WP9 – Dissemination, Exploitation and Communication

D9.10 – MERGING Workshop

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Summary

A final seminar titled “MERGING Final Public Workshop” has been organized at CEA premises (and webcasted) during the last month of the project. The aim was to gather all stakeholders from several sectors (industry, education, standardization bodies, etc.), to present the Merging project main results and expected gains for the deployment into the targeted markets and to provide a faster acceptance and integration of these results in the industrial value chain. In this report, the organization of the workshop is initially detailed. A complete program of the workshop is presented, with the reasoning behind each activity. All the activities that took place during the workshop are summarised in this deliverable.

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1. Context

The objective of this deliverable is to describe the organization and setting-up a workshop to present the various developments of different technical building blocks in the context of MERGING project. A part of this organization was drafted in the training plan (D9.8), with a tentative agenda and first proposals.

2. Organisation

2.1. Preparation

Several meetings have been organized between the coordinator (CEA), workshop leading partner (IPC) and the whole consortium, aiming to precise the content of this workshop and select date and location. This resulted in finalising the venue of the workshop at CEA Nano-Innov facilities at Palaiseau (Paris region) on October 17, 2023. The selection criteria were mostly based on the ease of access from European countries and the training demonstrations feasibility.

The workshop was organized in 4 technical sessions and one round table as follows:

- Session 1: Overall introduction to the MERGING project and the workshop's objectives
- Session 2: Building blocks developed in MERGING to solve soft-materials manipulation challenges
- Session 3: Integration and validation at the end-user's premises
- Round table
- Session 4: Tutorials on building blocks (2 parallel sessions)

The technical sessions and the round table topics are detailed in section 3.

2.2. Registration tool developed

A registration form was generated by IPC's communication team where the participants had access to the program of the workshop (https://offres.ct-ipc.com/fr/workshopmerging). The form collected the professional details such as their name, type of firm and their contact (see Figure 1). This form ensured to follow up the participants for providing them the information on transport and other arrangements. The data collected is strictly confidential and has been only used for the dissemination of workshop details for attendees.

2.3. Communication

The event details were widely broadcasted via the following professional mailing lists: EFFRA, Textile ETP (European Technology Platform for the Future of Textiles and Clothing), Euratex, EuraMaterials, EUCIA (The European Composites Industry Association), Polyvia (French Plastics processing and composites professional association), many French sectorial competitiveness clusters (Techtera, EMC2, ASTech, CapDigital, iTrans, Polymeris, Systematic Paris Region, Materalia, CIMES, SAFE), and VDMA (Mechanical and Plant Engineering association).

A LinkedIn post was first shared by the Merging project LinkedIn page, and was later reposted by IPC to its network of 8000 followers, and by all the other project partners. A total of four LinkedIn posts were posted to advertise the workshop. The screenshots of the posts are presented in the Appendix A.

The workshop was also advertized during the EFFRA days in Brussels (26th September 2023) where LMS and IPC have participated to communicate the results of the project.

Figure 1: Registration form used for the Merging final workshop

2.4. On-site organisation

The workshop was conducted in a hybrid format to reach wide range of audience. The formats are detailed below.

2.4.1. Face-to-face

A face-to-face format workshop was organised at CEA facilities, free of cost for the attendees. This format included all the workshop sessions described in section 2.1. Beside the four sessions and the round table, a visit of CEA LIST main technologies showroom and robotics platforms was organized by CEA. A poster session was also organized during the lunch time so as to provide more insights regarding the outcome of the project.

2.4.2. Web casting

CEA's video conferencing tool (LiveStorm) was used for the live broadcasting of the workshop. This tool helped the audience to interact easily with the presenters for the discussions after their presentations. Moreover, this tool also provided monitoring of how many participants have attended the event. A replay of the event can be viewed here:

https://www.youtube.com/watch?v=OLQJNl31U4E&t=2705s.

3. Detailed program and summary of the technical sessions

3.1. Workshop program

The workshop program has been categorized into four main sections : Introdution of the project, presentation of the building blocks, round table discussion and training sessions on the technologies developed during the project. The program for the workshop is detailed below:

- 8:30 – 9:00 *Registration*
- 9:00 – 9:10 Welcome at CEA LIST
- 9:10 - 9:15 Presentation of the agenda
- 9:15 – 09:35 Introduction to soft-materials manipulation and robotic challenges through MERGING use-cases
- 09:35 – 09:45 General value chain of MERGING technology
- 9:45 – 10:00 *Coffee break*
- **10:00 – 11:30 Building blocks developed in MERGING to solve soft-materials manipulation challenges**
    - 10:00 – 10:30 Introduction to the Electro-adhesion and relative skins and grippers (OMNIGRASP)
    - 10:30 – 10:50 Lesson learned from computer vision implementations in Merging workcells (AIMEN)
    - 10:50 – 11:10 Robots collaborative control and software suites (CEA)
    - 11:10 – 11:30 Work-cell control and digital-twin (LMS)
- **11:30 – 12:30 Evaluation of the MERGING technology on 3 industrial use-cases**
    - 11:30 – 11:50 Lingerie manufacturing (SELMARK, AIMEN)
    - 11:50 – 12:10 Food packaging (THIMONNIER, CEA)
    - 12:10 – 12:30 Large composites manufacturing (VDL, LMS)
- 12:30 – 14:35 *Parallel lunch session*
    - 12:30 – 12:35 Agenda of the afternoon and organization
    - 12:35 – 13:35 Networking lunch and Poster session
    - 13:35 – 14:45 Visit of CEA LIST Main technologies showroom and Robotics platforms
- **14:45 – 15:45 Round Table : "How MERGING technologies can help robotizing soft-materials manipulation tasks in the industry" (chaired IPC)**
- 15:45 – 16:00 *Coffee break*
- **16:00 – 17:30 Tutorials on Building blocks (parallel sessions)**
- Session A (in the workshop main room)
    - 16:00-16:30 : How to install and drive Electro-adhesion grippers for flexible objects (OMNIGRASP)
    - 16:30-17:00 : Tutorial on computer vision for workers and objects recognition (AIMEN)
    - 17:00-17:30 : Deformable Object Handling Controller: an intuitive package for scheduling, execution control, and monitoring (LMS)
- Session B (in CEA Robotics lab)
    - 16:30-17:00 : Robot easy programming - tutorial 1 : How instrumented gloves can facilitate human-robot collaboration for large flexible pieces transportation (CEA)
    - 17:00-17:30 : Robot easy programming - tutorial 2 : How to teach a robot through intuitive teleoperation (CEA)

3.2. Session 1

The following topics were covered during this session:

- CEA: Welcome at CEA LIST

- IPC: Presentation of the agenda
- CEA: Introduction to soft-materials manipulation and robotic challenges through MERGING use-cases
- IPC: General value chain of MERGING technology

3.3. Session 2

This morning technical session presented the building blocks developed in MERGING to solve soft-materials manipulation challenges. This session ensured a rich discussion between the audience and the speakers (See Figure 1-5). The discussions were mostly oriented towards the applicability, feasibility and further developments.

- OMNIGRASP: Introduction to the Electro-adhesion and relative skins and grippers

Figure 2: Technical presentation by OMNIGRASP on grasping flexible objects using electro-adhesive grippers

- EPFL (presented by OMNIGRASP): Shielded stretchable capacitive force sensors with liquid metal channels

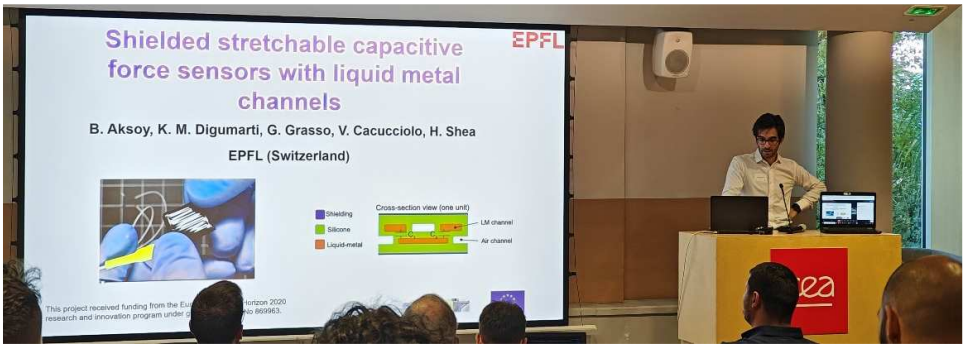


Figure 3: Technical presentation by OMNIGRASP on developing soft sensors for EA grippers

- AIMEN: Lessons Learned from Computer Vision Implementations in Merging Work Cells

Figure 4: Technical presentation by AIMEN on lessons learned from computer vision for Merging workcells

- CEA: Robots collaborative control and software suites

Figure 5: Technical presentation by CEA on robot arm programming and skills

- LMS: Work-cell control and digital-twin

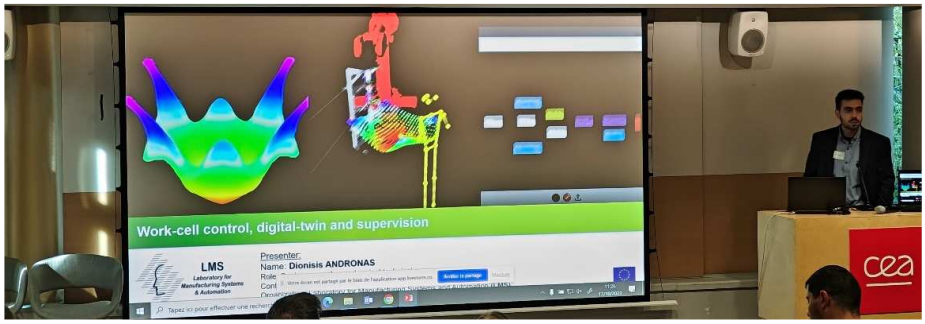


Figure 6: Technical presentation by LMS on the work cell controller, digital twin and supervision

3.4. Session 3

Then, the evaluation of the MERGING technology on 3 industrial use-cases has been presented:

- SELMARK, AIMEN: Lingerie manufacturing

Figure 7: Presentation of SELMARK use case

- THIMONNIER, CEA: Food packaging

Figure 8: Presentation of THIMONNIER use case

- VDL, LMS: Large composites manufacturing

Figure 9: Presentation of VDL use case

3.5. Session 4

Then, tutorials on Building blocks were proposed to the attendees. Session 4 was planned in 2 parallel sub-sessions to optimise the time of the workshop as well as to ensure the feasibility to the audience for easier selection of the interested topics.

3.5.1. Session 4.A

This session held in the auditorium.

- OMNIGRASP: How to install and drive Electro-adhesion grippers for flexible objects
- AIMEN: Tutorial on computer vision for workers and objects recognition
- LMS: Deformable object handling controller: an intuitive package for scheduling, execution control, and monitoring

3.5.2. Session 4.B

This session held in CEA Robotics laboratory.

- CEA: Robot easy programming - tutorial 1: How instrumented gloves can facilitate human-robot collaboration for large flexible pieces transportation
- CEA: Robot easy programming - tutorial 2: How to teach a robot through intuitive teleoperation

4. Summary of the round-table

A round table was organized with the end-users (VDL, SELMARK, THIMONNIER) and integrators (CASP and OPTEAMUM) of the Merging project, to highlight “How MERGING technology can help robotizing soft-materials manipulation tasks in the industry”. This session was chaired by IPC.

Figure 10: Round table discussion with end users and technical integrators on how merging technologies could improve manipulation of soft materials at industrial level

Q. How have the Merging technologies pushed the boundaries of the daily operations of your factories?

VDL commented that this project has helped in providing insights to the next generation of working methodologies. Usually, the operators try hard to adapt to a new system and it is not exactly easy but in the case of Merging, the entire setup is easy to use and training sessions on technologies were clear and sufficient for the workers to be autonomous with the robots. SELMARK commented that the Merging project has greatly helped the workers in reducing the load. SELMARK also commented on the possibility to apply the current developments to different manufacturing processes involving textiles. THIMONNIER commented that since they are not the end-user of the machine, a feedback on the experience cannot be provided until now. However, with the tests that were conducted internally, they feel confident that it will definitely improve the working conditions and also that they will be able to easily adapt.

Q. What would be considerations in integrating the Merging technologies in the existing industrial shop floors of the end-user facilities in future?

VDL and SELMARK commented that a selection was made to install an offline cell to test the functioning. The full scale implementation is planned but needs a lot of work to acquire space on the existing shop floor while not affecting the production of the site. OPTEAMUM commented that the work would first start by understanding the workers movements and their shop-floor managers. Depending on the production scale and products, the installation can greatly vary. With Merging building blocks, it can be easier since most work in a plug-and-play format. So it depends on the clients. However, in a new workspace, it would be much easier since the workers have to adapt to the existing conditions. CASP commented that unlike hardware integration, software integration cannot be straightforward at all times owing to the communication difficulties. The first criterion would be gathering resources which are not highly interdependent, thus communication between the modules should be easier. However, with the Merging building blocks, the problem can be greatly decreased since there are less dependencies and it would be easier to integrate.

Q. What improvements in terms of dexterity or new end-effectors would be necessary to improve the working conditions and productivity of your factories?

VDL, SELMARK and THIMONNIER commented that the new solutions are always welcome. However, what they would prefer are robust solutions which are portable and easily changeable. VDL expressed that any new end-effector which minimizes the damage to the fabrics would be their first interest.

SELMARK and THIMONNIER commented on the dexterity and speed, stating that they are in high volume production environment. So any improvements to speed and dexterity will be an added value to the production cycle.

Q. How safe are these technologies and robots to be working in an environmental along with humans? How to ensure this safety?

VDL, SELMARK commented that worker's safety comes first and nothing else can be of utmost importance. The workers are made aware of the safety measures that should be taken when operating along with robots. Furthermore, safety protocols on the robots can also be installed just like in the project implementation. OPTEAMUM commented that there can be other ways depending on the installation of the robot. If the robots are working along with humans, safety protocols such as speed reduction can be installed, however, if there are no collaborative tasks, laser sensors or just an isolation zone would be sufficient to ensure the safety as it has been done in some of the use-cases. THIMONNIER added that a risk assessment would be necessary in such cases and depending on the assessment, solutions can be sought.

Q. How easy is it to adopt collaborative robots and Merging technologies into the context of Industry 4.0?

CASP commented that the techniques developed within the project do suit the approach. However, the data currently available is not sufficient. LMS developed a digital twin for the flexible materials which can be the starting point. Rather than implementing huge data centres, it would be interesting to applying the techniques of training on the fly. This although creates issues in the start however, the models can be greatly improved.

Q. What other flexible materials can be used, other than the ones which have been tested during the project?

VDL commented that the testing would be carried out on different composite textiles and plastic sheets used for infusion process. However, since the current end-effectors are limited to the textiles, they look forward to new grippers which would enable them to test the global robotic solution for processes using new materials. SELMARK commented that they would carry on testing the EA developed gripper with various other products, but currently, the application will be only limited to the current ones. THIMONNIER has the objective to use other materials involved in different packaging technologies.

Q. How fast would be the adaptability of the workers to the collaborative robots and Merging technologies?

VDL commented that training the young staff members should be easiest than training the experienced ones. However, in the case of Merging, even the experienced ones were comfortable in using the technologies. SELMARK commented that the staff is used to learning new production techniques, thus this should not pose a great problem. OPTEAMUM seconded the statement of VDL. CASP and THIMONNIER stated that since there are until now no direct end users, it is not easy to get feedback.

Overall, the discussion was dedicated to the end-users experience on how the technologies developed within the project helped in reducing the worker's effort. The participants commented on the easier applicability and adaptation of the technologies at the industrial level. Participants commented that these improvements would call for the need to inculcate new training to the workers to use the implemented technologies. Participants also raised the point of safety of humans working in the same environment with collaborative robots and expressed that the precautions took in perimeter of the Merging use-cases were sufficient. Participants suggested that the current solutions were highly suitable for the applications suggested and an interest was shown that these solutions will be applied in the future to different segments of their manufacturing chain and possibly into other applications.

Other details regarding how the Merging project results could be relevant to a larger field of application, or to other industrial domains, can be found in deliverable D9.7 'Exploitation plan - Final'.

5. Participation and feedback

5.1. Participation statistics

73 persons registered for the MERGING public workshop. Among them, 38 persons registered for the face-to-face meeting (52%) whereas 35 registered for the webcasted version of the workshop (48%). From the 38 persons who registered for the face-to-face workshop, 28 finally attended the meeting (74%). From the 35 persons who registered to the on-line workshop, 28 connected to the on-line workshop (80%).

5.2. Feedback form

A questionnaire was setup and shared with the participants during the workshop, to identify the interests and bottlenecks regarding robotics technology for soft materials manipulation in various industries. The aim of the questionnaire was to enlarge the scope of future applications for the MERGING technologies. To maximise the feedback from the workshop attendees, an online questionnaire was created with a limited number of questions (10 questions, 5 minutes to fill in the form). The questionnaire is detailed in Appendix B, and can be found on-line here: https://shorturl.at/abwD9. The exploitation of the questionnaire is summarized in deliverable D9.7 'Exploitation plan - Final'.

6. Conclusion

The aim of this workshop was to disseminate the technologies developed within the Merging project for the past four years. The workshop was divided into three categories: technical presentations, feedback from end-users and training sessions. Technical presentations included various developments of the building blocks. End-users presented the implementation of the three different use-cases, and how the project contributed to the improvement of factory outputs. The round-table discussion shed light on what could be the future of these three different use-cases and how can the installations be improved further. Technology providers concluded the workshop with different training sessions. The outcomes from this workshop were mostly positive where various ideas were incubated for different applications and further developments of the technologies.

Appendix A: Dissemination on LinkedIn platform

Figure 11: LinkedIn post on the page of Merging project

Figure 12: Linkedin post of Merging workshop exhibiting VDL use-case

IPC Centre Technique Industriel de la Plasturgie et des Composites
8,276 followers
3w •

Exciting news! Mark your calendars for an unmissable event!

Save the Date: October 17, 2023

Get ready to witness the future of robotics in the manipulation of soft material: the next "MERGING Public Workshop", presented by the partners of MERGING. Thi event is your gateway to groundbreaking advances in industrial automation.

Location: CEA Nano-Innov, Palaiseau, France FR

The MERGING project has worked hard to create an innovative and user-friendly solution to automate the handling of delicate objects. From textiles to food packaging to composite manufacturing, these advances are set to reshape industri at every level.

What to expect: ◆ Explore cutting-edge technologies and project results from MERGING. ◆ Get insights into real industrial applications (think food, textiles, and composites). ◆ Dive into hands-on tutorials on the fundamentals of MERGING. ◆ Experience interactive tours showcasing CEA LIST's state-of-the-art facilities.

Connect and engage: Network over a delicious lunch. Take part in stimulating discussions during the roundtable. Engage with industry peers, enc users, and stakeholders passionate about the future of handling soft and fragile materials through user-friendly robotics.

This is a landmark event that promises to shape the future of industries around the world. Don't miss this opportunity to be part of a transformative journey.

Stay tuned for more news! #MERGINGWorkshop #RoboticsInnovation #FutureOfAutomation
Registration open for Merging public workshop ! https://hubs.li/Q0245b360

Figure 13: A LinkedIn repost 2 weeks before the workshop

IPC Centre Technique Industriel de la Plasturgie et des Composites
8,276 followers
1w •

TOMORROW ! October 17, 2023

Join us for the future of soft materials robotics at the "MERGING Public Workshop" presented by MERGING partners. Discover the revolutionary advances i industrial automation.

What lies ahead: ◆ Explore cutting-edge technologies and project results. ◆ insight into real-world industrial applications. ◆ Take part in practical tutorials on fundamentals of MERGING. ◆ Visit the state-of-the-art CEA LIST facilities.

Network and Engage: Enjoy a delicious lunch and engage in thought-provoking discussions at the roundtable. Connect with industry peers, end user and stakeholders who are passionate about the future of soft material handling wit user-friendly robotics.

Registration open for Merging public workshop in Palaiseau : https://hubs.li/Q025DjfS0

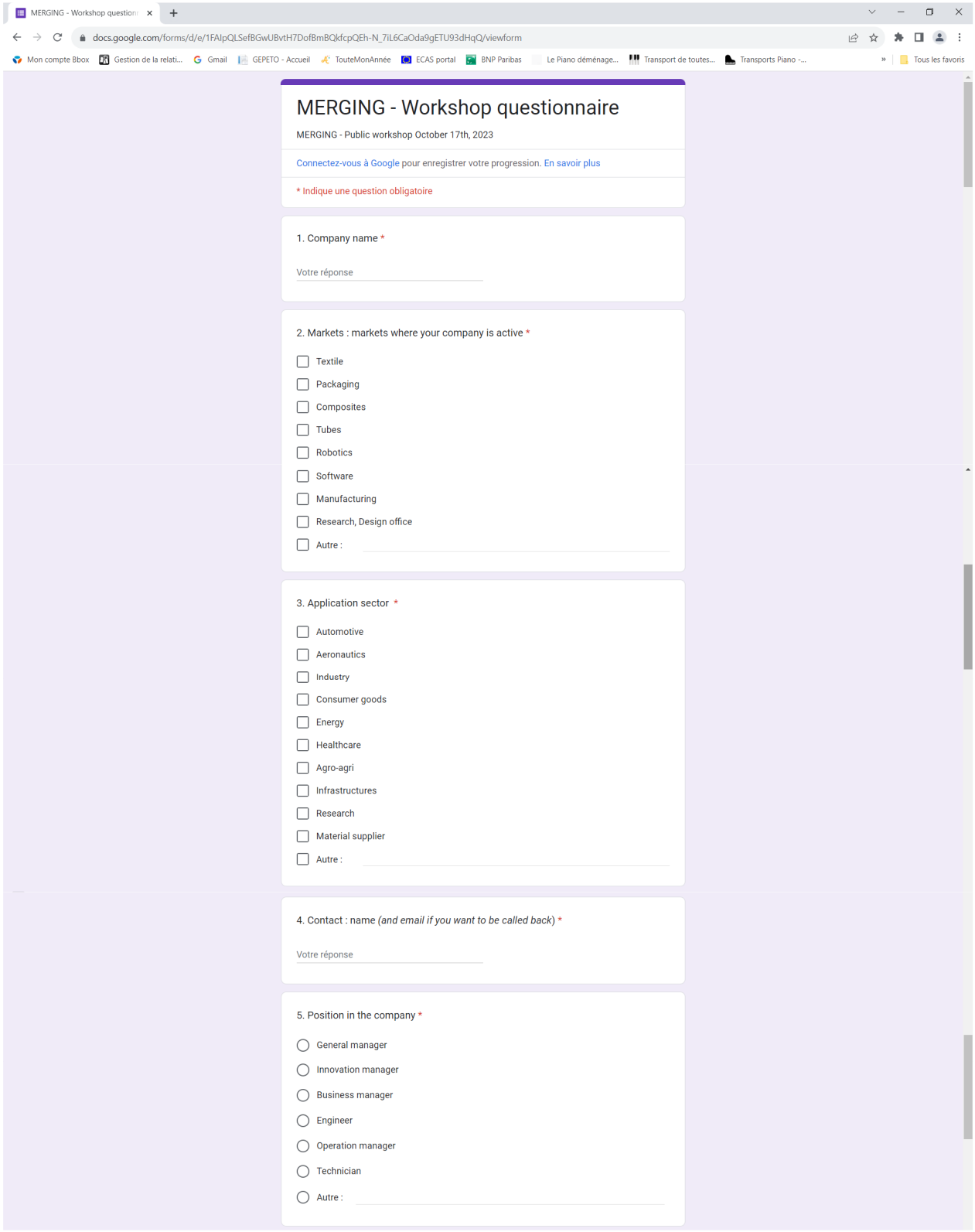
OR

Watch the workshop online : https://hubs.li/Q025D5NB0

Romain Agogué and 8 others

Figure 14: A LinkedIn repost one day before the workshop

Appendix B: Merging workshop questionnaire



MERGING - Workshop questionnaire

MERGING - Public workshop October 17th, 2023

Connectez-vous à Google pour enregistrer votre progression. En savoir plus

* Indique une question obligatoire

1. Company name *

Votre réponse

2. Markets : markets where your company is active *

- [ ] Textile
- [ ] Packaging
- [ ] Composites
- [ ] Tubes
- [ ] Robotics
- [ ] Software
- [ ] Manufacturing
- [ ] Research, Design office
- [ ] Autre :

3. Application sector *

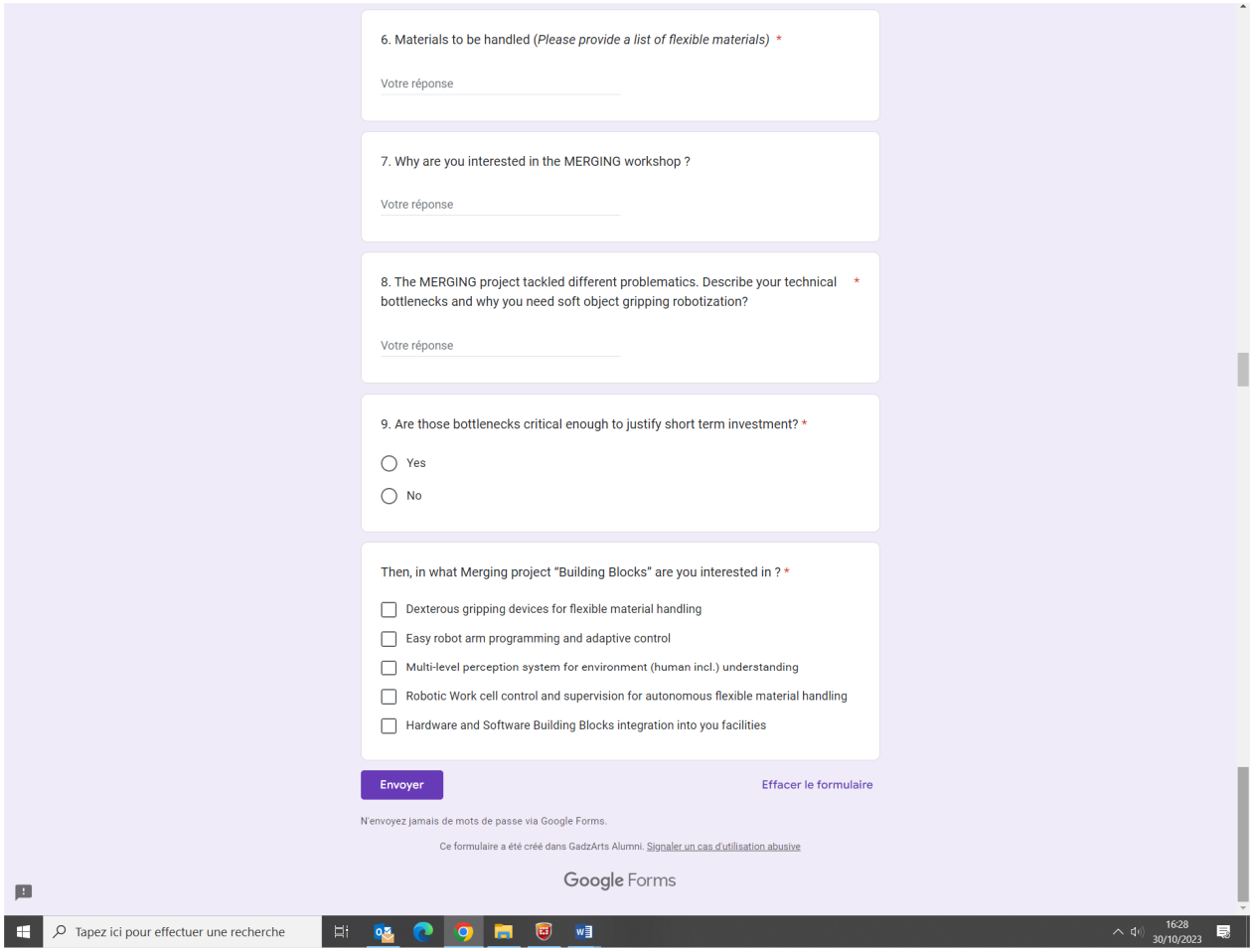
- [ ] Automotive
- [ ] Aeronautics
- [ ] Industry
- [ ] Consumer goods
- [ ] Energy
- [ ] Healthcare
- [ ] Agro-agri
- [ ] Infrastructures
- [ ] Research
- [ ] Material supplier
- [ ] Autre :

4. Contact : name *(and email if you want to be called back)* *

Votre réponse

5. Position in the company *

- ( ) General manager
- ( ) Innovation manager
- ( ) Business manager
- ( ) Engineer
- ( ) Operation manager
- ( ) Technician
- ( ) Autre :


6. Materials to be handled (*Please provide a list of flexible materials*) *
Votre réponse
7. Why are you interested in the MERGING workshop ?
Votre réponse
8. The MERGING project tackled different problematics. Describe your technical bottlenecks and why you need soft object gripping robotization? *
Votre réponse
9. Are those bottlenecks critical enough to justify short term investment? *
Yes
No
Then, in what Merging project "Building Blocks" are you interested in ? *
Dexterous gripping devices for flexible material handling
Easy robot arm programming and adaptive control
Multi-level perception system for environment (human incl.) understanding
Robotic Work cell control and supervision for autonomous flexible material handling
Hardware and Software Building Blocks integration into you facilities
Envoyer
Effacer le formulaire
N'envoyez jamais de mots de passe via Google Forms.
Ce formulaire a été créé dans GadzArts Alumni. Signaler un cas d'utilisation abusive
Google Forms
Tapez ici pour effectuer une recherche
16:28
30/10/2023