolving systems. Other links exist with the ECSEL ArrowHead Tools project which in turn has a close cooperation with ECSEL Productive 4.0.

4.2.5 Education and Innovation

Educating young scientists and involving them in innovation is an important aspect of the DayTiMe project. DayTiMe is actively involved in graduation assignments for M.Sc. and Ph.D. students which (partially) take place at industrial partner premises.

Several partners also employ company internal means to educate colleagues in the activities and results of the DayTiMe project (see Figure 8).



Figure 8: Impression of partner internal dissemination activities (Philips Healthcare, October 2019)



5 Standardization

5.1 Compliance with existing standards

Obviously the demonstrators and products to be developed in DayTiMe to comply with the existing international standards in particular regarding the devices in the use cases and the tools in the integrated tool kit. Some of the most important standards are listed in Table 2 below.

Table 2 Standards most relevant for the DayTiMe use cases and the integrated tool kit

Standard	Description
CRISP-DM	Cross Industry Standard Process for Data Mining ⁴
ISO 27001	Information Security
ISO 31000	Risk Management
ISO 13485:2016	Medical devices - Quality management systems - Requirements for regulatory purposes
IEC60601-1	Medical electrical equipment - Part 1: General requirements for basic safety and essential performance
IEC60601-1-33	Medical electrical equipment - Part 2-33: Particular requirements for the basic safety and essential performance of magnetic resonance equipment for medical diagnosis
IEC 60335-1	Household and similar electrical appliances - Safety - Part 1: General requirements
IEC 60335-2-8	Household and similar electrical appliances - Safety - Part 2-8: Particular requirements for shavers, hair clippers and similar appliances
IEC 62304	Medical device software

Apart from this, medical devices have to be approved by national and international regulatory agencies. In Europe this includes the CE Marking for medical devices while in the US the stringent FDA approval is required.

The healthcare OEM's owning the demonstrators in DayTiMe are long standing manufacturers of medical devices. They are all very aware and familiar with the regulations concerning the manufacturing of these devices and all have extensive experience in the procedures and steps required to get devices approved by the regulatory agencies.

5.2 Setting standards in DayTiMe

In a number of cases the innovations developed by DayTiMe have the potential to be used as reference for setting new standards. For this purpose C4FF will review the consortium technical papers and extract which elements need to be standardised and which need recognition from the relevant EU standards committees. In addition, C4FF will produce a paper based on what has been, or will be written for publication, prior to approaching the EU standardization bodies, which may include appropriate UK engineering institutions with royal charter. C4FF is also willing to seek quality standards recognition, if this is seen as an appropriate outcome.

⁴ C. Shearer, "The CRISP-DM model: the new blueprint for data mining," J Data Warehousing , vol. 5, pp. 13-22, 2000



A good example is the integrated tool kit, where in addition to C4FF, the DayTiMe Work package leader, Target Holding, participates in the dutch NEN standards committee “Artificial Intelligence and Big Data” as one of the initial partners, establishing national norms and contributing to the international ISO standardization work within SC 42 Artificial Intelligence.