S+T+ARTS

SCIENCE + TECHNOLOGY + ARTS

STARTS RESIDENCY METHODOLOGY

January 2025

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1. Introduction

The **S+T+ARTS** Initiative (Science, Technology & the Arts) was launched by the European Commission as a flagship program aimed at fostering collaborations between the fields of science, technology, and the arts to drive innovation in Europe. The core mission of S+T+ARTS is to bridge the gap between creative disciplines and cutting-edge technological research, bringing together artists, scientists, engineers, and technologists to address some of the most pressing challenges of our time.

The initiative is built on the understanding that the complexity of today's societal, technological, and environmental challenges requires novel approaches that go beyond traditional disciplinary boundaries. Innovation is no longer seen purely as a technological process, but rather as a multifaceted endeavor that benefits from the creative and critical thinking that the arts can bring. By integrating artistic perspectives with scientific and technological advancements, S+T+ARTS aims to foster interdisciplinary collaborations that can deliver transformative solutions in areas such as climate change, sustainability, urban development, and social inclusion.

This deliverable presents a study on the methodologies applied within the S+T+ARTS Residencies, which represent a cornerstone of the initiative. These residencies facilitate interdisciplinary collaboration and are designed to explore innovative solutions to societal challenges through the integration of artistic, scientific, and technological perspectives. By analysing these methodologies, this deliverable aims to provide insights into best practices and their potential for fostering art-driven innovation.

To develop this study, materials were collected from publicly available project documentation, including deliverables and reports found within the S+T+ARTS and CORDIS repositories. Additionally, an online survey was conducted among stakeholders involved in S+T+ARTS Residencies. The survey asked participants to identify their respective methodologies and share best practices, offering valuable firsthand insights into the processes and outcomes of these residencies. The combination of desk research and stakeholder input forms the foundation for this analysis, ensuring a comprehensive and well-rounded understanding of the methodologies underpinning S+T+ARTS Residencies.

1.1. S+T+ARTS Pillars

The S+T+ARTS (Science, Technology & the Arts) initiative by the European Commission is structured around five key pillars:

1. **S+T+ARTS Prize**: The annual STARTS Prize gives visibility to collaborations between artists and industry for new pathways to innovation, and artistic exploration of technology altering the use, deployment and perception of technology.
2. **S+T+ARTS Residencies**: Programs that facilitate collaborations between artists, scientists, and technologists, fostering art-driven innovation and offering new perspectives on research and business.
3. **S+T+ARTS Lighthouses**: STARTS Lighthouses support research seeking radically novel solutions and concrete results to major challenges for industry and society in close collaboration with artists as active members of the project teams. These lighthouse pilots explore novel uses of technologies and guide EU innovation actions towards more systematic inclusion of the Arts.

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4. **S+T+ARTS Academies**: The STARTS Academies strive to bridge the gap between art and technology to the public. Through educational initiatives with technologists and artists, the academies promote digital literacy and foster interdisciplinary learning.
5. **S+T+ARTS Regional Centers**: Centers that expand the initiative at the local level, promoting regional development and addressing specific local challenges through art, science, and technology collaborations.

2. S+T+ARTS Residencies & Core Principles

The S+T+ARTS Residencies are a cornerstone of the S+T+ARTS initiative, creating unique spaces where collaboration between artists, technologists, and researchers can thrive. These residencies are structured to foster interdisciplinary dialogue and experimentation, enabling participants to explore innovative solutions to societal challenges. By uniting diverse fields, such as artificial intelligence, urban planning, environmental science, and artistic practice, the residencies drive the development of human-centered technologies and creative breakthroughs.

As an integral part of the S+T+ARTS ecosystem, residencies help build networks of interdisciplinary practitioners who redefine how science, technology, and the arts intersect. They act as laboratories for innovation, where participants test ideas, develop prototypes, and establish new collaboration models that can be scaled across Europe and beyond.

The outcomes of these residencies contribute directly to the broader S+T+ARTS mission by fostering cultural and societal innovation, ensuring technological developments remain human-centered, and advancing interdisciplinary methodologies. They also help sustain and expand the initiative's impact, shaping the future of collaborative innovation in Europe.

Bridging art and technology for human-centered innovation

At their core, S+T+ARTS Residencies aim to not only to bridge the gap between the arts and technology, but also to foster a consistent, cross-disciplinary dialogue that transcends traditional boundaries. This approach enables the emergence of new, interdisciplinary knowledge that integrates the critical, creative, and technical perspectives of art, science, and technology. This fusion is particularly critical in an era of rapid digital transformation, where technologies like artificial intelligence, robotics, and blockchain are reshaping industries and societies. Artists involved in these residencies often act as critical observers and visionaries, exploring the ethical, cultural, and societal impacts of emerging technologies. Their contributions ensure that innovation prioritizes human values and improves quality of life. Conversely, technologists and scientists benefit from the unique ability of artists to provoke thought, challenge conventions, and inspire holistic approaches to problem-solving. Rather than treating the arts as an adjunct to technological innovation, the residencies emphasize creating a collaborative ecosystem where disciplines converge to explore uncharted territories. This collaborative approach promotes the development of hybrid knowledge—a transformative synthesis of ideas that can only arise when disciplines interact on equal footing. Through this process, the residencies not only yield innovative solutions but also redefine what constitutes innovation itself, broadening its scope to include cultural, ethical, and human-centred dimensions.

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Artists use technology not merely as a tool but as a medium to explore complex questions and provoke meaningful dialogue, while technologists gain fresh insights into the cultural and emotional dimensions of their work.

Community engagement & nexus of Art, Science and Technology

The core of S+T+ARTS residencies lies in fostering a nexus where art, science, and technology converge to catalyse societal innovation. This principle emphasizes that meaningful community engagement must underpin all residency activities, ensuring that the outcomes resonate with and serve the needs of diverse societal groups. By blending the conceptual creativity of artists, the technical expertise of scientists, and the innovative capacity of technologists, these residencies tackle complex challenges holistically. A wide array of strategies is employed to foster community engagement throughout the residency process. These strategies include workshops, participatory art projects, exhibitions, local events, collaborative design sessions, among other. One example of such engagement is the use of focus groups, which provide a platform for gathering diverse perspectives and be applied in various stages of the residency process. For instance, in the STARTS4AFRICA project, focus groups were organized in each of the four target countries—Ghana, Nigeria, Senegal, and Tanzania—to align the project's objectives with local contexts and innovation ecosystems. Each focus groups engaged in discussions to identify key societal and technological challenges, explore opportunities for integrating art and technology, and propose actionable solutions tailored to their respective country/region. These focus groups brought together local community members, stakeholders from various disciplines and even representative of local governments, thus ensuring that the challenges to be addressed in the residencies were not only grounded in real-world needs, but also feasible in the current ecosystem.

Ultimately, community engagement cannot merely be an adjunct but an integral element of the residencies, enabling participants to ground their projects in real-world contexts, foster inclusivity, and co-create solutions that address both local and global challenges. The interdisciplinary approach creates a space where technology becomes a medium for dialogue, art serves as a lens for reflection, and science offers tools for actionable insights. By aligning this triadic collaboration with participatory practices, the residencies ensure the development of human-centered, ethical, and culturally relevant innovations. Furthermore, they inspire a broader societal dialogue, extending the impact of these collaborations beyond the confines of the residency to nurture ongoing cultural, scientific, and technological enrichment.

Addressing societal challenges

S+T+ARTS Residencies are particularly well-suited to addressing complex societal challenges such as climate change, digital transformation, and social inclusion. By integrating artistic practices into scientific and technological innovation, these residencies provide new perspectives that traditional research and development models often overlook. The thematic alignment with European Union priorities, such as the Green Deal and digital transformation, ensures that these residencies contribute to sustainable and inclusive growth across the continent.
The interdisciplinary nature of the residencies encourages participants to think holistically, considering not only technological feasibility but also ethical, cultural, and societal implications. This approach ensures that the solutions developed are not just functional but also aligned with human values, reinforcing the EU's vision of technology as a tool that serves society.

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Creative experimentation and risk-taking

One of the defining features of S+T+ARTS Residencies is their emphasis on creative experimentation and risk-taking. Unlike traditional research settings constrained by specific goals and commercial pressures, these residencies provide a flexible, process-driven environment where participants can explore uncharted territories. Artists are encouraged to take risks and test unconventional ideas, even if they lack immediate practical applications. This openness often leads to disruptive innovations that challenge the status quo and inspire new ways of thinking. By iterating ideas and adjusting based on insights gained during the process, participants can refine their work and develop groundbreaking solutions to complex problems.

Open, transparent and inclusive selection framework

Every S+T+ARTS residency begins with an open call that invites applications from a wide range of participants, including individual artists, collectives, and small to medium-sized enterprises (SMEs). These open calls ensure a transparent and competitive selection process, providing equal opportunities for innovative and interdisciplinary projects to emerge. By maintaining strict deadlines and clear application procedures, the open calls aim to attract high-quality proposals that align with the residency's thematic focus and broader societal challenges. The open call format also guarantees a diverse pool of applicants, fostering inclusivity and promoting cross-disciplinary collaboration.

The evaluation process is designed to be flexible, ensuring that the criteria used to assess proposals can be adapted to suit the specific scope of the project, the nature of the technology and art components, and the desired outputs. This adaptability allows for the inclusion of diverse indicators that reflect the unique objectives of each residency. Proposals are assessed based on criteria such as artistic merit, innovation potential, feasibility, and thematic relevance. Multi-stage evaluations, including peer reviews, expert panels, and interviews, further guarantee that the most promising and impactful projects are chosen.

By combining an open and competitive application process with a structured and transparent evaluation mechanism, this principle ensures fairness, enhances the credibility of the program, and attracts high-quality proposals. The emphasis on inclusivity and merit-based selection reinforces the commitment of S+T+ARTS to fostering transformative collaborations across disciplines and sectors.

Research-driven and thematically aligned

The residencies are inherently research-based, with a strong emphasis on addressing specific societal and technological challenges. Themes such as sustainability, urban development, digital transformation, and health serve as the backbone of these programs, aligning with European Union priorities like the Green Deal, Digital Transition, Horizon Europe Missions, and the Social Economy Action Plan. This thematic focus ensures that participants work on projects with real-world relevance, driving innovation that can contribute to policy goals and societal well-being. Additionally, the research-driven nature of the residencies provides a structured framework for participants to explore new ideas and methodologies.

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While the residencies are deeply rooted in research, they are uniquely complemented by the advantage of quick prototyping steps throughout the residency process. Artists, with their inherent capability to test and iterate research questions rapidly, bring a dynamic element to the process. This ability allows for applied intermediary steps that yield tangible outcomes at various stages of the residency. Quick prototyping not only accelerates the exploration of research questions but also provides immediate insights that can be invaluable for researchers and industry partners alike.

Interdisciplinary collaboration

Collaboration lies at the heart of S+T+ARTS residences. Artists work closely with technologists, researchers, and industry experts to merge creative processes with scientific and technological expertise. This interdisciplinary approach fosters mutual learning, breaking down silos between fields and encouraging innovative problem-solving. By providing access to state-of-the-art facilities, networks, and expert guidance, the residencies ensure that artists can fully explore the potential of their projects. Importantly, non-artistic collaborators, such as technologists, researchers, and industry representatives, derive significant benefits from working alongside artists. Artists bring a unique capacity to challenge conventional thinking, offering fresh perspectives that can uncover hidden assumptions and inspire novel approaches. Their ability to visualize abstract concepts and create compelling narratives helps clarify complex ideas and communicate them effectively to diverse audiences. This skill is particularly valuable in fields such as technology and research, where innovations often need to be translated into accessible formats to gain broader support or adoption. In industry contexts, artists can drive innovation by introducing cultural and emotional dimensions to products and services. Their contributions can enhance user experience design, promote inclusivity, and ensure that technological advancements resonate with societal values. By embedding creativity into the development process, artists help collaborators address not only functional requirements but also the deeper cultural and ethical implications of their work. Over the years, these collaborations have resulted in outcomes that transcend the capabilities of any single discipline, showcasing the value of teamwork in addressing complex challenges.

S+T+ARTS residencies invite a diverse range of stakeholders to participate. These stakeholders typically include:

- **Artists and Creative Professionals**: Individuals or collectives with expertise in various art forms, including visual arts, performing arts, digital media, and design.
- **Scientists and Technologists**: Researchers and experts from academic institutions, research centres, and technology companies who bring technical knowledge and tools to the collaboration.
- **Industry Representatives**: Companies, including startups and established enterprises, that provide insights into market needs and practical applications.
- **Policy Makers and Public Authorities**: Stakeholders who align residency projects with regional, national, or European policy objectives and ensure societal impact.
- **Civil Society Organizations and NGOs**: Groups that represent community interests and ensure inclusivity and social relevance.
- **Educational Institutions**
- **Local Communities**

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It is important to note that while S+T+ARTS residencies often focus on inviting artists to apply, other projects have broadened the scope of open calls to include stakeholders like SMEs. For instance, initiatives such as Better Factory and Hungry EcoCities have targeted SMEs in their open calls. In the case of Better Factory, the open call invites SMEs in manufacturing to collaborate with artists and technology providers to design and implement customized digital solutions. This approach enables SMEs to integrate cutting-edge technologies, such as AI and robotics, into their operations while fostering creative and innovative strategies through artistic perspectives.

Tangible outputs and dissemination

Residencies are designed to produce tangible outcomes, such as prototypes, artworks, or installations that merge artistic and technological practices. These outputs are often showcased in exhibitions, festivals, and other public events (often, organized by the consortium partners), ensuring wide visibility and engagement with diverse audiences. Dissemination activities not only amplify the impact of the residencies but also inspire further dialogue and collaboration across sectors. The emphasis on deliverables ensures that each project contributes practical and conceptual value to the broader innovative ecosystem.
For instance, the S+T+ARTS AIR consortium formalized this kind of dissemination in the form of two obligatory deliverables in the artists' contracts: "Knowledge Transfer Sessions". The events were selected/organized in close collaboration between the artists and their respective regional centers to ensure alignment with the interests of the stakeholders, most promising target audiences and future development/funding opportunities. While Maria Arnal presented her "Impossible Larynx" residency outcomes at the academia-focused Connectivity Days event at the Vic University, Filippo Nassetti demonstrated his "Breathing Architecture" achievements to a more industry-focused audience at ELEM Biotech. Later they joined forces to present and discuss their methodologies on stage at the Sónar+D Festival and engage with the general public by demonstrating their outcomes at their scientific partner's (BSC) interactive booth in the festival's Project Area. The artists made sure to present along with their scientific collaborators to ensure the authentic communication of the concept/implementation of the collaborative process that is the core element of the S+T+ARTS methodology.

Defined rights and responsibilities of participants

S+T+ARTS residencies uphold clear guidelines regarding the rights and responsibilities of participants. Intellectual property (IP) arrangements are explicitly outlined, ensuring fair sharing of benefits and ownership among artists, partners, and stakeholders. These policies foster trust and transparency, encouraging open collaboration while protecting the interests of all parties involved. Additionally, ethical considerations are embedded within the residencies, particularly in projects involving sensitive technologies or societal implications, promoting responsible and human-centered innovation.

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3. Residency Methodologies

This section presents an overview of the S+T+ARTS residencies, categorized based on their primary methodologies. Each residency integrates artistic exploration, scientific research, and technological innovation into its approach. Although many projects draw upon various methodological components, such as collaborative design, experimental prototyping, or community engagement, the categorization reflects the dominant characteristic that defines each residency. This grouping provides a clear understanding of the core approaches driving these innovative initiatives, while still recognizing the multifaceted nature of their methodologies.

Challenge based methodology

The topics of S+T+ARTS residencies stem from the overarching theme of the S+T+ARTS project, ensuring alignment with its broader goals and vision. These topics are often framed as "**challenges**"—key issues or questions selected to inspire collaboration between the host institution and the participating artists. By addressing pressing global concerns and aligning with S+T+ARTS' priorities, these challenges provide a foundation for artistic and innovative exploration.

The challenges are often crafted through a **collaborative process** involving a wide range of stakeholders. This process often includes consortium partners, host institutions, and members of the broader quintuple helix – representatives from academia, industry, government, civil society, and the environment. By engaging this diverse network, the challenges are designed to reflect pressing real-world needs and ensure relevance to both local and global contexts. Challenges may be rooted in the specific geographical needs of a region, addressing issues that directly impact local communities or ecosystems. Alternatively, they may emerge from the institutional priorities of the host organization, leveraging its expertise to delve deeper into a particular area of interest or innovation. This dual approach ensures that the challenges are not only meaningful to the stakeholders involved but also aligned with the S+T+ARTS project's overarching objectives.

Artists submit project proposals that align with the defined challenges. Rather than constraining creativity, these challenges serve to guide and focus the artist's work, providing a meaningful context for their creative inquiry. By presenting a clear theme or problem, the methodology encourages artists to ground their ideas in real-world contexts while maintaining a connection to the residency's broader objectives. Applicants are expected to demonstrate their ability to engage with the challenge through proposals that combine artistic vision and technical expertise. The goal is to foster innovative approaches that address, interpret, or interact with the challenge in new and unconventional ways. At the same time, the methodology encourages pushing boundaries, inspiring fresh perspectives, and exploring uncharted territories of thought and practice.

Furthermore, during the application process, the artists are called to align their ideas and projects with the European Commission's priorities and goals. This alignment is essential for ensuring that their proposals address critical societal and environmental challenges identified by the EU. By incorporating these objectives into their creative practices, artists contribute to broader European initiatives, enhancing the relevance and impact of their work. This approach not only situates their projects within

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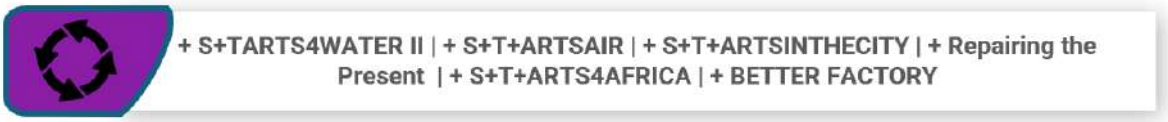
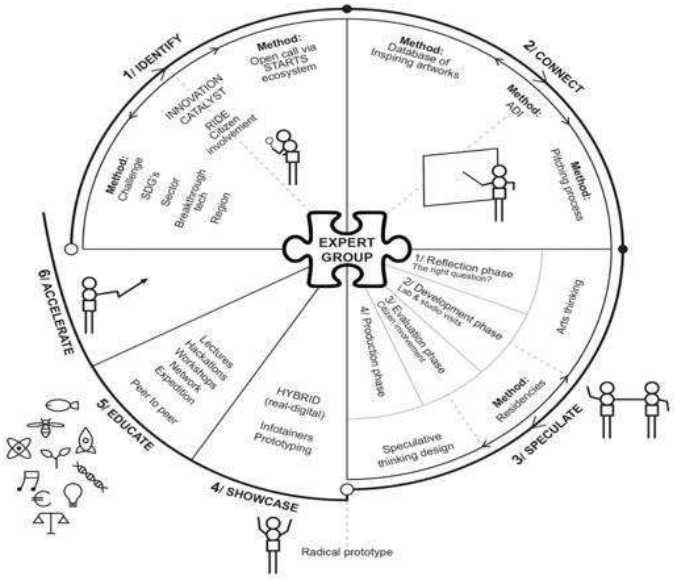
a global context but also fosters interdisciplinary collaboration and supports the overarching mission of the S+T+ARTS program to inspire innovation and meaningful change.

Residency wheel (challenge-based & phased implementation)



The "**Residency Wheel**" methodology refers to structured, phased approaches designed to foster interdisciplinary collaboration, cross-sectoral engagement, and art-driven value. These models emphasize iterative design, where each phase builds upon the insights gained in previous stages. The methodology enables participants to refine their work dynamically, leveraging stakeholder input and emerging opportunities as the residency evolves.

The "Residency Wheel" is a flexible framework designed to guide interdisciplinary residencies, with its stages and phases adaptable to suit the specific needs and components of each project. While the structure may vary depending on the unique context and goals, a core example, as depicted in the image below, provides a blueprint for implementing this methodology effectively. This example outlines a six-phase process that fosters collaboration, innovation, and continuous iteration.



The process begins with the **Identify** phase, where the central challenge or question is defined. Using tools like an "Innovation Canvas," participants map the scope, stakeholders, and objectives, creating a clear focus for the residency. This phase is supported by the "Expert Group," a central advisory body that ensures alignment throughout the process. In the **Connect** phase, relationships are built among stakeholders through activities such as workshops or the presentation of inspiring artworks. These activities establish common ground and foster initial collaborations, helping participants align on goals and possibilities.

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In the **Speculate** phase, the focus shifts to brainstorming and speculative design, encouraging participants to explore bold and innovative ideas. Reflection activities ensure alignment, and the phase generates conceptual designs that challenge conventional thinking. These ideas are brought to life in the **Showcase** phase, where initial prototypes or hybrid creations (combining digital and physical media) are presented to stakeholders and the public. Feedback gathered during this phase facilitates further refinement of the concepts.

The **Educate** phase focuses on knowledge-sharing, using workshops and training sessions to disseminate the residency's findings and insights. Participants and stakeholders benefit from these learnings, fostering a deeper understanding of the project's impact. Finally, the **Accelerate** phase refines the outcomes into a "Radical Prototype," integrating stakeholder feedback and insights from previous phases. This stage ensures the final product is practical, scalable, and impactful.

At the center of the wheel is the "Expert Group," which plays a critical role in maintaining continuity and providing guidance throughout the process. Each phase builds on the outcomes of the previous one, creating a continuous feedback loop that fosters innovation and adaptability. This iterative methodology ensures the residency evolves dynamically, delivering meaningful results tailored to the project's goals and the needs of its participants.

Design futures art-driven method

When Design Futures - a*n integration of Design Thinking (DT) and Futures Thinking (FT) developed by POLIMI* - meets Art Thinking the creative process driven by artists, the Design Futures-Art driven (DFA)[1] method is created. This approach is a cornerstone of the MUSAE project which aims establish a new People-Planet Centred by joining artists and companies to leverage digital technology innovation and addressing future challenges in the food domain to improve people's and the planet's wellbeing.

The DFA method was designed to guide participants through five key phases during their residencies:

+ Immerse
+ Horizon Scanning
+ Visioning
+ Ideating
+ Prototyping

Rooted in the Double Diamond of the Design Thinking approach, the DFA method alternates between divergent exploration and convergent idea generation.

[1] O'Gorman, A., Lauryn, M., Efremenko, T., Canina, M., Redava, P.I., Puig, L.E. et al. (2024) MUSAE: Fusion of art and technology to address challenges in food and health. *Nutrition Bulletin*, 00, 1–12. Available from: https://doi.org/10.1111/nbu.12723

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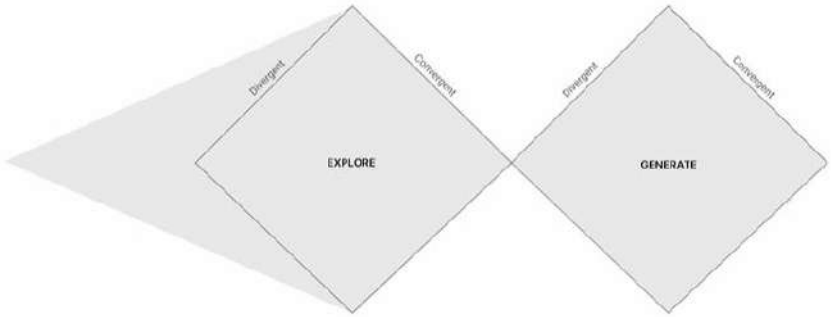

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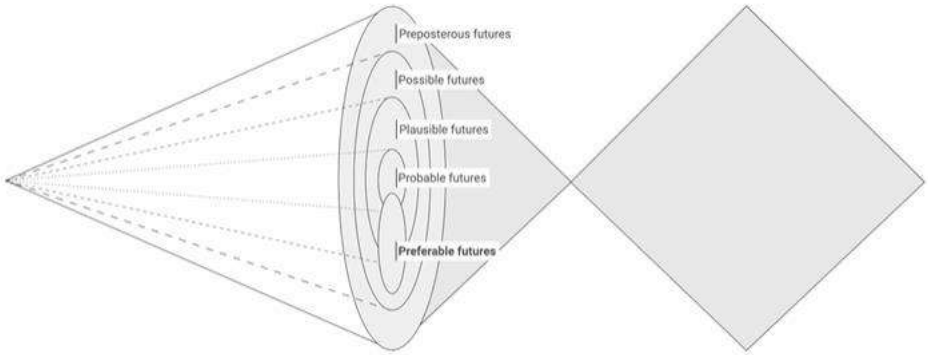
This approach is enriched by Futures Thinking, which enables the exploration of potential future scenarios and the identification of the most desirable ones. A conceptual basis for this process is the Voros Cone (2001), which illustrates the different types of futures explored through Futures Thinking.



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Within the DFA, artists and artificial intelligence collaborate to co-create possible futures. The residencies are defined by sequential steps, which must be defined by an activity with specific objectives and instructions. These activities may include workshops and co-design that bring together artists, technologists, and scientific experts. At the same time, individual activities must take place allowing artists to perform these with the support of AI. The initial three phases of the DFA method—Immerse, Horizon Scanning, and Visioning—culminate in the creation of a defined scenario. To ensure progress and alignment, domain and scenario assessment meetings are held, where artists and technical or scientific representatives validate developments and make collaborative decisions on next steps. These steps then guide the transition into prototyping and further advancement of the project's goals.

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Pilot use case-based methodology

The pilot use case-based methodology in the context of S+T+ARTS residencies provides a structured approach to fostering collaboration and innovation by focusing on specific, practical scenarios or experimental projects. A **pilot use case serves as a smaller-scale application of a concept, technology, or artistic idea, offering a controlled environment to test, iterate, and refine solution**s. Essentially, enabling artists, scientists, technologists, and stakeholders to collaborate on a shared focus, using the residency as a sandbox for experimentation and exploration.

This methodology typically begins with defining a real-world challenge that aligns with the residency's goals and broader societal impact. Stakeholders, including artists, technologists, and end-users, are then engaged to co-create the problem space. A focused, actionable pilot use case is developed to explore this challenge, often through creating artworks, testing prototypes, or engaging with communities. The use case is implemented through experimentation that combines artistic practices with technological innovations, followed by gathering feedback to refine and improve outcomes iteratively. Once the pilot is complete, the results are shared widely, with an assessment of how they might be scaled, replicated, or influence future policies, research, or artistic practices.

The pilot use case-based methodology emphasizes tangible outcomes, ensuring that the results are not only relevant but also actionable. In the MindSpaces project, for example, one pilot use case in the project is dedicated to improving urban environments, using L'Hospitalet de Llobregat, a city in the Barcelona metropolitan area, as a testing ground[2]. The project aims to enhance urban design by addressing issues like functionality, mobility, cultural preservation, and environmental awareness through advanced technologies and artistic exploration.

Artists in this use case collaborate with architects, technologists, and urban planners to design interactive art installations that reflect the cultural significance of urban spaces and propose innovative solutions to challenges such as pollution and traffic congestion. Utilizing the MindSpaces platform[3], which includes tools like AR/VR simulation and emotional data analysis, participants dynamically adapt urban designs based on real-time data and user feedback. These interventions create engaging public spaces that promote social connectivity, cultural appreciation, and environmental sensitivity, showcasing the transformative potential of art and technology in urban development.

[2] MindSpaces Project. (2022). *D1.4 Public final activity report and final self-assessment v1.0*. Retrieved from MindSpaces - Art-driven adaptive outdoors and indoors design | MindSpaces | Project | Results | H2020 | CORDIS | European Commission

[3] MindSpaces Project. (2029). *D6.1 Roadmap towards the implementation of the MindSpaces platform v1.0*. Retrieved from MindSpaces - Art-driven adaptive outdoors and indoors design | MindSpaces | Project | Results | H2020 | CORDIS | European Commission

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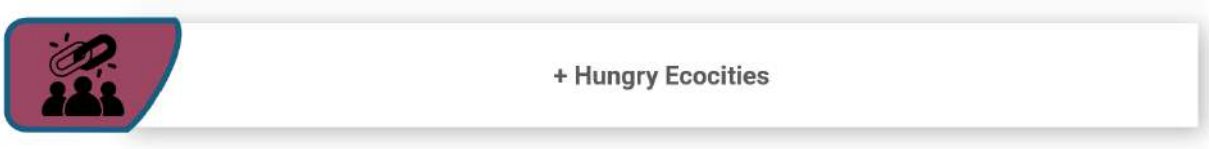
MATCHMAKING | Humanizing Technology Experiments (HTE) & Paths to Progress Experiments (PPE)



The Hungry EcoCities project delivered a methodology[4] for cross-disciplinary collaboration in the Hungry EcoCities residency experiments that is framed by a two-phase Open Call Process:

+ The first phase selects **End-Users** (SMEs) in the agri-food sector who present real-world challenges that can be addressed with innovative solutions.
+ The second phase invites **Artists** with a background in creative technologies and prior relevant prototypes or concepts to collaborate with the selected End-Users.

Subsequently, a core step in this methodology is the matchmaking and team formation phase that leverages the HECLab platform to foster collaboration between Artists and End-Users. This platform acts as a central hub where pre-validated Artists and End-Users can interact, aligning their goals and ensuring compatibility in terms of vision, expertise, and objectives. The HECLab is specifically designed to support cross-disciplinary communication and collaboration, facilitating a seamless pairing process. Through this system, Artists—who bring creativity, innovative thinking, and relevant experience—are matched with End-Users, typically SMEs in the agri-food sector, who present real-world challenges needing innovative solutions. Once matched, each team is formed by pairing one Artist and one End-User, who then work together to co-design and develop a prototype. These prototypes aim to address the specific challenges identified by the End-Users, such as improving sustainability, resource efficiency, or inclusivity in food systems.

The collaboration process in the Hungry EcoCities project unfolds in three interconnected phases: Setting the Stage, Collaboration Process, and Analysing and Diffusing Outcomes. Each phase is designed to ensure the successful execution of art-driven innovation experiments while fostering meaningful cross-disciplinary collaboration.

Setting the Stage marks the initiation of the project, where the core team is established. This team includes the Artist, the End-User, and consortium partners such as technical experts, studio representatives, and art-driven innovation facilitators. Together, they define the project's goals, outline the challenges to be addressed, and identify any knowledge or resource gaps that need to be filled. Key Performance Indicators (KPIs) are established during this phase, providing measurable objectives that guide the team's work and serve as benchmarks for evaluating success. The initial matchmaking process, facilitated through tools like the HECLab platform, plays a critical role in ensuring that all team members are aligned in their objectives and approach, creating a shared foundation for collaboration.

In the **Collaboration Process**, the teams move into the practical execution of their experiment. This phase is characterized by a semi-structured approach that balances guided collaboration with the creative freedom necessary for artistic exploration. Mentoring and continuous input from collaborators—such as subject matter experts or additional stakeholders—are integrated to enrich the process. The team works iteratively, allowing room for experimentation, pivoting, and innovation while adhering to the shared vision and objectives established during the first phase. Regular check-ins,

[4] Hungry-Ecocities_Deliverable-1.3-Art-Driven-Innovation-HEClab-matchmaking-methodology.pdf

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updates, and assessments ensure that the project stays on track and evolves dynamically to incorporate new insights or address emerging challenges.

The final phase, **Analyzing and Diffusing Outcomes**, focuses on evaluating the results of the experiments and identifying their broader implications. This analysis often employs frameworks like PESETABS, which examines the potential spill-over effects in domains such as policy, ecology, society, technology, and business. This phase not only assesses the success of the prototypes but also explores their scalability and potential for systemic impact. Outcomes are documented, shared, and positioned for further development, ensuring they contribute to sustainable innovation beyond the project's scope. This comprehensive approach fosters both immediate results and long-term value, embedding the experiment's findings into broader discussions on sustainable food systems and responsible innovation.

4. Best practices and lessons learned from previous residencies

The lessons learned and best practices presented in this section were gathered through the desk research conducted, as well as through the survey outlined in Section 1. This survey targeted S+T+ARTS Residency coordinators and key stakeholders, who provided valuable insights based on their direct experiences with the residencies. Their input highlights critical challenges, successful strategies, and recommendations for enhancing interdisciplinary collaboration, innovation processes, and stakeholder engagement within the S+T+ARTS framework.

Best practice: common-language for effective challenge definition

The VOJEXT project demonstrated that crafting impactful challenges requires an **inclusive and iterative process**. Engaging diverse stakeholders, including researchers, industry experts, and artists, and fostering a **shared language** ensured challenges were accessible. A balanced scope was key—avoiding overly prescriptive constraints allowed for creative freedom and diverse interpretations, resulting in innovative outcomes. Tools like **Miro for ideation**, critical making sessions, artistic interventions, and inspirational talks were employed to stimulate curiosity and imagination, providing a practical framework for future residencies.

The Better Factories project emphasized the critical role of **addressing language, cultural, and professional differences** in collaborative environments. Successful projects bridged language barriers by adopting a common 'lingua franca' and acknowledged cultural and professional differences with respect and education. Regular check-ins and clarifications ensured all team members understood goals, processes, and expectations, fostering clarity and consensus.

Together, these practices underscore the need for a dual focus on **effective challenge design** and **strong communication**. By integrating creative flexibility with strategies to bridge differences, residencies can create inclusive environments that drive innovation and achieve impactful outcomes.

Best practice: managing complexity in multi-stakeholder, multi-phased residencies

In projects such as **S+T+ARTSWATERII** and **S+T+ARTS in the City**, managing the complexity of residencies with multiple stakeholders has led to the identification of effective practices for coordination and collaboration. A standout approach is the use of **phase-specific stakeholder mapping and engagement plans**.

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This practice involves creating a detailed map of stakeholders for each phase of the residency, clearly identifying who needs to be involved, when, and how. By defining roles and responsibilities upfront, the residency team can ensure that stakeholders are engaged at the right moments, avoiding unnecessary overlaps or gaps.

Complementing this is the establishment of a **central coordination team or point of contact** to oversee communication and act as a bridge between stakeholders. This team ensures that information flows smoothly across internal and external partners, providing updates, clarifications, and support as needed.

Regular **checkpoint meetings** at each phase of the Residency Wheel further enhances this process. These meetings provide opportunities to reassess goals, address emerging challenges, and refine stakeholder contributions. By ensuring that all voices are heard, and adjustments are made proactively, projects can maintain momentum and cohesion across all stages.

Lesson learned: prioritizing face-to-face engagement for collaborative success

The **S+T+ARTS AIR** project emphasized the critical importance of face-to-face engagement with stakeholders to foster effective collaboration and meaningful outcomes in residencies. A key takeaway was the necessity of ensuring that any methodology includes a dedicated budget for physical presence and in-person follow-up with artists and stakeholders.

Face-to-face interactions allow for deeper, more personal connections that are often difficult to achieve through virtual communication alone. They enable nuanced discussions, immediate clarifications, and the opportunity to build trust among diverse participants. In a residency context, where stakeholders often come from different disciplines, backgrounds, and cultures, physical presence can significantly enhance understanding, alignment, and collaboration.

Moreover, in-person follow-ups with artists and stakeholders ensure that the project maintains momentum and accountability. Regular physical meetings can help address challenges in real-time, solidify commitments, and adapt strategies as needed. The tactile and immersive nature of physical presence also creates opportunities for stakeholders to experience the project's work directly, which can inspire stronger engagement and investment in its outcomes.

This lesson highlights that while digital tools are invaluable for communication, they cannot fully replace the impact of personal interactions. **For future residencies, it is essential for consortia to allocate sufficient resources for travel and in-person meetings, recognizing that this investment is fundamental to the success of collaborative, multi-stakeholder projects.**

Lesson learned: define success metrics beyond traditional outputs

Residencies within the S+T+ARTS framework require robust evaluation methods that go beyond traditional outputs like prototypes or artworks. Success should be measured in terms of societal impact, such as contributions to sustainability, inclusivity, or cultural transformation, as well as the partnerships formed and the knowledge generated. Metrics like community engagement, stakeholder collaboration, and the longevity of outcomes help gauge the broader value of the residency. Feedback collection is crucial throughout the process, starting with a baseline assessment of participant expectations, followed by mid-term reviews and post-residency evaluations. Stakeholder and audience input, gathered through surveys, interviews, and focus groups, provides qualitative insights into the residency's reception and relevance. To ensure continuous improvement, recurring patterns in feedback should inform refinements to the residency model. Experimenting with new formats, incorporating participant-led feedback, and tracking long-term impacts ensure that future iterations align with societal challenges

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and evolving innovation landscapes. By prioritizing holistic evaluation and adaptability, S+T+ARTS residencies can maximize their interdisciplinary and societal contributions.

Lesson learned: Increased diversity in Residency models

There is the necessity of expanding the diversity of residency models within S+T+ARTS programs to better support the transformative potential of interdisciplinary collaborations. Currently, the dominant model relies on challenge definitions where experts determine the research questions for artists. While effective in specific contexts, such as when artists play an explanatory or supporting role, this approach can limit the broader systemic impact of residencies. To foster deeper innovation and systemic change, it is crucial to design models where artists are involved from the very beginning, particularly in problem refinement and question formulation. Residencies should incorporate processes that emphasize co-creation and collaborative problem definition from the outset. For example, implementing matchmaking models where artists, scientists, technologists, and community stakeholders work together in initial phases—prior to proposal writing—can ensure the development of meaningful research questions and challenges. These co-creative stages can help identify and disrupt long-held assumptions that may have become counterproductive, allowing for fresh perspectives that push boundaries in innovative and constructive ways.

Lesson learned: Residencies – Evaluation & Impact Assessment

Residencies must adopt models with extended timeframes and deeper collaboration intensities, akin to research partnerships. Such models allow for sustained interaction and mutual influence among collaborators, fostering the creation of new forms of knowledge through interdisciplinary exchange. Outputs from these collaborations could include academic publications, technological prototypes, community-driven initiatives, and citizen engagement activities, reflecting a diverse range of societal and cultural impacts. To fully capture the value of these residencies, evaluation frameworks must evolve beyond focusing narrowly on short-term outcomes, such as prototypes or artworks. Instead, they should prioritize assessing broader, long-term impacts. Process-driven evaluations, which emphasize the methodologies, collaborations, and learning fostered by the residencies, provide a more comprehensive understanding of their significance. These should be complemented by longitudinal studies that track societal, cultural, and technological influence over time. Incorporating these dimensions into evaluation practices requires a shift in perspective and the inclusion of indicators that reflect transformative potential beyond immediate deliverables. Evaluations should assess systemic changes, societal impact, and the ability of residencies to influence policy, reshape research practices, and build lasting cross-disciplinary networks. By adopting these enhanced evaluation practices, residencies can align more effectively with the overarching goals of innovation and societal enrichment.

Best practice: community engagement – organic interactions

To foster genuine connections and ensure long-term impact, **residency projects** should prioritize open and accessible community engagement. Instead of limiting activities to exclusive exhibitions or conferences, all phases of the project should unfold in public, day-to-day spaces where organic interactions occur. This approach makes the creative process inclusive and relevant, encouraging spontaneous contributions from a diverse audience and embedding the project into the community's lived experiences.

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A key example is the **The Daladala-Verse (Ona Stories – Aurelio Mofuga)** in the S+T+ARTS4AFRICA program[5]. Rather than hosting closed events, the residency was integrated into everyday environments like market areas and transport hubs. Community members could encounter and participate in the project during their routines, engaging in informal discussions and contributing to its evolution. Public displays and interactive prototypes were designed to be approachable and situated in familiar settings, fostering a sense of shared ownership. This openness not only enhanced the project's immediate relevance but also ensured its longevity by embedding its outputs and knowledge within the local community.

By emphasizing accessibility and organic engagement, residency projects can build lasting connections, empower communities, and leave a sustainable impact aligned with local needs.

5. Conclusion and future directions

The S+T+ARTS initiative, through its residencies, has demonstrated the **transformative potential of fostering collaborations between the arts, sciences, and technology**. By creating a nexus for interdisciplinary experimentation, the program has not only catalyzed innovation but also addressed pressing societal challenges with solutions grounded in creativity and inclusivity. The methodologies employed, from challenge-based frameworks to the Design Futures-Art Driven approach, highlight the value of combining artistic vision with scientific rigor to achieve human-centered outcomes.

Key successes of the program include the development of innovative prototypes, the facilitation of meaningful community engagement, and the establishment of cross-disciplinary networks that redefine the boundaries of collaboration. The emphasis on flexibility, inclusivity, and the iterative refinement of ideas has proven essential in creating outcomes that are not only functional but also culturally resonant and ethically grounded. Moreover, the adoption of practices like the "Residency Wheel" and robust matchmaking processes has provided scalable models for future initiatives.

Of course, as the project continues to evolve there are critical areas requiring further reflection and improvements to enhance its effectiveness and sustainability.

+ Extended collaboration periods are crucial for achieving deeper and more transformative results. While current residencies often span one year, this duration may not suffice to foster the depth of collaboration, iterative development, and systemic change necessary for addressing complex challenges effectively. Longer residencies would provide the opportunity for sustained engagement, allowing participants to explore innovative solutions thoroughly and build stronger cross-disciplinary relationships.
+ Sustainability is a vital consideration for the future of S+T+ARTS residencies. The establishment of more Regional Centres can play a pivotal role in ensuring the longevity and accessibility of these initiatives. However, it is equally important to maximize the utilization of these infrastructures by integrating them into diverse projects and fostering continuous engagement across disciplines and sectors. These centres should serve not only as physical

[5] *S+T+ARTS4AFRICA Residencies –: The Daladala-Verse*. Retrieved from https://starts.eu/starts4africa-residencies-call-for-artists-the-dalala-verse/.

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spaces but also as hubs for ongoing collaboration, capacity-building, and community involvement, thereby reinforcing their value and impact.

+ One notable area for improvement is the integration of a bottom-up approach in the design of challenges. Currently, artists are not sufficiently involved in the formulation of residency challenges, which limits the program's capacity to address the most relevant and pressing issues. Incorporating artistic input from the outset can lead to better-formulated challenges, attract a greater diversity of applications, and produce more remarkable and impactful results. This shift would also empower artists to contribute their unique perspectives and critical thinking skills, ensuring that the challenges resonate with societal needs and foster innovation that is both meaningful and inclusive.

By building on its robust foundation and exploring these above mentioned future directions, the S+T+ARTS initiative is well-positioned to continue shaping a future where technology and creativity intersect to promote and response to the ever-evolving EU priorities.

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