



“Adding socio-economic value to industry through the integration of artists in research and open innovation processes”

DELIVERABLE 2.2

Publication on Co-Creation Methodology

Revised version V2

Grant agreement no: 732112





Adding value to research and technology through integration of artists in projects and synergy creation between creative industries, entrepreneurs, researchers and arts

Document information:

Project acronym:	VERTIGO	
Project full title:	Adding socio-economic value to industry through the integration of artists in research and open innovation processes.	
Project type:	Coordination and Support Action (CSA)	
EC Grant agreement no	732112	
Project starting / end date	01.12.2016 / 30.05.2020	
Website:	Vertigo.starts.eu	
Deliverable No.:	2.2	
Responsible participant:	EPFL	
Due date of deliverable:	30.01.19	
Revision history:	V1.0 / 29.01.2019	Pierre-Xavier Puissant, Nicolas Henchoz – EPFL Hugues Vinet - IRCAM
	V2.0 rev01 / 29.5.2019	Pierre-Xavier Puissant, Nicolas Henchoz, EPFL
	V2.0_Final / 31.05.209	Hugues Vinet, IRCAM
Dissemination level:	Public	
Authors:	Nicolas Henchoz, Pierre-Xavier Puissant, Tania Moreira, Hugues Vinet	

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Executive Summary

This document is a revised version of the deliverable submitted in January 2019, following the RP2 Review Report and the results of the peer review process by the Siggraph 2019 Conference.

EPFL+ECAL Lab has submitted a scientific contribution to the Siggraph 2019 Conference on Tuesday 29.1.2019. The contribution has been accepted. It has also been selected among the six art papers for the main stage, fast track presentation. It will also be published by Leonardo/MIT Press, and online open access. This article analyses the contribution of STARTS Residencies to set a global and scalable framework for artist residencies in high tech environment. The consortium will take advantage of this recognized contribution to publish a second document, engaging with the larger audience targeted by the STARTS Community. This document aims at sharing more residencies outcomes as well as methodology and tools now available for future residencies. References, data, interviews and observations gathered for the publication effort are now also organized in dedicated digital repository to induce for further analysis, by external researchers.



SECTION 1 - Publication Strategy

The initial plan of publishing a peer review publication has been extended to three deliverables. The peer review publication is the fundamental building block: it provides a worldwide recognized contribution by STARTS Residencies in terms of knowledge. It sets the context, the state of the art, the original contribution of the Action, and shows perspectives.

Based on this STARTS Residencies can develop the content towards potential users of the methodology and the tools, raise the awareness about artist contributions for high tech innovation and contribute to the development of a culture as well as a framework for such transdisciplinary contribution. Eventually, it will also put an emphasis on the achievement of the STARTS Community.

1.1 The Peer Review Publication

Siggraph has been selected as the first target for STARTS Residencies publication because of its size and its impact. As one of the main events of the digital world, it gathers around 15'000 people from industry, academia and art. The second benefit is a publication, after the Conference, in Leonardo/MIT Press, considered as one of, if not the most famous journal for art, science and technology. It was a risky bet as the acceptance rate is very low, usually under 10% (other conferences were planned, if the proposal was rejected). The submitted paper had to follow very strict rules, especially in terms of size. In March 2019, the authors have been informed that the contribution was accepted. Modification requested by the reviewers have been implemented. Most of them were aligned with the STARTS Residencies Annual Review. Final acceptance has been notified in April 2019. Eventually, the contribution has been selected among the six art papers for the additional fast track presentation on the opening plenary session, enhancing tremendously the visibility for STARTS. The contribution will be presented during the Conference (July 28 - Aug 1 in Los Angeles).

The article will be published by Leonardo/MIT Press by the end of the summer, as open source content, providing a worldwide impact. The accepted paper is shown on Chapter 2, but has to remain confidential until the presentation at the Conference.

1.2 STARTS Residencies brochure

In addition to the peer review publication, emphasizing the knowledge acquired by STARTS Residencies, the consortium has decided to publish an additional document to reach large professional audiences, with a strong focus on high tech industries and research centers, institution, and public entities fostering on innovation. Taking advantage of the latest outcomes of residencies, it will present the potential of Artists input within the innovation process, using several case studies in different field. It will also provide a pragmatic overview of the methodological framework and the tools available for companies and institutions which could benefit from residencies program. More globally, the document will also act as a common reference for the STARTS Community and serve the development of a new culture of innovation, taking in account users with their human and social



context. The content of the brochure will be jointly coordinated by IRCAM and EPFL, using material from the peer review publication, final report from Pierre-Xavier Puissant studies at EPFL, reports from residencies monitors and contribution from specific work packages. Layout and production will be performed by the communication team, led by IRCAM, to ensure full coordination with the STARTS environment.

Content aggregation is planned for early September 2019 to take as much residencies as possible in account. Paper version is expected to be released in October 2019. Diffusion strategy is embedded in the communication work package as well as in the dissemination plan.

1.3 Research and Development on Artist Residencies

STARTS Residencies is a CSA, which means that research is not its focus. Although it already provides a major success with a Siggraph & Leonardo publication, much more can be extracted from the experience, results and data gathered by the Action. As suggested by the project Advisory Board in Fall 2018, we have therefore launched a specific work to induce research work on this material.

Data provided by the program are collected and organized and structured in specific folders and repositories, along with bibliographic material, to create a large background for new research work.

By the end of August, we STARTS Residency will inform specific university and research teams about the availability of the material, the STARTS Community activity and the potential impact of this topic. Specific contact will be set with research teams have already started (ex: Pr. Berthoin-Antal - Berlin Social Science Center, Pr. Annie Gentes - Telecom ParisTech, Pr. Béla Kapossy - EPFL, Pr. Jeremy Myerson - Royal College of the Art...), to generate further work and create the link with the STARTS Community.



SECTION 2 - Accepted Publication on Co-creation Methodology

We present in this chapter the final and accepted version of the contribution from STARTS Residencies to Siggraph 2019 and Leonardo. This content is confidential until its release by Siggraph and Leonardo. The content is following the conference request and the reviewers' recommendations. Among several constrains, the length was strictly limited to 2500 words, including the references.

Artist Residencies for Innovation: Development of a Global Framework

Nicolas Henchoz, Pierre-Xavier Puissant, Ana Solange Leal, Tânia Moreira and Hugues Vinet

Nicolas Henchoz

Director
EPFL+ECAL Lab
Avenue du 24 Janvier 11, Renens, Vaud 1020
Switzerland
nicolas.henchoz@epfl.ch.

Pierre-Xavier Puissant

Research Assistant
EPFL+ECAL Lab
Avenue du 24 Janvier 11, Renens 1020
Switzerland
pierre-xavier.puissant@epfl.ch.

Ana Solange Leal

Senior Project Manager
INOVA+
Rua Dr. Afonso Cordeiro 567, Matosinhos 4450-309
Portugal
ana.leal@inova.business.

Tânia Moreira

Project Manager Assistant
INOVA+
Rua Dr. Afonso Cordeiro 567, Matosinhos 4450-309
Portugal
tania.moreira@inova.business.

Hugues Vinet

Director of Innovation
IRCAM
Place Igor Stravinsky 1, Paris 75004
France
hugues.vinet@ircam.fr.

ABSTRACT

Artists can play a major role in the success of innovation. The European program STARTS aims to increase their impact in high-tech environments. An international consortium has the mission to implement 45 residencies and set a complete framework for such partnerships. The authors identify methodological gaps from the literature and observe how the STARTS program fills them. The authors discuss the impact of the implemented solutions, providing the leading global study on this large-scale action. The resulting residency framework, including the methodology and its associated tools, will be released publicly, making it available to institutions and companies.

<1> Context

History shows the capacity of artists to drive innovation. In 1919, the Bauhaus called upon painters and sculptors to redefine the notion of building, along with architects. Embracing the rational approach of industrialization, they were able to rethink our relation to technology, functionality and aesthetics: Modernism drove the detachment from the idea of Nature in favor of the idea of Machine and Innovation [1]. In the 1950s, postmodernism reconnected with ornament, popular references and diversity. The radical design movement followed upon the revolution in the 1960s, involving utopian communities. New movements of artists immersed themselves in unexpected contexts using technology, like Fluxus or E.A.T. (Experiments in Art and Technology). In universities, hippie modernism activists pushed for a social vision of computers and networks [2]. The involvement of artists has taken different forms: from being a member of a team, such as at the Bauhaus, to retaining strong independence and preserving a critical attitude, such as Nam June Paik [3]. The tension between helping to solve engineering issues and providing a critical view was, and remains, a core issue [4].

Already before the twentieth century, residencies were established to bring artists into a specific context for a limited time period [5]. In the early 1960s, the idea of residencies in a scientific context emerged, as a way to capitalize on artists' disruptive thinking about new technologies. E.A.T. is a pioneer for such collaboration on a large scale. Whereas the Palo Alto Research Center's Artist-in-Residence program [6] is usually set as a reference, Europe and Japan have also been considered as driving forces in the 1990s, with initiatives like Ars Electronica, Zentrum für Kunst und Medientechnologie (ZKM) or Institut de Recherche et de Coordination Acoustique/Musique (IRCAM), which has built practice and knowledge of the art and science interface over the past 40 years. Since then, such initiatives have grown exponentially, taking advantage of digital media and mobility [7].

Researchers have studied residencies to develop knowledge on co-creation between artists and scientists. Several success factors emerge. The setting of a shared vocabulary helps artists to grasp the technology, preserve their own creativity [8] and share their visions [9]. The co-creation environment should be conceived as an in-between space, allowing heterogeneous identities and mutual access to artifacts [10]. Motivation is mostly driven by the unknown and existence of challenging tasks [11] toward an overall common goal, while at the same time forwarding personal ambitions for the collaborators [12]. Reaching this goal requires respect for expertise and accepting the recognition of artistic research as a valid practice in the production of knowledge [13]. The position of the artist must therefore be well defined in order to overcome the usual tension between problem solving and personal critique [14]. The different approaches related to the disciplines require handling discoveries and the unexpected from different points of view. Co-creation in such a context cannot be rushed [15]. Our review of these guidelines allowed us to identify five gaps that need to be filled in order to set a global framework for artist residencies: mediation, methodology, adaptation, goal setting and scalability. We will discuss these gaps alongside experimental results to evaluate the outcome of the action.

<2> Experimental Ground

The STARTS Residencies action provides an operational ground to study a global framework for artist residencies in scientific environments, and is dedicated to innovation. It is supported by the European Commission, as part of the STARTS program, with a twofold mission: on the one

hand, to support collaborations between artists, engineers and researchers to develop more creative, inclusive and sustainable technologies; and on the other hand, engage the creativity and critical thinking of artists to reflect on novel uses of technology and improve its integration into society. The STARTS Residencies action has committed to deliver, between 2017 and 2020, the following:

- 45 residencies over three years of activities
- a global methodology to promote such collaborative work in research centers and industry
- tools to implement the methodology
- knowledge to understand success factors for further initiatives

In February 2019, the global methodology was operational and the three calls planned have been launched. They involve 99 validated tech projects from 18 countries. The methodology, the digital platform, the jury and the support team are operational. Call 1 resulted in 10 residencies; call 2 resulted in 17 residencies; and call 3 completed the selection process, resulting in 18 residencies. The methodology is structured along three phases:

- a) Identification of high-tech challenges. Scientists propose technologies and describe the ambition of the project. They express their expectations from the artist(s) and the available resources. A committee of experts validates the proposals.
- b) Identification of artists and team assignments. Artists are invited to select a validated high-tech challenge and propose a contribution. An independent jury evaluates the proposals, using five factors: artistic relevance, convergence of expectations, implementation plan, innovation potential and technical approach.
- c) Implementation and impact. A mediator structures and follows the residency: he or she launches the collaboration through the inception meeting. It aims to ensure mutual understanding of goals, deliverables, resources, planning and tools. A formal part, with a contract, emphasizes mutual responsibilities. The meeting also allows individual expression of initial feelings. The midterm review checks the ongoing co-creation process, adapts the work plan and explores dissemination opportunities. Eventually, the

closure meeting discusses the residency outcomes. It marks the end of the co-creation work plan.

<3> Residency Outcomes: 2017–2018

To give a perception of residency outcomes, we focus this section on the work performed by three teams.

Atlas brings artists Yann Deval and Marie-Ghislaine Losseau to work with WEKIT in Oxford. WEKIT develops wearable experiences for knowledge-intensive training, in particular through the use of artificial reality (AR). The mediator successfully advocated to WEKIT for this choice of artists. The inception meeting had to support the implementation of an incremental workflow and the description of the common goal: producing three levels of interconnected realities. The first shows tiny wooden houses that children made by hand in workshops. The second allows the user to explore the same world in virtual reality. The third takes advantage of virtual reality to mix the different contributions in a single experience, joining digital and real-world expertise and environments.

The residency has led to a functional installation and design principles solving vision perception for AR glasses. For instance, it embeds the augmented field of vision into the real one through disruptive visual patterns and a transition zone, increasing the perception of normality. Results have been showcased at venues like Ars Electronica, South by Southwest (SXSW) and Oxford University's exhibition space. The partners have decided to pursue their collaboration.



Fig. 1. *Atlas*: The user is wandering in a world of hand-built wooden models, in different layers of reality. (© STARTS. Photo: Yann Deval and Marie-Ghislaine Losseau, 2018.)

In *The Plants Sense*, artists Maria Castellanos and Alberto Valverde have built an interactive installation allowing visitors to experience the language and behavior of plants. They have taken advantage of the technical framework and knowledge of Flora Robotica, a transdisciplinary team exploring “symbiotic relationships between robots and natural plants . . . to produce architectural artifacts and living spaces”.

The final prototype monitors different electrical and biochemical signals from plants. It turns them into multisensorial feedback to humans and behavior patterns for robotic plants. The project brings a critical view on the field explored by Flora Robotica while setting an unexpected experimental ground for the scientific team. Transdisciplinary competences in both the artistic and the scientific team have dramatically improved the co-creation process.



Fig. 2. *The Plants Sense*: detail of a sensor. (© STARTS. Photo: María Castellanos and Alberto Valverde, 2018.)

The *Magic Lining* residency brought together MAGICSHOES, a scientific project that explores how wearables generating sound can alter our body perception, and Kristi Kuusk, an artist working with sustainable smart textiles. Kuusk proposed to consider the full body of the user and the garment to explore new areas of impact for the technology. MAGICSHOES started to consider new dimensions like emotional impact and aesthetic expression. It led to a prototype showing innovative wearable solutions for tracking body signals (movement, physiology) and delivering sound while people are on the move.

The collaboration progressed fast, on both the artistic and the engineering sides. The prototype allowed the project to generate scientific knowledge through perception studies conducted by the Human-Computer Interaction group at Tallinn University.



Fig. 3. *Magic Lining*: wearable textiles developed during the residency. (© STARTS. Photo: Kristi Kuusk, 2018.)

<5> Discussion: Filling the Gaps

The STARTS Residencies action provides an assessment of the residencies' implementation and requests continuous feedback from the actors involved in the co-creation process. The assessment combines informal discussions, interviews, questionnaires and monitoring from the digital platform. As this European action has the ambition to generate a global framework for such collaborations, we discuss the results by looking at how it faces five common gaps identified in the literature.

- I. *Mediators should facilitate the dialogue between artists and scientists.* They can help to preserve the integrity of the boundaries of their cultural domains and identities, from which they can then interact [16]. The STARTS Residencies action has implemented mediators in each residency. The mediators consider the inception meeting as a critical moment to align the objectives of both parties and start to define a common language. Dialogue, often more

intense than expected, has been required to move from the personal interests driving the initial engagement to a common interest driving the project.

- II. *An integrated methodology, considering artists' and engineers' perspectives, would clarify the relationship and induce a dynamic flow throughout the co-creative process.* The development of this methodology is part of the initial commitment of this STARTS action. It has been implemented from the initial call for projects to the final assessment, including by experts and the jury. Participants have reported no missing steps. External experts praise the innovation and artistic outcome, but pinpoint shortcomings in several written reports from artists. Artists perceive the procedures and requests as time-consuming. But participants like Yann Deval underline that an incremental workflow induces a mutual understanding between different forms of creativity.
- III. *The evolution of innovation contexts and digital tools modify practices [17]. Thus, guidelines shall accompany this evolution and be adapted to it.* The STARTS Residencies action faces the gap by associating methodology with a digital platform. This integration impacted the submission form, the selection process and the inception meeting. The aforementioned incremental flow allows participants to anticipate needs and show faster results. The *Magic Lining* residency quickly identified the technology issues and was able to open useful perspectives early on, for example.
- IV. *The goals of art and engineering co-creation must be specified: Potential for disruption, social impact, economic impact, etc. are known to be strong common drivers.* In addressing this gap, we observe the influence of several STARTS Residencies action features. First, initial selection and support to the technology project clarify opportunities for the artists. Then the inception meeting seems to be instrumental to move from individual expectation to common goals as main drivers. Eventually the digital platform—involving standard inputs along a dynamic flow—defines a common narrative and spells out the co-creation process.
- V. *A generic framework should be scalable: The number of residencies can be increased at reasonable costs to allow their implementation as a regular practice in innovation.* The STARTS digital platform aims at reducing the need for mediator involvement. Experience indicates a strong autonomy of the teams during the co-creation phase. But even if each partner already comes with transdisciplinary competences, like for *The Plants Sense*,

mediators have been instrumental at specific moments, especially to support the initial definition of the technology challenge and to run the inception meeting. Scalability of the program must therefore consider a fixed cost for the platform and the methodology, and include a variable component proportional to the number of residencies for mediation. This effort is limited to specific steps: It is not expected to increase significantly with the duration of residencies.

Beyond the identified gaps, observations also show the impact of the independent jury. When gathering balanced competences, it contributes to the acceptance of unexpected teams and topics, enhancing the creativity potential, as shown by several projects, like WEKIT. But such unexpected teams also increase mediator investment.

<6> Conclusion

The STARTS Residencies action is setting a global environment for artist residencies in innovation projects, as it addresses the identified gaps. But the task is complex, as it must face contradictions. For instance, creativity is boosted by the diversity of applicants, but co-creation is improved by following a well-established framework and reporting tools. Also, scalability is key to produce a large impact, but human involvement by a mediator enhances success. The STARTS Residencies action provides an experimental and operational framework to address these issues. Based on the lessons learned, the initiative will release its tools and methodologies publicly: The digital platform is expected to accept calls from external entities starting mid-2019.

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