Towards a taxonomy of the challenges within typologies of collaborations between Art - Design - Engineering - Science – Humanities - a practical guide

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Abstract

Collaborations between Art - Design - Engineering - Science – Humanities, have a tendency to look grand on paper, appear logical to the mind, but in reality are far from easy to achieve. What are the secrets to successful collaborations?

With this SEAD White Paper we propose to provide a number of suggested actions towards a taxonomy of challenges involved with different typologies of collaborations between Art - Design - Engineering - Science – Humanities. In order to do this we put out a call to artists, scientists, engineers and designers, who requested to share their expertise by elaborating on key aspects of failure and success within their experiences of collaborations. This paper has been developed in such a way that it forms a ready-to-use practical guideline for new collaborators in the field of art, design, engineering, science and the humanities.

To keep a clear overview general observations were written into a set of suggestions supported with examples, such as theoretical argumentation and referential material, which are placed in the footnotes. As well as a list of challenges, questions and comments. Advisors and contributors were asked to supplement the articles with examples from practice and theory. By mapping issues within different typologies of collaborations, new collaborators may self-identify into roles and responsibilities and construct achievable aims and results.

We realize that in rapidly emerging new areas of practice, terminologies and taxonomies also evolve rapidly; this in itself is a record of how collaborations lead to new trans-disciplinary or inter-disciplinary forms. Thus by understanding the complexity of problematic issues that surround such collaborations we hope to develop a working group of collaborators to begin to build an educational tool to be used as a practical guide by those who aspire to engage in such collaborations.

In this white paper we identify suggestions concerning the developing of useful taxonomies that clarify the variety of situations, obstacles and opportunities, to facilitate Science and Engineering to Artistic and Design based works and theories and the scope of the Humanities and their varied collaborations.

1) Motivations We suggest that for each collaboration a meta-value is written for the motivation to collaborate that stands separately from the motivations, aims and objectives of the project in which one collaborates. We suggest to further define a main motivation and a set of flexible sub-motivations.

Example: collaboration introduces to alternative ways of thinking and perceiving. It leads to unconventional combinations of skills and talents. It stimulates novel methods of investigation, developmental structures, processes and techniques. It creates new analogies, observational skills, perspectives and patterns. Collaborations lead to a potential of new discoveries and intellectual property.[i]

Example: Perhaps with each project the motivation is to develop new knowledge. What this 'new knowledge' actually is, and how one will obtain it, depends on the experience of each collaborator, one's discipline and the methods of one's field. For this one needs to be open to what different fields

consider as new knowledge. Knowledge not only being objective, but also subjective. Knowledge that is not necessarily reproducible.

Each collaboration should define the sub-categories of motivations separately based on the institutes and individuals involved.

Example: sub-motivations may be to work with new creative expressions or to find new forms of (social) communication with the public for instance new visualization tools for complex scientific phenomena, such as big data. New ways of finding empathy and engagement with the material is as important as raw knowledge. This can be the role of artists, who offer new creative ways of approaching problem-solving, and who also can reconfigure scientific conventions for methods of documentation and recording so that the information itself is more compelling and/or more accessible, both to scientists and the general public.

Challenges: Be aware of the motivations of the other. It is entirely possible to have differing motives and alternative aims and objectives, even while working on the same project, but it is important to be able to put things into an appropriate context. This means that it is possible that where one outcome is considered a success, while another is not.

Questions: What would you consider as a successful result? How would you measure or capture that? The metrics of success in science are quite different from the metrics of success in art. Should you define new ones? What do you consider as a novel method? A novel object? A novel discourse? What skills would you like to learn?[ii]

Comments: The motivations of each collaborator need to be clear, for yourself and for the other. Do not raise expectations to an unrealistic level, collaborating with disciplines is difficult. If you reach only 30% of what you set out to do, you have made significant progress.

2) Method and Methodology We suggest that all collaborations create a common departure for assessment and evaluation of process and results by mapping preferred methods, methodology, or methodologies. We suggest to be open to all forms of departure points.

Interdisciplinary collaborations have a high probability to fail when they stay on the level 'wouldn't it be fun if...'. The sharing of ideologies may form a 'base for valuable innovation, production, distribution and socio-cultural consumption potentials'.[iii] But in order to succeed collaborators need to be able to access results and evaluations.[iv]

Example: One method to finding a common point of departure for assessment and evaluation of process and results is the formulation of answers to the following questions:

What do you want to achieve? This in essence comes down to formulating a description of aims and objectives and a research question and or problem statement.

Why is what you want to achieve important and for who? This articulates the urgency and the significance of what you hope to do.

Who else has been doing similar things? This positions the project in related fields.

How do you want to achieve the project? Which methods will you be using to achieve the project?

How will you analyze and or present your project? Which methods will you be using to share your project or put the project in a wider context?

How will you monitor progress? Which type of validation (quality control) will be performed?

Challenges: The challenge in using these starting points is to be open and flexible. To be aware of how the different methods can be combined in the formation of a creative research methodology that respects all disciplines.

Example: Let's look at the question: How to make a person happy? In all disciplines this is a valid departure point. However, the methods used to answer this question are very different. An artist might

choose to begin with a very iconic starting point: the study of a balloon. A simple tool considered to bring happiness.

At first glance this might not be interesting for another discipline, until that study of the balloon becomes for instance an attempt to make the smallest balloon possible and the wish is to insert it into a human body. What does it mean if that balloon holds a 'happy acid' face and a yellow balloon is inserted with a needle. What does it mean when the material of that balloon actual contains 'happiness inducing' chemicals. How small can we go? Can a balloon still be yellow when it is nano? The important thing is to allow room for imagination, and not be bound by limitations of existing ideas.

Questions: What questions are you not allowed to ask yourself within your discipline? What methods are you not allowed (or not willing) to use? Why? What are the consequences? Are you able to think outside the box? Are you willing to throw the box away?

Comments: The main thing to be aware of is that one cannot judge any starting point a priori. One needs to understand that what is considered as a valid answer and or question depends on the discipline and field. This is important to protect the field, yet it also limits a field. Collaborators need to be aware of, and be prepared to use, insights that were not anticipated. This implies a willingness to diverge and embrace tangents.[v], as well as a transgression of what are usually considered as disciplinary boundaries.

Financial Issues: Anyone searching for funds is confronted with the need to be able to sketch answers to such questions. Depending on where you are applying and for what, the narrative may change to fit requirements of a funding institution. This requires the ability to view an application through different policies. The methods you bring to the foreground in grant applications can influence decisions. Transdisciplinary collaborations are difficult to get funded and maintain. The collaborators need to be aware of the incentive and reward structure in the collaborators area. This may be different from their own. That way collaborators can report back on what was achieved. Here too time can be a big issue. You want to get started but you have to deal with all sorts of administrative issues that can cause many unexpected delays. The more people involved – the more a collaboration will cost.

(Differing) expectations: Mapping individual expectations in advance will help avoid misunderstandings and disappointments.

Credits: When collaborating it is crucial to respect all contributions. The more complex a collaboration becomes the more important it is to keep track of involvement. Make sure that everyone is credited appropriately. Think about how the film industry structures and credits complex collaborations.

Time: a collaboration can accelerate a process, but more likely it may also decelerate a process. Are you using tools like a time able, flow chart or a Gantt chart? When you determine a structure you will find a way to organize this, this does not need to be a linear process. Often calls for collaboration are put out that need to take place in a 3 month timeline. This is hardly enough time for an individual to develop a project. Anyone planning a collaboration needs to take realistic planning into account.

Locations: While some people work only behind a computer, many need a studio workspace. When such a space is not provided – collaborations that aim to make use of different methods can become problematic. Respect the needs of the collaborators you invite.

Ethical issues: A very real issue within collaborations is the issue of ethics. Many methods, in particular where human subjects are involved, might be considered unethical. Sometimes special permission will be needed. This might also require higher costs. Think about issues of fire safety. Where one might turn a blind eye in a project space for a one time execution of a flammable work, an institute has to be more strict. Make sure such issues do not surprise you at a last moment.[vi]

3) Knowledge Transfer and Dissemination We suggest paying particular attention to moments and methods of knowledge transfer and to devise a clear plan of action for knowledge transfer and dissemination.

Example: A nice example of a particular form of knowledge transfer is given by Jill Scott in her essay *Suggested Transdisciplinary Discourses For More ART_SCI Collaborations* in which she explains how in trans-disciplinary collaborations knowledge transfer is often situated, meaning it is embedded in language, culture, tradition as well as methods. It is, as she elaborates, entwined with reflection and interpretation for instance with metaphors, contextual immersion and relational creativity. She gives the example of the differences in impact on the general public between a generalized metaphor already embedded in everyday language and a poetically mind-shifting metaphor, explaining that the embedded knowledge might move between dimensional associations, spatial orientation as well as the ontology of a metaphor (abstract vs. concrete texture). For instance, by breaking down archetypical metaphors such as 'hard' (difficult) science and 'soft' (easy) science could break old, biased, often gender based, hierarchies.[vii]

Challenges:

Objectives: When two or more disciplines are collaborating, knowledge transfer happens on more than one level. It is important to respect all levels of knowledge transfer. Or to prioritize depending on one's objectives. It is important to note here that personal research is quite different from a double-blind clinical trial; something that differentiates art and science[viii].

Presentation: Artistic insights and knowledge might be best disseminated in an exhibition as well as a publications, lectures, and presentations. Different presentation methods present requirements. It is important to take the requirements of each field into account. Presenting works in an exhibition hold different requirements than presenting results in a lecture or publication. How will the presentation methods be designed? Will there be a curator? A graphic designer? A mediator? An installation consultant?

Documentation: How to share results and with whom? What medium will work most effectively? Does one describe results with text? And if yes, with which style? with drawings? photographs? A YouTube mini documentary video?

References: Methods of reference are common practice within the sciences, within art this can be a delicate issue. Artists are used to sharing their influences, but are not trained in being and or remembering sources. Artists have a tendency to be protective of their inspirational sources as art is often criticized if it resembles too much the work of another. Where as in science this is considered discourse and a blessing to find.

Failure: In science a project might fail, without it being a scientific failure. Where in science an outcome might be a disappointment, it is not necessarily damaging to a career. In the arts, failure is feared more often than not. In spite that the artist is often told not to fear failure, the artist is not accustomed to show failure to the general public, unless that is an integral part of the art practice. This might cause tension and or confusion within a collaboration.

PR and Communication: The approaches for PR and Communication can be very different for each field. This needs to be discussed. In science certain issues would be considered prudent to not share with a general public, where in art scandal and danger might bring an edge to a work in such a way that it contributes to the success of the work.

Questions: What are the identifiable results of the collaboration? How are the results distributed in the different fields? How do these results relate to trends in the art world? How do the results fit within a discipline's discourse? What role does an institute play? What type of institutes are involved? Who is your audience? What do you expect from them? Is the collaboration a two-way benefit or can only one side benefit from the collaboration?

Comments:

Brainstorming: Brainstorming can be useful method for finding common ground. When brainstorming, depending on how many individuals are involved, it is useful to appoint an experienced mediator, a facilitator, and someone who documents. When brainstorming one needs to be aware of levels of listening vs. talking [ix]

Rules: to find common ground it can be useful to do exercises that define the parameters of participation. This can be taken to a creative level where the rules become: 'there must always be a sheep involved' – 'it must always happen at night'. One might also use socratic dialogue methods.

Institutions: it is important to determine what role institutions play in the process of the knowledge transfer in terms of reaching an audience, as well as knowledge conservation.

Audience: Who is your target audience? The general public? Professionals? Where science might aim to convey the understanding of an audience as accurate as possible, in the arts, the responsibility of understanding is often left to the devise of the audience.

Critics and Peers: It is important to think about how you involve critics and peers in your process, and to think about their role in the dissemination of knowledge.

Educational institutions should think about how to educate innovative collaborations, and help understand the different forms of knowledge transfer. They need to find a way to facilitate and stimulate the skills that are exchanged in collaborations within their curricula – for this to happen, specialist attitudes need to be flexible.[x] One also must not underestimate the role an educational institution may play in the development, dissemination and preservation of developed knowledge. Investigate this.

4) Definitions and Generalizations We suggest that collaborations define their respective disciplines through generalized descriptions in their own words, and to identify the presence of generalizations in everyday language as well as generalizations in different fields of study.

One might not think it, but in an over-specialized world generalization is important – without generalization we would not have an overview, it would be more difficult to communicate, or lead. It is important to know when it is functional and when is it not.

Example: Collaborations between Art - Design - Engineering - Science – Humanities are often generalized as SCI-ART collaborations in which 'The Arts' subdivided into: Design, Dance, Theatre, Art, Fashion, Fine Art, in which divisions are made between Autonomous Art and Applied Art. And 'The Sciences' are subdivided into into the 'hard' and 'soft' sciences: 'Hard' being: technology, engineering, physics, chemistry, biology and 'soft' being disciplines such as philosophy, psychology, sociology. What if these “hard” categories were to be treated as “fuzzy” categories with flexible boundaries?

Example: Other countries, such as The Netherlands, make divisions as follows: *Alpha* sciences as the study of the products of human action and behavior: (art) history, linguistics, literature, music, philosophy. Alpha tends to use methods in which well-argued interpretation is autonomous. *Beta* sciences as study of non-human nature: physics, biology, maths, and technology. Beta sciences tend to use causal methods. *Gamma* sciences as the study of human action and behavior: psychology, sociology, law, economy and some philosophies. Gamma tends to use both[xi].

Example:

As an artist I am interested in: the creation of meaning, perspective shifts, expression and aesthetics, as manifested in associations, materials, lines, colors, volumes, movements, behaviors, structures and experiences. *Why?* To make us think, to make us aware, to make us understand, to make us experience, to entertain.

As a designer I am interested in: shifts of functionality, efficiency, practicality, aesthetics and usability of objects and materials, as manifested in objects, structures, behavior, experiences, lines, volumes, colors, maths, and patterns. *Why?* To make things better, depending on what needs to be made better and what is considered as better.

As an engineer I am interested in: how things work in order to make things that work, as manifested in mechanics, physics, structures, biology, chemistry, software and hardware. *Why?* To create things that work, depending on what needs to work and how it needs to work.

As a scientist I am interested in: finding, structuring and organizing knowledge in the form of testable explanations, as manifested in the maths of chemistry, physics, chance, materials and patterns. *Why?* To understand, to create, to predict, to build, to think, to be aware.

The humanities are interested in: how and why humans do what they do? This is manifested in observations, experiments, research, formulation of theories and arguments. *Why?* Curiosity is human nature. To help us understand, to help us predict, to help us think, to help us regulate, to help us sustain, to help us create.

Challenges:

Shared Methods: drawing, observation, experimentation, and validation are methods used in all disciplines. Be aware of the differences. Observation in physics has different connotations than observations in art, be aware of differences in methods of observation, subjective observation of an eye or objective observation with numerical instruments.

Definitions: The meanings of words differ from discipline to discipline. These differences may be subtle or less subtle. Discuss meanings on a regular base. The meaning of 'embodied' in Artificial Intelligence is not the same as in dance[xii].

Communication: the challenge here is to find the right balance, to respect all disciplines and to treat disciplines as equal, at the same time do not forget your own discipline. When learning new skills, it is easy to get carried away with the methods of another discipline. Regular communication, learn to listen, learn to be aware.

Questions: How do you define what you do? How do you define your field? What are the paradigms of your field? What are the boundaries of your field? Are you using a top-down or a bottom-up approach to generalize?

Comments: Throughout history the categorizations of science have shifted. This is not always considered as a good thing[xiii]. Be respectful of paradigms, but do not be afraid to shift them. Art has paradigms just as much as science does. Think about notions that art can only be made by artists or that theory is harmful to art. For each collaboration new paradigms need to be created.

5) Types of Collaborators and Collaborations We suggest to determine types of collaborators and collaborations, as they are closely linked to expectations and motivations.

One of the first things that would be good to determine is if the collaboration is multi-, inter- or trans-disciplinary. Disciplinary meaning a branch of knowledge, instruction, or learning, a field of study[xiv]. The differences between Multi-, Inter- and Trans- disciplinary is difficult to understand as the definitions have not yet been significantly researched and are often used intermediately in everyday language. Good explanations have been developed by health research scientist Bernard Choi and consultant Anita Pak[xv]:

Multidisciplinary: draws on knowledge from different disciplines but stays within the boundaries of those fields. Is like a salad bowl (such as a vegetable platter or mixed salad, in which the ingredients remain intact and clearly distinguishable). Additive, 2 + 2 = 4

Inter-disciplinary: analyzes, synthesizes and harmonizes links between disciplines into a coordinated and coherent whole. Is like a melting pot (such as a fondue or stew, in which the ingredients are only partially distinguishable). Interactive, 2 + 2 = 5

Transdisciplinary: integrates different disciplines and in so doing transcends each of their traditional boundaries. Is like a cake (in which the ingredients are no longer distinguishable, and the final product is of a different kind from the initial ingredients). Holistic, 2 + 2 = yellow

Example:

Paradisciplinary: Unlike inter-, multi-, cross- and transdisciplinary collaborations, which define various types of interactions among a group of (at least two) individuals working together on a common project (e.g. an artist and a scientist), paradisciplinarity applies to a single individual practicing two disciplines at the same time.

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i This summary is based on the reflections collected on a blog by Roger Malina in which he includes observations from The Wellcome Trust, and Root Bernstein http://malina.diatrope.com/2010/08/29/what-are-the-different-types-of-art-science-collaboration/ (last viewed Nov 14th, 2012)

ii In 2008 *The Museum of Modern Art (MoMA)* presented the exhibition *Design and The Elastic Mind* that showcased a history of how science has influenced art and how art has influenced science in particular in the areas of mobility, nanotechnology and electronics. Visiting such exhibitions may inspire your motivations. http://www.moma.org/interactives/exhibitions/2008/elasticmind/ (last viewed Nov 14, 2012)

iii Jill Scott, *Artists-In-Labs, Processes Of Inquiry*, Springer Verlag/Wien, 2006, p. 24

iv Ben Peperkamp, Gosuin van Heeswijk, Erwin Roebroeks: ASE: Arts & Sciences, Haalbaarheidsonderzoek & aanbevelingen, Eindhoven p.p. 15-16 found on http://www.alice-eindhoven.nl/2009/09/artscience-centre-eindhoven/ (last viewed, Nov 14th, 2012) In this they refer to statements by Robert Zwijnenberg and Joep Huiskamp

v Ben Peperkamp, Gosuin van Heeswijk, Erwin Roebroeks: ASE: Arts & Sciences, Haalbaarheidsonderzoek & aanbevelingen, Eindhoven p.16

vi An interesting project on ethics may be found here: www.artscienceethics.com (last viewed, 14 Nov, 2012)

vii Jill Scott, Ibid p.p. 24-26.

viii McGuire, A.L., & Lupski, J.R. (2010). Personal genome research: what should the participant be told? *Trends in Genetics*, 26: p.p. 199-201.

ix http://www.slideshare.net/leisa/collaboration-techniques-that-really-work-presentation

x Jill Scott, Ibid. p. 24

xi http://www.uu.nl/wetfilos/bijsluiter/alphabetagamma.html (last viewed Nov 14, 2012)

xii Jill Scott, Ibid. p. 26 and p. 27

xiii http://blogs.scientificamerican.com/literally-psyched/2012/08/10/humanities-arent-a-science-stop-treating-them-like-one/

xiv Bernard C.K. Choi, Anita W.P. Pak, 'Multidisciplinarity, Interdisciplinarity And Transdisciplinarity In Health Research, Services, Education And Policy: 1. Definitions, Objectives, And Evidence Of Effectiveness', Clin Invest Med, vol 29, no 6, December 2006 p.p. 359-360

xv Bernard C.K. Choi, Anita W.P. Pak, Ibid. p. 352

Two conditions are thus required for any given practice to be defined as paradisciplinary:

i) Parallelism – the two disciplines must be performed in parallel by the same individual, in a synchronous fashion (*a neurobiologist who is also choreographer clearly meets this criterion; a choreographer who changed career to become a neurobiologist does no*t)

ii) Symmetry – the importance (involvement) of each disciplinary practice must be relatively symmetrical in the individual's curriculum (*a composer who publishes scientific papers in acoustics and also performs musical pieces in concert halls meets this second criterion; a physicist who publishes in scientific journal and also enjoys playing the piano at home does no*t) [xvi]

xvi As mentioned by François-Joseph Lapointe in his SEAD White Paper: http://seadnetwork.wordpress.com/white-paper-abstracts/final-white-papers/how-i-became-an-artscientist-a-tale-of-paradisciplinarity/ (last viewed, Nov 16th, 2012)

We encourage each project to define their own definitions and types of collaborators.

Example:

5 Types of Participatory Collaboration between art students and university students**[xvii]

1. A university student interested to get closer to art with the interest of gaining depth and new perspective in relation to their own discipline. Participating observer.

2. A university student who is interested in the integration of artistic methods without aspiration of making art. Integrating artistic methods as an enrichment of academic methodologies. Art without the

artist. Active observer, for instance involved with methods of re-enactment.

3. A hybrid student, trained in one or more disciplines. One who seeks new forms of knowledge production combining artistic and academic methods aiming for the highest achievements in both methodologies. This may also be a team of two or more people type 2 and 3.

4. An art student who wants to get closer to the theories that are related to his work. Aims for high artistic achievement. Knowledge development is Secondary.

5. An art student who wants to get inspired by academic theories. To get closer to science. Theories are applied to suit the artist and are not tested or analyzed for truth.

** please note that in The Netherlands universities are separated from art schools

We encourage each project to design and work with their own metaphors.

Example: For instance one might refer to collaborations as they are manifested in nature and described by biology as: mutualistic collaboration (+/+), competition (-/-), parasitism (+/-), Neutralism (0/0), Commensalism (0/+)[xviii]

Challenges: The more people are involved the more difficult it may become to reach a common vision.

Questions: What type of collaborator are you? What is your role? Will you function as advisor? passive or active observer? Facilitator? Actor?, Teacher? Co-creator? Co-author? What are your expectations? Who is leading the project? Are there more than one leader? How is your collaboration structured?

Comments:

Vision: Creative endeavors often require visionary approaches. Is the project led by one vision(ary)? Or more?

Responsibilities: To avoid disappointment or confusion it is important to clarify who is considered responsible for what, and when, but also to allow for flexibility within these responsibilities.

Attitudes: Respect for the collaborators field/interests and differences to one's own has to be paramount. Do not consider your discipline as intellectually superior. Be ready to investigate the methods and methodologies of different disciplines[xix]. Be ready to learn new skills. Respect the accumulated knowledge of each discipline as well as the associated means of expressing it. Transdisciplinary collaborations are a catalyst to innovation. You truly cannot predict what you get.

Commitment: Individuals should be clear about what their commitment can be for the project.

International: When collaborating in an international context, one might encounter miscommunication due to language difficulties, where things may 'get lost in translation' or cultural differences. These may involve banal issues such as time punctuality or directness versus circling around an issue during dialogue.

Summary

ONE SUGGESTED ACTION:

Create a comprehensive practical guide that builds towards a taxonomy of the challenges within typologies of collaborations between Art - Design - Engineering - Science – Humanities starting from and adding to the issues touched upon in this paper in order to facilitate successful collaboration: Motivations**, Method and Methodology, Knowledge Transfer and Dissemination, Definitions and**

Generalizations, Types of Collaborators and Collaborations. Dealing with issues such as structure, location, funding, planning, communication, commitment, time, ethics and attitudes.

Obstacle/opportunity: centralized practical knowledge about multi-, inter, and trans- disciplinary collaboration, in particular with Art - Design - Engineering - Science – Humanities collaborations, is insufficiently documented and or collected. Many individual projects have made reports of their findings. This is an opportunity to create a collection of guidelines that in a low threshold practical formation, may function as an international handbook that can be used as a tool for future collaboration projects.

Stakeholders: for all (new) collaborators and educators of multi, inter, and transdisciplinary collaborations, as well for those who initiate, facilitate and or fund such projects.

[xvii] This description was born from observations within the hounours programme Art and Research, a collaboration between the University of Amsterdam and The Gerrit Rietveld Academie.

[xviii] With thanks to François-Joseph Lapointe

[xix] Jill Scott, Ibid p. 26