D11.3 2nd Dissemination and Communication Report

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101016953

Author(s)/Organisation(s)	Aleksandra Tolmačev (FSH)
Contributor(s)	Mladen Radišic, Stavros Tsitouras, Tamara Trninić, Milica Nenadić
Work Package	WP11 Dissemination, Communication, Exploitation
Delivery Date (DoA)	31.12.2022
Actual Delivery Date	28.12.2022
Abstract:	This report provides overview of dissemination and communication activities conducted in the last twelve months, M13-M24. Changes, improvements, and updates of strategic approaches are systematically and comprehensively described.

Document Revision History			
Date	**Version**	**Author/Contributor/ Reviewer**	**Summary of main changes**
01/11/2022	V0.1	Aleksandra Tolmačev (FSH)	ToC with initial content
22/11/2022	V0.2	Aleksandra Tolmačev (FSH)	First version of deliverable
29/11/2022	V0.3	Mladen Radišić, Tamara Trninić, Stavros Tsitouras (FSH)	Internal review
12/12/2022	V0.4	Aleksandra Tolmačev, Milica Nenadic (FSH)	Updated version, sent to coordinator
13/12/2022	V0.5	Konstantinos Stavridis (CERTH)	Peer review
14/12/2022	V0.6	Aleksandra Tolmačev, Mladen Radišić (FSH)	Implemented suggestions

Dissemination Level		
PU	Public	**X**
PP	Restricted to other programme participants (including the EC Services)	
RE	Restricted to a group specified by the consortium (including the EC Services)	
CO	Confidential, only for members of the consortium (including the EC)	

Funding Scheme: Innovation Action (IA) ● Topic: H2020-ICT-46-2020

Start date of project: 01 January, 2021 ● Duration: 36 months

CoRoSect Consortium			
Participant Number	**Participant organisation name**	**Short name**	**Country**
1	UNIVERSITEIT MAASTRICHT https://www.maastrichtuniversity.nl/	UM	NL
2	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS https://www.certh.gr/	CERTH	GR
3	HOCHSCHULE EMDEN/LEER https://www.hs-emden-leer.de/en/	HSEL	GER
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Executive Summary

The D11.3, the 2nd Dissemination and Communication Report provides a comprehensive overview of the conducted activities, in the last twelve months. It will present achievements, approaches, and adjustments of the strategies carried out, to improve and promote the CoRoSect's online, offline and in-person identity.

This document complements the previously delivered Dissemination and Communication Plan (D11.1, submitted in M3), and the 1st Dissemination and Communication Report (D11.2, submitted in M12). The two documents are similar in structure and approach.

However, this document aims to compare the actions accomplished during the first year (M01-M12) of the project (planned actions), and actual actions occurred during the second year (M13-M24) of the project. Moreover, the overall purpose is to present changes undertaken for improvement of dissemination and communication activities and to present future directions.

Below, a short overview of each chapters and topic is presented.

Chapter 1 – *Introduction* > clarifies CoRoSect's objectives and context regarding the dissemination and communication efforts.

Chapter 2 – *Dissemination and Communication Activities* > concentrates on the activities outlined in the D11.2. It further elaborates on tools, changes, channels, strategies, approaches, and measures undertaken for the successful execution of all activities during M13-M24 of the project. Moreover, it will highlight the main lessons learned during this period.

Chapter 3 – *CoRoSect's Observation and Interpretation* > describes the ongoing evaluation and monitoring of communication-related activities. In this chapter, strategic aspects for the successful coordination of the CoRoSect communication and dissemination activities will be summarized. A summary of partners' efforts will be provided and a progress assessment toward the achievement of the Key Performance Indicators (KPIs).

Chapter 4 – *Action Points and Next Steps* > provides future directions for the dissemination and communication activities over the upcoming 12 months.

Chapter 5 – *Conclusion* > concludes the report.

1. Introduction

1.1. Project's aims and outcomes

CoRoSect aims to create novel perspectives by incorporating robots, AI, and Big Data to provide added value in the modern food chain, in particular in insect farming. In this specific project, insects are introduced, as a missing piece of the puzzle of the food system. With rising environmental crisis, climate change and challenges within food security, automated insect farming serves as a viable and sustainable solution these issues. Automated insect farming offers a very collaborative environment – where humans and robots undertake tasks such as transferring and handling crates monitoring environmental conditions, larvae separation/detection, and insects feeding.

Global challenges are tackled through sustainability, contraction in food waste, and expansion of automatization and optimization of insect farming. The advantages of restoring insects into the food chain are multiple: availability throughout the whole year, efficient production, low-quality organic waste converted into protein-rich end products, edible for humans and animals, insects products used as fertilizes and biofuels, increase in income (due to the circular economy), support of robotics and automation in all phases of insects' life cycle.

As previously mentioned, the goal of CoRoSect's solution is to create a collaborative environment, but also a safe environment among robots, humans and insects. A sophisticated human-robot solution scheme is introduced in the real-time environment, where five service groups are deployed in the whole production process in insect farms.

Even though automated farms are great achievements in this project, it is of great importance to provide a safe working environment, while maintaining robots' productivity. Therefore, the need for human-centered AI is the best solution, in order to improve health and safety risks

The CoRoSect solution will be tested in five large-scale pilots, located in five different countries, focusing on different processes in the insects' life cycle. Afterward, the conducted experiments will be analyzed by industrial partners, insect farms, and technical partners.

The CoRoSect's communication and dissemination strategies are of great significance, not only during the project's lifetime, but also beyond the end of the project. The purpose is to provide effortless market acceptance of CoRoSect's solution.

1.2. Context

The significant innovations of the CoRoSect project are built on the Reference Architecture Model Industry 4.0 (RAMI 4.0) and carried out as an Industrial Cyber-Physical System (ICPS). The aim of these digitalized integrated robots is to support all stages of the insect's life cycle. As a matter of fact, the underlying assignment of this system is to execute repetitive, but also cognitively and physically demanding tasks. Demanding tasks, in insect farming, are all of those that require increased manual efforts or continuous human supervision, i.e. transferring and handling crates (destacking and stacking), monitoring of environmental conditions, larvae separation/detection, insect feeding, etc. Moreover, these processes are considered expensive, dangerous and time-

consuming, therefore they are replaced with correspondingly automated robotic-based service-oriented procedures (a 140-compliant Information-Communication Infrastructure).

A real-life environment with an interdisciplinary human-robot collaboration framework is designed for the purposes of testing above mentioned procedures. This serves as a boosting factor for the increase in farm productivity and quality of service.

The CoRoSect's vision is to create a unique solution for supporting rearing among these three species: Tenebrio molitor (Mealworm), Hermetia illucenc (Black Soldier Fly), and Acheta Domesticus (Crickets).

As previously mentioned, one of many purposes of the CoRoSect project is to accomplish successful cooperation and collaboration between humans and robots, while process and manipulation tasks are shared and performed at the same time.

1.3. Objectives

The following table includes a list of the main objectives of dissemination and communication activities. The efforts outlined in D11.1 (Dissemination and Communication Plan) have been the focus of all efforts undertaken during the lifespan of the project. For better comprehension of the dissemination and communication objectives, a breakdown of the actions taken to accomplish them is provided under each objective.

O1	Attract a sufficient number of industry-leading innovators (insect farmers, robotic technology developers, environmental scientists…) as well as insect farm adopters from across the continent.
Over the past twelve months, attention was given on engaging with vital stakeholders through stakeholders' connections, direct contact with key industry participants, and raising the visibility of CoRoSect at events, conferences, and on social media.	
O2	Present, to potential CoRoSect beneficiaries, the value of gaining access to cutting-edge, robotic technologies in insect farming and the community that supports them.
The promotion of CoRoSect via social media and blog articles has accumulated a lot of interest from a wide range of other target audiences that CoRoSect hopes to connect with, in addition to the already created community for robotics in insect farming. The best indicators of this are the quantity of website traffic and the expanding number of social media followers.	
O3	Highlight the importance of piloting, testing, and experimenting with novel robotic-based technology and services and business models, in an environment that focuses on collaboration.
Events, conferences, publications, newsletters, as well as promotion on social media channels serve as a broadcaster of CoRoSect's outcomes from piloting, testing and experimentation.	
O4	Raise the awareness of different stakeholders - locally, regionally, and internationally – how important is the role of insect farming in increasing the sustainability and resilience of our food systems and also in additional business creation.

In the past year, the focus was directed on the promotion of pre-pilot activities, on the importance of restoring insects into the modern food chain, and on upcoming pilots. In the future steps of the project, attention will be given on possible business developments.	
O5	Ensure proper know-how exchange among CoRoSect partners.
The exchange of information among consortium members has been a top objective throughout the project. This has been accomplished by updating partners on pertinent and significant events, the status of publications, newsletter features.	
O6	Develop networks and liaisons with innovation intermediaries, insect farmers, technology providers, and environmental scientists to share resources and maximize impact.
The overall goal is to increase CoRoSect's visibility and to promote the variety of advantages that insect farming will experience thanks to this digitalized, integrated robotic technology.	
O7	To support the development and maintenance of the official project's website throughout the project lifecycle.
The website includes a description of the project, its purpose and its advantages. News and outputs are regularly updated. It responds to both broad and specialized audiences, as the main information hub for visitors. Furthermore, the discussion corner was added for the sake of interactive communication with interested audience.	

Figure 1 CoRoSect Communication and Dissemination Objectives

2. Dissemination and Communication Activities

The CoRoSect communication and dissemination activities have been identified and established in the D11.1 Dissemination and Communication Plan, with the aim to build a strong image status of CoRoSect, to be easily recognized and associated with. For that reason, different tools, channels, and strategies have been developed in the past twenty-four months. In this section, each of these segments are covered.

2.1. CoRoSect Image

In the D11.1 Dissemination and Communication Plan, the visual identity (logo, branding material, colors, templates) for CoRoSect was established with the aim to convey a strong and coherent image status. Hence, during the first half of the project, diverse promotional materials and brand elements were created, in order to strengthen visual recognition of the CoRoSect (Examples given in Figure 2 – Iknowledge Forum and Figure 3 – INSECTA 22). Logo, brand colors, posters, brochure, and branded templates, caps, t-shirts, hoodies etc., were created and shared with consortium partners. All communication and dissemination materials acknowledged EU support and displayed the European flag (emblem) and funding statement. Since the goal of the communication material was to spark an interest in the local, European and global community, it was successfully used at different events, and proved to be very appealing to the target audiences, making a great impression.

Figure 2 CoRoSect Logo at Iknowledge Forum

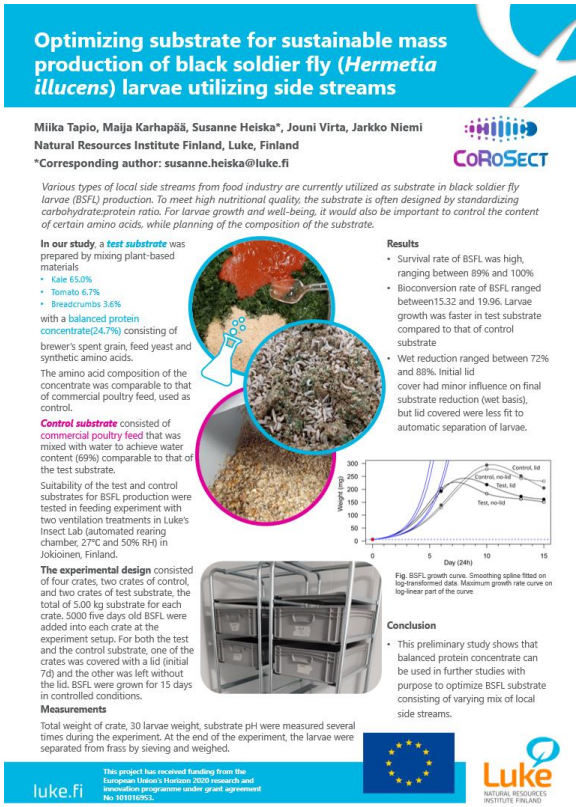


Figure 3 CoRoSect Logo at INSECTA 22 Conference

Since the CoRoSect is very cautious about the environment, it is also following eco-friendly sustainable practices, hence all promo materials are digitally available, in order to reduce waste and unnecessary printing. For this reason, the partners have been guided to print all branding material on environmentally friendly paper and fabric, and only upon request.

2.2. CoRoSect Channel Mix

Throughout the project, CoRoSect has been using diverse spectra of digital channels. It was proved to be very useful for boosting the visibility of the CoRoSect project and spreading the word among different communities.

CoRoSect successfully shared its findings on Facebook, Twitter, LinkedIn and Youtube. Hence, it exploited the full potential of social media, spreading the results and empowering fruitful connections among stakeholders, industry leaders and target audiences.

2.2.1. Social Media Campaigns

During the second year of the project, CoRoSect has launched many interesting campaigns on Social Media Channels (LinkedIn, Twitter, Facebook), whereas the spotlight was on the project's goals, methodology, results, purpose and events. The campaigns that took place in second year of the project are described in this section. The success of campaigns is tracked by followers' growth, website traffic and engagement on the CoRoSect Social Media Profiles and Google Analytic, which is further explained in the section 2.2.2 CoRoSect's Social Media Traffic.

2.2.1.1. What's the buzz about?

This particular campaign is of informative character, as shown in the Figure 4, and it was launched during the last quarter of 2022. CoRoSect aims to inform its audience about recent developments and achievements in insect farming, especially about introducing insects into the modern food chain. Moreover, it strives to explain the advantages of introducing robotics, AI, and big data analytics into insect farming. Last, but not least the overall idea is to provide interesting facts about CoRoSect area of work.

Figure 4 Example of the campaign

2.2.1.2. Women and Girls in Science

CoRoSect empowers women and girls in the field of science, with the aim to inspire even more of them to pursue career in science and engineering. Hence, CoRoSect's remarkable women, leading and handling scientific projects with their ground-breaking research, are at the center of attention, as seen in the Figure 5 and Figure 6. These types of campaigns are of thematic nature and will be different throughout the year.

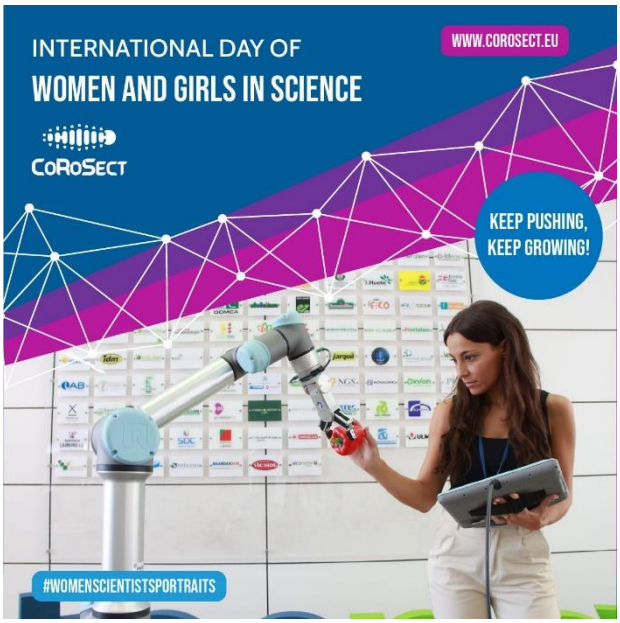


Figure 5 Example of the campaign

Figure 6 Example of the campaign

2.2.1.3. CoRoSect appearances

It is of great significance to announce CoRoSect's participation at events, conferences, debates on social media, etc. Therefore, the event announcement, as given in the Figure 7, is the first level of engagement, in order to get audiences' attention from all around world and to get them informed about CoRoSect's appearances. The second level of engagement is publishing content, as presented in the Figure 8, and outcomes of CoRoSect's presentation at an event.

ANNOUNCEMENT

Figure 7 Example of an announcement

PARTICIPATION AT AN EVENT

Figure 8 Example of the participation at event

2.2.1.4. Pre-Pilot Findings

In the last twelve months, CoRoSect has entered dissemination phase, where the real and tangible results, from the experiments and testings, are emerging. Therefore, this campaign is dedicated to all successful achievements accomplished during the pre-piloting, as it can be seen in the Figure 9. CoRoSect is proud to present the hard work, as presented in Figure 10, of the whole consortium through this cycle of successful testing. This type of campaign is planned to launched during/after each piloting, in order to promote work and achievements of the partners.

Figure 9 Example of the campaign

Figure 10 Example of the campaign

2.2.1.5. Lessons Learned

This type of strategic approach of interacting with interested audience proved to be fruitful. The reason behind it lies in the fact that content was more personalized and detailed. This was accomplished due to emerging of tangible results and outcomes, that are of great importance for creating interesting content. The campaigns "What's the buzz about" and "Pre-Pilot Findings" serve for raising awareness about about CoRoSect's mission, vision and achievements. Through growth in knowledge, especially if a topic is unfamiliar and new, this type of campaign shows to enhance increase in audience's interest in the project. Moreover, the campaign "CoRoSect appearances" has proven to attract audience, because of CoRoSect's active and live participation at events, presenting it results and developments, showing its positive outcomes to the world. Furthermore, active participation in live events, conferences, summits and etc., proofs that CoRoSect is transparent and accountable for its work.

This type of a strategic approach resulted in obtaining more organic impressions (content that has naturally appeared in someone's newsfeed), likes and reports. Thus, a key learning takeaway is that by promoting concrete outcomes with individualized and in-depth information raised audience's interest in the CoRoSect project.

2.2.2. CoRoSect's Social Media Traffic

In the last twelve months, the number of followers on all CoRoSect social media networks has significantly increased. Since the last report in M12, the number of followers on LinkedIn, Facebook, and Twitter, **increased from 635 to 1065 followers**. The strategic procedures to inspire audience to follow CoRoSect work is presented further in the text.

2.2.2.1. LinkedIn

CoRoSect's profile, on this well-known medium, has attracted high number of followers in the last twelve months. The LinkedIn Followers' Metric (Figure 11), presented below, shows how number of followers' flow changed over time.

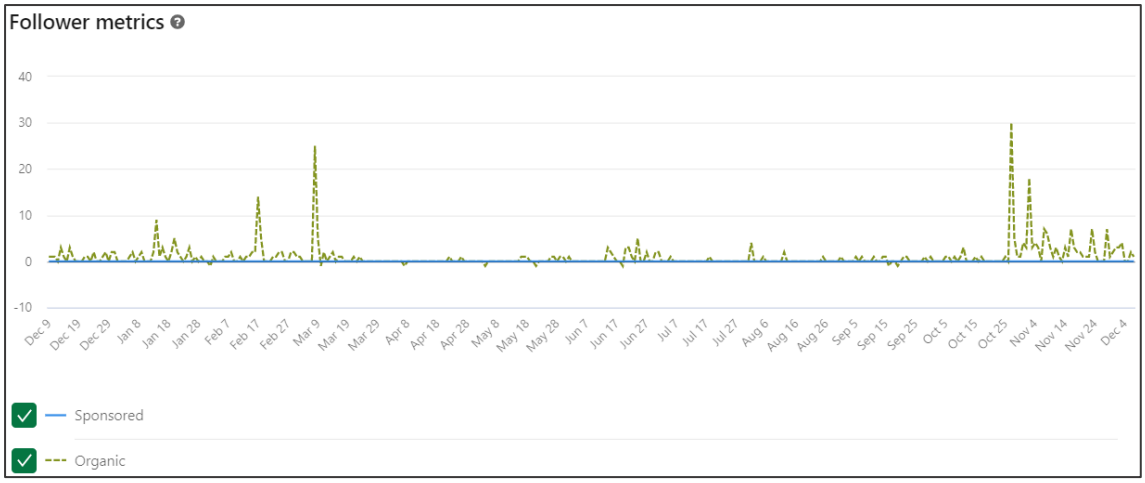


Figure 11 LinkedIn Followers' Metrics (M12-M24)

The reason behind this achievement of CoRoSect's communication is the accurate and appealing way of conveying CoRoSect messages, especially the ones related to strictly technological terms. It is of great importance for the CoRoSect communication team to broadcast CoRoSect's accomplishments in an appropriate language, understandable to everyone.

The followers' demographics, as presented in the Figure 12, on LinkedIn indicate CoRoSects' progress in reaching a wider audience.

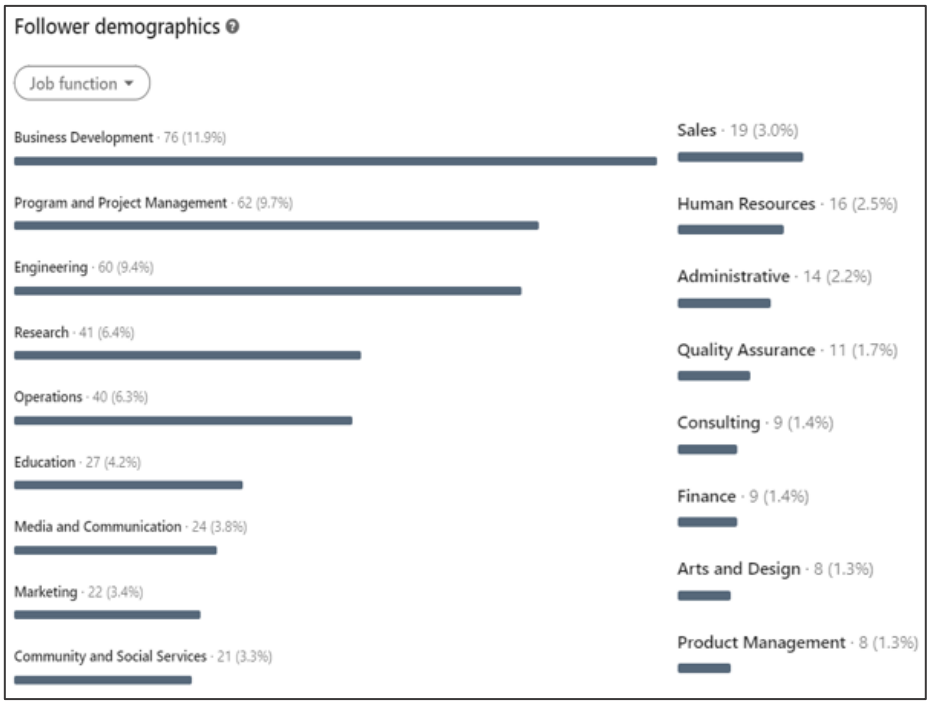


Figure 12 Followers' demographics (M12-M24)

Diverse followers' demographic is the result of attractive and compelling content, which is regularly fine-tuned and improved.

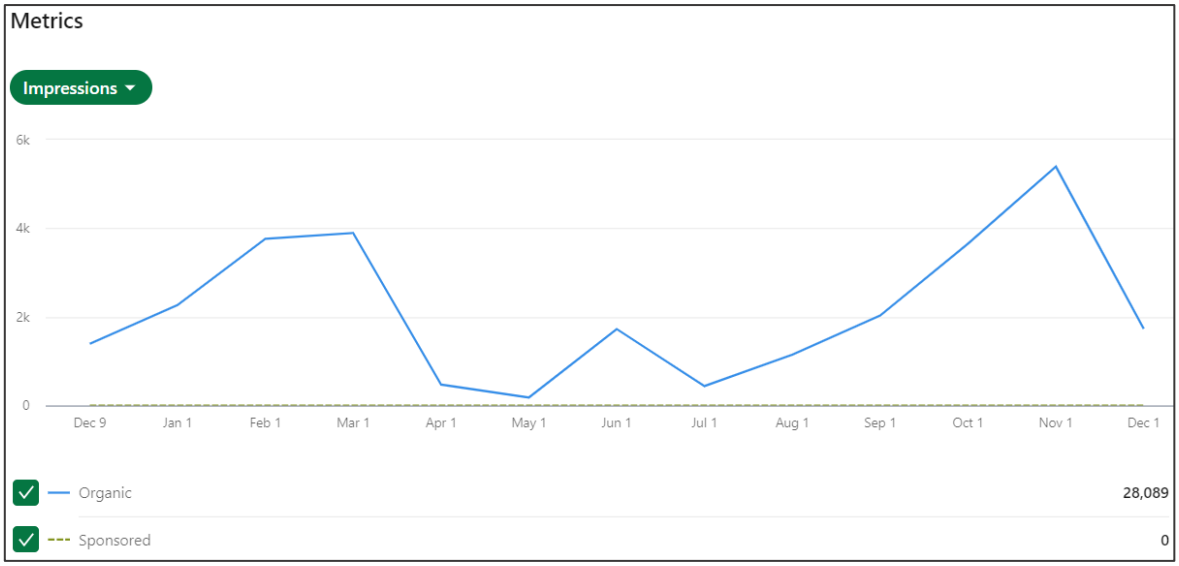


Figure 13 Impressions on the content (M12-M24)

In the figure 13, the metrics represent the impressions' flow (number of times a post was shown to LinkedIn users) in the last twelve months. It is noticed that more personalized content like the campaign "Women and girls in science" published in the first quarter of the year, and "Pre-pilot activities" published during the last quarter of the year, empowered the growth of the content impressions. These two types of content are more detailed and present tangible concrete results and achievements of CoRoSect. Hence the peak in the impressions.

EXAMPLES

Figure 14 shows the post with 1945 impressions, which is considered as the post with the most organic impressions, and it is related to the campaign "Women and girls in science".

Figure 14 Post with the most organic impressions

The second post that reached high number of organic impressions, precisely 1438 organic impressions, is related to the concrete outcomes of pre-pilot activites, as shown in the Figure 15.

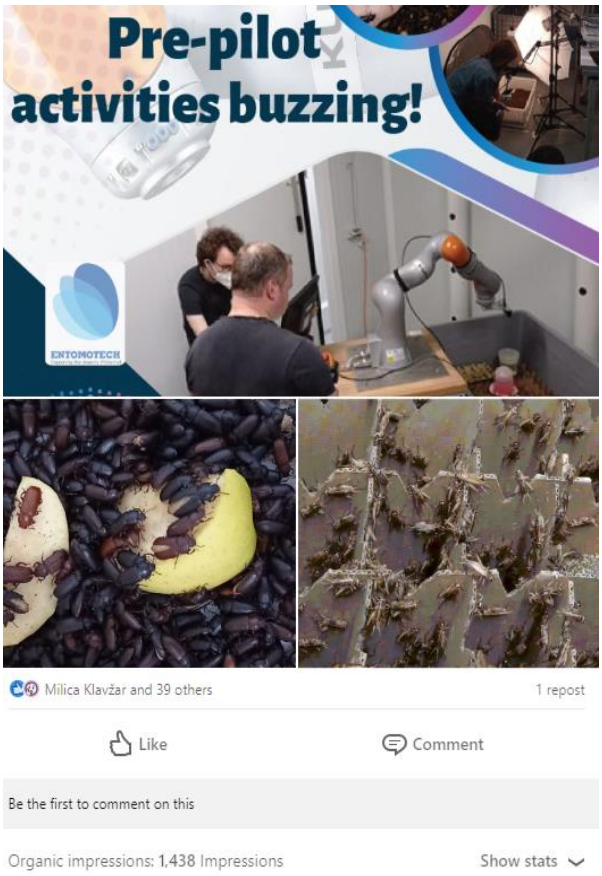


Figure 15 Post with the most organic impressions

2.2.2.2. Twitter

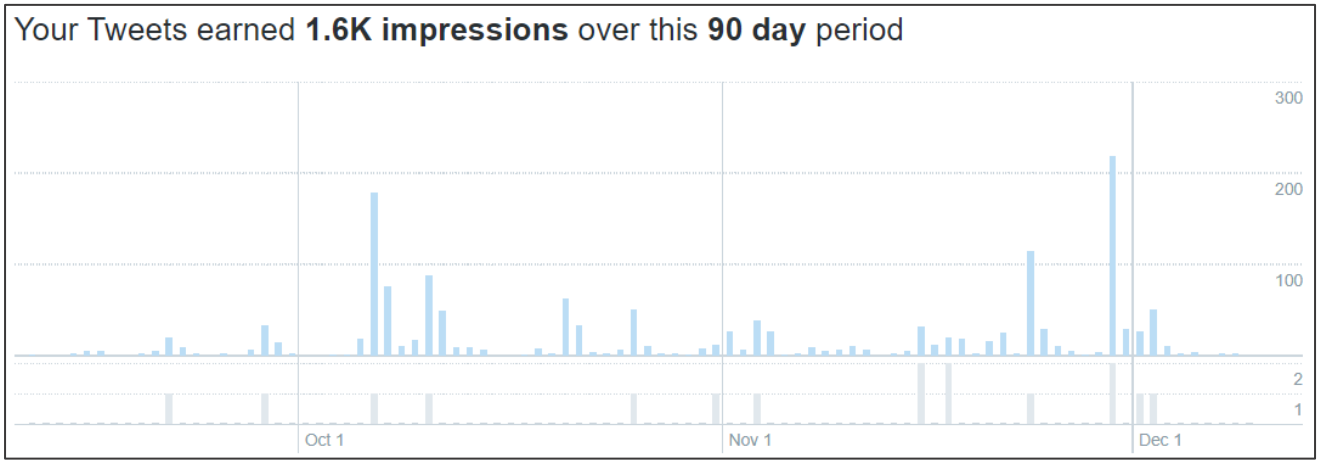


Figure 16 Twitter analytics (last 3 months)

The Twitter Analytics in Figure 16 represent twitter impressions, namely the number of times a tweet is viewed in Twitter timeline or search results. CoRoSect engagement on Twitter is showing great results, especially in the last quarter of 2022. The reason for that is the promotion of

CoRoSect's results and achievements at the events, summits, conferences, etc, and all of them gained the most impressions. Hence, the essence of the growth on Twitter is the CoRoSect tailored communication, and promotion of piloting activities.

Figure 17 CoRoSect Top Tweets

Figures 17 and 18 represent the top tweets on the CoRoSect Twitter profile. Meaning that these two tweets are considered as the most popular tweets on this Social Media Channel.

This is based on mostly on the impressions, because they have high number of impressions on Twitter. As previously mentioned, impressions provide the number of times a content is displayed, whereas engagement shows how many times a user interacts with the CoRoSect tweets over the given time. In addition, Twitter engagement rate is the number of engagements divided by impressions.

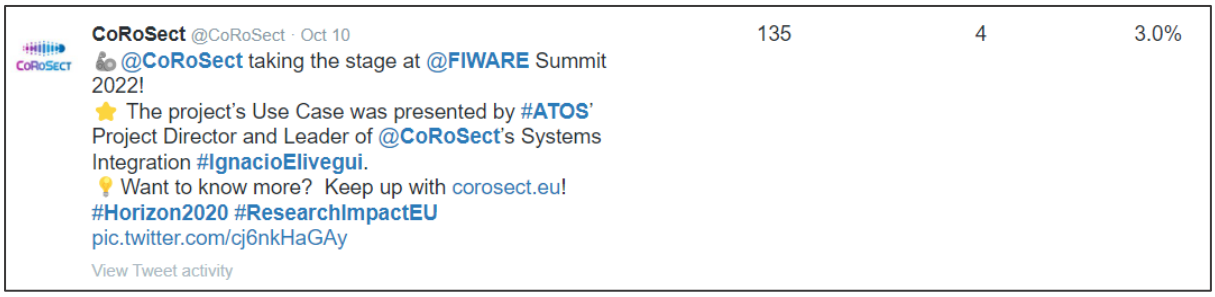


Figure 18 CoRoSect Top Tweets

However, the CoRoSect audience, on this particular medium, realized that CoRoSect is on a good track and is performing good results, especially after its presentation to the review panel. This was beneficial for the project, and this specific tweet, shown in the Figure 19, gained 459 impressions and it is considered as the top tweet in the period of twelve months.

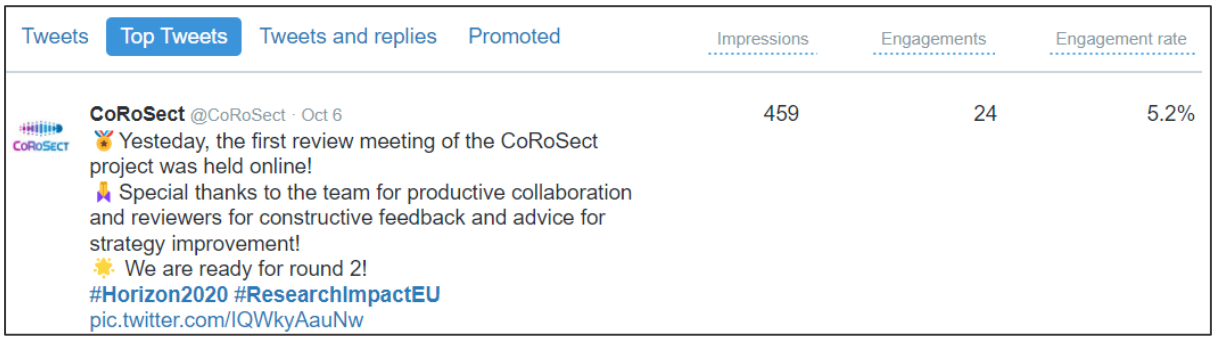


Figure 19 CoRoSect Tweet with the most impressions

The next CoRoSect's second top tweet is again related to the promotion of inviting people to subscribe to the CoRoSect Newsletter, in order to stay tuned about recent activities, outcomes and developments.. This confirms that the audiences on Twitter are interested in the results, improvements, collaborations, productions, and strategies of CoRoSect. Therefore, the CoRoSect announcement of the upcoming newsletter issue gained the most impressions. This respective action gained 373 impressions.

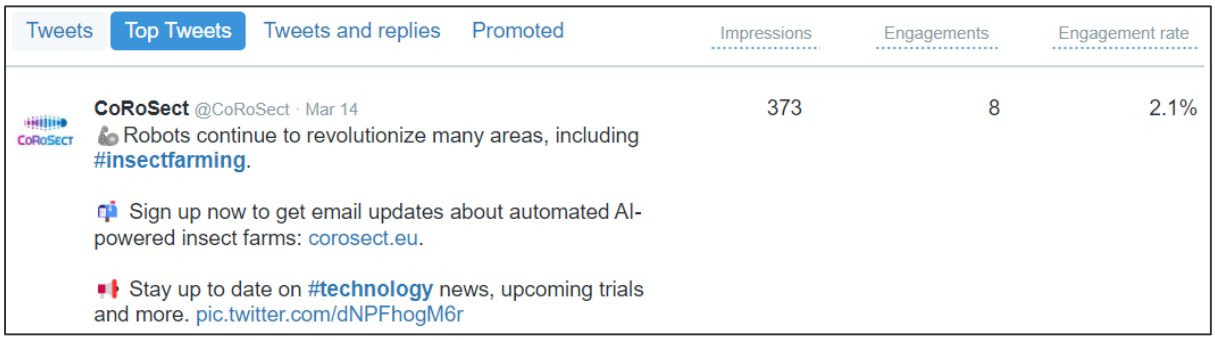


Figure 20 CoRoSect Top Tweet

Since cooperation is the most eminent pillar of the CoRoSect work, it has been also externally proven, that working together is the best way toward success. Therefore, the top tweet of November month is about the closer alliance toward insect farming efficiency between two partners of the respected consortium.

Figure 21 CoRoSect Top Tweet

2.2.2.3. Facebook

The metric in the Figure 22 shows the flow of page likes gained in the last twelve months.

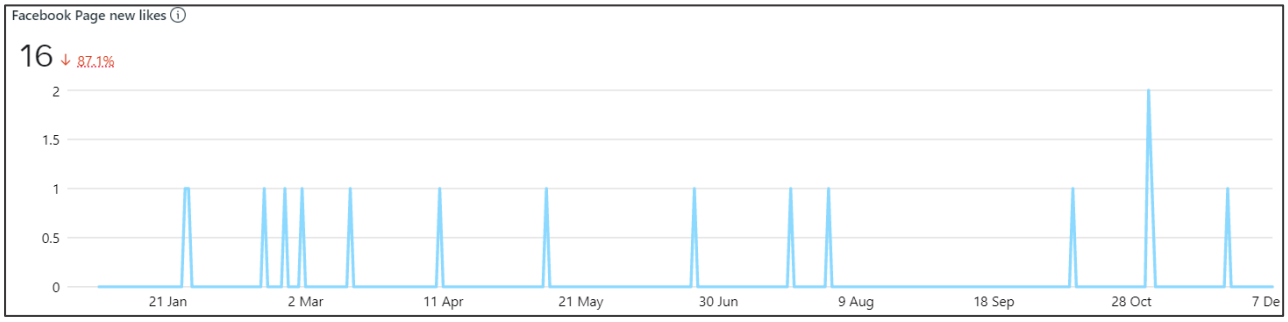


Figure 22 Facebook Analytics (M12-M24)

In the last twelve months, CoRoSect's engagement on Facebook was successfully boosted. The outcomes are seen above. The growth in page likes increased during the first and last quarter of this year, as noticed on the CoRoSect's LinkedIn and Twitter profiles. This confirms that content focused on the results from pre-pilot and concrete facts boosted CoRoSect profiles.

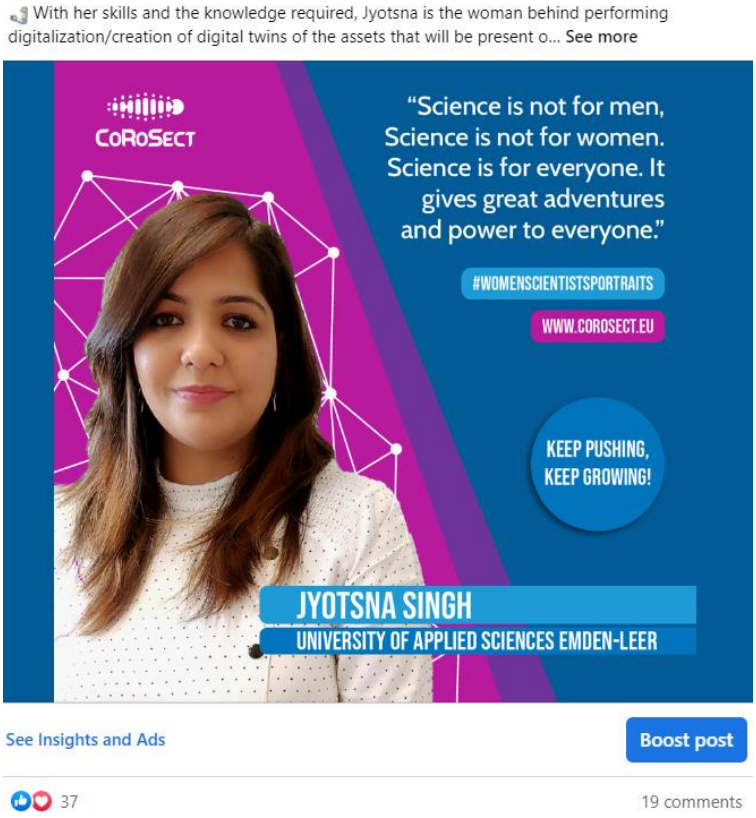


Figure 23 CoRoSect the most liked Facebook Post

2.2.2.4. YouTube channel

This particular Social Media channel serves the purpose of presenting the visual segments of the project. In order to create qualitative visual promotions (videos, demos, etc.), more tangible and visual results should be available, and they are dependent on the start date of the pilots. Once the piloting starts, the focus of this channel will be on creation of the content for the CoRoSect Youtube channel.

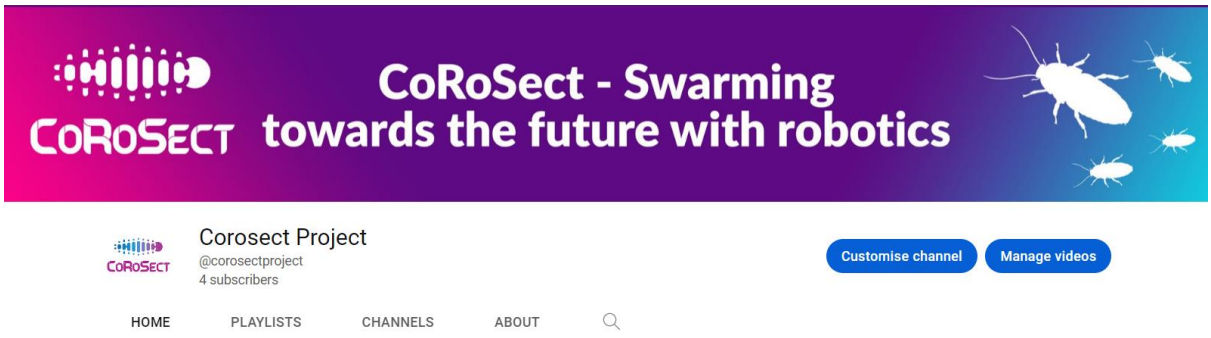


Figure 24 CoRoSect YouTube channel screenshot

2.2.2.5. Lessons Learned

A rationale for the continuation of growth is the improvement of the approach. During the last twelve months, the development of CoRoSect profile on LinkedIn is regularly monitored. After gathering data and insights, the evaluation of statistics and information were evaluated. Hence, it was agreed upon weekly usage of invitation credits, beneficial not only for networking, but also for broadening the array of the CoRoSect audience.

Furthermore, since LinkedIn is a great channel for linking professionals, specialists, educators, and academics, therefore CoRoSect communication team successfully reached out to the groups associated with/working within the same realm as CoRoSect does. Moreover, adding extra hashtags such as #technology #development #technologytrends #robotics #insects #insectfarming #buzz #automation # collaboration #cooperation, etc, is contributing to the growth of followers.

Efforts for dissemination and communication are only as effective as the endeavors made by each of the partners to carry them out, hence the project significantly depends on the steps undertaken by each consortium partner. All consortium partners are encouraged to participate in dissemination and communication activities by routinely posting new information from CoRoSect to their social media platforms.

2.2.3. Newsletter

As previously mentioned, a high number of the CoRoSect audience, as noticed in the Figure 25, is interested in what really is happening within the CoRoSect borders.

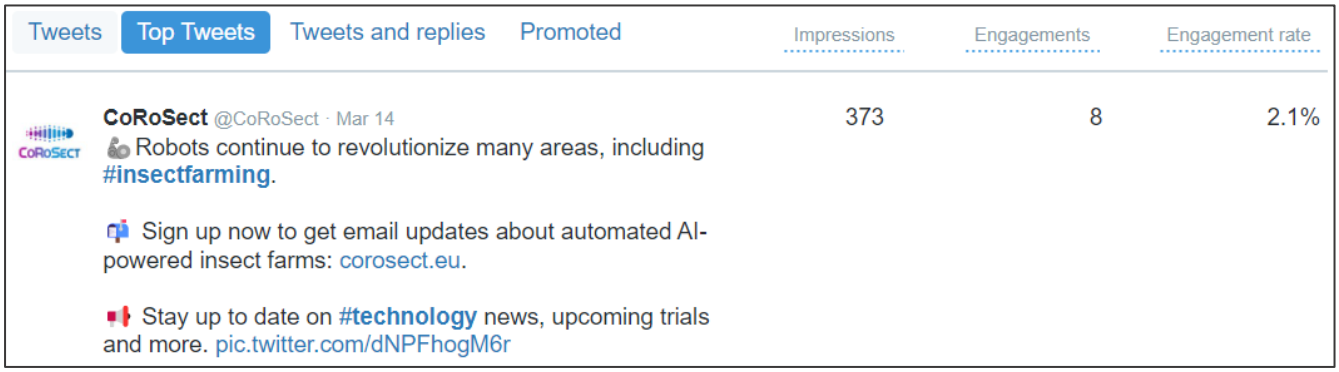


Figure 25 Twitter impressions for Newsletter Announcement

Based on the shown interest in the CoRoSect newsletter, and the idea of providing high quality content, it was decided that a newsletter would be published quarterly. This has proven to be a more efficient way of targeting the CoRoSect audience. In essence, this ensured proper and prompt updates on the CoRoSect's most recent achievements, as presented in the Octobers' issue of the Newsletter (Figure 26).

Figure 26 CoRoSect Newsletter

2.2.3.1. Newsletter campaign

CoRoSect implemented a new strategic approach for gaining more subscribers, as presented in the Figure 27. An amazing campaign was created and published in different groups, which turned out to be a good achievement for CoRoSect.

Figure 27 Newsletter Campaign

Moreover, further step has been taken regarding our newsletter subscription. As previously mentioned, LinkedIn is powerful tool for connecting professionals in this industry, hence the Sign Up button (Figure 28) has been added, in order make newsletter subscription effortless.

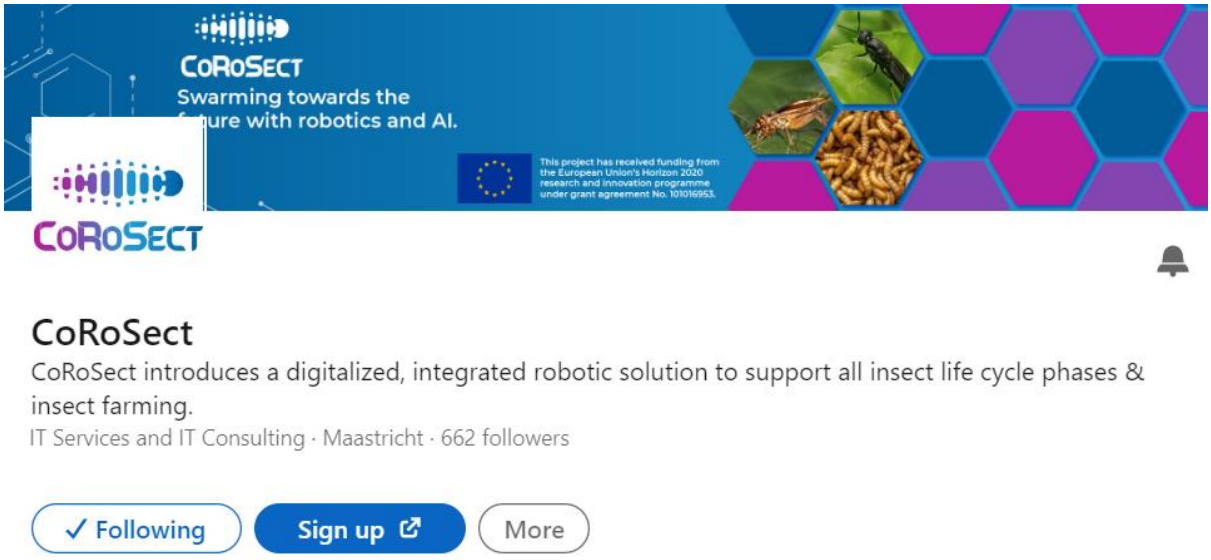


Figure 28 Sign-up Button on LinkedIn

For this reason, Newsletter Form, as presented below in Figure 29, has been added on the CoRoSect website, in order to make it visible and approachable for the CoRoSect audience.

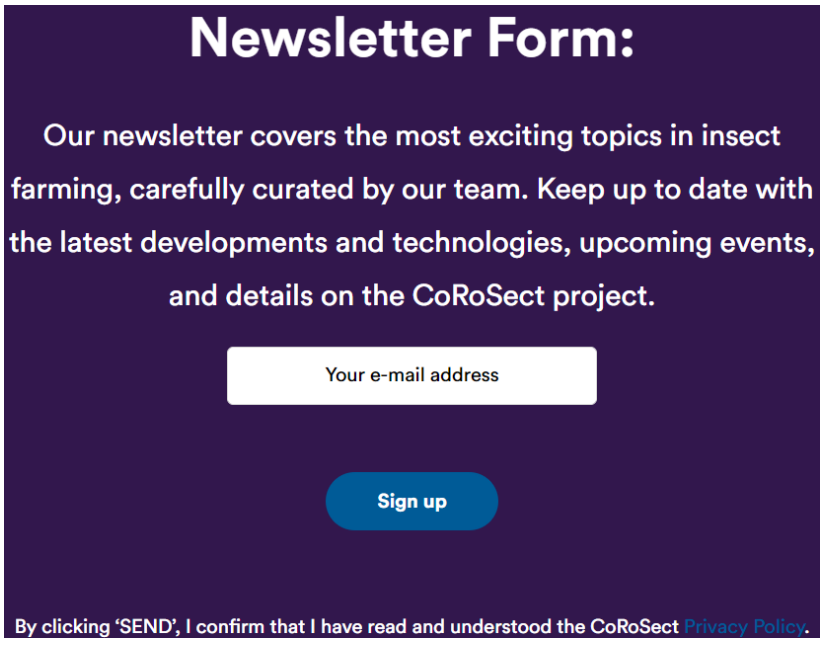


Figure 29 Newsletter Form on the website

2.2.4. CoRoSect website

The strategic approach implemented in reaching out to the CoRoSect target audience has contributed to the significant increase in the number of website views. Since the last report, namely in the last twelve months, this number grew from 3000 to 7000 website visits.

The great achievement is accomplished with the web page of the project. Since it is another important pillar of the strong and recognizable visual identity of the CoRoSect project, the website has been regularly updated and enhanced. The rapid growth and progress of this endeavor are confirmed through the increase in visitors to the website.

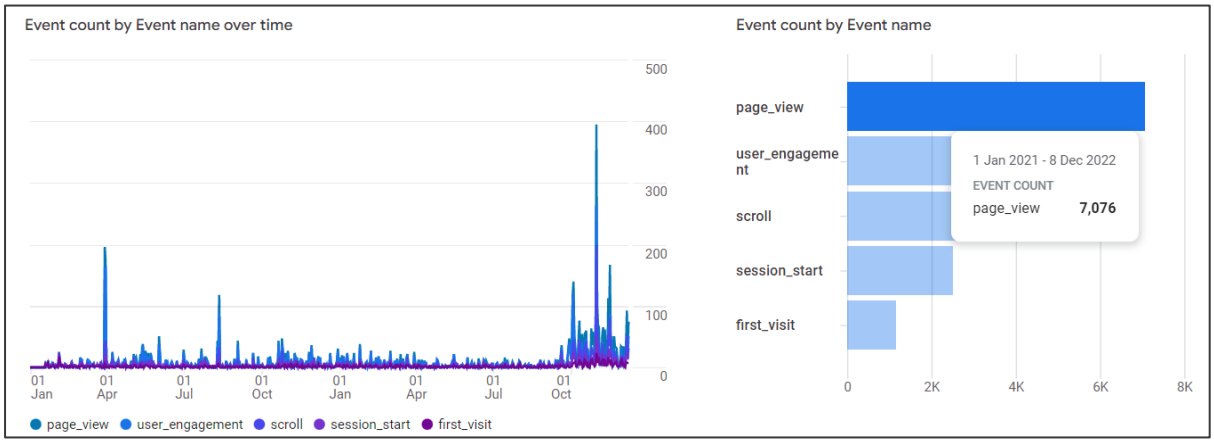


Figure 30 Website Page Views (M01-M24)

During the last quarter of this year, the number of visitors has significantly increased, as it is represented in the Figure 30. The considerable progress is due to enhanced strategic approaches and content, which is educational, interactive and inspirational, and it is regularly tracked on the Google Analytics diagrams. In the Figure 31, number of visits, scrolls, user engagements and first visit from the project start up until M24 are presented for detailed overview of numbers.

	Event name +	↓ Event count	Total users
		19,032 100% of total	1,186 100% of total
1	page_view	7,076	1,150
2	user_engagement	5,252	884
3	scroll	2,857	790
4	session_start	2,511	1,148
5	first_visit	1,151	1,150
6	click	118	66
7	file_download	64	28
8	view_search_results	3	2

Figure 31 Number of visits, scrolls, user engagement, first visits (M01-M24)

Such a rapid increase in the number of visits is achieved with interesting and tailored content, that generates more interest and views in our pages on the website. It also serves as a key resource for anyone looking to gain knowledge about the project and its primary objectives.

In the last twelve months, interactive communication with visitors was established, enabling them to follow the news, and stay up to date on the latest advancements in the robotics and insect farming field. As our operations advance, the website will be closely watched, regularly updated and creatively improved.

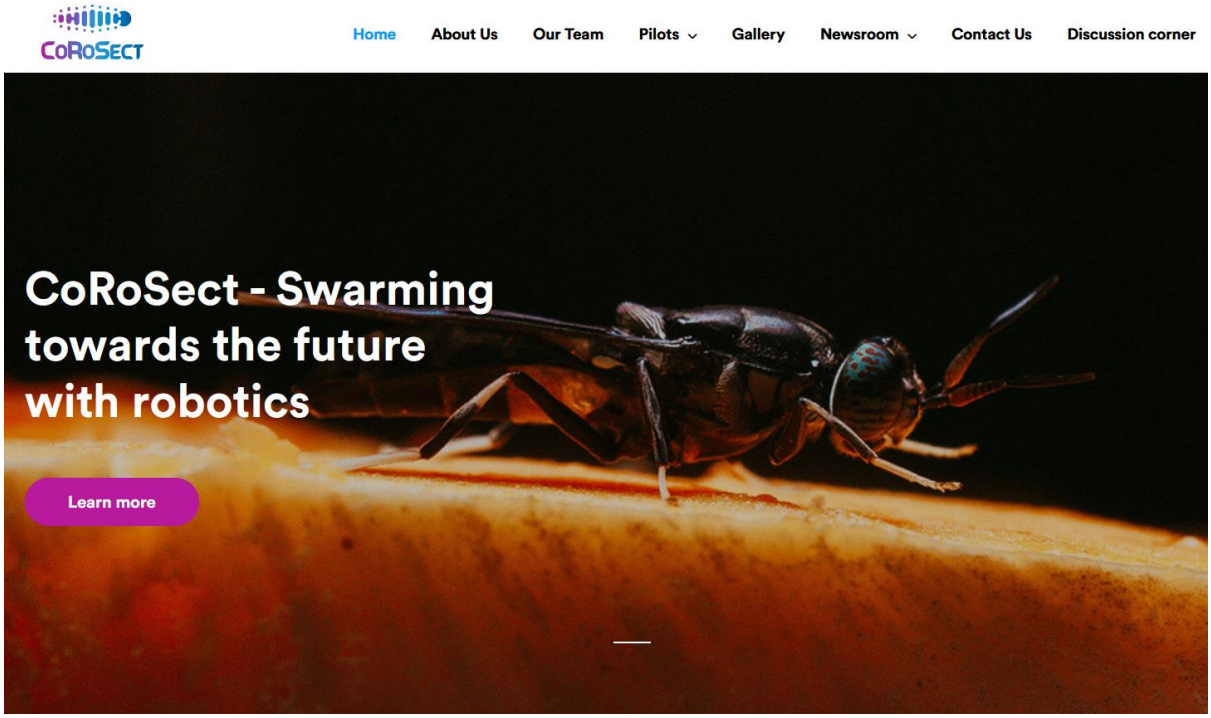


Figure 32 Home page of the website

With the new and visible data emerging, the communication team inserted slight improvements on some segments of the website, as it is presented in the Figure 32. This has been shown to have a positive impact on the increase of visitors to the CoRoSect website.

2.2.4.1. Improvements on the website

NEWSROOM

After a thorough analysis and insight, the NEWSROOM tab, as shown in the Figure 33, was improved with the aim to show the latest updates and news of the CoRoSect project. Moreover, it is important to highlight that the actual boost of the website was due to presenting the latest innovations and developments in the technological aspect of insect farming, in detail.

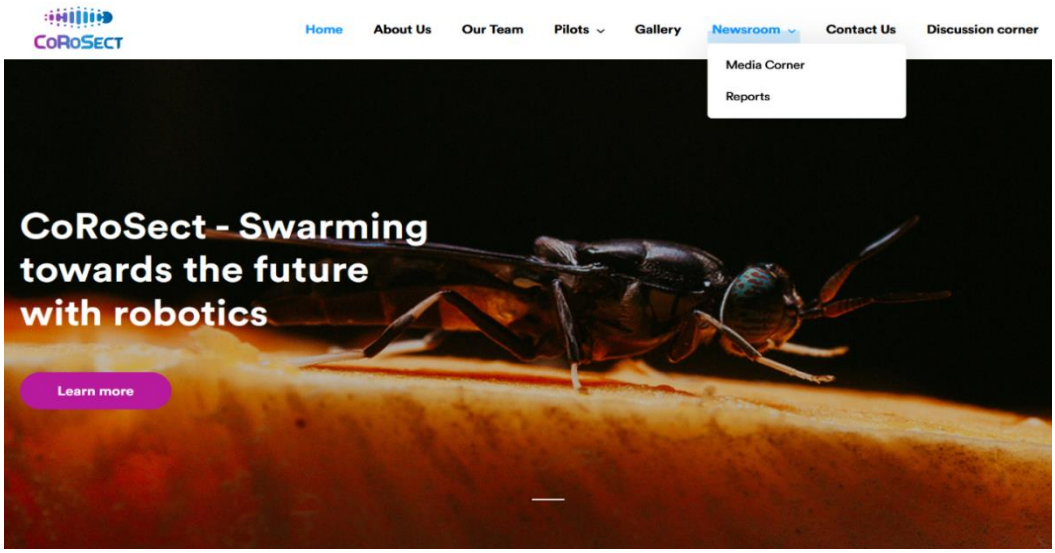


Figure 33 Newsroom tab and its components

MEDIA CORNER

A strong and recognizable visual identity is achieved through qualitative branding material. Therefore, this segment (Figure 34 shows Media Corner Tab) brings marketing purposes into focus, while enabling access to the CoRoSect branding material: trademarks, logos, artworks, visuals, etc.

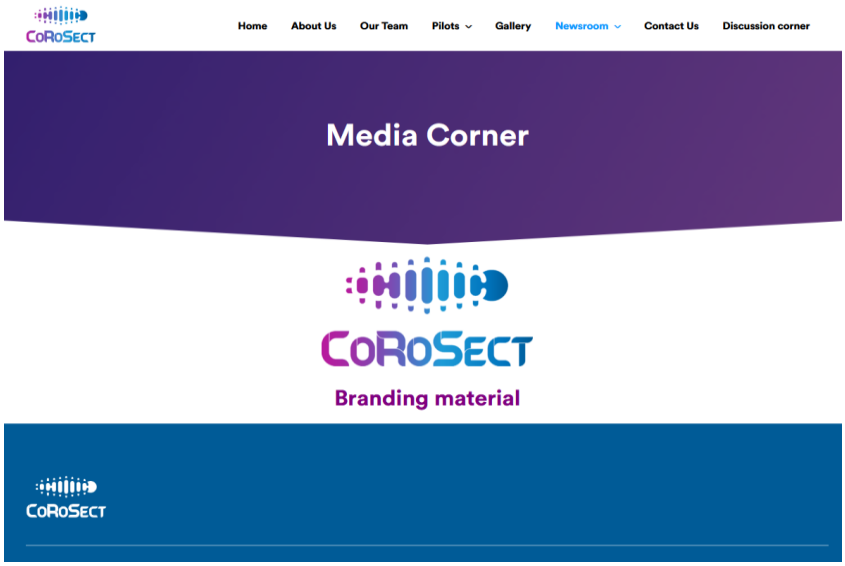


Figure 34 Media Corner Tab

REPORTS

Transparency, openness, and accountability are something that CoRoSect stands for, and is very proud of achievements so far. Therefore, this section on the website will be dedicated to all publicly accessible reports of the project, and to enable the CoRoSect visitors to get acquainted with the CoRoSect work. The below presented picture shows tentative representation of public deliverables.

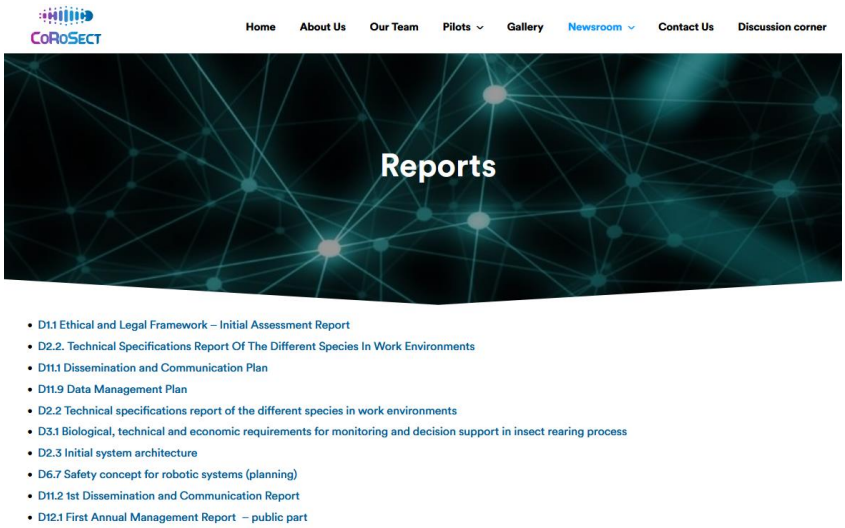


Figure 35 Reports Tab

CONTACT US

The project's contact page extends an invitation to anyone working in the agri-food-tech sector to get in touch with the project's communication team to explore opportunities for collaboration, joint events, or exhibiting. However, the goal of this section is only to communicate with potential partners, and to realize future collaborations. Since it was the place meant for more generic questions, therefore it was agreed upon to open a niche – **Discussion corner** - for curious visitors of the CoRoSect website to engage in an interactive communication.

2.2.4.2. Discussion Corner

Since the CoRoSect project is entering the second phase of its objective, the aim is to engage and to inspire the audience through two-way communication activities, that is how the *Discussion corner* was established, and a tab, represented in the Figure 36, is dedicated to this particular activity.

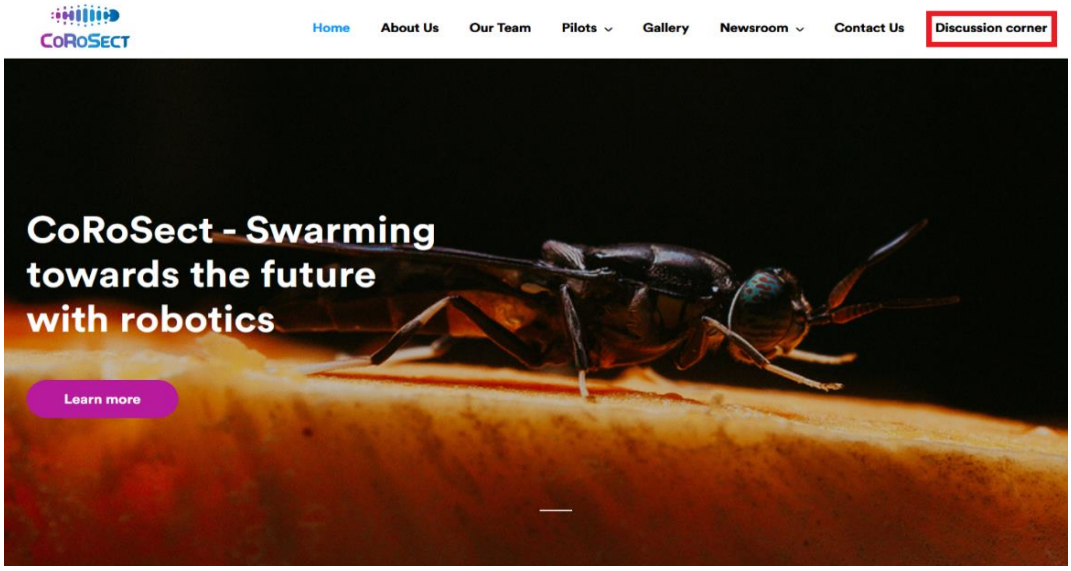


Figure 36 Discussion Corner on the Home Page

After a comprehensive analysis of the inbound market, it was deduced that a specific place for the exchange of opinions, questions, and messages regarding the CoRoSect topics, is required. This type of collaboration, namely interactive communication with visitors is essential and beneficial to the CoRoSect project and its visibility in different communities and it will boost development of new ideas, insights and solutions.

The Discussion Corner tab is designed to be appealing, to intrigue, to inform and to encourage. The aim is to inspire visitors to ask questions regarding CoRoSect work. The Figure 37 shows the look of the Discussion Corner. On the left side of the window, the CoRoSect audience can see previously asked questions. This will not only serve to inform them about details of the CoRoSect developments/achievements/results, but also to encourage them to ask questions, and also to assure them that they will be answered. However, on the right of the window, users will have a chance to fill in the form and send inquiry to the CoRoSect team, which will be facilitated by the WP11 leader, namely FoodScale Hub (FSH), about what interests them.

FSH is in charge of filtrating received questions/messages/inquiries and responding to them. Furthermore, in the case that the answer requires expertise, the questions will be further referred to the relevant expert. Once the answer is received from an expert, it will be publicly available on the CoRoSect website, and the notification will be sent to a person's email address. Therefore, it is obligatory to insert an email address and at least first name to know to whom it should be addressed.

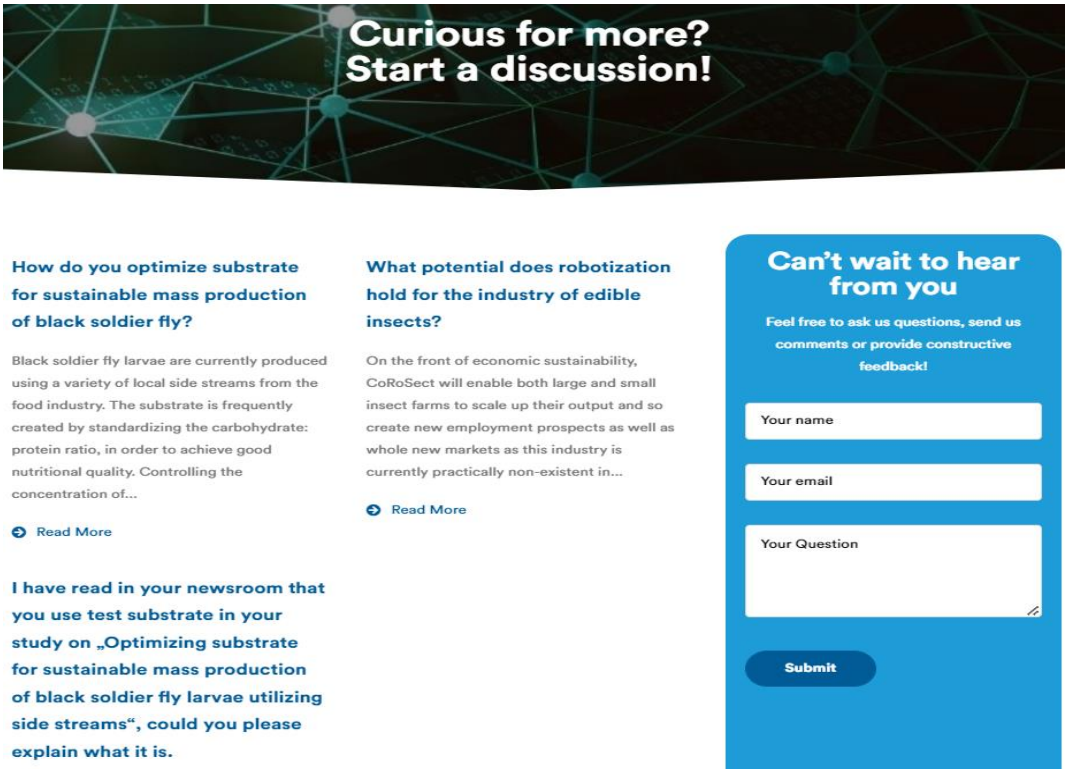


Figure 37 Discussion Corner Tab

The discussion corner intends to bring new ideas and subjects into the limelight for discussion and knowledge exchange. This could provide a great opportunity for both visitors and experts to find new ways toward sustainable insect farming. It will also create better and more interesting interactions between visitors and experts on the website.

2.2.4.3. Insect farming stories you won't find anywhere else

With the aim to intrigue CoRoSect's audience, and to grow a loyal consumer base for the future business endeavors, this part of the website was developed, and the visual image of this segment is presented in the Figure 38. This section is dedicated to insights and outcomes of the innovations tested in real-time environments, which will enable potential business actors to see future business developments. Each pilot section is updated with the relevant story, namely the results of (pre-)pilots' development and innovation are published.

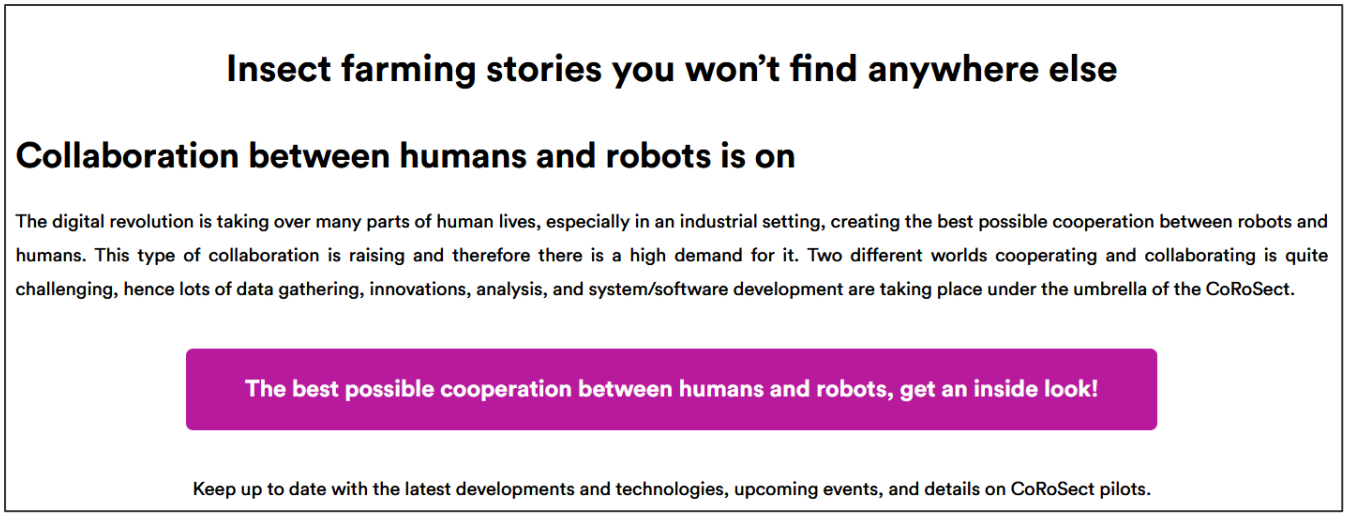


Figure 38 Example of Insect Farming Stories

The strategic aspect of "Insect farming stories you won't find anywhere else" is to strongly disseminate the outputs of the testings. This will create a compelling case for the CoRoSect services viability, competitiveness, and added value in comparison to the alternatives available on the market, to engage and retain end-users, and subsequently to market its exploitable assets.

2.3. Face-to-face meetings & Dissemination Events

Throughout the course of the twelve months, CoRoSect took part in all pertinent online events and webinars to disseminate the CoRoSect messages and enhance connections with other related projects and important industry players.

Although during the significant period of the project's duration, events were either online or hybrid (due to COVID-19), CoRoSect worked hard to ensure a thorough and successful online and offline presentation of its results and achievements to a larger number of stakeholders and increase its prospective.

Therefore, CoRoSect got a chance to shine on the stage and to publicly present its technologies, accomplishments, and solutions at diverse events, enabling promotion, networking, and collaboration boost.

In the last twelve months CoRoSect was involved in over 20 different activites, such as conferences, exhibitions, workshops. The CoRoSect's role was not only to present its achievements, but also to actively participate and co-organize.

In the list below are some events, conferences and exhibitions, where CoRoSect was actively and successfully presented, using appealing branding material, and showing off with the recent developments.

Advanced Factories

29-31 March 2022

Advanced Factories is the yearly gathering of industry leaders. Since 2017, this event has secured its position as the industrial trade show where the most recent products in industrial automation systems, robotics, industrial software, artificial intelligence, artificial vision, and virtual simulation solutions, as well as Big Data, IoT, cybersecurity, industrial cloud computing, machine learning, and all technologies 4.0 related to digital manufacturing, are displayed.

CoRoSect involvement in the event

Robotnik presented appropriate option, as presented in the Figure 39, for industrial applications in indoor environments like factories or warehouses, where the transport is one of the most demanded operations. CoRoSect was presented through appealing informative flyers, with the aim to provide visitors a chance to consult Robotnik regarding the solution.

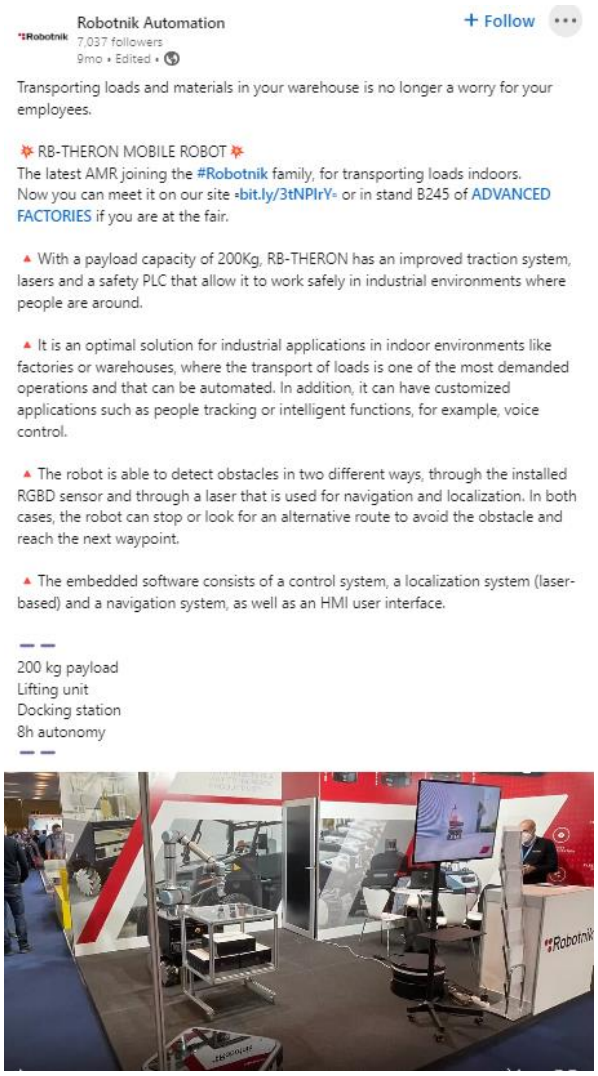


Figure 39 CoRoSect presented by Robotnik

Industry Forum

1-3 June 2022

The annual IEEE ISIE brings together scientists, academics, business leaders, and practitioners from more than 100 nations to discuss cutting-edge technologies, discoveries, creative solutions, research outcomes, and projects related to industrial electronics and their applications.

CoRoSect involvement in the event

HSEL successfully presented technological developments at the Industry Forum. The main topic was integration work for the CoRoSect project "Industry 4.0 compliant Digitalization of Insect Production Farm (EU Project CoRoSect)". This type of development is of great importance for the automatization in insect farming.

73rd Annual Meeting of the European Federation of Animal Science

5-9 September 2022

Through several parallel sessions, a plenary meeting, poster presentations, and debates about scientific advancements in livestock production around the world, the European Federation of Animal Science (EAAP) Annual Meeting provide a platform for the application of innovative ideas in practice.

CoRoSect involvement in the event

Since the one of many visions in the CoRoSect project is to introduce insects as a missing puzzle in the modern food chain (Figure 40 – CoRoSect at EAAP2022), this was a great opportunity for to present CoRoSect project insect digital twin work done at LUKE.

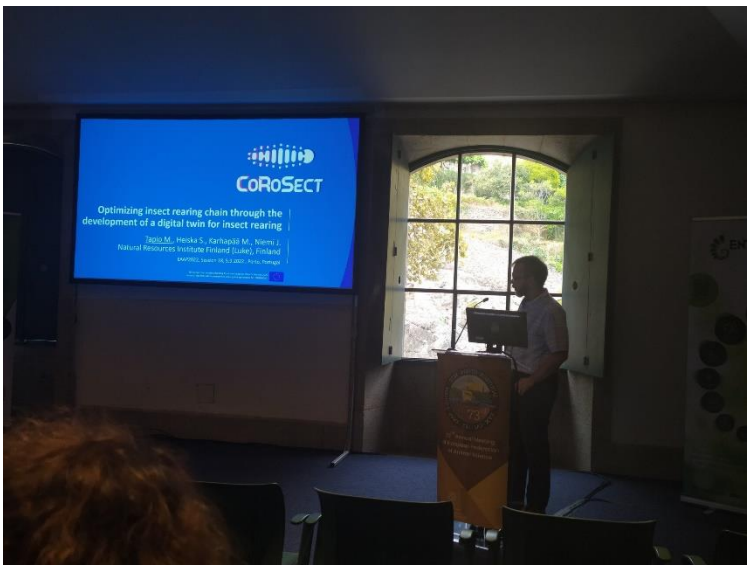


Figure 40 CoRoSect at EAAP2022

INSECTA 2022

14-16 September 2022

The INSECTA conference has established itself as a place where science and industry engage in fruitful knowledge exchange encompassing newcomers and experts. But the goal of the conference is multifold and it goes beyond the individual work of single entities. The aim is to build a strong ecosystem, connect companies and research institutes that play a major role in insect production and application, so the prospective aspects of insect technology could be discovered and implemented.

CoRoSect involvement in the event

One of the partners at the CoRoSect project, LUKE – Natural Resources Institute Finland, presented its work within the project framework entitled „Optimizing substrate for sustainable mass production of black soldier fly (Hermetia illucens) larvae utilizing side streams. "LUKE highlighted that various types of local side streams from the food industry were currently utilized as substrate in black soldier fly larvae (BSFL) production. To meet high nutritional quality, the substrate was often designed by standardizing carbohydrate: protein ration. In order to ensure larvae growth and well-being, it is important to control the content of certain amino acids, while planning of the composition of the substrate. This is shown in the Figure 41.

Figure 41 CoRoSect at INSECTA 22

EC3 Cybercrime Conference 2022

19-20 October 2022

Law enforcement, the private sector, and academia gathered at Europol's headquarters, the world's largest platform of exchange on cybercrime. The theme was "The Evolution of Policing – do we need

a social contract in cyberspace?". Europol's Cybercrime Conference looked at the challenges and opportunities that the digital age presents to policing.

CoRoSect involvement in the event

Partner KUL attended the event and followed discussions on the legal and policy developments that aim at ensuring the privacy and security of emerging technologies, concerning particularly big data and AI. They have also been involved in discussions on how to enhance public and private collaboration to increase the security of ICT technologies.

This event enabled us to find about the developments in the field of law and creating policies regarding emerging technologies, in order to address them in our research, and make any necessary interventions, and develop policy guidelines on unaddressed issues.

Iknowledge Forum

3-5 October 2022

Research and technology organizations are fundamentally focused on helping businesses advance technologically and increase their level of competitiveness through the creation, development, and dissemination of cutting-edge solutions, technologies, and scientific-technical knowledge to the business sector, from which they receive a portion of their funding. The majority of these organizations are "non-profit" ones.

CoRoSect involvement in the event

Tecnova Team shared some insights and learning takeaways from the CoRoSect project at the roundtable at the Forum, as it can be seen in the Figure 42, dedicated to challenges and future trends in the technological aspect of the agriculture and food industry. The

Figure 42 CoRoSect at Iknowledge Forum

FIWARE Summit

14-15 September 2022

The two-day Fiware Summit featured cutting-edge innovation, increased teamwork, and networking opportunities. All FIWARE enthusiasts and novices, members and partners, startups to major players, public administrators and academics, developers to strategists, project managers to CEOs, were welcome to attend the event. According to tradition, FIWARE offers support to people who want to use well-known Open Source technology to change this world for better, predict the future, or disrupt markets.

CoRoSect involvement in the event

CoRoSect's Information Management System (IMS) and the Route Manager component for the safe human and robot collaboration (HRC) environment were presented (Figure 43). ATOS showcased the I4.0 Manufacturing Execution System using FIWARE Digital Twins.

Figure 43 CoRoSect at FIWARE Summit

In order to reach our key stakeholders for post-project exploitation, taking part in such events and promoting the project is essential.

3. CoRoSect Monitoring System

CoRoSect dissemination and communication team puts a huge effort into improving all actions, hence weekly tracking is adopted.

The communication and dissemination strategy's progress is evaluated by using the results of monitoring tools, tracking its performance, and deciding whether a new framework is necessary to assure success in achieving performance goals.

Accordingly, all the activities are organized in advance, with the purpose to concentrate on producing content that is expressly intended to advance communication, growth hacking, and community building.

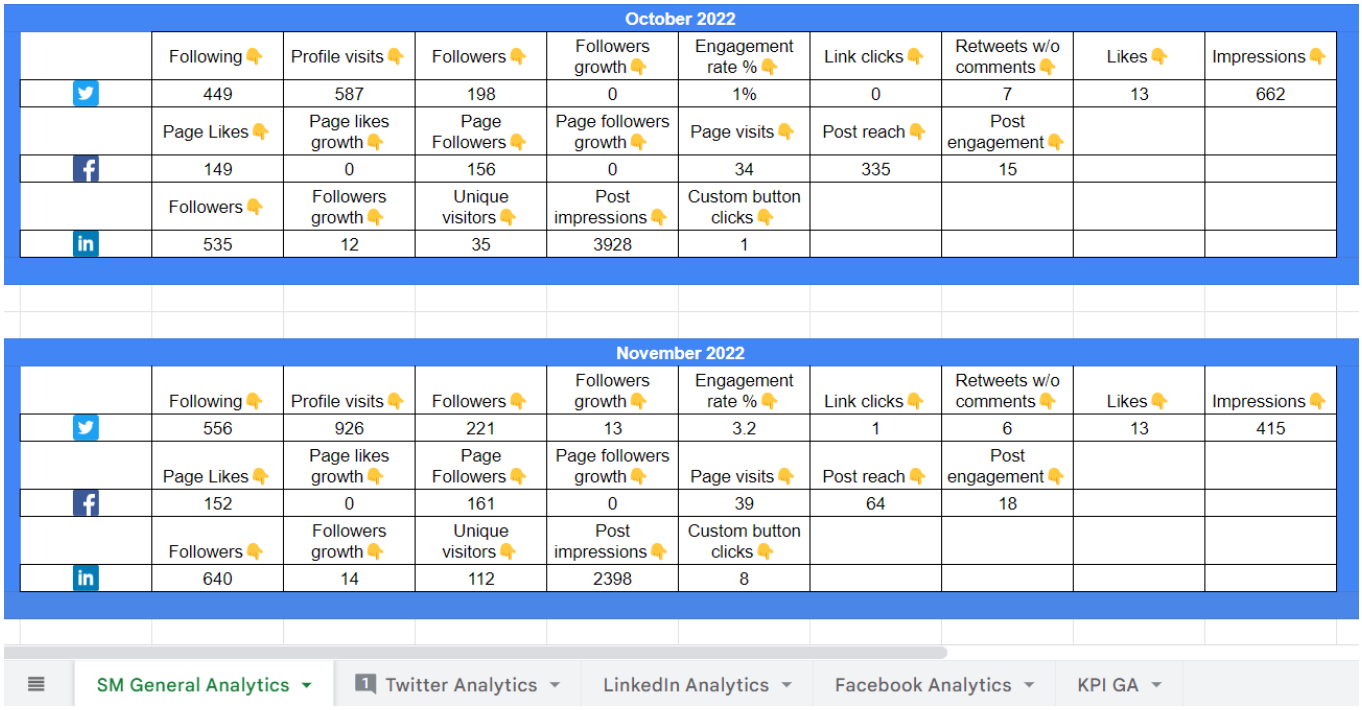
3.1. Tools for monitoring

To create a such an appealing image of CoRoSect and to disseminate CoRoSect results in an intriguing, interesting, and captivating manner, the following tools need to be used to track and assess the growth:

- Content Planner - gather compelling social media messages, visuals and calls to action
- Social Media Analytics – gather data from LinkedIn, Twitter, Facebook, Website Page Views
- Event Tracker Calendar – gather future and past events
- Email Campaign Tracking and Reporting (Mailchimp) – gather number of subscribers to the Newsletter
- Google Forms cloud-based Questionnaire – used for survey and questionnaires, to collect any additional information
- CoRoSect Activity Report – collect information on CoRoSect's activities
- Google Analytics – tracks data on website traffic

The majority of these spreadsheets and tools have been added to and are updated regularly on the CoRoSect Google Drive. Each consortium partner should give a brief report on their individual outreach initiatives. A short and interactive Google Form Questionnaire is used to gather this data. The Social Media Metrics spreadsheet is used to monitor the impact of previously chosen KPIs and evaluate the effectiveness of outreach and communication initiatives. Each social media network provides a tracking sheet with certain parameters that should be followed on a weekly and monthly basis. In order to increase audience engagement, we review the insightful data we gathered at the end of each month and decide where to focus our attention the next month.

In the table below, communication team is tracking the flow on all CoRoSect social media channels, both on a monthly and weekly basis. This also leads to the better and precise overview of changes.



October 2022									
	Following 👇	Profile visits 👇	Followers 👇	Followers growth 👇	Engagement rate % 👇	Link clicks 👇	Retweets w/o comments 👇	Likes 👇	Impressions 👇
	449	587	198	0	1%	0	7	13	662
	Page Likes 👇	Page likes growth 👇	Page Followers 👇	Page followers growth 👇	Page visits 👇	Post reach 👇	Post engagement 👇		
	149	0	156	0	34	335	15		
	Followers 👇	Followers growth 👇	Unique visitors 👇	Post impressions 👇	Custom button clicks 👇				
	535	12	35	3928	1				

November 2022									
	Following 👇	Profile visits 👇	Followers 👇	Followers growth 👇	Engagement rate % 👇	Link clicks 👇	Retweets w/o comments 👇	Likes 👇	Impressions 👇
	556	926	221	13	3.2	1	6	13	415
	Page Likes 👇	Page likes growth 👇	Page Followers 👇	Page followers growth 👇	Page visits 👇	Post reach 👇	Post engagement 👇		
	152	0	161	0	39	64	18		
	Followers 👇	Followers growth 👇	Unique visitors 👇	Post impressions 👇	Custom button clicks 👇				
	640	14	112	2398	8				

Figure 44 Social Media Analytics Excel Sheet

Below represented table shows weekly updates on the CoRoSect LinkedIn profile.

	LinkedIn Analytics 2022							
	10/10-14/10	17/10-21/10	24/10-28/10	31/10-04/11	07/11-11/11	14/11-18/11	21/11-25/11	28/11-02/12
Followers 👉	514	516	535	580	604	626	640	650
Followers growth 👉	5	2	12	45	24	22	14	10
Page views 👉	159	147	155	219	248	250	257	178
Post impressions 👉	2867	2253	3928	3937	3119	2992	2398	3122

Figure 45 LinkedIn Monitoring Excel Sheet

Social Media Content Planner (Figure 46)aims at tracking all the compelling social media messages, visuals and calls to action, created during the project duration.

Date	Time	Campaign	Message	Graphic Y/N
15.11.2022	09:00	Pre-pilot - Tecnova	🏅 Success by the Tecnova team in the insects' and object's manipulation. 🔬 During this session, the team was testing the effectiveness of the end-effector for the manipulation of insects and objects. ⏳ The results were good! 👍 Sample collection from insect larva was done WITHOUT causing harm to them. Moreover, the same end	Yes
17.11.2022	16:00	Pre - pilot OAMK	🦎🐤 Chirping is louder and louder, this time you can hear the success from OAMK! 🌞 🔬 Prototypes of different sensors with the supporting software solutions are built and tested! 📰 The prototypes measured temperature, humidity, CO2, NH3 and moisture of the substrate, for the sake of the well-being of insects during the rearing process. 😃 🏅 The tests in the pre-pilot provided crucial details on: ✅ The scale of different parameters in the insect growing environment ✅ The usability and performance of the selected sensor solution	Yes
22.11.2022	15:30	Pre-pilot ATOS and Robotnik	Robotnik and ATOS team up for insect farming efficiency What have our #techpartners been up to!? 👉 Well.. they have created D-Robot that can robustly and accurately destack and stack crates filled with insects, without crashing. 🤔 How did they achieved that?	Yes
29.11.2022	10:00	Pre-pilot ATOS and Robotnik	📫 Achievements continue… 🍾🍾 🔬 #techpartners (Robotnik Automation and Atos) developed a #server (OPC-UA server) for updating the status of the D-Robot's movements, execution of commands and determination whether the action have succeeded or failed. 🦾 ⭐ The server: ✔ connects to the CoRoSect Information Management System (IMS) ✔ serves as a bridge between the IMS and ROS (interface for robot)	Yes

Figure 46 Content Planner for Social Media

In addition to the assistance provided by each social media platform's analytical capability, Google Analytics (Figure 47) is used to monitor and report website traffic. Google Analytics serves as a great tool for better understanding the CoRoSect audience and assessing efforts and achievements of execution. Therefore, it enables boosting results, due to tracking of users interaction with the CoRoSect website.

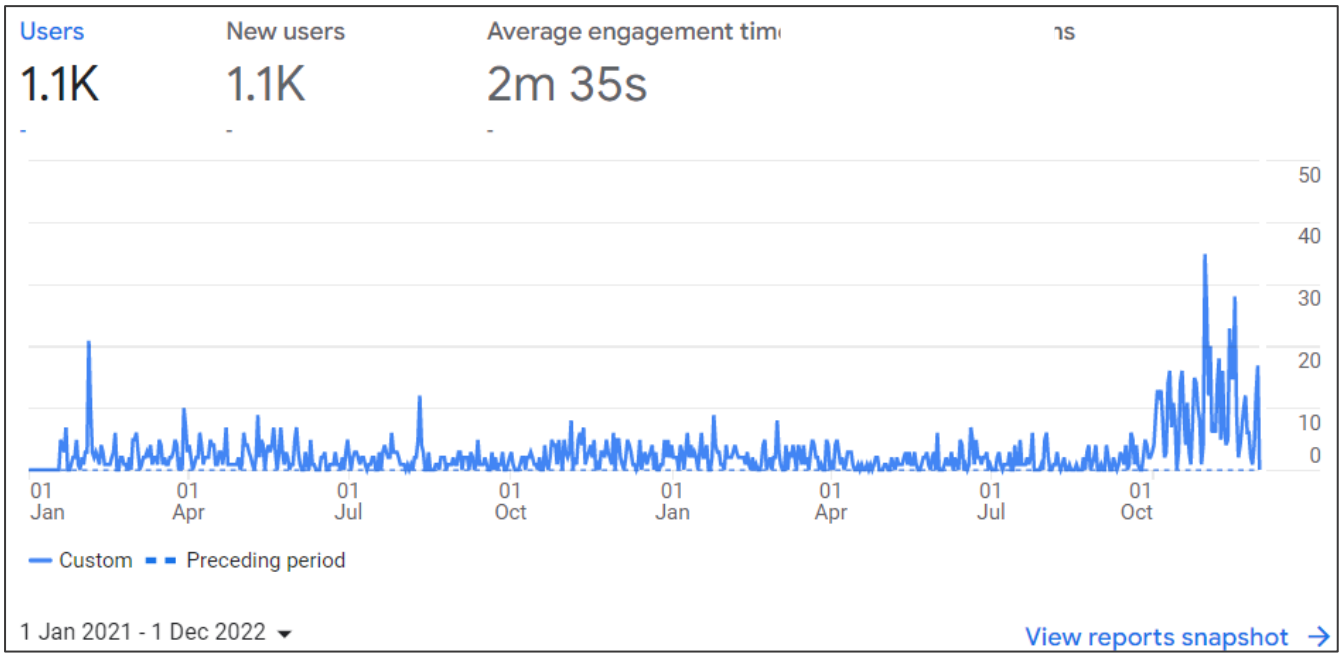


Figure 47 Google Analytics – Number of Users engaged with the CoRoSect website (M01-M24)

The CoRoSect communication and dissemination team is heavily concentrating on achieving the KPIs. As seen from all the work previously presented, reaching KPIs is going in the right direction, as can be seen in the Figure 48.

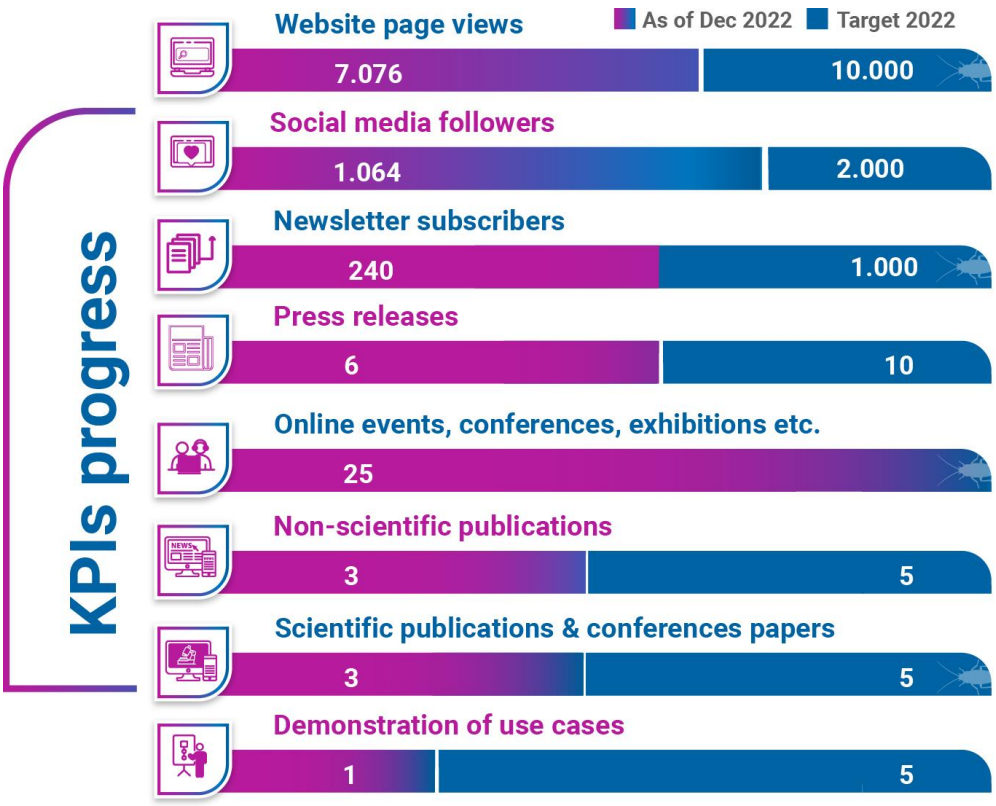


Figure 48 KPIs Progress as of December 2022

The CoRoSect team made significant strides towards the improvement of communication and dissemination activities. Furthermore, for the updates on the KPIs in the form of questionnaire and the monthly activity report are regularly sent out to the whole consortium, in order to keep everything trackable and manageable.

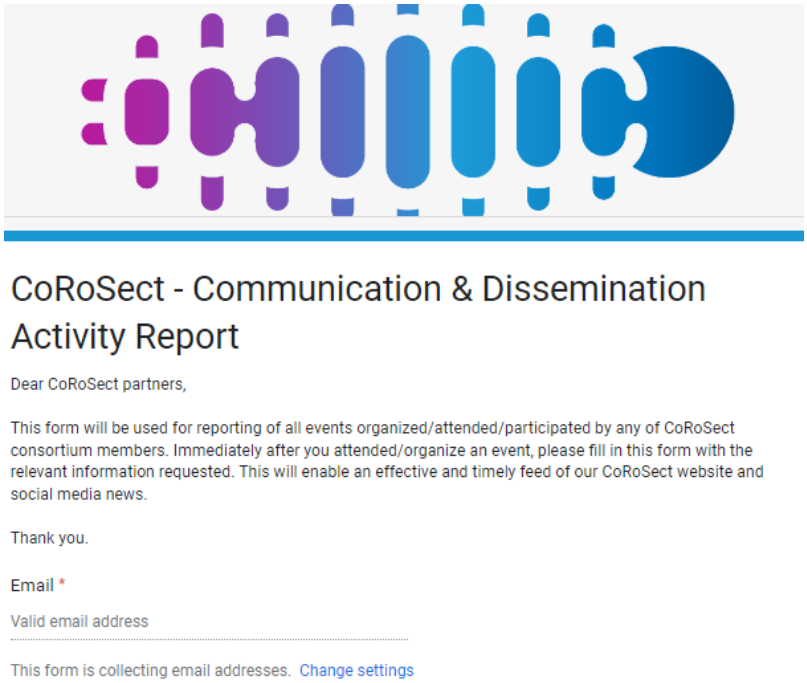
As previously mentioned, with the tangible results emerging, scientific publications, demonstration of use cases, conference paper and etc. will be published and executed. This particular KPIs Update Tracker table serves not only to track achievements across the consortium, but also to have insight into the publishing content in the local languages of all partners.

Hence, following list of scientific publications and conference papers present results generated under the umbrella of CoRoSect:

- Tapio M., Heiska S., Karpahää M. and Niemi J. 2022 „Optimizing insect rearing chain through the development of a model-driven decision support system", Journal of Insects as Food and Feed Volume 8, Issue Supplement 1, p. S107. (https://www.wageningenacademic.com/doi/epdf/10.3920/jiff2022.s1)
- Tapio M., Karpahää M., Heiska S., Virta J., Niemi J. 2022 "Optimizing substrate for sustainable mass production of black soldier fly (Hermetia Illucenc) larvae utilizing side streams ", Book of Abstracts of INSECTA 2022 – International Conference, p.87 (https://insecta-conference.com/wp-content/uploads/2022/09/BAB_106_Insecta_2022_final_mit-U1.pdf)
- Tapio M., Heiska S., Karpahää M. and Niemi J. 2022, "Optimizing insect rearing chain through the development of a digital twin for insect rearing", Book of Abstracts of the 73rd Annual Meeting of the European Federation of Animal Science, p.276 (https://www.eaap2022.org/docs/AbstractBookEAAP.pdf)

Furthermore, it is also important to list non-scientific publications:

- Securing European Cyberspace: Is the Food and Agriculture Sector Critical?
- Trustworthy AI for Insect Farming



CoRoSect - Communication & Dissemination Activity Report

Dear CoRoSect partners,

This form will be used for reporting of all events organized/attended/participated by any of CoRoSect consortium members. Immediately after you attended/organize an event, please fill in this form with the relevant information requested. This will enable an effective and timely feed of our CoRoSect website and social media news.

Thank you.

Email *

Valid email address

This form is collecting email addresses. Change settings

Figure 49 CoRoSect Activity Report

The CoRoSect Activity Report (Figure 49) is sent out on the monthly basis to collect information on CoRoSect's activities. Type of activity, description of activity, name and place of activity, date of activity, and type of audience, and etc., are some of the data that are required to be filled in by partners.

3.2. Pilots' results tracking

The CoRoSect is entering the dissemination phase, due to emerging outcomes from the pilots and experimentation. This will be a great route toward the dissemination process of the CoRoSect. The publishing or presentation of scientific findings, resulting from or based on the activities carried out within the framework of the project, enact as a trigger for clients'/customers' curiosity. Therefore, this encourages the general goal of CoRoSect's inbound marketing initiatives – to draw important stakeholders and keep them interested.

Since the processes in the pilots are repeating, thus innovations and technologies are more or less similar throughout each cycle. For that reason, it is of great significance for WP11 to receive all the necessary information, in order to disseminate the results. Tools and approaches considered for this step are of iterative nature. This type of method is created for the best benefit of the project. Thus enabling the content to be, not only great in quantity but more importantly great in quality.

- Tailored-made e-mails, sent out after each cycle, in order to compare improvements, differences, and discrepancies allowed to be published online.
- Google forms cloud-based questionnaires – this has proven to be a better method to gather data, rather than sending out excel sheets to be filled out. This type of data collection allows better overview, and more interactive sessions, enables more detailed responses, and is efficient.
- Excel sheets – easier to collect numeric achievements, which will provide us with an overview of the scientific publications, and published outcomes of the pilots.

Certainly, this segment will help the future endeavors that should be undertaken for developing exploitation strategies for exploitable assets. The Figure 50 represents approach toward collecting necessary information regarding pre-pilot and future pilots.

ENTOMOTECH								
E-MAIL	REMINDER	PARTNER	BRIEF SUMMARY	VISUAL	VISUAL DESCRIPTION	POSTED ON:	LINK	REMARKS
Yes	Not needed	ENTOMOTECH	The pre-pilot activities have given us a sort of preview of the possible future of automated farming of certain insects like Hermetia illucens, Tenebrio molitor, and Ancheta domesticus. Our main role, as insect breeders, was to mainly assist the technical team by showing them or familiarizing them with the different stages of insect farming and the problems that may arise when incorporating their tech for each stage of the insects' development. The next step now belongs to the technical team. They will fine tune the integration until such time that it can be commercially available.	Yes		03.11.2022	https://www.linkedin.com/feed/update/urn:li:activity:6993909105937526784	
Yes	Not needed	OAMK	Before the pre-pilot based on the identified user requirements for high-quality insect rearing, suitable sensors solutions for intelligent crates were identified, studied and developed. Pre-piloting prototypes of different sensors were built in order to be integrated into intelligent crates. These will monitor the critical parameters for the well-being of insects during the rearing process. Initial prototypes of sensor solutions with the supporting software solutions were tested in the pre-pilot. There were three intelligent crates created and tested, with several sensors elements in each crate. Sensors were measuring temperature, humidity, CO2, NH3 and moisture of the substrate. Pre-pilot gave important information on the scale of different parameters in the insect growing environment and also the usability and performance of the selected sensoring solutions as well as the wireless communication and software solutions. Results of the pre-pilot will be exploited in the development of the system and in the future piloting actions.	Yes	Attached is a picture of crate with temperature, humidity and substrate sensoring	17.11.2022	https://www.linkedin.com/feed/update/urn:li:activity:6999020611138142208	
Yes	Yes	TECNOVA	From Tecnova our current achievement at the Pre-pilot was the trail and prove of the effectiveness our designed end effector for the manipulation of insects and objects. The result obtained was the capability to pick sample of insect larva successfully, without causing harm to them, and the capability to pick both drinkers and trays with the same end effector.	Yes		15.11.2022	https://www.linkedin.com/feed/update/urn:li:activity:6998190466638774272	

Figure 50 Pre-pilot and Pilots Tracker

The tailored-made strategy is aimed at pilots' promotion.

4. Action Points and Next Steps

The following report on dissemination and communication activities is D11.4 Final Dissemination and Communication Report in M36. Several measures will be put in place, as the project enters its third and final year to maintain the momentum and the good flow started in the first year, but enhanced throughout the second year.

The overall priority is to focus on updating the Newsroom with the latest developments, insights, and interesting facts from the CoRoSect realm of work. For that reason, the spotlight will be on interactive experiences. Due to pilot activities, the target audience will have a chance for one-on-one communication with the experts, which is established through the discussion corner, enabling clients the possibility to ask interesting questions, moreover this puts an emphasis on the dissemination of pilots' outcomes.

Having in mind, that the outcomes of the pilots will be in the spotlight, hence the focus will be on the dissemination activites will be more in the spotlight in the next period. Consequently, the number of followers, website visits, interest in the project, social media engagement, blog posting, news and etc., will significantly increase. With more findings and results nearing the end, communication and dissemination activities will be intensified.

4.1. Future Events

There is a number of relevant events in which CoRoSect plans to participate. The Figure below represent some of them.

Event	Date	Location
European Robotic Forum (ERF 2023)	14-16 March 2023	Odense, Denmark
INSECTA 2023	14-15 September 2023	Magdeburg, Germany
VIVA TECH	14-17 June 2023	Paris, France
ICINCO	13-15 November 2023	Rome, Italy
HACKATHON	17-18 March 2023	Maastricht

Figure 51 Events' Tracker

Furthermore, with the emerging results from the testing, it is expected to have multiple publication opportunities in the upcoming period. For example, Journal of Insects as Food and Feed, Entofomago (first international specialized information media on edible insects as food&feed), "Food Production, Processing and Nutrition", Journal on Insects, Insects as Feed, will serve for this purpose.

5. Conclusion

The overall purpose of the dissemination and communication activities is to create a strong and recognizable online and offline image of CoRoSect and to show the world the amazing achievements accomplished during the project's lifespan. Moreover, it is also important to present findings that emerged during the experimentation period. Hence, the deliverable D11.1 Dissemination and Communication Plan established well-tailored dissemination and communication actions. In the following deliverable D11.2 1st Dissemination and Communication Report, the focus was on raising awareness of CoRoSect's aims, goals, visions and mission. With this deliverable D11.3 2nd Dissemination and Communication Report, all agreed action points from the previous reports were achieved, additionally, it enhanced completed endeavors executed by the dissemination and communication team.

CoRoSect online presence has been significantly improved, which is confirmed by the increase in numbers. Furthermore, social media outreach achieved amazing progress by implementing diverse social media campaigns, contributing again to the acquisition of KPIs. Nevertheless, this would not have been done without quality and diverse content provided to the CoRoSect audience, thanks to the contribution from the whole consortium.

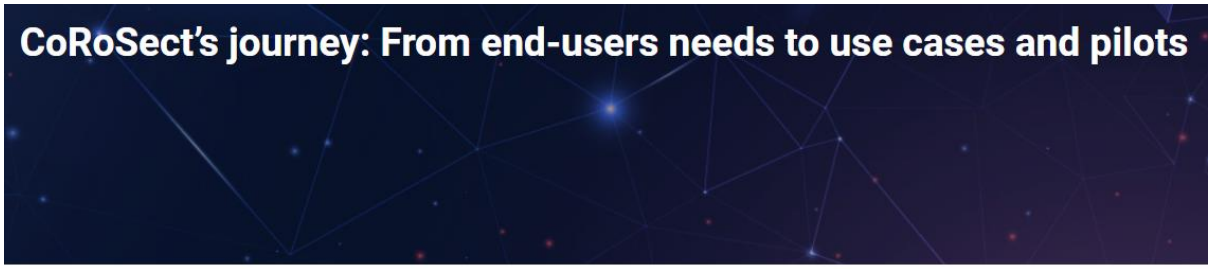
Furthermore, the most recent developments emerging from the use cases will to great extent boost the growth curve of the overall performance of the Dissemination and Communication activities.

By all counts, and with proven results, the overall trajectory of the Dissemination and Communication actions is on a good track, with no deviation or corrections needed, affirming that CoRoSect works to maintain alignment with the goals outlined in D11.1 Dissemination and Communication Plan, to expand its visibility in pertinent networks and to further disseminate and communicate all objectives

6. Annexes

1. Insect farming stories you won't find anywhere else

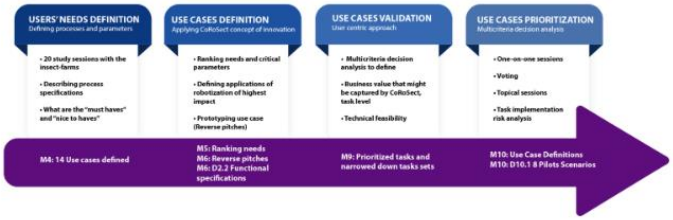
The below represented show the whole story behind the "Insect farming stories you won't find anywhere else".



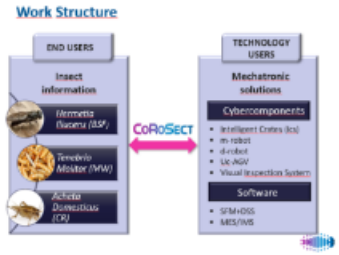
Insect farms have been among the last fields to undergo a digital revolution, but changes are happening, and they will be reflected in productivity boosts, increased quality, and reduction of production costs. In order to create a paradigm shift in insect farming with state-of-the-art robotic solutions, CoRoSect partners have made significant strides, like setting up 8 use cases for piloting, to test and validate CoRoSect technologies. But before that, all partners made sure that end-user needs are a starting point for the proper preparation of the use cases. Based on the multi-instrumental analysis, 5 types of use cases were extracted:

- Quality Management and Intervention
- Oviposition Management
- Larvae/Cricket Management
- Pupation Management
- Harvesting/Waste Management

8 use cases have been designed and chosen for piloting, to test and validate CoRoSect technologies. The following approach was used to choose 8 scenarios:



In order to define the functionalities and technologies of the CoRoSect system, extensive information on insect rearing of the insects Tenebrio Molitor, Hermetia Illucens, and Acheta Domesticus was collected. The gathered data detected specific information and requirements from final users, which are of great significance for the project. This has facilitated the definition of system architecture for CoRoSect system implementation.



Furthermore, technical characteristics and boundaries for mechatronic solutions in the CoRoSect project were presented for each species in the following structure:

- Life cycle and physiology
- Production requirements
- Farming operations, including Key Performance Indicators for the different production areas.

It is of great importance to pinpoint the fact that partners have engaged in process of technical requirements and technology implementation for the CoRoSect Area including software management and the different cyber components that will interact with human operators.

Based on CoRoSect's initial objectives and functional requirements extracted from the use cases (specific insect-rearing tasks) and scenarios (end users' farms), the first CoRoSect Reference Architecture (CoRoSect RA) was established. This architecture identifies and interlinks the CoRoSect components and defines the tiers and functionalities that guide the integration of the final CoRoSect System.

The following components have been defined:

The logical implementation of the CoRoSect system (in its first version) defines the communications and relationships between components inside a layer and between the OT/IT layers.
The CoRoSect process view
The CoRoSect development view

These different views of the CoRoSect System Architecture have been done according to the RAMI4.0 guidelines to define a novel architecture Industry 4.0 compliant.

It is of great importance to highlight the fact that the focus has been on the development of the structure from motion and the Decision Support System, where current work is being done on the design of the Unified Modeling Language diagrams for both systems. This will make it easier to develop associated software. Currently, the definition of the graphical interface to communicate all the cyber-physical components of the system and their implementation is being established. The result of this work will allow CoRoSect to offer a light and configurable Information Management System that optimizes the workflows in the d-cell of each farm.

The development and planning of the d-cell workspace for each of the farms are of the essence. To properly organize the planning and preparation of the pilots, the technological users and the designated farms are working closely together. All efforts are being made to provide a definitive solution for installing the d-cell in each farm and simulating the specific pilots in each situation.

2. Newsletter - October Edition

CoRoSect

Welcome to CoRoSect's October 2022 Newsletter –
Working together toward robotics-enabled insect farms

CoRoSect's journey: From end-users needs to use cases and pilots

Insect farms have been among the last fields to undergo a digital revolution, but changes are happening, and they will be reflected in productivity boosts, increased quality, and reduction of production costs. In order to create a paradigm shift in insect farming with state-of-the-art robotic solutions, CoRoSect partners have made significant strides, like setting up 8 use cases for piloting, to test and validate CoRoSect technologies. But before that, all partners made sure that end-user needs are a starting point for the proper preparation of the use cases. Based on the multi-instrumental analysis, 5 types of use cases were extracted:

- Quality Management and Intervention
- Oviposition Management
- Larvae/Cricket Management
- Pupation Management
- Harvesting/Waste Management

Read more...

Collaboration between humans and robots is on

The digital revolution is taking over many parts of human lives, especially in an industrial setting, creating the best possible cooperation between robots and humans. This type of collaboration is raising and therefore there is a high demand for it. Two different worlds cooperating and collaborating is quite challenging, hence lots of data gathering, innovations, analysis, and system/software development are taking place under the umbrella of the CoRoSect.

In the CoRoSect project, the emphasis is on how workers' concentration levels change during the execution of specific human-robot collaboration tasks. Gathered data is used to train deep learning models in an industrial environment, which will be recreated using a mobile Augmented Reality Device, such as Microsoft's HoloLens 2. This has shown great results and significant progress has been achieved in the establishment of the simulated environment. But CoRoSect teams do not stop here!

They have put effort into the experimentation of different algorithms for detection, tracking, and measuring the distance of people and objects from fixed cameras, to find the adequate algorithm. Their final decision fell onto the use of detic, a method to detect Twenty-Thousand Classes using Image-Level Supervision with DeepSORT, a tracking-by-detection algorithm. Furthermore, the determination of the message bus and messages to be sent to the rest of the components is undertaken.

In addition, CoRoSect teams have been working toward the enhancement of the annotation process. They have tested a super-pixel algorithm called Simple Linear Iterative Clustering (SLIC). An attempt was made to split single frames into subframes using high- resolution frames of actual insects provided by the farms.

Segmentation of insects using SLIC (Left), and Optical Flow (Right) algorithms

The best possible cooperation between humans and robots, get an inside look!

Path toward environmentally and economically sustainable insect farming

Viability and continuity are the key pillars toward building a sustainable path, but not the only ones to achieving it. In order to create environmentally and economically green and renewable insect farms, sustainable insect diets have to be enhanced. The CoRoSect team has taken this issue under its roof. They have designed the experiment from which the information on developing a decision support tool for insect rearing and on insect feeding will be extracted. Preferred rearing conditions and parameters are the key factors to be followed, and considered insects are mealworms, black soldier flies and house crickets. These factors aim to find out the most optimal diet for these insects, hence enabling sustainable insect farming. The method to conduct this experiment is through the inclusion of different side streams of agriculture and food sector in the diets, the nutritional content of diets, and the supply of water to insects. In one of many presentations, it was highlighted that various types of local side streams from the food industry are currently utilized as substrates in black soldier fly larvae (BSFL) production. To meet high nutritional quality, the substrate is often designed by standardizing carbohydrate: protein ratio. For larvae growth and well-being, it would also be important to control the content of certain amino acids, while planning the composition of the substrate.

Results presented at INSECTA 2022!

CoRoSect supports women and girls in science

The CoRoSect project is not only about technological development and insect farming, but also about diversity. Throughout our project, it has been proven and confirmed that diverse teams do better science. Therefore, in this newsletter issue, we want to applaud to the incredible women and girls in science, who are taking strides in their field to reimagine the future, and we are very proud to have them in CoRoSect!

Read more about our incredible women and girls!

CoRoSect

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101016953.