

# Guideline for STEAM Facilitators



# ABOUT THE PUBLICATION

With the support of the Erasmus+ programme of the European Union. The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

This publication was developed by Conexiones improbables with the support of the Steam Process partners.

Vitoria-Gasteiz (Spain), 2023

Read more about the STEAMProcess project:

<https://www.xamk.fi/en/research-and-development/steam-process-innovating-the-transition-process-from-stem-to-steam-approach-in-science-teaching/>

© Authors, Conexiones improbables and South-Eastern Finland University of Applied Sciences

# CREDITS

## AUTHORS

Roberto Gómez de la Iglesia, Nerea Ayerbe, Anna Pinotti, Lucas Dedyn and Itziar Puente.

# ABSTRACT

This guide is aimed at facilitators who seek to foster the relationship between different disciplines and sectors in STEAM projects within the framework of higher education. It focuses on the need to develop a transdisciplinary look at learning processes from the understanding of the complexity of the world and the need to seek simple solutions in their application. This requires being able to formulate new questions, something in which the Arts are a privileged framework. The aim is to vindicate the **A** of Arts as a field of knowledge generation on an equal footing with the rest: Science, Technology, Engineering and Mathematics. The guide provides resources and reflections to facilitate the task of really connecting these different fields of knowledge, although it emphasizes the facilitation processes that can be promoted from the arts, culture or creativity, the currently weakest link in the chain.

# INDEX

1. Notes for STEAM facilitators in the form of a guide.....	5
2. What does it mean to facilitate between different people? .....	7
3. STEAM process facilitation .....	12
4. Facilitation tools .....	14
4.1 To create trusting environments (climates of empathy and active listening) .....	15
4.2 To create a climate of equality and teamwork .....	17
4.3 To generate a common language (to harmonise the group and to come together) .....	18
4.4 To generate or resolve conflicts .....	20
4.5 To explore different opportunities and to encourage divergent thinking (generation of new ideas) .....	21
4.6 To foster cooperation .....	25
4.7 For visual process management .....	26
4.8 Creative meeting dynamics .....	28
5. References .....	30
6. STEAMProcess .....	31

# 1. NOTES FOR STEAM FACILITATORS IN THE FORM OF GUIDE

The aim of this guide is to define the role that facilitators can play in favouring the relationship between different sectors and disciplines, especially in the context of STEAM projects in higher education, providing some references of tools that they can use in their task. Although the approach is generalist, we cannot avoid, given the framework of the STEAM Process project and the background of the writers of this guide, putting special emphasis on the role that methodologies and tools from the arts can play in fostering such processes.

There is an increasing tendency for families, students and even a large part of the formal education environment to ask the education system to train in specialization for employment. This produces graduates with a high level of technical skills but, perhaps, with an insufficient capacity to understand and analyse complex situations. Education must train for life and, in any case, for employability, but not necessarily for jobs that are changing and will change rapidly in the coming years. We are in an environment of black swans<sup>1</sup>, of accelerated changes in many key aspects of our lives and, among them, we can highlight the development of exponential technologies.


In the face of excessive technologization, it is becoming increasingly important to incorporate into education the development of a **360-degree**, multidisciplinary, but above all **transdisciplinary approach**. A view that approaches the complex reality of the world from the point of view of complexity and, at the same time, seeks simple answers in its application (not an easy thing to do). And this is something that STEAM strategies must pursue.

But what happens with many of these initiatives? Basically, they are developed in environments where the arts are perceived, in the best of cases, as a friendly means to explain and understand scientific or technical/technological phenomena, but not as a field of knowledge generation on an equal footing with the rest, or with the same legitimacy.

In fact, the A for Arts has been the last to arrive. STEM strategies are still being discussed in many places, often based on gender issues, on how to familiarize young women with science and technology studies (which is what the market seems to demand the most).

---

<sup>1</sup> Taleb, Nassim Nicholas. *The Black Swan: The Impact of the Highly Improbable*. (2007). The concept of black swans refers to events that fall outside human experience and cannot be predicted by conventional statistical analysis or mathematical modelling. These events are rare, but can have a profound and lasting impact on economics, politics, society, technology and other fields.



Our experience tells us that it is not easy to develop STEAM processes in mega-specialised environments. The relationship between different people, who have different backgrounds, use different languages, different research or development methodologies and have different frames of reference and relationships, often requires the **intervention of a third party**. For example, in business innovation environments based on artistic and cultural processes, the intervention of mediators is needed to develop common frames of reference, common languages (and often differential of the parts), neutral spaces that favour the emergence of hidden creative capacities and new questions in the face of everyday challenges or new ways of approaching the resolution of a problem.

In the STEAM educational environment, we cannot always have the role of mediator specialized in "sewing" diverse worlds, but we must at least have people trained in **facilitating transdisciplinary processes**, with the ability to connect worlds that have very different characteristics, different perspectives and different conceptual frameworks. This diversity is the fertile environment for STEAM processes, but we must know how to sow, nurture and care for this soil in order to reap its fruits.

The disciplines, as we understand them today in a differentiated way, are not much more than two centuries old. And the changes that are taking place at an accelerated pace are once again **blurring the barriers** that have been built up during that time between the different fields of knowledge. But there are still many clichés and prejudices associated with each discipline, as well as a large number of conditioning factors specific to each context, social environment or market. Unfortunately, the arts are often in an unfavourable position in this respect.

This guide is a small support for those people who, from within the educational system itself, or from outside as promoters of learning processes and personal growth, want to favour a reciprocal relationship, even if it may not always be symmetrical, between the Arts, Science and Technology.

The potential facilitator will find in this guide some useful reflections and resources to support his or her task. These are just a few examples. There are many methodologies and tools that we can use. But above all we need an attitude of dialogue, of collaborative construction, of non-hierarchy between fields of knowledge, of valuing expert and non-expert contributions, of active listening, of learning to construct new questions.

As Jorge Wagensberg (1993) reminded us, "changing the answer is evolution, changing the question is revolution". A good facilitator is, above all, a person capable of guiding the working group towards the search for the right question. From there, it is easier to find the right answer by crossing disciplines and perspectives. Thus begins the STEAM revolution, a new Renaissance full of "new Leonardos" where the Arts can not only be the object of work but also the methodological subject, obviously not exclusive, to achieve it.

## 2. WHAT DOES IT MEAN TO FACILITATE BETWEEN DIFFERENT PEOPLE?

As the report "Composing knowledge to better understand contemporary challenges" by the Daniel and Nina Carasso Foundation (2023) points out, we can talk about mediation, dynamisation, facilitation or diplomacy, but what is clear is that the composition of knowledge is inextricably linked to the work of care and the building of links. It is a matter of concentrating on the modalities of exchanges that allow all parties to find their place; detecting misunderstandings and terminological problems in order to integrate them into the collective work; understanding each other's practices in order to **identify possible common working spaces**; and, finally, finding the right ways of presenting, explaining and telling the project to external interlocutors.

The successful facilitation of STEAM processes requires the development of a context of **trust** between those involved, often coming from the same educational institution but with markedly different specialisations and often seen as antagonistic.

This gives rise to a first reflection that has to do with **the value of diversity**: why not incorporate people not only from different disciplines but also from different contexts into STEAM processes? Some experiences linking educational centres, artists, companies and mediators have been particularly successful, such as the [pilot experience](#) promoted between 2021 and 2022 by the Department of Education of the Basque Government and Innobasque with the support of Conexiones improbables.

What if we also incorporated, for example, citizens or non-teaching staff of educational institutions? As Sennet (2012) says, the greater the diversity, the greater the probability of emergent phenomena.

But managing diversity requires skills and knowledge to prevent these processes from becoming unproductive chaos and, instead, to achieve great results in terms of exploration, discovery, creation and interdisciplinary learning.

But **how do we create these environments of trust** between different people that allow us to build common projects, generate shared meanings, transmit and provoke knowledge in all directions, catalyse creative capacities, convergent and divergent thinking, or activate multiple intelligences?

Everything starts from the need to **get to know each other** (having information and direct knowledge of the other), a prior step to **recognise** each other (being able to establish the differential identity of the other), to **respect each other** (treating each other with taste for diversity, dignity and consideration) and to **empathise** (participating affectively in the reality of the other). From there it is possible to develop **trust** between different people (belief in the other). This is a complex process that we often have to do in a very short time. That is why the creation of friendly and informal atmospheres, the use of tools that encourage active listening and the discovery of the desires, concerns and challenges of others, the establishment of common and differentiated codes of the specialities present or the use of unusual spaces, are some relevant issues in the facilitation process.

Building **trusting** environments (a word closely linked to the concept of care) is part of developing a CO culture <sup>2</sup>:

- **Collaborative**, as a cooperative, multi-agent, multi-level and multi-disciplinary skill and habitus, to be fostered in the higher education environment internally and externally.
- **Cocreative**, which stimulates processes of ideation and creation among different people, starting not from the highest possible agreement but from the lowest common denominator, which has to be identified.
- **Community-based**, with a sense of impact and commitment internally and with the community (not only the educational community) in which it is developed. Working STEAM strategies linked to environmental challenges is the most natural way to understand how complex situations require multiple perspectives and, moreover, can offer surprising results.
- **Co-responsible**, which assumes, together with the tasks that correspond to each agent, discipline or field of knowledge, the responsibility that these entail, sharing them in a reciprocal and solidary manner.
- **Connected**, which promotes the non-hierarchical connection of diverse actors, sectors and disciplines.
- **Cohesive**, with shared and coherent meanings and lines of action among the parties involved in STEAM processes.

The role of people in the facilitation of research, experimentation or creation processes of an inter or transdisciplinary nature incorporates different layers that must respond to the diversity of people, knowledge, languages and contexts with which they interact. In short, it is a matter of **mediating and guiding the complexity between diverse**, mixed knowledge and disciplines, often distant from each other, in the diversity of ways of approaching research or practice, or in the mixture of what is considered expert with the "non-expert".

---

<sup>2</sup> This classification is based on the wording elaborated from Conexiones improbables for the plan of cultural reactivation of Granollers in 2022.



A facilitating agent **identifies the** participants, puts the various parties **in contact with each other, mediates** in their dialogue and adapts the working methods throughout the process, adapting and modifying strategies and tactics according to the characteristics or demands of the social groups, organisations and collectives with which he or she works.

On the other hand, it provides a relational framework in which, although it is clear that the nature of each of the participants in the co-creation process is preserved, they can **cooperate with each other in a climate of equality**, considering the different disciplines with the same legitimacy in the creation of knowledge, without predeterminations that imply biases or preferences.

Co-creative processes should be based on open sharing of knowledge and experiences, on joint analysis of all available information to successfully contribute to the approach of any STEAM project.

For this reason, we insist on the need to **construct a common language**, agreeing on what we understand about different concepts that are specific to each disciplinary field and trying to build a common frame of reference. We also insist on creating a **climate of empathy** and permanent, active and **committed listening**, and on the internalisation of the logics of the experience by all participants. Likewise, the facilitators accompany the research and the creative process by intervening when it is necessary to unblock, accelerate or slow down a situation; when it is necessary to resolve a **conflict**, or even provoke it (the value of positive conflict, as well as the value of failure, of error) that mobilises stagnant capacities through creative disturbances.

In short, a STEAM process facilitator must be an **open-minded** person, capable of catalysing hidden creative capacities, of encouraging divergent thinking, but also convergent thinking, always in a climate of respect and trust oriented towards discovery, **exploration** and joint construction, crossing disciplines, crossing perspectives in order to, as François Deck (2008) says, fit the improbable by mutualising competences and incompetences.

In the final moments of the process, the facilitators guide the different parties (S\_T\_E\_A\_M) in the **use of opportunities** arising from the experience as well as in the way to continue, if necessary, the relationship and to implement the results of the project. In addition, the facilitator can favour the connection of educational organisations promoting STEAM projects with their community, with their productive or social environment, enabling interaction with other educational environments, other experiences or communities.

For a STEAM process to be successful, certain common factors must be present in all the parties involved: the decision and **daring** towards the heterodox with which the parties face the development of these dynamics, the generation of a climate of mutual trust, moving from multidisciplinary to interdisciplinarity and from

there to **transdisciplinarity**, co-research among equals, the establishment of a real commitment of all the participants, the development of a vision that is not short-termist (not sticking to a specific experience or topic). And, of course, the existence of adequate facilitation.

It will be essential for a facilitator to recognise and understand the characteristic behaviours of team members (Brunt, 1993). These behaviours can influence the progress and performance of the team, and can manifest themselves throughout the process development cycle. The facilitator should **model constructive behaviours** to help the process succeed and achieve the team's goals. Their **tasks, responsibilities and challenges** include:

- **Dynamise STEAM sessions and be inspiring:** it encourages participation and generates contexts conducive to motivation and the search for shared meanings beyond joint actions.
- **Generate trusting environments and new relational spaces:** any project is based on building relationships and conversations between people, therefore taking care of the physical and virtual, "productive" or emotional spaces between the various participants is crucial.
- **Be cooperative and encourage cooperation:** show interest in the points of view and opinions of the other members of the process and facilitate adaptation for the common good of the group, without ignoring or undervaluing individualities, which bring richness. Cooperate to innovate and innovate to cooperate.
- **Accompany and check the process:** keep track of aspects related to the process such as challenges, topics for discussion, deadlines, agenda or conclusions, progress and tasks to be developed in the future and persons responsible.
- **Harmonising the group:** it brings together different languages and jargons, encouraging teamwork and group cohesion, suggesting different ways of approaching the project.
- **Clarifying situations:** active listening, with the ability to synthesise and focus debates, balancing convergent and divergent thinking in the process, questioning acquired knowledge, encouraging and training in the generation of new questions.
- **Risk-taker:** is willing to take risks in the event of process failure or embarrassment to the team or to the success of the project. Knows how to turn a "mistake" into an opportunity in order to ensure viable outcomes within the objectives that have been set.
- **Unblock conflict situations** and/or activate the mobilisation of the capacities of the different members of the STEAM working group.
- **Evaluating processes and results:** to this end, it is important to manage and measure expectations, to establish indicators of success of the project both in terms of the results of the STEAM project and of the "dialogic" process itself between disciplines.

An important aspect of the facilitation process, which must always be kept in mind, is that the motivation to develop or learn has to remain with the different actors involved. Only they can do the work if they really want to develop and grow. It can sometimes happen that a facilitator, when he or she notices that the team is struggling, offers to "do the work for them". This is easy to understand, as no one wants to see their charge fail, but facilitators must remember that the learning has to be done by the team. Their role is to "guide and not push". This should be made clear to the different actors at the beginning of the process.

In summary, some of the **characteristics or competencies** that a facilitator should have are:

- Teamwork and cooperation
- Listening skills and empathy
- Encourage communication between different
- Ability to energise and catalyse hidden capacities
- Ability to detect and analyse different interactions, especially between arts, sciences and technologies, and to understand complex systems.
- 360°, global, transversal vision of projects
- Adaptability
- Search for external support
- Critical thinking
- Creativity
- Delegation
- Interpersonal sensitivity
- Energy
- Effectiveness



Image by Saioa Olmo for Conexiones improbables

# 3

## 3. STEAM PROCESS FACILITATION

From an overall perspective of incorporating Art in STEM processes, it is important to define the added value that artists and art can bring to the STEM sectors in terms of learning and research. The role of the artist or creative person is fundamental to the development of the process. Sometimes they can act as facilitators, but it is recommended to separate both roles: the artist or creative agent, who works intensively with his or her own methodologies in the field of the arts, and the facilitator, who, although he or she can also come from the same field, must be clear about his or her role as a balancer and a blender of disciplines.

We have already mentioned the inferior conditions in which A usually starts from compared to STEM disciplines in this type of process. The facilitator has to ensure a **fruitful dialogue between disciplines**, although the singularity in the evolution from STEM to STEAM lies in the introduction of a humanistic, ethical and aesthetic, critical and creative perspective that invites the involvement of artists, creators and creative people in these processes. Many of them, as is the case with scientists, engineers, technologists or mathematicians, are not accustomed to or equipped with the appropriate tools to promote a transversal dialogue between areas of knowledge. They are not trained to blur the barriers between disciplines, nor to overcome the barriers between their worlds. This is why facilitation is required.

But why facilitate STEAM processes by incorporating artists and creators<sup>3</sup>?

- Firstly, because they are good **researchers**, as they provide a complementary and differentiated vision to the classic processes of classical research, incorporating new perspectives and methodologies.
- Because they are **extreme users** of methodologies by getting the most out of products, processes or ideas. They are able to find potential and possibilities in "improbable processes" that the rest of us do not normally find.
- They are also **creative catalysts**, often managing to be the trigger for hidden innovation to emerge in teams. They often develop **critical and divergent thinking** that questions the established as an inherent part of artistic practice and helps to rethink almost immovable premises in the scientific-technical world.
- They are also people with a **high social sensitivity** who move in territories that go beyond the aesthetic, aspiring to influence other spheres other than the purely artistic.
- These artists and creators manifest themselves with a **multiple expressiveness** as they represent from different creative perspectives and communicate through the **generation of experiences**.
- And they have a high capacity for **global vision**, for identifying interactions between different agents and elements and for understanding complex systems.

<sup>3</sup> Based on Conexiones improbables website.

Not all artists are trained, possess these characteristics or wish to participate in the educational field in collaboration with other expressions or disciplines. In this sense, the role of the facilitator is to identify those creative people and accompany them together with other professionals from different fields of knowledge. This will generate a rich intersection that establishes environments conducive to cross-pollination, similar to what happened in Renaissance Florence<sup>4</sup>.

These creative profiles can come from any field of artistic or cultural expression, and even from other disciplines, as **creativity and divergent thinking is not exclusive to the world of the arts**. In any case, they are professionals who want to collaborate with fields **outside the strictly artistic**.

Their work tends to be more linked to the generation of **methodologies**, the creation of **experiences** and the analysis of systems, than to the production of objects and expressions of art in the traditional sense. Their practices, as has been seen in different national and international experiences, tend to be **experimental, collaborative and anticipatory**; committed to their environment; framed in a set of values and critical of the established; and risk-taking and effective for the development of processes of applied creativity for innovation.

Developing STEAM processes that combine artistic and scientific-technological visions can be extremely enriching. However, to ensure the success of these processes, adequate facilitation and even mediation is crucial.



Image by RGI for Conexiones improbables

<sup>4</sup> Historical period in which the city of Florence, Italy, experienced an unprecedented artistic and cultural flowering during the 15th and 16th centuries. During this time, renowned artists congregated creating an interdisciplinary community where collaboration and the exchange of ideas were fundamental, giving rise to great advances in art, architecture, literature and other disciplines.

## 4. FACILITATION TOOLS

Some useful tools for facilitation processes are listed below.



Below we list a series of tools that can be useful in STEAM facilitation processes. These are just a few examples that aid the facilitator's work. There is a lot of literature regarding group dynamics, methodologies, and tools for teamwork, process definition, or innovation. We have classified the tools we propose as examples into 8 areas that can be used to address different needs that diverse groups of people may have in STEAM strategies.

## 4.1 To create trusting environments (climates of empathy and active listening)

### Improbable encounters (Encuentros improbables)

A dynamic that allows participants to get to know each other briefly and quickly and facilitates an atmosphere of trust between them. It encourages active listening and at the same time allows participants to think about the challenge that each person or organisation is facing in relation to the established theme.

This dynamic consists of dividing the participants into groups or pairs with the person they know the least in the group. A specific worksheet designed by the Conexiones improbables team is used, which poses 5 specific questions.

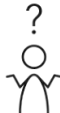




- What do you like to be called?
- What do you do?
- What do you like the most?
- What worries you most?
- What is your biggest challenge?

The pairs or groups have to write down the other person's answers, in order to actively listen to him/her and then be able to present him/her to the other person to the group.

This tool has been designed by Conexiones improbables.

conexiones **improbables**

ENCUENTROS IMPROBABLES  
TOPAKETA GERTAGAITZAK  
IMPROBABLE ENCOUNTERS

<p><b>¿CÓMO TE GUSTA QUE TE LLAMEN?</b> NOLA GUSTATZEN ZAIZU DEITZEA? HOW DO YOU LIKE TO BE CALLED?</p> <hr/> 	<p><b>¿A QUÉ TE DEDICAS?</b> ZERTARA DEDIKATZEN ZARA? WHAT DO YOU DO?</p> <hr/> 	
<p><b>¿QUÉ ES LO QUE MÁS TE GUSTA?</b> ZER DA GEHIEN GUSTATZEN ZAIZUNA? WHAT DO YOU LIKE DOING MOST?</p> <hr/> 	<p><b>¿QUÉ ES LO QUE MÁS TE PREOCUPA?</b> ZER DA GEHIEN KEZKATZEN ZAITUENA? WHAT WORRIES YOU MOST?</p> <hr/> 	<p><b>¿CUÁL ES TU MAYOR RETO?</b> ZEIN DA ZURE ERRONKARIK HANDIENA? WHAT IS YOUR BIGGEST CHALLENGE?</p> <hr/> 

www.conexionesimprobables.com

## Valyous

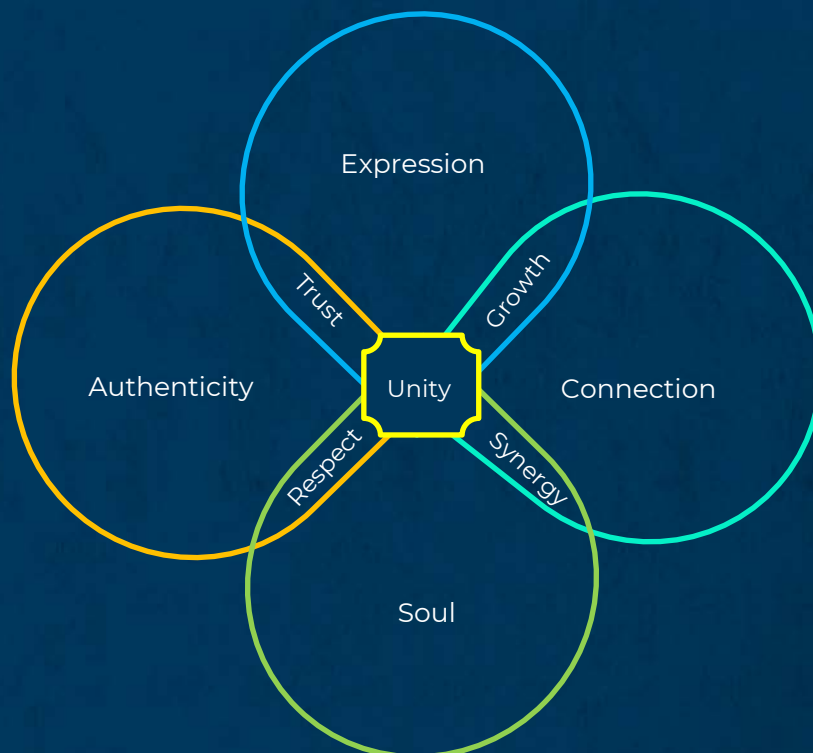
15-20 min exercise

An ideal tool to encourage participants to introduce themselves and their context and activity to others involved. The following are suggested questions that can be printed on A5 cards and given to participants as a guide:

- What is your name?
- Where are you from and where do you come from?
- What do you do?
- Why are you here today?
- What do people say about the work you do? What is your big ambition?
- What difference do you hope to make?

If the activity is done in a large group, participants can be paired up and asked to interview each other based on the printed cards and then introduce their peers. It is usually easier to answer a question about someone else than to give an insight into oneself.

Source: <https://www.shiftupagency.com/valyous>





## 4.2 To create a climate of equality and teamwork

### Open Space

*To generate a climate of equality and teamwork // To generate or resolve conflicts*

It is a methodology that makes it possible to obtain, from a large group of people and in a minimum amount of time, **the best ideas on a large topic.**

It is key to have a strong and clear purpose, and for participants to connect with this purpose.

### Standards:

1. Anyone who shows up at a meeting is the right person.
2. Whatever is happening is the only thing we will ever be able to have
1. Whatever time [the meeting] starts, it's the right time.
2. When [the meeting] was over, it was over.



\*If at any point you feel you are not learning or contributing anything, use your two feet. Go to another meeting where you can learn or contribute.

### Process:

They should have a room to meet and share knowledge and another room to capture all the content and concerns they are bringing out:

- Each attendee states the issues or "problems to be solved" that he/she would like to address.
- Share it with the rest of the classmates and write it down on a post-it.
- The post-it notes are placed on a blank whiteboard in the form of a matrix and divided by timetable and room (apart from the room so as not to distract).
- The meetings corresponding to each topic are held simultaneously, not all of them dealing with the same topic (1 hour each).
- Meetings: The person who has suggested this topic dynamises the session.
  - o Selection of problems to be addressed (brainstorming).
  - o They are written on post-its.
  - o Each person has 5 votes to vote on the issues they would like to discuss.
  - o They vote and the 3 most demanded problems are chosen.
  - o Each topic is addressed.
  - o General conclusions.
- All participants meet in the same room and share the conclusions, lessons learned, ideas or possible activities that have been proposed. Everything is written on the blackboard.

Source: <https://proyectosagiles.org/2012/05/15/que-es-open-space/>

### 4.3 To generate a common language (to harmonise the group and to come together)

#### **Applied Theatre Techniques (Role Playing)**

It is a technique inspired by improvisation theatre. It consists of the representation by two or more people of a situation that occurs in real life, in general, to express a situation that causes them discomfort.

Instead of mentally assessing situations, we place ourselves in a certain context by assigning the roles to be assumed by the participants in order to simulate and dramatically relive a situation.

The same scene can be repeated several times to understand how different users would act in the same situation.

We must define the role of the character and the context in which he or she will develop.

It is used when we want a group to understand a behaviour or situation and to put themselves in the place of those who live that reality, working at the same time on empathy, conflict resolution or the capacity to adapt.

Source: <https://www.becas-santander.com/es/blog/role-playing.html>



## Six Thinking Hats

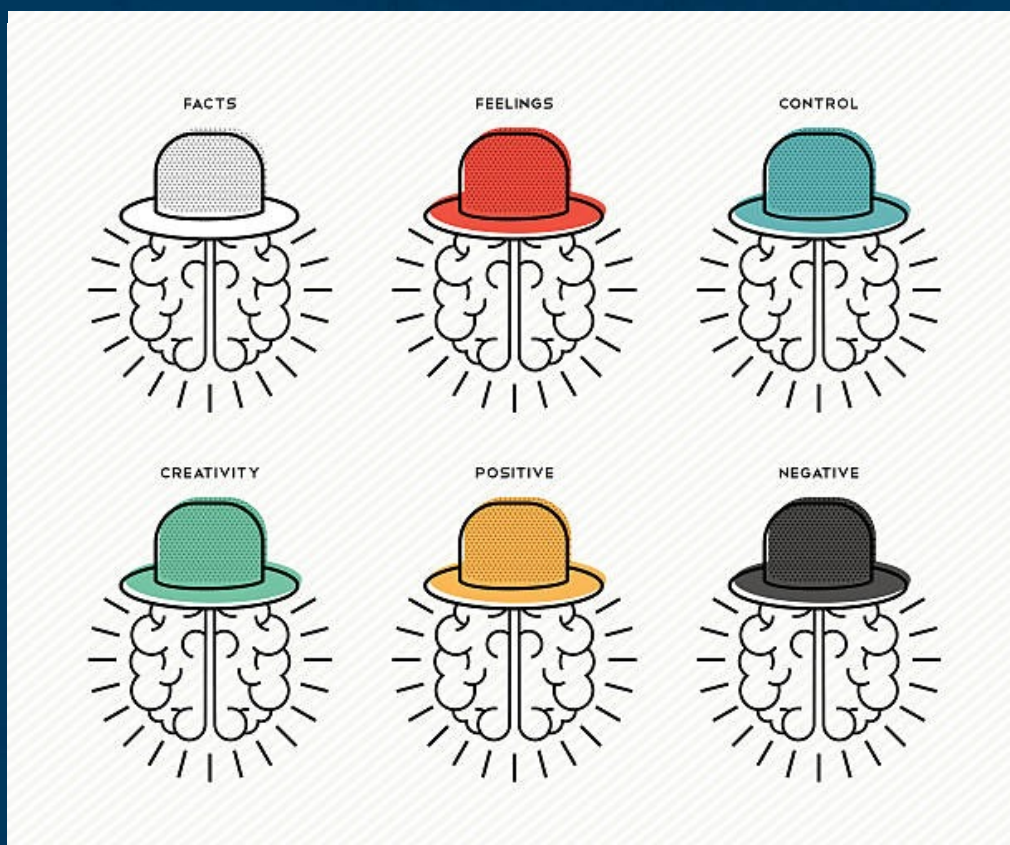
The tool provides a means for groups to plan thinking processes in a detailed and cohesive way, and in doing so to think together more effectively.

The premise of the method is that the human brain thinks in a number of distinct ways which can be deliberately challenged, and hence planned for use in a structured way allowing one to develop tactics for thinking about particular issues. De Bono identifies six distinct directions in which the brain can be challenged. In each of these directions the brain will identify and bring into conscious thought certain aspects of issues being considered.

Colored hats are used as metaphors for each direction. Switching to a direction is symbolized by the act of putting on a colored hat, either literally or metaphorically. This metaphor of using an imaginary hat or cap as a symbol for a different thinking direction was first mentioned by De Bono as early as 1971 in his book "Lateral Thinking for Management".

These metaphors allow for a more complete and elaborate segregation of the thinking directions. The six thinking hats indicate problems and solutions about an idea the thinker may come up with.

Source: "Six thinking hats" (1985) by Dr. Edward de Bono



## 4.4 To generate or resolve conflicts

### **Catalytic Questioning**

This tool is used to open the mind, think of new solutions and value different perspectives (Gregersen, 2013). The method incorporates five simple and unconventional steps to help change our questions and creatively solve important problems:

1. Have a white board.
2. Choose an issue of concern to the team.
3. Participate in a question round with one team member writing down each question. This exercise gives the possibility to think of questions, reflect on each question and think of better questions. **Unanswered.** Spend 10-20 minutes on this section. Question everything. Do a round of 50-75 questions.
4. Choose 3-4 questions, which address issues you want to work on and focus on.
5. Search for answers to these questions: this can be done by contrasting different groups, creating rapid prototypes, observing our environment... Once this individual work has been done, bring all the ideas together as a team to brainstorm and come up with better solutions together.

Source: <https://hbr.org/2013/07/catalytic-questioning-five-ste>

### **Chain of questions (Cadena de preguntas)**

*The Chain of Questions* is a methodological resource that works on those issues that generate doubts in the participants. Although its operation is very simple, the result it produces is important because it allows us to detect the areas of concern and the areas of success of the target issue of the tool used by Conexiones improbables.

Operation:

- Participants are asked to stand in two parallel rows, so that people are facing each other.
- They are asked to think of a question that concerns them about a particular issue.
- When they have it, the dynamics are explained.
- The first person in the two rows will throw the question they have thought of to the person in front of them, who will then have to answer their question with another related question. And so on, successively, completing the entire rows.
- Rounds may be made as many times as appropriate.

Ideally, one person in the group should write down all the questions that come up, so that the group can then choose the question that stands out the most for him or her. Once we know all the questions that have been chosen, we can reflect on the issues that have emerged and identify the main issues of concern to the group.

## 4.5 To explore different opportunities and to encourage divergent thinking (generation of new ideas)

### **Crazy 8 / Crazy 24**

The Crazy 24 tool consists of making 3 Crazy 8's. This tool helps us to think of ideas in a short time (8 minutes). It is done by taking a sheet of paper, folding it into 8 parts, leaving 8 spaces to write down 8 different ideas. The group is asked to write down in 1 minute rounds one idea in each section of the paper.

The evolution of this tool consists of:

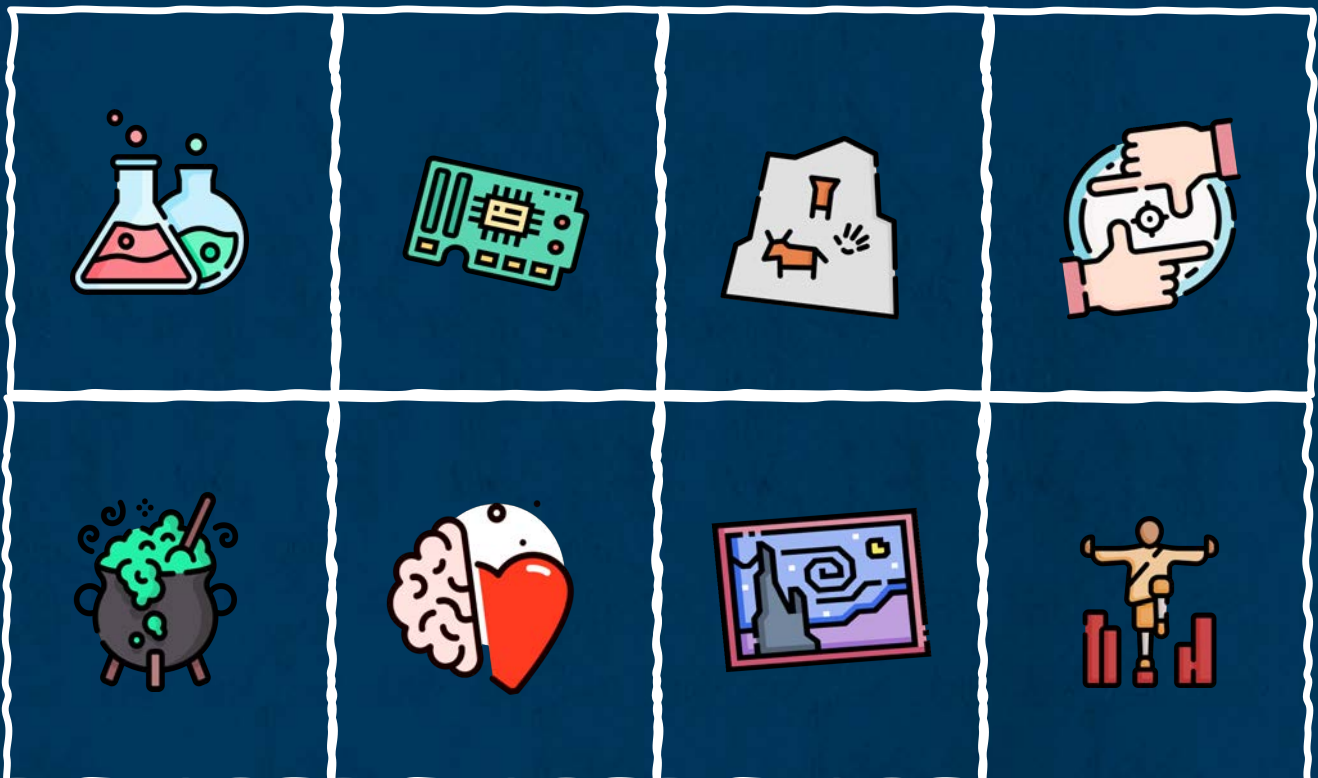
- Make a crazy 8 by drawing 8 insights
- Select the insight you like best
- Make a crazy 8 with 8 strategies for that insight
- Select the strategy you like best
- Make a crazy 8 with 8 ideas to make the strategy tangible and implement it.

Source:

Crazy 8: <https://franciscotorreblanca.es/crazy-8-metodologia-creativa-soluciones/>

Crazy 24: Methodology designed by Learning by Helping, social innovation laboratory

<https://learningbyhelpinglab.thinkific.com/courses/creacion-de-proyectos-de-impacto-social>



## Storycubes

A game that encourages creativity and innovation. It consists of creating stories based on the images that appear on the dice, encouraging the imagination of the participants.

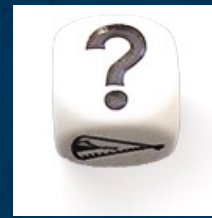
Roll the dice, then create a story that starts with "Once upon a time..." and use the nine symbols on the dice faces. Start your story with the first symbol that catches your eye - and then let your imagination run wild!

To build your story, you can use three dice to start the plot, three dice to develop it, and three dice to end it.

Source: <https://www.storycubes.com/es/>



Image by [www.storycubes.com](http://www.storycubes.com)



**If inspiration doesn't come,**  
Think about your favourite series, film or book - what might happen to the characters in other times or places?



**You can interpret the symbols**  
as you wish. They may represent different things to different players, and your first interpretation is often the correct one.



**Combine all your dice**  
If you have several boxes of Rory's Story Cubes, use them to add a new dimension to your stories!



**If in doubt...**  
...just roll the dice. There are no misinterpretations, no bad stories. More than a game, Rory's Story Cubes is an experience, a unique moment to share with your loved ones!

## LEGO Serious Play

Methodological steps:

- 1. Posing:** A challenge is posed, previously agreed upon in the group, which should not have any correct or obvious solution and which should be of concern to the team.
- 2. Build:** Participants make sense of what they know and what they can imagine. Building a model with LEGO SERIOUS PLAY pieces.
- 3. Sharing:** Participants share their stories
- 4. Reflect:** Reflection on what was heard or seen in the model.

Objectives:

- Build individual models.
- Build shared models.
- Create scenarios.
- Make connections.
- Build a system.
- Imagining future events.
- Extracting principles to guide future strategic behaviour.

Source: <https://www.lego.com/en-us/themes/serious-play>



## BrainWriting 6-3-5

When faced with a problem to solve or a process to improve, it is often difficult to think of options very different from what we have always done. In 1969, Bernd Rohrbach developed the 6-3-5 method as a way of generating ideas in writing. It was based on the fact that brainstorming groups are especially effective when the ideas of one team member are developed by the others.

BrainWriting 6-3-5 is a process that anyone can use to identify new ideas or solutions. The aim is to generate as many creative ideas as possible. The process ensures that very verbal people do not overwhelm quieter members. It also allows individuals to see what others have written.

The basis of the procedure can be summarised as: 6 people generate 3 ideas for 5 minutes, in a succession of 6 rounds. It can be used with groups of 6 or 60 people. The process is carried out in six "rounds" of five minutes or less, and uses a worksheet similar to the one shown in the figure below.

- Six participants sit in a group, under the supervision of a moderator. Each participant comes up with 3 ideas in 5 minutes. The ideas are written on a worksheet.
- After this time, each individual receives the worksheet with the ideas from the person on their right, while passing theirs to the person sitting on their left.
- The second round is the same, except that the worksheet you receive now consists of six ideas.
- After six rounds, in 30 minutes, the group will have produced a total of 108 ideas.
- In this process, the ideas of the other participants serve as inspiration to generate new ideas.

A variation is to provide a small sheet of paper with sticky notes. Ideas are written on the notes rather than on a worksheet and can be easily grouped into themes.

Source: <https://www.aiteco.com/metodo-635-brainwriting-de-generacion-de-ideas/>

	<i>Subject:</i>		
	<i>Idea 1</i>	<i>Idea 2</i>	<i>Idea 3</i>
<i>Name 1:</i>			
<i>Name 2:</i>			
<i>Name 3:</i>			
<i>Name 4:</i>			
<i>Name 5:</i>			
<i>Name 6:</i>			



## 4.6 To foster cooperation

### **Take on the improbable (Encajar lo improbable)**

Game to reflect on methodologies for innovation and teamwork.

*Take on the improbable* is a game that proposes to reflect on attitudes and aptitudes for invention, both from the artistic field and from a search for organisational or social innovation. It is an optimal tool to achieve the objective of "opening up to open and collaborative innovation" and meets all the conditions to be able to broaden views and changes of perception on the role of creation and creativity in the ways of working and in its application in innovation processes. This game helps us to discover our capacities (sometimes hidden), our knowledge, talents, fears, blockages, prejudices, values, feelings, emotions... when it comes to posing personal, organisational and social challenges in teams. And how to face more disruptive innovations.

The game is made up of 48 hexagonal cards, 8 of them without text, and a set of adhesive cards to use on the blank cards or jokers. The card texts are in French, English, Mandarin Chinese, Portuguese, Spanish and Basque.

Source: Conceptualised by François Deck and adapted by Conexiones improbables, [www.conexionessimprobables.com/eng](http://www.conexionessimprobables.com/eng)



Image by Conexiones improbables

## 4.7 For visual process management

### Kanban

It is an organisational system. It is based on 4 basic principles:

- Start with what is being done now.
- Commit to seek and implement incremental and evolutionary changes.
- Respect existing processes, responsibilities and positions.
- Encourage leadership at all levels.

Work is carried out on a dashboard consisting of three columns "TO DO", "IN PROGRESS" and "DONE".

- It consists of visualising the workflow to detect possible bottlenecks, creating a continuous and uninterrupted flow of work.
- It also aims to eliminate multitasking.
- It must be useful to the team, only in this way will they use it.
- The dashboard should be shared and reviewed with the team, in short but efficient team meetings.
- A shared vision is essential.

Other tools to assist visual management:

- Colours **green - good, yellow - fair, red - bad**
- Shapes road signs.

Source: <https://asana.com/es/resources/what-is-kanban>



Image by [www.mamaqueesscrum.com](http://www.mamaqueesscrum.com)

### Flechanban

We need a blackboard to put this tool into practice.

On the left corner, we draw a "funnel" divided into three colours (**green, yellow** and **red**), a system that allows prioritisation. This area will be used by the enabler or the person responsible for the meeting (Product Owner / Service Request Manager) to manage the requests.

In the upper zone, we place the Urgent lane in red, a lane for urgent tasks and used for special situations.

Below this lane we draw the arrow, where each member has a row. Here, the tasks of each member of the group are placed. At the tip of the arrow, we draw the "demo" zone, where the customer-facing tasks are placed.

To help visualise the board further, a colour legend is generated, which helps us to classify the different coloured post-its according to their intended function.

## Affinity process

The affinity diagram organises a large number of ideas into their natural relationships. It is the organised output from a [brainstorming session](#). Use it to generate, organise, and consolidate information related to a product, process, complex issue, or problem. After generating ideas, group them according to their affinity, or similarity. This [idea creation method](#) taps a team's creativity and intuition. **It was created in the 1960s by Japanese anthropologist Jiro Kawakita.**

WHEN TO USE AN AFFINITY DIAGRAM:

- When you are confronted with many facts or ideas in apparent chaos.
- When issues seem too large and complex to grasp.
- When group consensus is necessary.

### Typical situations are:

- After a [brainstorming](#) exercise
- When analysing verbal data, such as [survey](#) results
- When collecting and organising large data sets
- When developing relationships or themes among ideas
- When reducing attributes to categories that can be addressed at a higher level

### How to use it:

- Explicitly state the issue/question/problem being examined through the affinity process.
- Write each answer on a card or sticky note. Use clear, complete sentences.
- Sort the cards into affinity groups: this is a silent process involving all members. Continue grouping and regrouping until all members stop.
- Create concise but comprehensive header cards for each final group. The header should capture the essential linkage of all the cards below it.
- Review the exercise: What do the headings tell us? What is suggested? Discuss the links that can be seen between the headings.

Source: <https://citoolkit.com/articles/affinity-diagram/>

## 4.8 Creative meeting dynamics

### **Check-in check-out dynamics**

These dynamics are important to give a dynamic and gamified sense to the work session, it consists of setting up a dynamic at the beginning of the meeting and another one at the end of it.

Exercises should last 5 minutes at most. They should be different for each meeting, usually small games or questions that are thrown in to encourage thinking.

Own elaboration.

### **EXAMPLES OF CHECK-IN DYNAMICS**

---

- **"Vehicle"**: Each participant is asked to choose a vehicle that represents him/her. Each person will share their vehicle and explain why they have chosen it.
- **"The song"**: Each participant is asked to choose a song that represents him/her. Each person will share their song and explain why they have chosen it.
- **"The traffic light scale (red, yellow and green)"**: Participants are asked on the scale of these three colours to say how they feel about tackling the meeting, with green being "very good, looking forward", yellow "well... it's not my day" and red "I don't feel like it and I don't trust the process".
- **"Key words"**: Each participant is asked to choose a word that represents how they feel at that moment. Each person will share their word and explain why they chose it.
- **"The object"**: Each participant is asked to choose an object they have in their environment and represent it. Each person will share their object and explain why they chose it.
- **"Creative questions"**: In this game, each person is asked to come up with a creative question to get to know the other members of the group better. For example, "If you could be an animal, which one would you be and why?"
- **"The magic object"**: Each person chooses an object they have in their environment and explains how that object could be used in a magical situation. For example, "This pencil could be turned into a spell that makes plants grow faster".
- **"Reinforce people"**: We should say 3 compliments (personal or professional) to the person sitting on our right.

## EXAMPLES OF CHECK-OUT DYNAMICS

- **"What was learned today"**: Each participant is asked to share one thing they have learned during the session. This will allow them to reflect on what they have learned and consolidate their knowledge.
- **"The rose and the thorn"**: Each participant shares one positive (the rose) and one negative (the thorn) aspect of the session. This will allow them to express both their satisfactions and frustrations.
- **"The letter"**: Each participant writes a letter to their future self, telling them what they have learned and what they hope to achieve. Each person then shares their letter with the group.

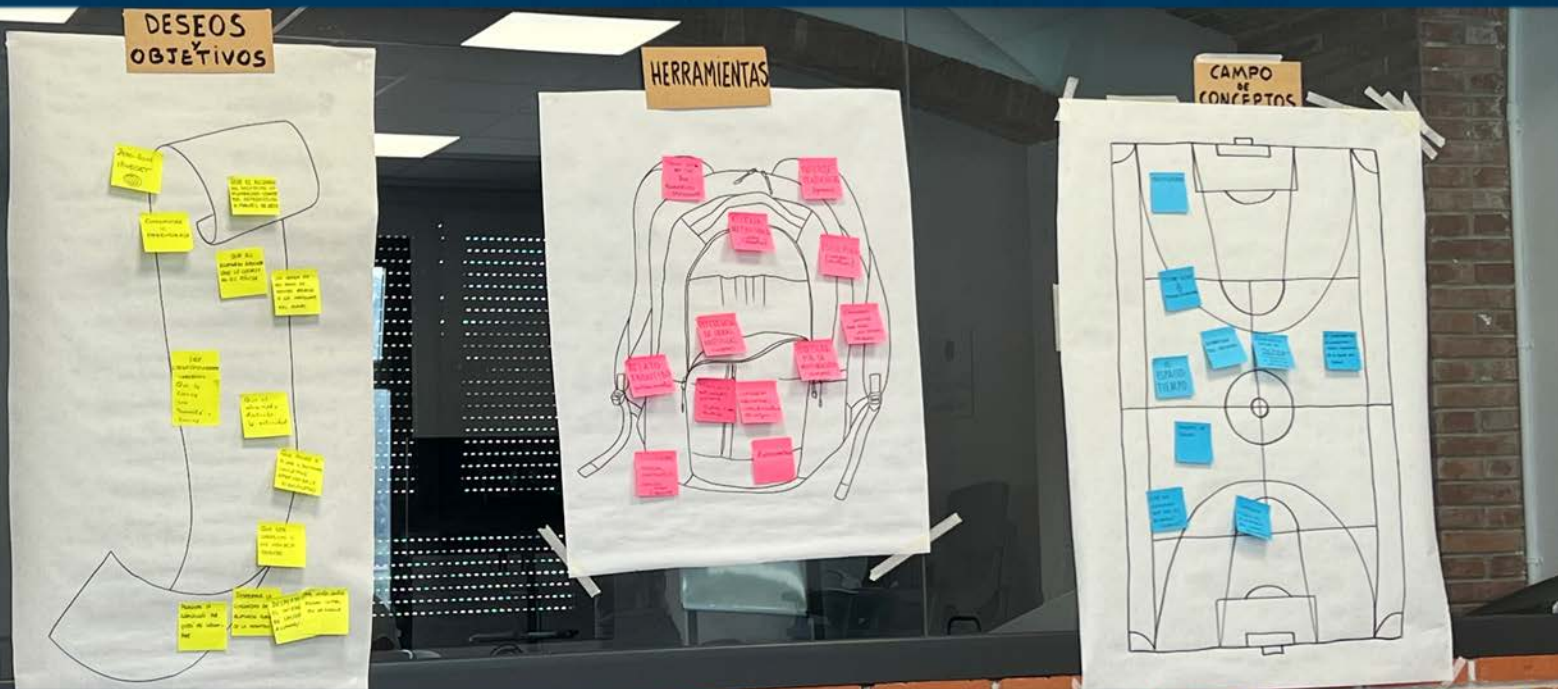


Image by Conexiones improbables

## 5. REFERENCES

Brunt, J. (1993). *Facilitation skills for quality improvement*. Madison, WI: Quality Enhancement Strategies.

Design Council. *Skills and Learning*. Available at: <https://www.designcouncil.org.uk/our-work/skills-learning/tools-frameworks/framework-for-innovation-design-councils-evolved-double-diamond/>

Frans Johansson (2004). *The Medici Effect: Groundbreaking Perceptions at the Intersection of Ideas, Concepts and Cultures*. Harvard Business School Press

François Deck (2008). *Taking on the improbable*, in *Disonancias 2007/08*. Edit Grupo Xabide, Vitoria-Gasteiz, 2008.

Carasso Foundation (2023). *The Carasso notebooks. Composing knowledge to better understand contemporary challenges*. Available at: <https://www.fondationcarasso.org/wp-content/uploads/2023/02/FNC-Componer-saberes-ES-21.02.23-FAB.pdf>

Gómez de la Iglesia, R. (2015). *Arts and culture for open innovation: hybridising to innovate (generating improbable connections)*.

Gregersen, H. (2013). *Catalytic Questioning*, Harvard Business Review. Available at: <https://hbr.org/2013/07/catalytic-questioning-five-ste>

McManus, A. (1992). *The memory jogger for education: A pocket guide of tools for continuous improvement in schools*. Salem, NH: GOAL/QPC.

Oficina d'Estudis i Recursos Culturals, Diputació Barcelona (2022). *Plan for the reactivation of the cultural and creative policy of Granollers post covid-19: A look at the 2030 timeframe*.

Porvari, M., Suntola, S. & Suortti, H. (2022). *Introducing the (A) in STEM Processes*. Xamk Inspire 40. South-Eastern Finland University of Applied Sciences. [Online] Available at: <https://urn.fi/URN:ISBN:978-952-344-432-4>.

Rohrbach, B. (1969). "*Kreativ nach Regeln - Methode 635, eine neue Technik zum Lösen von Problemen*". Creative by rules - Method 635, a new technique for solving problems first published in the German sales magazine "Absatzwirtschaft", Volume 12, 1969. p73-75 and Volume 19.

Sennett, Richard, (2012). *Together: The Rituals, Pleasures and Politics of Cooperation*. Anagram.

Taleb, Nassim Nicholas (2007). *The Black Swan: The Impact of the Highly Improbable*. Random House Mondadori.

*The Ultimate Flowchart Guide 2022*. Available at: <https://www.zenflowchart.com/flowchart>

Wagensberg George (1993). *If nature is the answer, what was the question?* Tusquets.

## 6. STEAMProcess

The STEAMProcess project focuses on the transition from the STEM approach to STEAM, through the promotion of cross-fertilisation between technical-scientific knowledge and artistic-humanistic knowledge, for the creation of innovative teaching support tools and training materials.

This initiative has been developed over the period 2020-2022, in the framework of the ERASMUS+ call for Cooperation for innovation and exchange of good practices (Strategic Partnerships for Adult Education).

STEAMProcess aims to foster disruptive innovation by promoting the use of artistic skills in education and the practice of science and technology.

The project aims to stimulate, among others:

- The inclusion of cultural and creative components in skills development and lifelong learning programmes.
- Supporting programmes that integrate the arts into STEM curricula and cross-sectoral projects that combine the arts with STEM disciplines.
- The development of a literacy policy for the cultural and creative sector.
- The creative thinking of citizens.
- The search for innovative and creative solutions to social, environmental and environmental challenges and challenges...

The alliance that has carried out this project is made up of five organisations from four European countries: XAMK, South East Finland University of Applied Sciences, which acts as project leader; the consultancy Changemaker AB (Sweden); the Centre for the Development of Cultural and Creative Industries, MateraHub (Italy) and the companies specialised in the hybridisation of art and culture with other sectors, Sineglossa (Italy) and Conexiones improbables (Spain).

Image on the next page, by Conexiones improbables



FORMASI  
PADA GLASER

KLASIKAL  
PADA PANG  
PO BUKU

KLASIKAL  
PADA PANG  
PO BUKU

KLASIKAL  
PADA PANG  
PO BUKU

KLASIKAL  
PADA PANG  
PO BUKU

KLASIKAL  
PADA PANG  
PO BUKU

KLASIKAL  
PADA PANG  
PO BUKU

KLASIKAL  
PADA PANG  
PO BUKU