COGITO

D9.7 – COGITO Living Lab Activities Evaluation Report v2

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Authors

Name	Beneficiary	Email
Agnieszka Mikołajczyk	ASM	a.mikolajczyk@asm-poland.com.pl

Reviewers

Name	Beneficiary	Email
Georgios Lilis	UCL	g.lilis@ucl.ac.uk
Jochen Teizer	DTU	teizerj@byg.dtu.dk

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Executive Summary

This report is a summary of the main Living Lab activities performed in the COGITO project between M12 and M24. This document presents the approach and results of the webinar dedicated to external project's stakeholders who will be direct users of COGITO's solutions not only in pilot sites located in Denmark and Spain, but also in other European countries. Not only the organizational issues are covered, but more importantly - also the outcomes of the meeting supported by the results of four polls conducted during the online webinar.

In the first part of the report, the description of workshops' organisational aspects is provided – dates, places, hosts, and participants. Moreover, the recruitment process and recruitment tools (e.g. e-mail invitations, presentation and videos) are mentioned.

The report recalls the main objective of the Living Lab webinar – to present the most matured COGITO tools, raise awareness about goals, objectives, and innovations, arouse commitment and acceptance of pilot site occupants and stakeholders. The document also lists the elements that were briefly presented to the gathered audience: COGITO goals and innovations to be delivered, project tools with its practical approach, possibilities to follow COGITO project's news and start the cooperation in the future. Means used by the workshops organisers to better illustrate the project scope are also mentioned in this report, e.g. presentation, videos, polls, cooperation with BUILD UP portal.

The core part of the report is the presentation of the webinar outcomes collected from the participants via polls. In general, the webinar was co-organised by COGITO representatives and BUILD UP portal.

The webinar reported in the document was planned as the 2nd round of the Living Lab workshops and took place on 4th October 2022. The first round of workshops took place in April and May 2021.

Table of contents

COnstruction phase
diGItal Twin mOdel

List of Figures

List of Tables

COnstruction phase
diGItal Twin mOdel

List of Acronyms

Term	Description
BUILDUP	The European Portal for Energy Efficiency in Buildings
COGITO	Construction Phase diGItal Twin mOdel
D	Deliverable
D&C	Dissemination & Communication
DCP	Dissemination and Communication Plan
DEM	Dissemination and Exploitation Manager
D9.1	Deliverable 9.1 COGITO branding, website and social media channels
D9.2	COGITO dissemination and communication plan and associated material report v1
D9.3	COGITO dissemination and communication plan and associated material report v2
D9.4	COGITO dissemination and communication plan and associated material report v3
ECTP	The European Construction, built environment and energy efficient building Technology Platform
ESCO	Energy Service Company
GDPR	General Data Protection Regulation
HS	Health & Safety
ICT	Information and Communication Technologies
KPI	Key Performance Indicators
LL	Living Labs
M	Month
QA	Quality Assurance
QC	Quality Control
SR	Stakeholders Requirements
T	Task
WP	Work Package

1   Introduction

1.1   Scope and objectives of the deliverable

This report is the second of three Living Lab activities Evaluation Reports, where the overall framework of the COGITO Living Lab implementation is described.

The last D9.6 version of the Living Lab Activities Evaluation Report presented the first round of workshop which was dedicated mostly to FER and RSRG employees who are the direct beneficiaries of the COGITO solution. The idea of that workshops was to collect requirements for the tools we were about to develop at that phase of the project. We could gather a wide audience from both Living Labs; however, it was a challenge to reach external stakeholders. This time we decided to show our practical approach to digital twin in the construction sector. The content of the webinar was consisted of overall presentation of COGITO project goals, objectives and innovations, and presentations of 3 most matured COGITO tools. We also decided to focus on external stakeholders. To reach that we have organized the webinar with BUILD UP portal. It supported us in dissemination activities, spreading the information at the European level.

ASM being the leader of WP9 is in charge of Living Labs activities coordination and dissemination of these activities.

This report presents the summary of the main Living Lab activities performed in the second round of the COGITO workshops and will be updated in M36.

1.2   Relation to other tasks and deliverables

The D9.7 Living Lab Activities Evaluation Report v2 report is being prepared in relation to D9.2, D9.3 and D9.4 deliverables which are the consecutive versions of COGITO dissemination and communication plan and associated material report. The Living Lab workshops are part of the dissemination activities. The aim in this area is to raise awareness and engagements of particular target groups into COGITO's solutions development: Construction Project/H&S/QA Managers and construction companies, construction site labour, technological platforms, professional associations and initiatives, and general public. They will be effectively reached through a variety of communication channels and the utilisation of a wide range of dissemination instruments upon the end of the project's life cycle and beyond it. Furthermore, the second round of workshops was also an exercise to check if the tools are known for the audience, if it answers the needs of chosen target groups, and if it will find final clients on the market after projects' end.

1.3   Structure of the deliverable

This deliverable presents current, holistic Living Lab approach to target groups, especially external stakeholders, course of the webinar, and results of conducted polls. It also provides a whole overview of the strategy and specific tools implemented to reach the expected outcomes in the reporting period and in the following months. The first part of the document presents the objectives and the strategy followed during the reporting period. The second, and last, section focuses on the webinar description, results, and further steps to improve already undertaken actions.

2   Living Lab Action Plan regarding the second round of workshops

Living Lab Action Plan (presented in D9.6) was established at the beginning of the project to schedule particular activities like collecting mailing lists, setting up the database, preparing dissemination materials, planning follow-up activities, etc. We have planned exact dates for each activity, responsibilities, measurements and described targets. The Living Lab Action Plan as a solid document was distributed to Living Lab Managers and discussed during the meetings. According to the detailed schedule following actions were undertaken:

● Several online meetings with ASM, HYPERTECH, FERROVIAL, RSRG, UEDIN, CERTH representatives to verify goals of the second round of LL workshops, set up the agenda, choose the speakers and content format, develop the mailing list of potentially interested external stakeholders, and discuss all organizational issues.
● Developing dissemination materials: banner for online publications, article presenting the webinar description, goals, and agenda (posted on COGITO website, BUILD UP portal, ECTP Newsletter, ECTP calendar, COGITO social media channels, COGITO Partners' social media channels, COGITO Partners' Newsletters), COGITO webinar's presentation.
● Establishing cooperation with BUILD UP portal to reach wider audience and support dissemination activities by:
    o creating the landing page for registration purposes,
    o posting the article where the description of COGITO project, agenda, and speakers are presented,
    o coordination of all needed dissemination and content materials delivery,
    o setting up the rehearsal meetings for GoToWebinar platform tools testing,
    o posting the article summing up the webinar course,
    o gathering all needed materials and data after the webinar: statistics, the webinar recording.
● Undertaking follow-up actions: posting all dissemination materials relevant for the webinar on COGITO's website, social media channels, sending information about the webinar recording available on BUILD UP and COGITO YouTube channels to Ferrovial and RSRG's business mailing lists (consisted of interested in the project's solution internal and external stakeholders).

Dissemination activities towards Living Labs were also planned and included in **D9.2**, the updated version – **D9.3, and D9.4**:

● posts publication in social media and project website (publication of materials, recruitment, webinar announcement and feedback, etc.)
● publication of articles,
● information exchange with other EU projects and initiatives during conferences and personal meetings, e. g. ASHVIN, BIMprove, BIM2TWIN, SPHERE, BIM4EEB, BIMERR, Building Digital Twin Association (BDTA) .

3   COGITO Living Lab Activities

During the reported period we were analysing which tools were more mature to be presented in a wider audience through a webinar. Based on that analysis, we decided to present a bundle of the tools, involved in the Quality Control digital twin applications, and include the Visual Data Pre-Processing module, the Geometric and Visual Quality Control services, and the onsite and offsite data visualisation solution, i.e., DigiTAR and DCC, respectively. The event (webinar) was organized in line with the COGITO Living Lab Activities Plan schedule, reaching the targeted audience, described in section 3.1. The webinar included the following items:

● an introduction session, presenting not only Living Lab concept, but also goals and innovations of COGITO project;
● the main workshop's presentations, describing the abovementioned tools, their features and usage;
● a Q&A session during which participants could ask questions to the presenters in the chat box;
● an evaluation questionnaire consisted of 2 questions displayed and voted at the end of the webinar.

In D9.6 we had planned to organize that workshop in June 2022, however, due to the tools' development phase, holidays, and intensive conference period, we decided to move the date of the webinar to 4th October 2022.

3.1   Target groups

COGITO target groups have been thoroughly described in D9.6. While preparing the webinar content we have decided to focus on:

● Construction Project/H&S/QA Managers,
● Construction companies,
● Construction site labour,
● Technological Platforms and Professional Associations and Initiatives.

All of these groups are closely related to the construction sector and have a direct or indirect influence on what tools are used in the construction site to improve working conditions. Consortium members have already collected e-mail addresses of potential stakeholders connected with their professional network. RSRG and Ferrovial verified their mailing list which were established for the first round of workshops purposes to extend them with external stakeholders like: construction companies, associations and constructions clusters in Denmark and Spain. International network consisted of Technological Platforms, Professional Associations and Initiatives, Scientific Community, and Construction Companies is established by COGITO's Partners to expand the list of contacts.

On the other hand, The BUILD UP web portal also targets professionals working in the building sector (public or private) with an interest on the latest developments at technical or practice level, policy legislation, and financial issues. Having in mind we both have the same actors on the construction market as a target, we decided to organize the webinar jointly. The benefits coming out of this cooperation are mutual. We could extend the list of external stakeholders reached by BUILD UP portal, and the BUILD UP portal could raise awareness about their activities among our business partners and cooperating construction associations.

4 Organisation of COGITO Living Labs

4.1 Roles and responsibilities

ASM as a Dissemination and Exploitation Manager (DEM) is responsible for the Living Labs activities planning and coordination, while its execution responsibility belongs to the Living Lab Managers: FER and RSRG. During the reporting period Hypertech, UEDIN and CERTH were also involved to present the tools chosen to enrich the webinar content.

All activities are discussed with Hypertech – Project Coordinator and Partners involved in each round of workshops.

4.2 Living Lab activities schedule

Table 1 below presents the overview of Living Lab activities schedule that were planned to be implemented within the project. Regarding the updated approach, we have decided to reschedule the workshops/webinars as presented in the Table2. Each event will be devoted to external stakeholders and involved into business plan for the COGITO project. The content will present project tools and innovations. All events will be recorded and promoted on different European portals and its social media channels to cover not only regional market of Denmark and Spain, but also other European markets.

Channel	Objective of the dissemination	Type of audience	Measurement	Schedule/frequency/update
Workshops	To raise awareness, engagement and acceptance of pilot site occupants and stakeholders; to involve end users in the requirements definition; to train users and contribute to the adoption of the COGITO concept and operation in the pilot sites; to involve all stakeholders in the evaluation of COGITO results	Construction Project/H&S/ QA Managers Stakeholders Construction site labour	8 workshops organised within Living Labs activities	2 workshops by M12, 4 workshops by M24, 2 workshops by M36

Table 1 Living Lab activities schedule valid until M12

Channel	Objective of the dissemination	Type of audience	Measurement	Schedule/frequency/update
Workshops	To raise awareness, engagement and acceptance of pilot site occupants and stakeholders; to involve end users in the requirements definition; to train users and contribute to the adoption of the COGITO concept and operation in the pilot sites; to involve all stakeholders in the evaluation of COGITO results	Construction Project/H&S/ QA Managers Stakeholders Construction site labour	8 workshops organised within Living Labs activities	2 workshops by M12, 1 workshops by M24, 2 workshops by M26, 2 workshops by M32, 1 workshop by M36

Table 2 Living Lab activities schedule M12-M36

4.3   Key Performance Indicators

A set of Key Performance Indicators (KPIs) has been defined to measure the efficiency and effectiveness of the Living Lab activities. It is worth to mention that the invitation to the workshop and link to the article and the recording published after the webinar was to 107 business contacts of Ferrovial and RSRG. The statistics included into the KPIs showed the following numbers:

- Attendees: 21
- Registrants: 33
- Attendance rate: 64%

The recording of the webinar was watched by 56 users of BUILDUP and COGITO YouTube channels. The table below summarises desired overall targets of KPI achievement at the end of the project's duration, and the current status in M24:

Activity name	KPI	Target number in total	Status in M24
Living Lab activities	Number of organised workshops/trainings/meetings	8	3
	Number of participants to the workshops	400	89
	Number of follow-up activities resulting from the workshops	4	2
	Number of direct participant (occupants) targeted: ● Spain ● Denmark ● Other European countries	120: 60 60	89 33 35 21
	Number of indirect participants (consumers) targeted ● Spain ● Denmark	280: 140 140	107 27 80

Table 3 Key Performance Indicators

The KPI evaluation is an ongoing activity, monitored constantly before and after every workshop. Effectiveness and progresses are assessed, and, if needed, relevant changes are implemented in order to achieve the planned results. Every 6 months, during the GA meetings, all partners are informed about current status of KPI's performance and about the planned actions to fulfil the initial commitment in terms of expected goals. Actual status of KPIs shows where we need to focus to reach all target goals. The dissemination action plan developed for the next 12 months according to these data is the following:

- increase the number of indirect participants;
- disseminate information and promotional materials regarding the remaining 5 rounds of workshops;
- include the results of the 2nd round of workshops into the 2nd issue of COGITO Newsletter planned to be sent in M25;
- promote the idea of Living Lab workshops among sister-projects;
- include information about Living Labs into the COGITO brochures/leaflets and other dissemination materials; and
- promote Living Lab activities via press releases.

4.4   Risk and COVID impact

Regarding the risks and COVD-19 impact, we are still facing difficulties in organizing events such as LL workshops on site as there is still epidemic danger. Communication platforms offer nowadays a wide range of tools which support the organizers in preparing audio-visual, multidimensional events, however it still requires a larger amount of effort to prepare all materials which will have relevant quality to display it on the screen. It can affect the clear understanding of COGITO's expected outcomes and cause less interest in the developed tools.

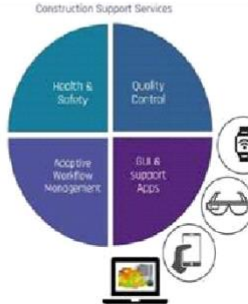## 5   COGITO's 2nd round of workshops

Figure 1 COGITO's Living Lab webinar banner

In the first phase of the second round of workshops organization, Consortium Partners met during several online meetings and a physical general assembly meeting in Denmark to establish the target groups, agenda, presentation content and the best form and platform to conduct the event. It was decided to organise a one-hour webinar in cooperation with BUILDUP portal to reach wider audience at the European level.

Figure 2 Living Lab e-mail invitation by Ferrovial

In the second phase, we sent the invitation to Ferrovial (see Figure 2) and RSRG business mailing lists consisted of potential internal and external stakeholders (e.g. Building SMART International, Building SMART Spanish Chapter, Acciona, Bexel, AEC-ON, IDESIE, Blogic, Autodesk, Dalux, Züblin – BuildingSMART). The invitation was also published on Partners' intranet.

In the third phase, the landing page for registration and article on BUILDUP portal were published, where all details were available. Dissemination activities were undertaken to promote the webinar were conducted by ASM, COGITO Consortium Partners and BUILDUP portal:

- The article was posted on COGITO website, BUILDUP portal, ECTP portal, ECTP Newsletter
- The COGITO's Living Lab banner was designed (see Figure 1)
- The Social media campaign, providing news and promoting registrations, was conducted 1 month before the webinar
- Invitatios were sent via COGITO's Partners business mailing list

The target, leaders and agenda of the webinar are listed below:

- **Target**
  Construction Project/H&S/QA Managers and Construction companies, Construction site labour, Technological Platforms and Professional Associations and Initiatives.

- **Leaders**
  Hypertech (Hypertech)
  University of Edinburgh (UEDIN)
  The Information Technologies Institute (CERTH)

- **Agenda (60 minutes)**
  11:00-11:05 Introduction – COGITO project innovations and goals (Hypertech)
  11:05-11:10 What is your experience with DIGITAL TWIN (short poll)?
  11:10-11:20 Data Acquisition: Visual Data Pre-Processing for contributing visual data (2D and 3) to the project Digital Twin (CERTH)
  11:20-11:30 Quality Control: GeometricQC for automatically control geometric quality against defined specifications (UEDIN) & VisualQC for automatically detecting defects in pictures acquired on site (CERTH)
  11:30-11:40 Visualisation: DigitAR for on-site Augmented Reality-based Digital Twin information visualisation and decision making (CERTH) & Digital Command Centre (DCC) for offline Digital Twin information visualisation (Hypertech)
  11:40-11:50 Q&A session
  11:50-11:53 Will the tools answer your needs (short poll)?
  11:53-12:00 Wrap up & conclusions

In the last phase of the second Living Lab round of workshops, all data and statistics were collected, the article on workshop course was published linking to the recording available on BUILDUP portal YouTube channel. All dissemination materials such as 3 videos, presentation and the workshop recording were also published on the project's website and YouTube channel with relevant descriptions of all presented tools.
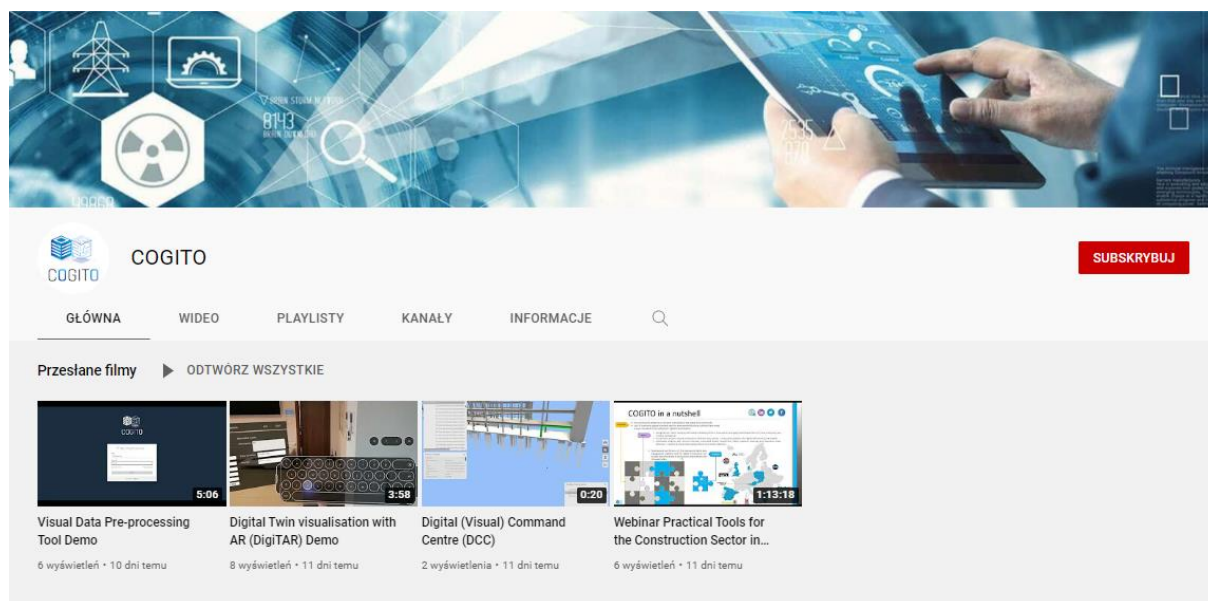
Figure 3 COGITO's YouTube channel

5.1 Workshops course

On the 4th of October, BUILD UP hosted the webinar "Practical Tools for the Construction Sector in Digital Twin", targeting mainly Construction Project/QA Managers and Construction companies, Construction site labour, Technological Platforms and Professional Associations and Initiatives, interested in Digital Twin and current practical solutions in that area. During this session, the learning outcomes and progress that COGITO has made were presented, and the opinions of the audience about this topic through different polls were collected.

Figure 4 COGITO Living Lab workshop presentation

Moderated by Agnieszka Mikołajczyk, from ASM Research Solutions Strategy, the session addressed one of the COGITO project's challenges: Towards minimising construction project time/cost overruns and alleviate

workplace accidents, COGITO targets to a semantic and pragmatic alignment between novel data capture techniques and delivery of value-adding end-user services.

To face it, the project introduces a real-time digital representation (twin) of a construction project, using methods to ensure interoperability among the different components and technologies constituting the digital twin ecosystem.

Giorgos Giannakis, from Hypertech, was the first one to take the floor to say that "the construction phase has so far been overlooked by the Digital Twin community, and the lack of commonly agreed standards and low interoperability among collected data reveal a major drawback to the enterprises' digital transformation". On the other hand, he brought some light to the solution: the development and delivery of (1) a transparent digital data management platform and (2) digital Construction 4.0 toolbox that contributes to productivity improvement and increased safety.

After this presentation, Thanos Tsakiris, from the Information Technologies Institute, talked about the Visual Data Pre-processing Tool and highlighted the steps that the tool needs to follow:

1. Select a construction project
2. View the on-going work orders
3. Upload the necessary files
4. Send the files to the DTP (the Digital Twin Platform will provide the necessary data to the appropriate Quality Control Tool).

In third place, it was the time to speak about Geometric Quality Control, conducted by Martin Bueno Esposito, Research Associate in Civil and Environment Engineering for the School of Engineering at University of Edinburgh. An important part of his intervention revolved around this question: "Which QC rules are passed, failed, not controlled? And why?".

Thereafter, Tsakiris took the floor again to explain the functioning of two of the tools that are currently in place: Visual Quality Control (for automated defects detection in pictures acquired on site) and DigiTAR (on-site Augmented Reality-based Digital Twin information visualisation and decision making).

Giannakis was the speaker in charge of closing these presentations, talking about the Digital Command Centre – DCC (off-site Digital Twin information visualisation). In addition, the audience was asked about their knowledge of all the topics discussed in the webinar and how they would like to be involved in the COGITO project.

At the end of the session, a Q&A space was opened where the panellists responded to questions raised by the audience.

5.2   Important results

During the webinar 4 polls were displayed to gather specific information about the audience. Our goal was to identify what kind of background our participants have, what is the level of knowledge about digital twin, what is the context in which they recognize digital twin, and if they are interested in implementing COGITO tools into their practice as well as if they want to join the remaining 5 workshops, we would like to organize during the following year of project duration.

Figure 5 1# Living Lab webinar poll

The first poll indicated that the webinar participants know the concept of digital twin (74%) what a very good news was as we knew the presentation will be interesting in terms of the topic. 16% of respondents answered they already know of implementation tool and 11% answered they have a practical experience with digital twin. It means that tools presented during the event could be considered as a product needed in the future depends on the innovation and unique selling proposition.
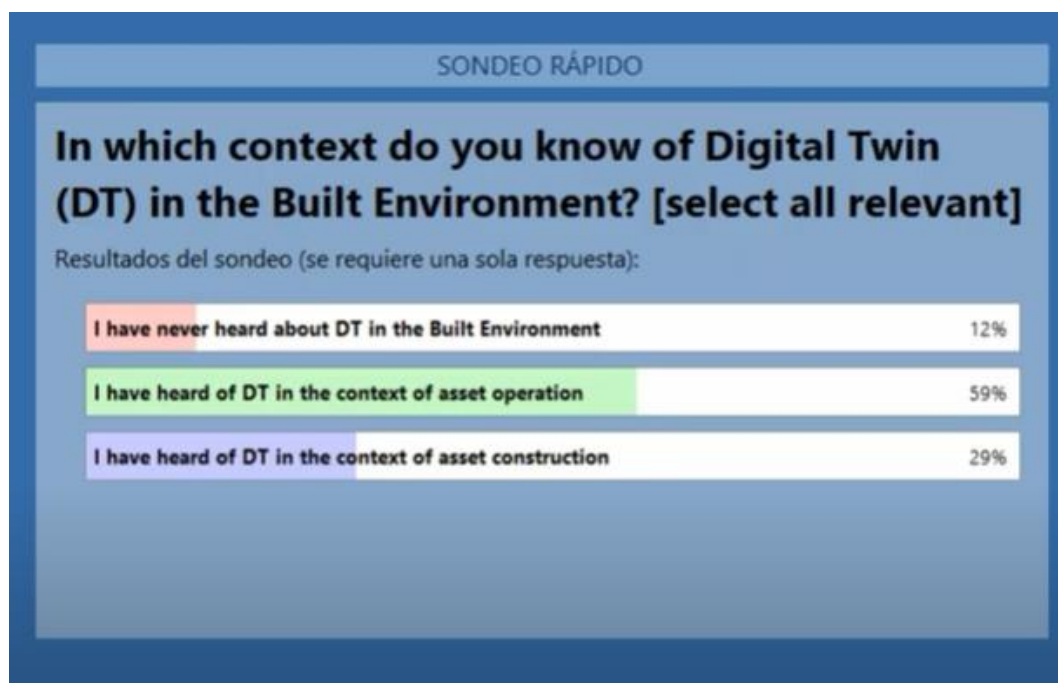

Figure 6 2# Living Lab webinar poll

Most of the audience answered they have heard of DT in the context of asset operation and 29% claimed they've heard about it in the context of asset construction. The answers prove that webinar listeners have a deep knowledge of DT regarding construction sector, which allows the lecturers to discuss issues in detail,

especially technical ones. It also shows that they think that DT is an evolving concept following the construction from its conception to its final implementation.
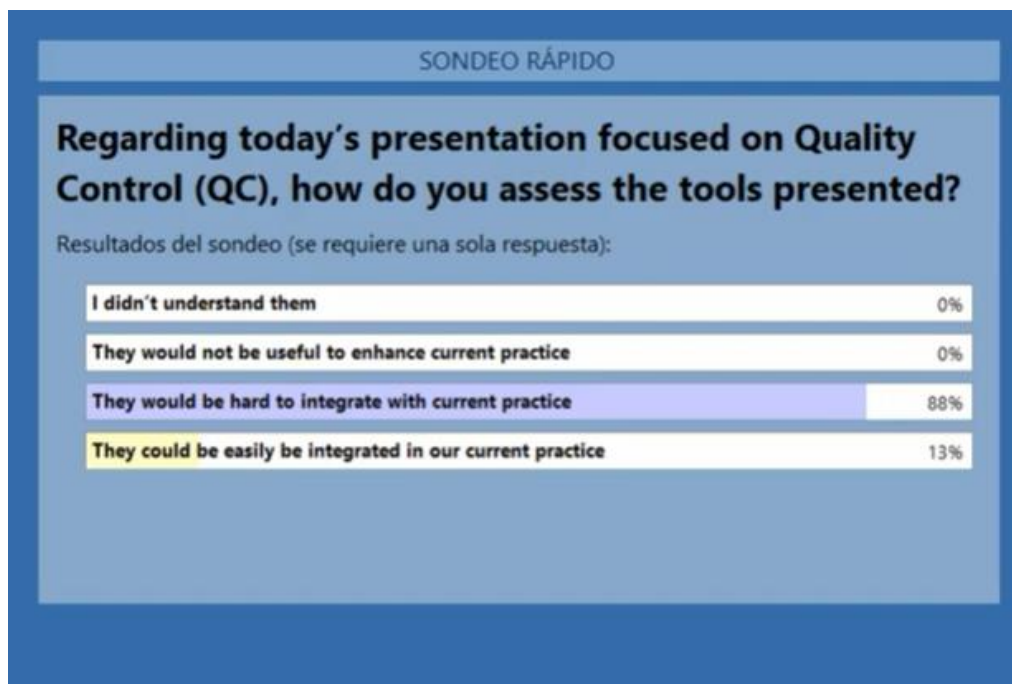

Figure 7 3# Living Lab webinar poll

What was very important for us in terms of business aspects was the question about presented tools assessment. 88% of respondents answered it would be hard to integrate with current practice. This information leads us to organize further discussions about the integration of each tool with daily work process. This answer may also reveal the low level of open BIM data adoption for data exchange and collaboration.
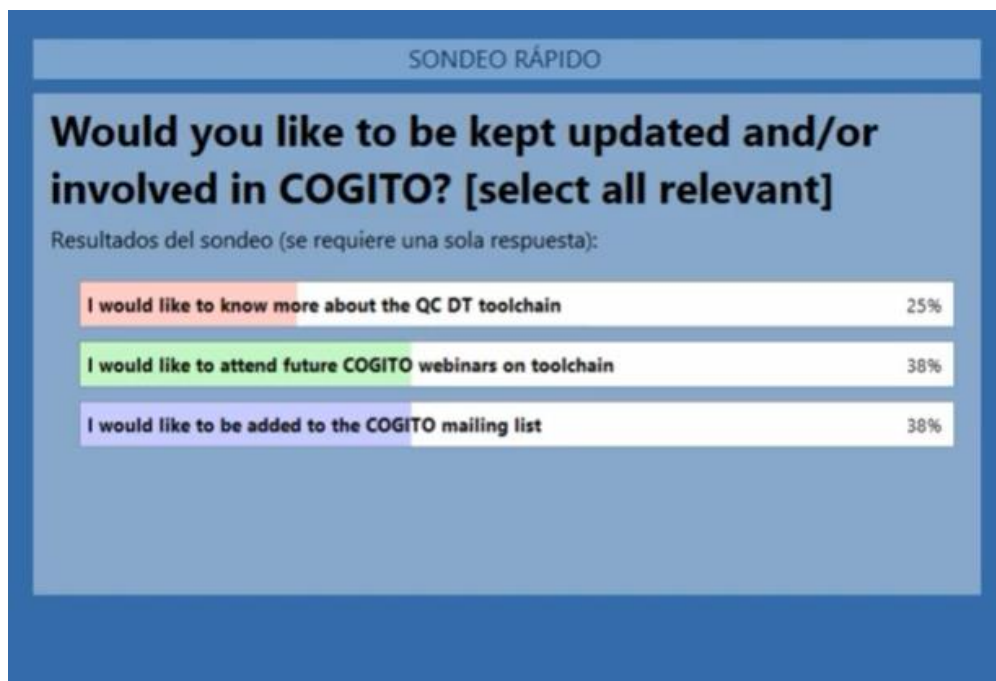

Figure 8 4# Living Lab webinar poll

Regarding the following COGITO's activities we have gathered the feedback in the end of the webinar that 38% of participants would like to attend future COGITO webinars and would like to be added to the mailing list. Also 25% would like to know more about QC DT toolchain.

6   Conclusions

In the reporting period between M12 and M24 Living Lab activities were focused on reaching external stakeholders in the first place, presenting most mature tools, and our practical approach, having in mind that the audience is consisted of potential future clients. The business aspects of presenting COGITO tools and gathering feedback from the Living Lab workshops participants, are very important for further tools developments and finally for entering the European market with tested and assessed product by its users in the first place.

It was still not that easy to gather as big audience as it was planned, however the concept of several workshops in the form of webinars is expected by our audience. It will build a consistent series of events which is easier to remember as a 'COGITO's practical tools in Digital Twin for the construction sector' than a separated workshops with different titles.

We also plan to disseminate the articles about the series of LL workshops regionally and internationally sending the press releases to different platforms publishing information about constructions sector, devoted to its innovations, especially in terms of Digital Twin.

The results of the polls brought us important information not only about the feedback and knowledge of the webinar attendees but also about the need of COGITO tools and possible difficulties to integrate them with their current practice. It was also good to receive positive feedback on the webinar content and the will to take a part in the following 5 LL workshops.

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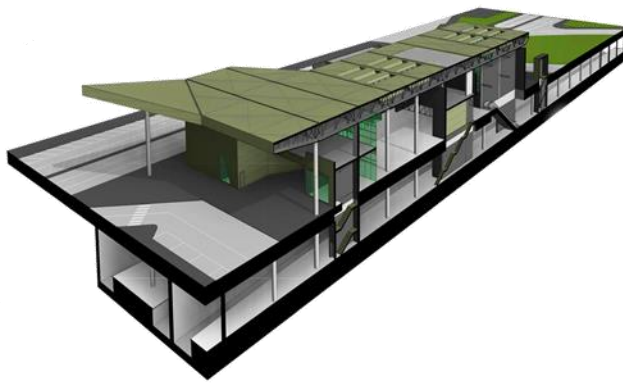
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CONSTRUCTION PHASE DIGITAL TWIN MODEL

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