D2.11 REPORT ON THE DFA METHODOLOGY AND TRAINING AND MENTORING FORMAT TRANSFER (b)

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Executive summary

Deliverable 2.11 “DFA methodology and Training and Mentoring Format transfer (b)” is the second and final deliverable reporting on the transfer and implementation of the Design Futures Art-driven (DFA) method in the widening country Serbia. While the first deliverable (D2.10) focused on the initial training and application of the first part of the DFA method, this document builds on that foundation to present the experiences, feedback, and outcomes related to the second diamond of the DFA method, as implemented during the Second Residency of the MUSAE project. The development of the DFA method itself is a joint effort by Politecnico di Milano (POLIMI), Gluon, and the University of Barcelona (UB-Art), while its transfer and contextualization in Serbia has been led by the School of Electrical Engineering (ETF) – University of Belgrade.

The report is structured to follow the chronological process of the method’s application and evaluation. It begins by describing ETF’s participation in the Milan-based training on the second diamond of the DFA method in September 2024, and their facilitation role within the wider residency programme. It continues with the introduction of the three artist-company teams that included at least one Serbian partner, and provides insights into their collaborative journey. Next, the report outlines their final prototypes and showcases the outcomes presented at the MUSAE Final Prototype Exhibition in Belgrade. This is followed by a detailed overview of the DFA method’s implementation during the Second Residency and a synthesis of feedback collected from Serbian participants, highlighting both the strengths and areas for refinement. In parallel, feedback on the mentoring format is summarized, with suggestions for its further improvement. Finally, the report concludes with a short presentation of the MUSAE STARTS Academy event held in Belgrade in June 2025 and its role in the dissemination and consolidation of the DFA methodology in Serbia.

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1. Introduction

1.1. Purpose of the document

The purpose of this Deliverable report is to present the activities, reflections, and feedback collected during the second phase of transferring and implementing the Design Futures Art-driven (DFA) method in Serbia, one of the Widening countries involved in the MUSAE project. As the regional digital innovation hub, the School of Electrical Engineering (ETF) played a key role in supporting the application of the DFA methodology within artist-company collaborations during the Second Residency, while also contributing to the refinement of its training and mentoring components. The activities described in this report include participation in the DFA training session held in Milan in September 2024, ETF's involvement in mentoring and facilitation throughout the Second Residency programme, and the support provided to the three artist-company teams with Serbian partners. In particular, this deliverable highlights the feedback gathered on the second part of the DFA method, as well as on the mentoring process and its perceived value, with the aim of informing the final iteration of the MUSAE Factory Model.

The structure of the document follows the sequence of implementation and engagement, where Section 2 outlines the training activities conducted at the start of the Second Residency, including ETF's role and insights. Section 3 introduces the artist-company teams involving Serbian participants and presents the context of their collaboration. Section 4 focuses on the development and public presentation of their final prototypes. Section 5 provides an overview of the DFA method and collects detailed feedback from Serbian participants about its implementation, while Section 6 addresses the mentoring programme and summarizes the feedback and recommendations for its improvement. Finally, Section 7 presents an overview of the MUSAE STARTS Academy hosted in Belgrade, and Section 8 concludes the report with key takeaways relevant for the MUSAE Factory Model final deliverable.

1.2. Terms and acronyms

Acronym	**Description**
Design Futures Art-driven method	DFA method
ETF	School of Electrical Engineering - University of Belgrade
POLIMI	Politecnico di Milano
SME	Small-Medium Enterprise

2. Setting up the grounds for the DFA method

During the MUSAE Second Open Call, 11 art-tech teams consisting of a European artist and a European tech SME were selected as winners. The start of the second MUSAE residency was in September 2024, when the Second Residency Kick-Off meeting occurred, and included members of the project Consortium, that would later act as art mentors, tech mentors, and food mentors, as well as the 11 art-tech participating teams. The Kick-Off primarily allowed all engaged parties to meet each other and to familiarize themselves with all of the 11 art-tech projects. Moreover, the Kick-Off was formatted as a 2-day training, on the 19th and 20th of September, in Milan conducted by POLIMI. The training was focused on the application of the second part of the DFA method. The goal of the training was for the mentors to brush up on the second part of the DFA method, and mainly, to introduce the 11 winning art-tech teams to the DFA method, the DFA Tools and Guidelines, and to gather early feedback.

One person from the ETF team (one researcher) joined the training, receiving a brush-up on the second diamond of the DFA method and got acquainting themselves with 11 art-tech teams, previously selected at the MUSAE Second Open Call. Furthermore, being already familiar with the DFA method, the ETF team member acted as a facilitator during the Challenge Exploration and Ideas Exploration workshops in Milan, guiding artist-company teams through the different activities, clarifying the goals and expected outputs of the activities, and answering eventual questions the artist-company pairs may have had.

The ETF team member was paired with the Remedy Garden team, composed of the artist group Baum & Leahy and the company Blast Studio. Together, they built upon the artist-company team's selected scenario, "Holobiont Gardens," which the ETF team member was already familiar with from participation in the project during the 1st Open Call.

On the first day of the 2nd Residency Kick-Off, held on 19th September 2024, the ETF team member participated as an external member and facilitated the Challenge Exploration workshop (Figure 1). During this session, the artist-company team and the facilitator collaboratively defined a shared set of hopes, fears, and values using post-it notes and other materials provided for the workshop (e.g., value cards, futures compass). They envisioned a 'scene from the future', immersing themselves in a movie metaphor, which helped them complete the challenge map. This exercise culminated in the creation of a challenge statement that concluded the workshop.

Figure 1 - ETF team member and Blast Studio employee during the Challenge Exploration workshop in Milan.

On the second day, 20th September 2024, the ETF team member again participated as an external member and facilitated the Ideas Exploration workshop. Conducted as an intra-team activity, this format enabled broader input from multiple participants (Figure 2). The workshop began with a round of the Polak Game to explore participants' attitudes toward the future. This was followed by several rounds of brainstorming, idea selection, positioning, and finally, voting on the most promising ideas. Following the two workshops, the artist-company team expressed great satisfaction and enthusiasm regarding their experience with the DFA method.

The ETF team member collected personal feedback from his own perspective as a representative of a Widening country, with the aim of improving the DFA method and the associated training and mentoring formats. This feedback was shared with the wider consortium at the subsequent project meeting.
The feedback collected from ETF can be summarized as follows:

Effectiveness of the DFA method: The workshop strongly demonstrated the potential of the DFA method. The team facilitated by the ETF member expressed high satisfaction, as the process enabled them to conceptualize a future aligned with their values and hopes while addressing their fears. They were able not only to refine their existing concept but also to generate new ideas for prototypes and explore how these could shape desirable futures.

Focus on the expanding phase of the second diamond: While the expanding phase of the second diamond effectively fosters creativity and showcases the strengths of the DFA method, it does not sufficiently highlight the challenges involved in developing real-world prototypes. To address this, the ETF team member suggested incorporating the more rigorous Concept Feasibility Assessment into the workshops. This phase, where ideas are critiqued, stress-tested, and evaluated for practical viability, would better prepare teams for the realities of prototype development and the constraints posed by limited resources.

Figure 2 - ETF team member with Remedy Garden team members within the larger group of artist-company-mentor teams.

Understanding the method: The second part of the DFA method was introduced in a single session, which felt constraining when compared to the more immersive first diamond workshop held in September of 2023, which lasted a whole week. Trainees were not given enough time to fully engage with all of the associated activities.

Reception of the explored phases: Despite the above, the Challenge Exploration and Ideas Exploration activities of the second part of the method were well received by participants across all roles: lecturers, researchers, SME employees, consortium members, and artists. These activities were clearly explained, supported by appropriate materials, and logically structured.

Improved understanding between artists and companies: Companies found it easier to grasp the artistic process and to develop a shared language with artists when working through the DFA method. However, participants expressed that the workshop should have been longer to allow deeper understanding of the entire DFA process. They recommended extending the DFA method introduction and ensuring that it takes place in an environment conducive to immersive collaboration.

Need for a terminology guide: As in the first residency Kick-Off, both artists and technologists would benefit from a glossary or dictionary of future-thinking terms. Although to a lesser extent than during the first residency, unfamiliarity with specific terminology still caused confusion during the workshops, despite future-oriented thinking being a central component of the DFA method.

3. Second residency artist-company teams with Serbian parties involved

One fully Serbian artist-company team (BeeSustain), along with two European teams that included a partner from the Widening country Serbia (Nourish and NeuroCooking), participated in the Second Residency Programme, which ran from September 2024 until June 2025, culminating in the delivery of their final prototypes. Throughout the residency, all teams followed the same process and adhered to the same timeline, regardless of whether they were designated as 'Widening' or European teams. The programme included monthly online mentoring sessions and a series of training modules covering topics such as the DFA method, innovation, technology, art-tech collaboration, intellectual property, and the technologies available at the ETF Robotics Laboratory, specifically in collaborative robotics and digital biomechanics, as well as thematic sessions related to food.

At the outset of the residency, all artist-company teams participated in a two-day workshop on the Design Futures Art (DFA) method, held in Milan and organized by POLIMI. As part of their engagement with the technological ecosystem, all of the teams with Serbian parties involved were invited to visit, and visited, the ETF Robotics Laboratory, where they held in-depth discussions with two PhD students and five postdoctoral researchers about current robotics technologies and future perspectives.

Like the ten other artist-company teams, the Widening artist-company team took part in a series of trainings focused on art-tech collaboration, ethics in agri-food technologies, human-machine interaction, data ethics, iteration and data management, and intellectual property organised by MUSAE consortium. They also joined the Concept Assessment Meeting in Barcelona, organized by PAL Robotics, and exhibited their prototype at the MUSAE Final Prototype Exhibition in Belgrade, hosted by ETF Robotics.

In addition, all artist-company teams participated in the MUSAE STARTS Academy, also held in Belgrade in June 2025 and organized by ETF Robotics, where they had the opportunity to present their work and reflect on their experience working with the DFA method.

The following three pages provide a summary of the teams that included at least one Serbian partner, along with selected highlights of their interactions with the ETF team throughout the residency process.

The Serbian artist-company team

Serbian artist: Miljan Stevanovic
Serbian company: Beehold
Name of the project: Bee-Sustain
Mentoring team:

Tech mentor: Maja Trumić (ETF)
Art mentor: Marita Canina (POLIMI)
Nutrition mentor: UCD

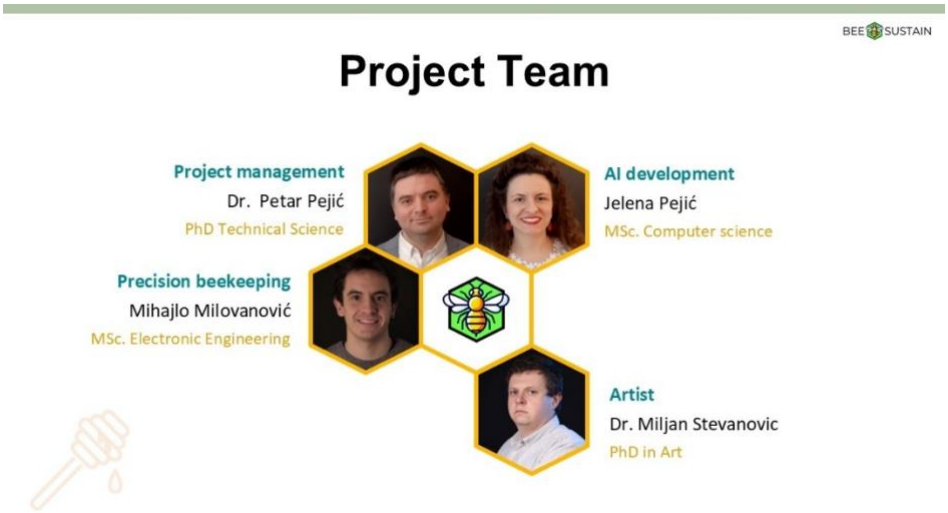

Figure 3 - BeeSustain team presentation slide

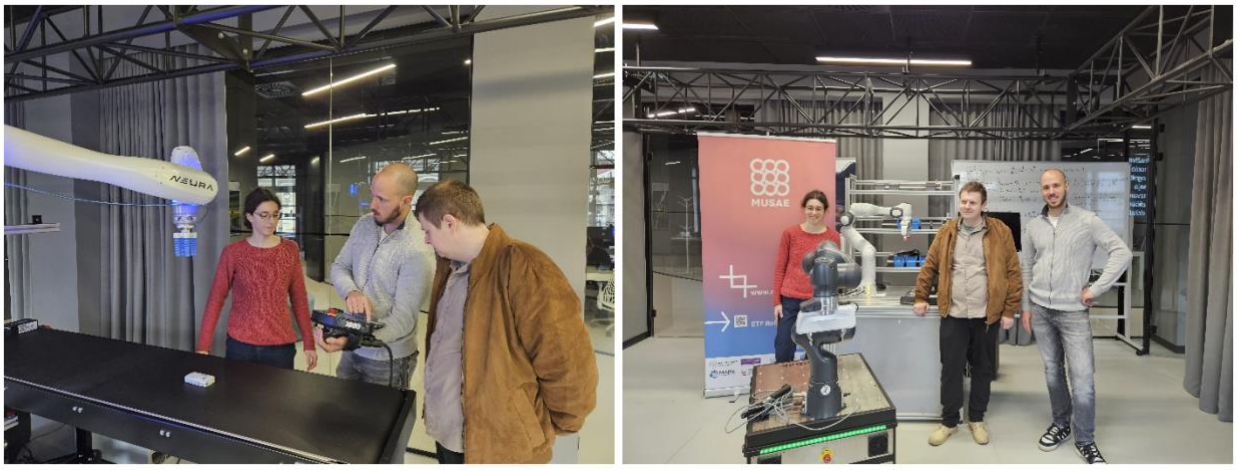

Figure 4 - Maja Trumić (ETF) and Filip Bečanović (ETF) hosting Miljan Stevanović (Bee-Sustain Artist) at the ETF Robotics laboratory during one of the prototype iteration phases

(1/2) European artist-company team involving one Serbian party

Serbian artist: Sanja Sikoparija
[Spanish] company: Starlab
Name of the project: Nourish
Mentoring team:

Tech mentor: Priya Chandrasekar (UB Tech)
Art mentor: Eloi Puig (UB ART)
Nutrition mentor: UCD

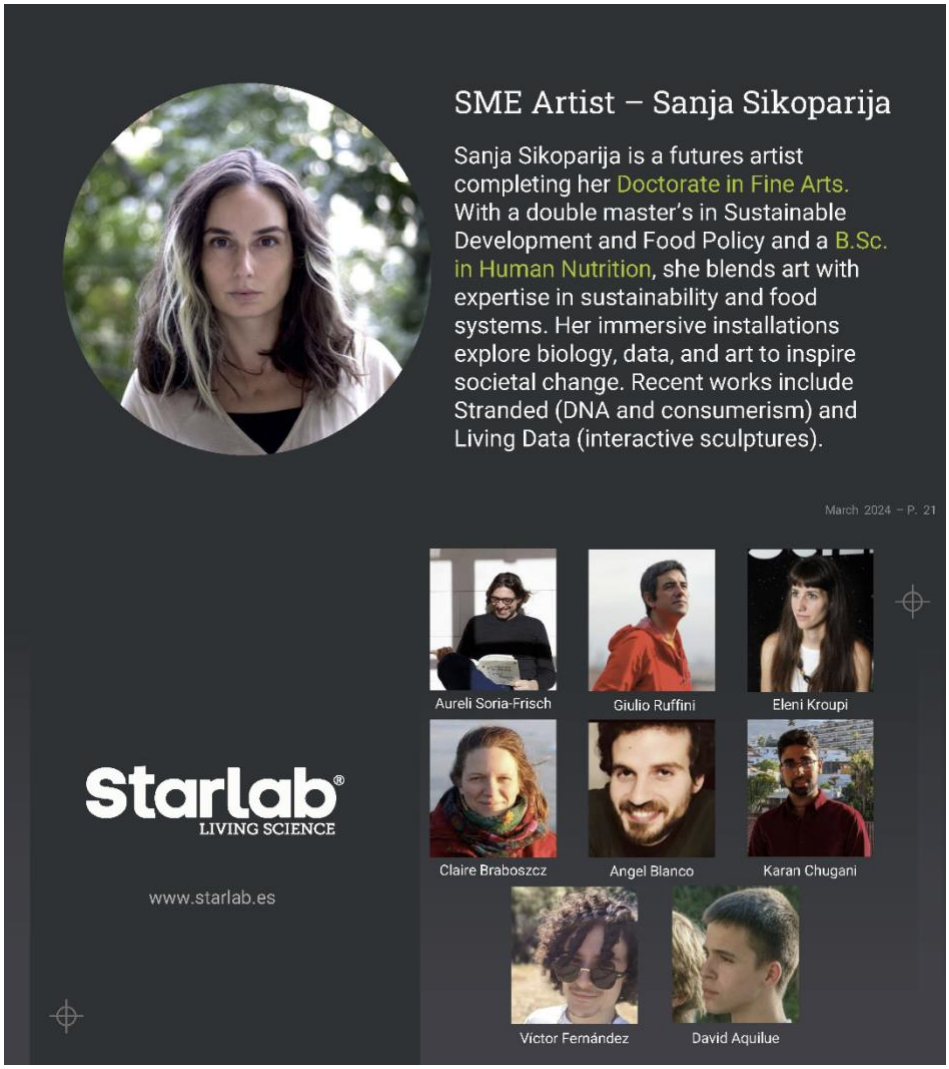

Figure 5 - Nourish team presentation slide

(2/2) European artist-company team involving one Serbian party

[German] artist: Anna Rosinke
Serbian company: mBrainTrain
Name of the project: Neuro-Cooking
Mentoring team:

Tech mentor: Filip Bečanović (ETF)
Art mentor: Carmen Bruno (POLIMI)
Nutrition mentor: UCD

Figure 6 - Neuro-Cooking team presentation slide

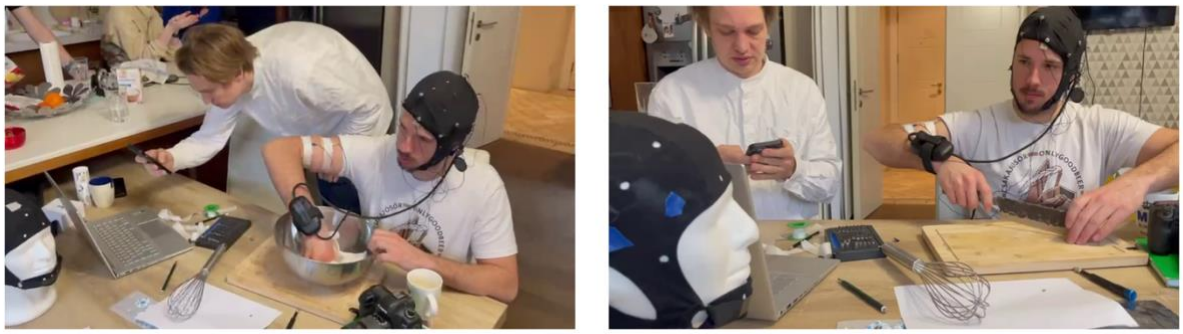

Figure 7 - Filip Bečanović (ETF) with the Neuro-Cooking team at mBrainTrain's offices participating as a subject in the first iteration of prototype development.

4. Second residency final prototypes and the final prototype exhibition of artist-company teams with Serbian parties involved

The second MUSAE residency culminated in the development of fully realized TRL5 prototypes by the artist-company teams, including those with Serbian partners. These prototypes were developed by applying the second phase of the DFA method—focusing on concept feasibility, iterative prototyping, and user validation. Each project addressed key challenges within the "Food as Medicine" domain, blending technological innovation with artistic perspectives. The outcomes of this collaborative process were presented at the MUSAE Final Prototype Exhibition held in Belgrade, offering the public an opportunity to explore the tangible results of this transdisciplinary work. The following section details the three Serbian-involved teams' final prototypes and their public presentation.

4.1. Final Prototypes

The Serbian artist-company team

Serbian artist: Miljan Stevanovic
Serbian company: Beehold
Name of the project: Bee-Sustain

Figure 8 - Picture associated with the Bee-Sustain team's prototype

Concept & Prototype description: BeeSustain is an innovative solution that integrates AI, IoT-based hive monitoring, and an interactive Art Book to support sustainable beekeeping and biodiversity conservation. The mobile app provides real-time data and AI-driven insights for optimizing hive placement, predicting nectar flow, and improving hive management. The Art Book enhances user engagement by blending artistic storytelling with scientific education on pollination and sustainability. Designed for accessibility, BeeSustain empowers both beekeepers and citizens to contribute environmental data, fostering community participation and ecological awareness. By merging technology, art, and citizen science, it promotes modern, data-driven beekeeping while preserving pollinator ecosystems.
Connection to the scenario [Future Scenario: Patterns that Persist]: BeeSustain aligns with the Patterns That Persist scenario by tackling biodiversity loss, declining pollinator populations, and the need for sustainable agriculture. It supports ecosystem sustainability through AI-driven hive management, optimizing pollination and protecting bee populations. Its adaptability helps beekeepers respond to climate change with predictive insights on nectar flow, ensuring resilience. By fostering data transparency, BeeSustain strengthens consumer trust in authentic honey while enhancing food security, supporting farmers, and boosting rural economies. On a global scale, it aids biodiversity preservation and ethical trade, promoting sustainable agricultural practices. Through technology and community engagement, BeeSustain offers a holistic approach to ecological and economic challenges.
Technology: BeeSustain leverages cutting-edge hardware, software, and artificial intelligence to provide an integrated solution for sustainable beekeeping and biodiversity monitoring. By

combining IoT devices, a robust software platform, and advanced AI models, BeeSustain offers an innovative approach to hive management and environmental stewardship.

Prototype descriptions alongside prototype videos are present on the website:
https://musae.starts.eu/bee-sustain/

(1/2) European artist-company team involving one Serbian party

Serbian artist: Sanja Sikoparija
[Spanish] company: Starlab
Name of the project: Nourish

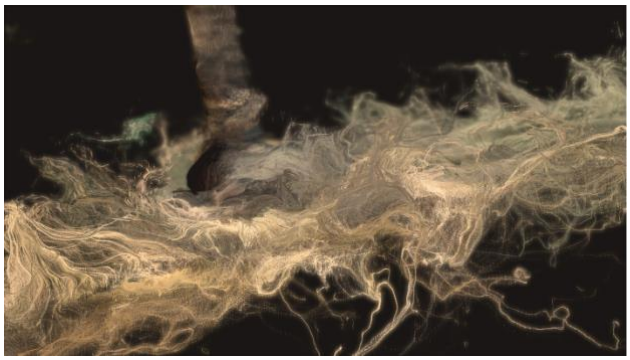
Figure 9 - Picture associated with the Nourish team's prototype

Concept & Prototype description: This concept envisions a versatile neurofeedback tool that reshapes how individuals and industries understand the relationship between food and brain function. Designed for both emotional response measurement and cognitive assessment, the tool provides data-driven insights into how food affects mood, focus, and stress levels, supporting personalized nutrition and mental well-being. Industries such as food technology and nutrition science can leverage this data to develop tailored products that enhance emotional and cognitive performance. The tool seamlessly integrates into daily wellness routines, using EEG data and AI algorithms to deliver insights through a user-friendly interface, without requiring additional tests or user inputs. During development, traditional cognitive assessments and emotional questionnaires will be used to validate EEG metrics, ensuring accuracy and reliability. The final product will offer scalable, non-intrusive assessments, making neurofeedback an accessible part of everyday life. Its ability to track both immediate emotional reactions and long-term cognitive effects has the potential to revolutionize our understanding of food's impact on mental and emotional health, driving adoption across multiple industries.
Connection to the scenario [Future Scenario: Bio-intelligent Data]: The Nourish concept aligns with the Futures Compass, promoting sustainability, health, and equity through AI-driven, real-time insights into the emotional and cognitive effects of food. By encouraging eco-friendly dietary choices and empowering individuals to detect subtle changes in well-being, it fosters proactive health management and a healthier relationship with food. Designed to be affordable and inclusive, Nourish minimizes health disparities while maintaining data security and user autonomy. Its evidence-based approach ensures reliable recommendations, reducing unintended health risks. By balancing innovation with ethical considerations, Nourish bridges personalized nutrition with societal well-being, paving the way for a more sustainable, equitable, and health-conscious future.
Technology: The Nourish tool utilizes advanced AI and EEG technology to provide real-time insights into how food affects emotional and cognitive states. The AI analyzes EEG signals to track emotional responses and cognitive performance, offering personalized feedback for improved mental well-being and cognitive function. A validation study with EEG data will ensure the tool's accuracy, comparing emotional responses and cognitive task performance before and after food consumption. The system integrates machine learning models to classify emotional states and estimate cognitive performance. Designed for scalability, the tool can adapt to new EEG devices and sensor technologies, ensuring ongoing relevance and future-proofing. Nourish is applicable across healthcare, food, and nutrition industries, supporting healthier, sustainable dietary choices with a focus on emotional and cognitive health.

Prototype descriptions alongside prototype videos are present on the website:

https://musae.starts.eu/nourish/

(2/2) European artist-company team involving one Serbian party

[German] artist: Anna Rosinke
Serbian company: mBrainTrain
Name of the project: Neuro-Cooking

Figure 10 - Picture associated with the Neuro-Cooking team's prototype

Concept & Prototype description: The project redefines "food as medicine" through three key pillars: Planetary, Mental, and Physical Health, emphasizing the multi-sensory and therapeutic aspects of cooking. Cooking engages all senses, and the lack of tactile stimulation has been linked to mental health issues like touch hunger. The project aims to create a wearable prototype equipped with EEG, motion, pulse, and muscle contraction sensors to analyse users' emotional states in real-time. By responding with tailored cooking instructions, the wearable supports mental well-being, cognitive development, and fine motor skills, making it a potential tool for personalized therapy. The research phase explored case studies on food preparation, sensory experiences, and technology, forming a foundation for hardware development and basic cooking techniques. Given the deep cultural and personal significance of food, the project seeks to personalize cooking education similarly to how nutrition is individualized.
Connection to the scenario [Future Scenario: The Cooking Ape Institute]: The Remis project builds on the Cooking Ape Institute scenario, highlighting the mentally beneficial aspects of food preparation as part of a holistic approach to food as medicine. It recognizes cooking as a meditative and therapeutic practice, integrating anthropological, physiological, and psychological perspectives. Inspired by Wrangham's research, the project acknowledges the role of cooking in fine motor skill development, skin and gut microbiome health, and multi-sensorial experiences that enhance mental well-being.
The project envisions a wearable device that tracks EEG, motion, pulse, and muscle contractions, offering real-time analysis of emotional states. This data informs adaptive cooking instructions aimed at relaxation, cognitive improvement, and therapeutic support. The broader goal is to explore new ways of teaching cooking, emphasizing its mental health benefits while remaining connected to planetary and physical health. Currently, mental health is the core focus, but future iterations—potentially supported by AI models—will integrate planetary and physical health aspects more deeply. The Future Compass framework underpins this multi-dimensional approach, guiding the project's evolution beyond MUSAE 2.
Technology: For the Remis project, the project uses dry EEG electrodes to detect brainwaves, and the adapted app mentioned above to detect emotions and mood. We will utilize the SMARTING PRO X EEG amplifier, which can capture data across multiple c: EEG, Channels (modalities): ECG (pulse), motion sensors, audio envelope via microphone input, and EMG (muscle contractions).

Prototype descriptions alongside prototype videos are present on the website:
https://musae.starts.eu/neuro-cooking

4.2. Final prototype exhibition

From the 21st to the 23rd of June of 2025, the MUSAE Final Prototype Exhibition titled "GROW. COOK. CODE. Rethinking Food Futures" was organized at the Palace of Science in Belgrade Serbia.

To attract visitors the information about the MUSAE Final Prototype Exhibition "GROW. COOK. CODE. Rethinking Food Futures" was shared on the websites of the Palace of Science and of the Centre for the Promotion of Science of Serbia, on their respective Instagram pages, and on the LinkedIn page of ETF Robotics, with guided tours of the exhibition being offered. A total of 19 applications were received for the guided tours (mostly art and tech students). Herein we provide a brief overview of the prototype presentation at the MUSAE Final Prototype Exhibition by the teams with Serbian parties involved.

The Bee-Sustain team's final prototype exhibition text: Bee-Sustain is an innovative project that bridges technology, ecology, and art to support sustainable beekeeping and biodiversity. Developed through the MUSAE art-tech residency, the project responds to the decline in pollinators by empowering beekeepers with tools to adapt to climate change, optimize honey production, and contribute to environmental health. Bee-Sustain also invites citizens to engage in ecological monitoring, fostering a wider sense of shared responsibility for biodiversity. The Bee-Sustain prototype integrates custom-built IoT hive devices and microclimatic sensors that collect real-time data on hive conditions and environmental factors such as temperature, humidity, CO_2, and air quality. This data feeds into an AI system trained on over 120,000 datapoints, which predicts nectar flow and recommends optimal hive placement. These insights are delivered through a mobile app with a user-friendly interface. Alongside the technology, an interactive Art Book transforms data into visual narratives, making scientific insights accessible and engaging. The Art Book includes pressed plants, dynamic visualizations, and location-based environmental records, creating a living document of biodiversity. Bee-Sustain thus merges precision beekeeping practice with creative storytelling to inspire a new era of ecological stewardship.

Figure 11 - Demo of the Bee-Sustain team's prototype at the MUSAE Final Prototype Exhibition

The Nourish team's final prototype exhibition text: What if your brain could reveal how you really feel about what you eat? Our interactive prototype invites visitors to explore this question through an immersive experience that blends neurotechnology, food, and art.
Using a wearable EEG Enobio Neuroelectrics headset, participants taste different food samples while their brain activity is monitored in real time. A pre-trained machine learning model decodes emotional responses: such as pleasure, surprise, or attention, based on the real time neural signals. These emotions are then instantly translated into a dynamic 3D visual artwork.
As your emotional state shifts with each bite, the visuals evolve, creating a personal, moment-to-moment reflection of your inner experience. The result is a living artwork shaped by your brain's

response to flavouring, no filters, just pure feeling. This installation is part of the Nourish project, which explores how technology can help us reconnect with food and emotion.

Figure 12 - Demo of the Nourish team's prototype at the MUSAE Final Prototype Exhibition

The Neuro-Cooking team's final prototype exhibition text: The project explores the therapeutic and cultural potential of bread-making by merging traditional food preparation with advanced neurotechnology. Responding to the sensory imbalance of digitally dominated lifestyles, the project emphasizes the psychological and physiological benefits of tactile, multi-sensory experiences—particularly those found in working with dough.

At the core is a custom-developed wearable that records EEG (brain activity), EMG (muscle tension), pulse, and hand motion. This real-time sensor data is interpreted through an emotional model, which recognizes the user's mental and physical state. The device then provides adaptive haptic feedback—vibrations and pressure patterns—guiding the user through movements that support relaxation, awareness, and emotional regulation during the bread-making process.

The system functions as a closed-loop feedback mechanism and is designed for use in therapeutic contexts such as MBSR, ergotherapy, or anxiety treatment. It is also personalized through 3D scanning, made from recyclable and partly biodegradable materials, and avoids non-repairable, composite tech.

This project reimagines food preparation as a meaningful, embodied experience—a sensory and emotional counterbalance to the abstractions of digital life. The long-term goal is not to create a new gadget, but a temporary, supportive tool that helps individuals reconnect with their senses and restore balance through one of humanity's oldest cultural practices: the preparation of food.

Figure 13 - Demo of the Neuro-Cooking team's prototype at the MUSAE Final Prototype Exhibition

5. DFA method feedback from the widening country

The following section provides a brief description of the DFA method and its implementation in the Second Residency in Serbia (sub-sections 5.1 and 5.2), the feedback from Serbian artist-company team partners on the method (sub-section 5.3), as well as synthesized insights for the improvement of the final version of the DFA method (sub-section 5.4).

5.1. The DFA method

At the heart of the Second Residency was the DFA (Design Futures Art-driven) method, which guided the work of the artist-company teams throughout their collaboration. This approach brings together elements from Gluon and UB-Art's Art Thinking methodology and Politecnico di Milano's Design Futures framework, developed by the IDEActivity center. Designed to overcome common hurdles in art-tech partnerships, the DFA method offers a clear, structured path for exploring future possibilities through creative collaboration. It plays a key role in the MUSAE Factory Model, which supports stronger artistic engagement within European Digital Innovation Hubs. By doing so, it helps companies, SMEs, and start-ups to adopt more forward-thinking and strategic approaches to innovation.

The DFA method follows a double-diamond structure, meaning it is divided into two distinct phases of divergent and convergent thinking—first to explore and define the challenge and its future potential and vision, and then to ideate and refine potential solutions. The first diamond was carried out by the 12 selected artists in late 2023 and early 2024, resulting in 12 future scenarios that addressed pressing challenges related to food, sustainability, and human-biome interaction. The second diamond was then implemented by 11 artist-company teams during the latter part of 2024 and into early 2025, producing 11 art-tech TRL5 prototypes that embodied these future visions and demonstrated their potential impact through concrete, functional solutions.

5.2. The DFA method implementation

The DFA method is divided into two main segments: the "Explore" phase—which encompasses the Horizon Scanning and Visioning stages and leads to the creation of a future scenario—and the "Generate" phase, which includes Ideating and Prototyping, ultimately resulting in a prototype. The Explore segment was piloted through two art-tech experiments during the First Residency in Serbia. The Generate segment was tested during the Second Residency in one fully Serbian art-tech experiment, as well as in two additional experiments that included a Serbian partner.

As in the First Residency, the DFA method during the Second Residency was implemented using two digital platforms: Figma and Miro. Figma was used to distribute guidelines and describe the DFA method steps. Miro provided a collaborative workspace for artists, companies, and mentors, supporting progress tracking, feedback exchange, and the collection of research outputs. Each artist-company team used the Figma platform to access instructions and process overviews, while also creating individual Miro boards to apply the DFA method in their specific contexts. The application of the method during the Second Residency ultimately led to the development of 11 prototypes.

5.3. Summary of artist feedback on the DFA method

5.3.1. Ideating phase

The ideating phase took place between September 2024 and December 2024. The second deliverable submitted by all artist-company teams has been used as a source of feedback on the components of the ideating phase: Challenge Exploration, Inspirational Research, Ideas Exploration, and Concept Development. The feedback provided by Serbian participants is summarized below.

Activity 1: Challenge Exploration

Clear framing. Participants found the framing of the challenge to be clear and effective. All Serbian participants reported that the Futures Compass was a helpful tool in quickly highlighting the core issues within the food system and clarifying their role as contributors from a Widening country. The Bee-Sustain team particularly appreciated how the compass revealed a guiding triangle of planetary, mental, and physical health, which helped maintain internal alignment throughout the project.

Tight timeboxing. Some concerns were raised regarding time constraints. The Neuro-Cooking team noted that the early stages of idea divergence were cut short due to the need to meet milestone deadlines. This limited the exploration of more unconventional or speculative ideas, often referred to by participants as "wild cards."

Activity 2: Inspirational Research

To the point. Participants found this stage to be highly engaging and productive. The Miro platform was described as an effective tool for gathering and organizing ideas. Serbian teams reported enjoying the process of clustering sources of inspiration and providing asynchronous feedback. The Nourish team highlighted the value of being able to display scientific papers and artistic mood boards side by side without conflict, creating a balanced and stimulating research environment.

Information overload. Nevertheless, some teams experienced challenges related to information overload. Bee-Sustain suggested implementing a simplified tagging system to help differentiate between empirical case studies and more speculative references.

Activity 3: Ideas Exploration

External feedback welcomed. Serbian teams welcomed external feedback, which was facilitated by a hybrid format of physical and online workshops. They appreciated the opportunity to hear perspectives from peers outside of Serbia, which helped refine their concepts.

Inadequate voting. The voting mechanism used during this phase received mixed reviews. The tool was perceived as overly quantitative for evaluating concepts in the early stages of art-driven research. Neuro-Cooking suggested retaining the visual "heat-map" approach while postponing the use of numerical scoring until the concepts had undergone further development.

Activity 4: Concept Development

Enjoyable process. Serbian partners found this phase enjoyable and creatively rewarding. They responded positively to the iterative process that combined storyboarding, sketching, and AI-generated imagery using tools like Midjourney and DALL-E. This approach allowed team members with varying drawing skills to contribute equally. The Nourish team emphasized that holding co-located design sprints in Barcelona led to faster and more decisive progress.

Scope tension. A recurring challenge across teams was balancing the expansive nature of artistic exploration with the demands of delivering a prototype at Technology Readiness Level 5. Bee-

Sustain observed that the detailed artistic aspects of the project sometimes reduced the time available for technical prototyping.

Suggestions for improvement for the Ideating phase

Several improvements were proposed by the Serbian participants. These included allocating specific time at the end of the Challenge Exploration phase for exploring speculative "wild-card" ideas without risking delays to the overall schedule. Additionally, participants recommended introducing a lightweight tagging system on Miro (e.g., case study, speculative, technological, artistic) to better organize the inspiration wall. Teams also advised deferring numeric scoring until the Concept Development stage, while retaining qualitative clustering methods earlier in the process. Finally, it was suggested that expectations around Technology Readiness Level should be slightly more flexible to help teams strike a balance between artistic depth and realistic prototype outcomes.

5.3.2. Prototyping phase

The prototyping phase occurred from January 2025 through early June 2025. The fifth deliverable submitted by all artist-company teams has been used as a source of feedback on the components of the prototyping phase: Concept Feasibility, Prototyping Iterations, and Prototype Assessment. The feedback provided by Serbian participants is summarized below.

Activity 5: Concept Feasibility

Positivity of risk-logs. Teams noted the value of maintaining early risk logs, which helped prevent unexpected complications. Bee-Sustain highlighted that their pivot toward an IoT-integrated plant database was positively received and viewed as a feasibility success driven by the design process.

Cross-border delays. Cross-border collaboration presented logistical challenges. The Nourish team lost approximately five weeks due to delays in obtaining IRB approval and regulatory clearance for their headset device

Early issues of ethics & invasiveness. Neuro-Cooking was forced to replace its textile EEG cap with a 3D-printed frame due to safety and compatibility issues, which consumed their project buffer time.

Activity 6: Prototyping Iterations

Adequate pacing. The iterative development process was generally well received. Weekly online demonstrations allowed Serbian artists to stay involved, even when physical hardware was located abroad. For example, the mBrainTrain team in Belgrade live-streamed hardware tests to collaborators in Berlin.

Inadequate iteration number. Despite these efforts, all three teams encountered limitations due to overlapping work packages (WP5 through WP7). Serbian partners felt that these overlaps compressed the available time for iteration and learning. They recommended that future residencies include an additional iteration slot to address this issue.

Activity 7: Prototype Assesment

Positive exhibition feelings. The final public exhibitions in Belgrade were described as highly valuable. Serbian end-users responded positively, especially to storytelling conducted in the local language, which enhanced relatability and emotional impact.

Testing phase was success. Bee-Sustain reported successful Technology Readiness Level 5 confirmation across ten pilot apiaries, marking a significant milestone in their development.

Artistic-Technical trade-offs. Teams continued to face the broader challenge of reconciling artistic ambition with the technical requirements of TRL-5 delivery. Once again, Bee-Sustain observed that time spent on artistic detailing occasionally hindered technical progress.

Suggestions for improvement for the Prototyping phase

Based on their experiences, Serbian teams suggested the creation of a regulatory support guide specifically tailored to Widening countries. This would help streamline ethics approval and customs procedures, potentially saving weeks during project setup. Teams also recommended reserving a "soft-lock" iteration two months before the final exhibition to avoid scheduling conflicts between work packages. Lastly, it was proposed that all teams be provided with a shared KPI template, allowing them to track interim results in a standardized way without compromising future publications.

5.3.3. Digital Platforms & Tools (Figma and Miro)

Across all three teams—Bee-Sustain, Neuro-Cooking, and Nourish—Miro emerged as a central and widely appreciated digital platform for structuring ideas, enabling creative exploration, and enhancing collaborative workflows. Teams valued its flexibility in organizing content, tracking progress, and integrating diverse forms of input such as sketches, videos, and podcasts. Miro was particularly praised for its utility during the brainstorming and ideation phases, where it provided a shared visual space for interdisciplinary teams to engage with one another. The Bee-Sustain team considered Miro essential, while the Neuro-Cooking team noted its role in fostering creativity through multimodal exchanges. Some suggestions emerged to further streamline workflows by incorporating reporting templates into Miro, reducing time-consuming administrative documentation.

Figma was consistently recognized as a valuable companion tool, particularly for its role in accessing methodological overviews and guidelines of the DFA method. Teams reported that its structured presentation of the DFA method supported early-phase orientation and complemented mentor guidance effectively. Although Figma was not highlighted as intensively used during the later stages of prototyping, its clarity and documentation features were appreciated, especially in the early implementation of the DFA method. Overall, the combination of Figma and Miro enabled an effective balance of structured methodological access and freeform collaborative ideation, particularly suitable for interdisciplinary teams blending artistic and technological approaches.

5.4. Insights for DFA improvement

A common insight across the Bee-Sustain, Neuro-Cooking, and Nourish teams is the need to better align the DFA method with the practical demands of innovation-driven projects, particularly those aiming to deliver TRL5 prototypes. While the method's value in stimulating creative exploration and future-oriented thinking was widely acknowledged, several teams highlighted that the emphasis on open-ended ideation sometimes conflicted with time and resource constraints. Bee-Sustain pointed out that exploring concepts which could not realistically be implemented within the project's TRL5 framework felt inefficient. Similarly, Nourish raised concerns about the tight timeline, which challenged the execution of iterative processes while developing a functional prototype. Teams suggested revisiting or adjusting the TRL5 requirement or adapting the method to better support applied, outcome-oriented innovation paths.

Another major theme was the desire to streamline administrative demands and deepen the integration of mentoring and interdisciplinary input. Neuro-Cooking explicitly criticized the burden of formal deliverables in the project, proposing a shift toward embedded reporting mechanisms within platforms like Miro, validated by mentors rather than requiring separate documents. This aligns with feedback from other teams emphasizing the importance of responsive, well-rounded mentorship to guide both creative and technical aspects. All teams valued the inclusion of diverse perspectives—from technical to business and artistic—but suggested that further support, such as structured co-creation workshops and early industry engagement, could make the method more effective. Collectively, these insights point to a need for a more agile, mentor-supported, and practically grounded evolution of the DFA method to better serve future art-tech collaborations.

6. Mentoring feedback from the widening country

6.1. Mentoring programme description

During the residency program, the Serbian artist-company team Bee-Sustain received mentoring from ETF, POLIMI, and UCD to support the development of their prototype by leveraging the DFA method. Moreover, the artist-company team Neuro-Cooking with the Serbian company mBrainTrain also received mentoring from ETF, POLIMI, and UCD.

It is worth noting that all art, tech, and food mentors received training on the DFA method in Milan, and they were also involved in mentoring European MUSAE artists.

Approximately every two weeks there was at least one meeting dedicated to the core team mentoring sessions, involving the artist-company team, as well as art and tech mentors, where mentors were explaining the following steps of the DFA method and assessing the progress of the team. The length of the meeting was depending on the questions and needs of the artist-company team. There were two plenary meetings for Concept Assessment (in-presence meeting in Barcelona in November 2024) and Concept Feasibility (online meeting in January 2025).

6.2. Summary of the feedback

All three teams—Bee-Sustain, Neuro-Cooking, and Nourish—expressed strong appreciation for the mentoring component of the MUSAE project, emphasizing its role in enriching their projects from multiple perspectives. Mentors were regarded not just as technical advisors, but as key collaborators who facilitated creative, strategic, and operational alignment within each team. The Neuro-Cooking team particularly valued the interdisciplinary nature of the mentoring environment, which enabled them to view the project through technical, artistic, and business lenses. Nourish highlighted the availability and openness of mentors, noting that they were responsive to requests for additional support and genuinely invested in the team's success. Bee-Sustain also emphasized the value of mentoring in shaping citizen engagement strategies and refining their conceptual direction.

The teams found structured monthly sessions useful, but many noted that ad hoc mentoring interactions were even more effective in addressing time-sensitive or project-specific challenges. These informal sessions allowed for more targeted problem-solving and were seen as a complement to the regular meeting structure. Overall, mentoring was described as a crucial enabler of progress throughout the project's ideation and prototyping phases. While the teams operated in diverse thematic and technical domains, they uniformly agreed that access to experienced, flexible, and engaged mentors played a pivotal role in helping them translate abstract concepts into tangible, aligned prototypes.

6.3. Insights for the mentoring process improvement

Despite the generally positive experience, the teams identified several areas where the mentoring process could be improved. A recurring recommendation was to increase the diversity and specialization of mentors, particularly in areas such as industry collaboration, art-tech integration, and regulatory or user-centered design. For instance, Bee-Sustain and Neuro-Cooking both

suggested that having mentors with more applied or industry-facing expertise—especially in aligning artistic outputs with TRL5 technical requirements—would better bridge the gap between conceptual ideation and prototype feasibility. Neuro-Cooking also emphasized the value of introducing mentors with deep knowledge of interdisciplinary methods early in the process to guide scenario development and prototype alignment from the start.

Additionally, teams proposed a more proactive mentoring structure, with built-in workshops or facilitated co-creation sessions rather than relying solely on consultation-on-demand. These structured interventions could provide a more consistent framework for aligning project direction, especially during critical milestones like scenario formulation and early prototyping. Several participants suggested that mentors could be more involved in confirming the correct application of the DFA method, potentially reducing the burden of formal reporting. Finally, embedding mentors more deeply into digital collaboration tools—such as integrated feedback loops on Miro—was seen as a promising way to maintain momentum and foster responsive, real-time support throughout the project lifecycle.

7. The MUSAE S+T+ARTS Academy in Belgrade, Serbia

A one-day academy (*i.e.,* the MUSAE STARTS Academy) was organized on the 23rd of June at the Palace of Science, in Serbia in Belgrade. The workshop was hosted in the same place as the MUSAE Final Prototype Exhibition "GROW. COOK. CODE. Rethinking Food Futures", in order to attract artists.

To reach out to potential attendees, the information about the MUSAE STARTS Academy was shared on the website of the Centre for Promotion of Science of Serbia, their Instagram page, and on the LinkedIn page of ETF Robotics. Registration for the guided tours and the MUSAE STARTS Academy was mandatory, and was administered through Google Forms. As a result, we received 94 applications for the MUSAE STARTS Academy. As captured in Figure 14, the atmosphere of the MUSAE STARTS Academy reflected the dynamic exchange of ideas and the strong interest in bridging art and technology within the local innovation ecosystem.

Figure 14 – Photos from the MUSAE STARTS Academy

The program of the MUSAE STARTS Academy was structured around three key objectives, each designed to address the specific needs of artist participants. First, the academy aimed to introduce and promote the MUSAE project and the DFA method by demonstrating its practical applications, fostering its dissemination, and encouraging its adoption in future projects. Second, the event sought to officially announce the opening and promote the S+T+ARTS Knowledge Hub for fostering Art-Tech collaborations, particularly within the context of Serbia's role as a Widening country. Finally, the academy was intended to empower attendees with practical knowledge and skills on how to build collaborative networks, develop project concepts, and apply for STARTS and other related Art-Tech initiatives.

The initial part of the workshop aimed to introduce participating artists to the DFA methodology and inspire them to apply it within their own creative and collaborative projects. The programme commenced with a welcome address by the hosting team from ETF, followed by a keynote presentation by representatives of the MUSAE coordinating institution, POLIMI. Joining the academy in person, the POLIMI team introduced the audience to the MUSAE project, elaborated on the DFA methodology, led a workshop activity on Domain Building (a step of the DFA method), and presented the Factory Model Pack: a comprehensive toolkit designed to support artists and companies in structuring and developing their own innovation pathways.

Subsequently, Professor Ali Muhammad from the University of Southern Denmark delivered a presentation on the integration of art and technology within Digital Innovation Hubs. Drawing on

the experience of the Better Factory Project, he demonstrated how structured collaborations between artists and SMEs can be implemented, highlighting successful case studies, showcasing tangible outcomes, and emphasizing the available funding mechanisms and partnership opportunities within such frameworks.

This was followed by a talk from Professor Kosta Jovanović of ETF, who presented the institutional expertise and infrastructure available within the ETF Robotics Laboratory and introduced the Palace of Science as a Knowledge Hub for interdisciplinary and art-tech collaborations. He outlined the available facilities and partnership models, encouraging artists to explore collaborative opportunities with local researchers and engineers.

After a coffee break, the academy continued with presentations by the 11 laureate artist-company teams selected through the MUSAE 2nd Open Call. Nine teams presented their work in person, while two joined remotely via Microsoft Teams. Each team shared insights into how the DFA methodology supported their design and prototyping process, including user studies, iterative development, and potential impacts of their prototypes.

Following a lunch break, participants joined guided tours of the "GROW. COOK. CODE. Rethinking Food Futures" exhibition and three laboratories within the Palace of Science, namely, the Robotics Lab, Biomedical Lab, and AI Lab. These labs, known for their interdisciplinary approach and interest in art-tech collaborations, offered attendees a firsthand look at ongoing research and technological capabilities.

In the afternoon session, Ramona Van Gansbeke, representing MUSAE partner GLUON (Belgium), introduced current and upcoming funding opportunities for art-tech initiatives at the European level, providing attendees with a list of valuable contacts and resources. This was followed by a presentation from Jovana Jankov of the Centre for the Promotion of Science in Serbia, who shared national funding instruments and the Centre's experience supporting similar initiatives in the Serbian context.

The complete programme of the academy is detailed in Table I of this document.

The feedback from the attendees was positive, particularly praising the great organization and timely evolution of the academy. All of the attendees reported having heard information that they deemed important during the academy.

In conclusion, the MUSAE STARTS Academy in Belgrade succeeded in equipping artists with practical knowledge about the DFA methodology, collaboration frameworks, and funding opportunities. It served as a springboard for future partnerships and a catalyst for continued development at the intersection of art, science, and technology in Serbia.

Table I. Programme of the MUSAE STARTS Academy

S+T+ARTS Academy, Monday 23rd of June	
10:00 – 10:05	Welcoming speech (ETF)
10:05 – 10:50	MUSAE Factory Model Pack (POLIMI, Italy)
10:50 – 11:20	Art and tech within Digital Innovation Hubs (SDU, Denmark)
11:20 – 11:30	Presentation of collaboration opportunities for artists and introduction of the Knowledge Hub (ETF)
11:30 – 12:00	Coffee break and networking
12:00 – 13:10	Five-minute presentation of each artwork (MUSAE artists)
13:10 – 14:10	Lunch break
14:10 – 15:10	Guided tours of the exhibition and laboratories in Palace of Science
15:10 – 15:40	Coffee break
15:40 – 16:10	Promotion of S+T+ARTS activities and funding opportunities (GLUON, Belgium)
16:10 – 16:40	Promotion of art+science activities (Centar za promociju nauke)
16:40 – 17:00	Q&A
17:00 – 18:00	Guided tour through the history of Palace of Science

8. Conclusions

The MUSAE project team from the School of Electrical Engineering successfully completed training in the DFA method, applied it during the second MUSAE residency held in Serbia, and actively contributed to its dissemination. This was achieved through their participation in the well-attended MUSAE STARTS Academy and the MUSAE Final Prototype Exhibition, both held at the Palace of Science in Belgrade.

Three teams involving Serbian partners participated in the Second Residency programme. These included a Serbian artist-company duo, a Serbian artist paired with a Spanish company, and a Serbian company working with a group of German artists. All three teams followed the structured programme, which encompassed implementation of the DFA method, as well as training and mentoring activities, leading to the development and delivery of fully realized TRL5 prototypes.

The prototypes were developed in alignment with the MUSAE project consortium's expectations and addressed important challenges within the "Food as Medicine" domain. Among the Serbian-involved projects, two out of three focused on wearable technologies, while one explored application of artificial intelligence.

The feedback collected from all three artist-company teams underscores the overall effectiveness of the DFA method in supporting interdisciplinary collaboration and creative exploration. Teams consistently highlighted the value of future-oriented thinking, structured ideation phases, and scenario-building exercises in bridging artistic expression with technological development. The method offered a clear framework that helped align diverse perspectives within each team and facilitated the translation of speculative ideas into functional prototypes. Stakeholder engagement and co-creation workshops were particularly praised for helping ground creative visions in real-world contexts, thereby enhancing the relevance and feasibility of the final outcomes.

At the same time, the teams also identified common areas for improvement. Most notably, they stressed the need for a better alignment between the exploratory nature of the DFA method and the practical constraints of delivering TRL5-ready innovations. Challenges such as tight timelines, administrative burdens, and resource limitations were echoed across teams, prompting suggestions for a more agile and tailored implementation of the method. Mentoring was universally appreciated and seen as essential to project success, though several participants recommended more proactive, integrated support from mentors and greater flexibility in reporting practices. Overall, the artist-company feedback reinforces the potential of the DFA method while offering constructive insights for its continued evolution.