

Maximising Collaborative Success Between Science and Art:
Lessons from the Illuminating the Self Public Engagement
Project



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 **CANDO**

Lighting the Way to a New Epilepsy Treatment

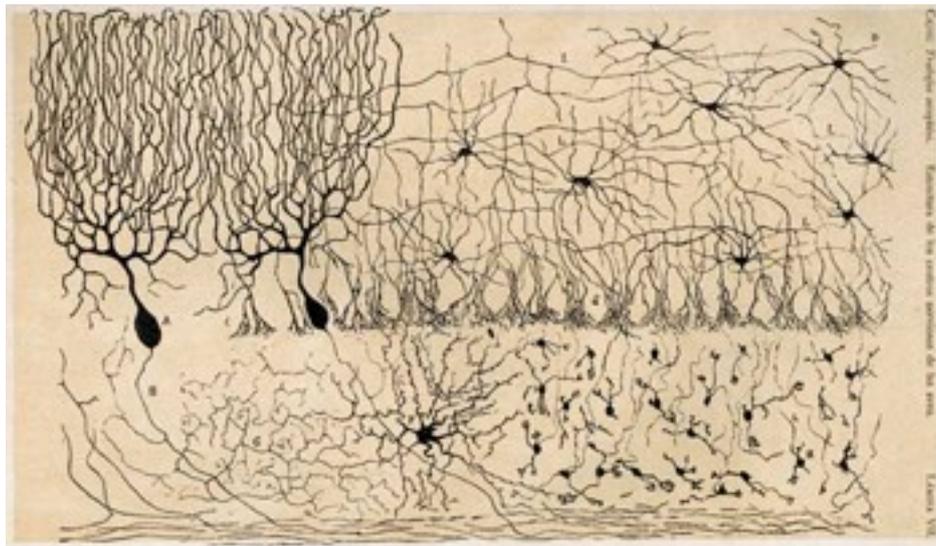
There has been a long historical link between art and science, with scientists such as Ramon y Cajal and Charles Darwin using art to illustrate and explain their findings. With the advent of photography and film, the need for artistic technique decreased and the two practices began to diverge. This cultural separation has continued with many students focussing on either science or the creative arts. However, both are compatible and complementary, utilising similar methodologies and practices. Collaborations between the two have the potential to benefit everyone involved by being exposed to new audiences and new methods of working.

Support for collaborations has increased in recent years with funders such as Wellcome providing support for sciart projects, acknowledging the ability of art to not just support communication and engagement but to work alongside science, arousing interest and emotions. Interest that researchers and institutions can tap into to engage audiences, building support, accountability and trust in their work.

But maximising the impact of a collaboration can be difficult. Therefore, this review explores the lessons learnt from our own experiences of collaborating with artists, theatre companies and computer designers as part of *Illuminating the Self*, where artists responded to the CANDO research project. Itself a collaboration, bringing together scientists and engineers to develop a new therapy for focal epilepsy involving gene therapy and bioelectronic implants within the brain. We explore areas important for successful interdisciplinary collaboration such as identifying mutual key objectives, acknowledging differing work practices, managing budgets and planning publicity programmes.

INTRODUCTION

Art and science have a rich history, encompassing people such as Leonardo da Vinci, Ramon y Cajal and Charles Darwin. Scientists who explored, detailed and shared their scientific discoveries through art. Without the state-of-the-art technological imaging techniques available today, drawings and paintings were the best way of accurately depicting findings. As the saying goes, a picture is worth a thousand words and through their work their understanding of science could spread across the globe.



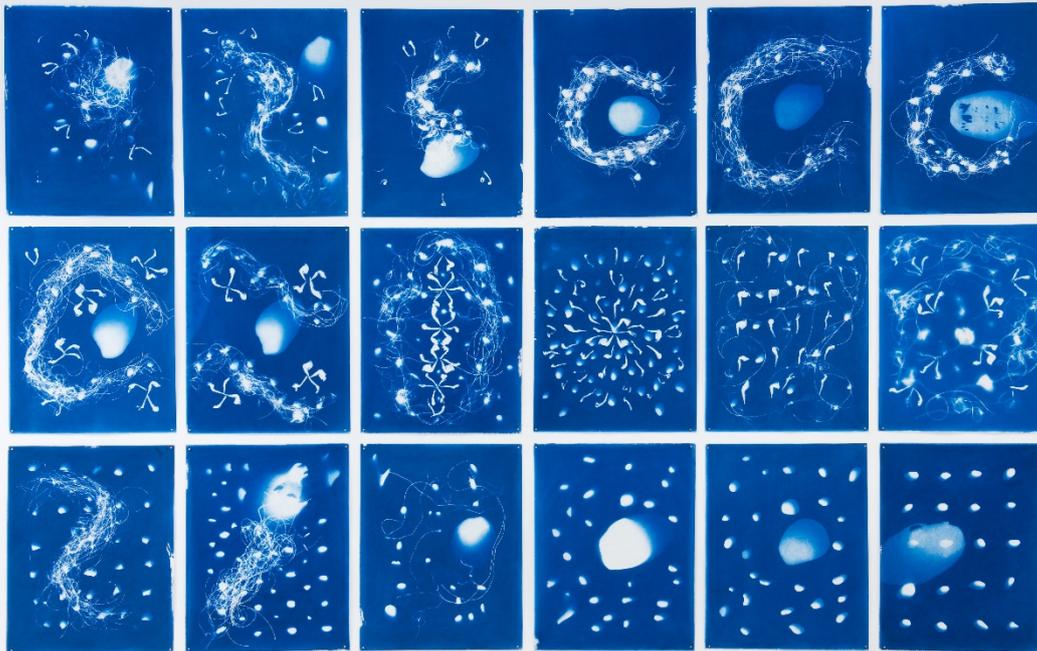
Drawing of the cells of the chick cerebellum neurons, by Ramon y Cajal, 1899, Wikimedia Commons, Public Domain.

With high-powered microscopes and digital cameras able to capture more detail than ever before, the relationship between art and science changed. But the many commonalities between art and science supports their continued engagement. Both endeavour to provide an understanding of the world around us by asking questions, observing, researching and refining answers. They require attention to detail, problem solving, collation of information, and an ability to argue from evidence whilst reconciling conflicting views. However, while science seeks data to provide objective explanations of the world, artists can respond to those same questions from a more subjective, personal or emotional level. In this way, the work that they produce is an individual response to a topic that invites the viewer to form their own interpretations.



Sounding like Blue, meteorological balloon, fan, LEDs, with a sensor, size variable, Andrew Carnie, 2019. Photograph by Michael White.

With this in mind, the Newcastle University-led CANDO (Controlling Abnormal Network Dynamics using Optogenetics) research project, supported by funding from Wellcome, embarked on a major engagement project called *Illuminating the Self*. The CANDO project aims to develop a new light-based therapy for the population of epilepsy patients who do not respond to medication and are ineligible for resective surgery. The proposed technique of optogenetics, however, which utilises light-reactive proteins to correct abnormal brain activity, has never been utilised in the human brain before. Therefore, the project looked to engage the patient population and public in regards to issues raised by the research. What impact does epilepsy have on people's lives? To what extent should we try to treat epilepsy by altering brain circuits? What are the risks of implantable technology within the brain, and what should be the limits of therapies that alter our genetic make-up? What are the wider legal, ethical and societal implications of biomedical technologies that may in future challenge what it means to be human?



Out of the Blue, installation of 18 cyanotypes, Susan Aldworth, 2020. Photograph by Colin Davison.

Public engagement is increasingly important for academic institutions, ensuring their work is relevant, responds to society's needs and builds public trust. A two-way process, involving sharing and listening, it should mutually benefit everyone involved. Done well, it can challenge conventional thinking, providing fresh, new perspectives on topics. But to have meaningful engagement, there must be mutual interest. A survey by the British Science Association (Castell et al, 2014) found that while there was generally widespread interest from the public in science and engineering, many people had concerns around research. 43% of respondents agreed with a statement that the speed of development in science and technology is too fast to follow (Castell et al, 2014). Meanwhile, a Wellcome survey found that as many as 59% of young people in school thought that understanding science was not important to their daily lives, with only 56% of students aged 14-18 agreeing that science was important for society in general (Wellcome, 2019). As the generation most likely to benefit from new technology coming through it is important that they are engaged with science so that society can decide what is best for everyone. However, engagement and understanding of new technology is hampered by the dissemination of misinformation through the ever

expanding world of social media. Therefore practitioners must take an active role in making their work accessible.

There will be sections of the population who seek out health and technology news, but many will not. However, when engaging public opinion, it is important to try and engage with all parts of society. And engaging these audiences requires being able to motivate and interest them. As once people have developed an interest in something, they become more receptive to further information and engaging in discussion. Fortunately, this is something which the creative arts are particularly skilled at. And through collaboration, artists can help researchers to unlock these audiences, while simultaneously helping them to look at their work in new ways, encouraging more adventurous, more open and more engaging work.

Illuminating the Self involved artists Susan Aldworth and Andrew Carnie, theatre group Operating Theatre and software developer AnimaVR. By engaging separately with a range of artists we hoped to utilise various formats to engage with a range of backgrounds, and not just those already interested in science and technology. However, a wider collaborative approach was embraced with people engaging in conversation, sharing ideas and thoughts. But a collaboration with the arts is not one of art servicing science. Artists must be allowed to interpret and develop work so that everyone can benefit from collaboration. And artists have been shown to benefit from collaborating with science. Between 1996 and 2006, the organisation Wellcome ran a Sciart funding programme to support visual arts projects which involved artists and scientists in collaboration. At the end of this programme an evaluation found that the collaborations had provided artists with new methods of working, improved research processes and levels of artistic technique (Glinkowski and Bamford, 2009). Artists were also exposed to new content and new ways of thinking, helping them to develop new ideas and practices. Within the *Illuminating the Self* project, this was highlighted as a major benefit of the collaboration. Indeed many artists thrive on being taken out of their comfort zone and exploring new topics. Collaborating artist Andrew Carnie reflected, '*Challenging one's own practice is so important, I like listening to scientists to get new ideas, to hear new concepts that might change my work.*'



Andrew Carnie, Left: "Blue Matter" 2019, 28 min four channel HD video, on black voile screen, size variable Centre: "Lost for a While: in thought" 2019, voile tube, trees, tripod, tent poles, motor, lamp, and sensors, 3.5m x 2m x 2m Right: "Storm Level: fair Isle" 2019, twelve line lasers, voile tube and panels, tent poles, fan, clamps and sensors, 3.7m x 2m. Photograph by Colin Davison.

Collaboration may also provide artists with access to new contacts, new audiences and new sources of funding through organisations that support public engagement with science, technology, engineering and maths (STEM) subjects. Through *Illuminating the Self* artist Susan Aldworth has built connections with a number of other artists, designers and institutions. Those connections allowed her to work on scale greater than she could have one on her own, and create in her work a level of diversity that reflects the individuality of epilepsy, one of her key messages from the project. These connections have continued after the exhibition, hopefully leading to and supporting future work.

MAKING THE MOST OF COLLABORATION

Many organisations have schemes in place to help connect scientists and artists. An artist being anybody within the creative arts industry such as poets, dancers and musicians as well as painters and sculptors for example. But finding the right person to collaborate with can be tricky. Someone interested in exploring the same topic and who is able to arouse the curiosity of the general public. It can take time, and people should not rush into a collaboration. But when you do, what can you do to make the most of the opportunity? What follows is a series of points to consider before embarking on a project inspired by the lessons learned during the *Illuminating the Self* project. Through our experiences, hopefully the possibilities of any science and art collaboration can be maximised.



Out of the Blue, kinetic installation of 100 antique embroidered garments, Susan Aldworth, 2020. Photograph by Colin Davison.

Agree mutual aims of the collaboration

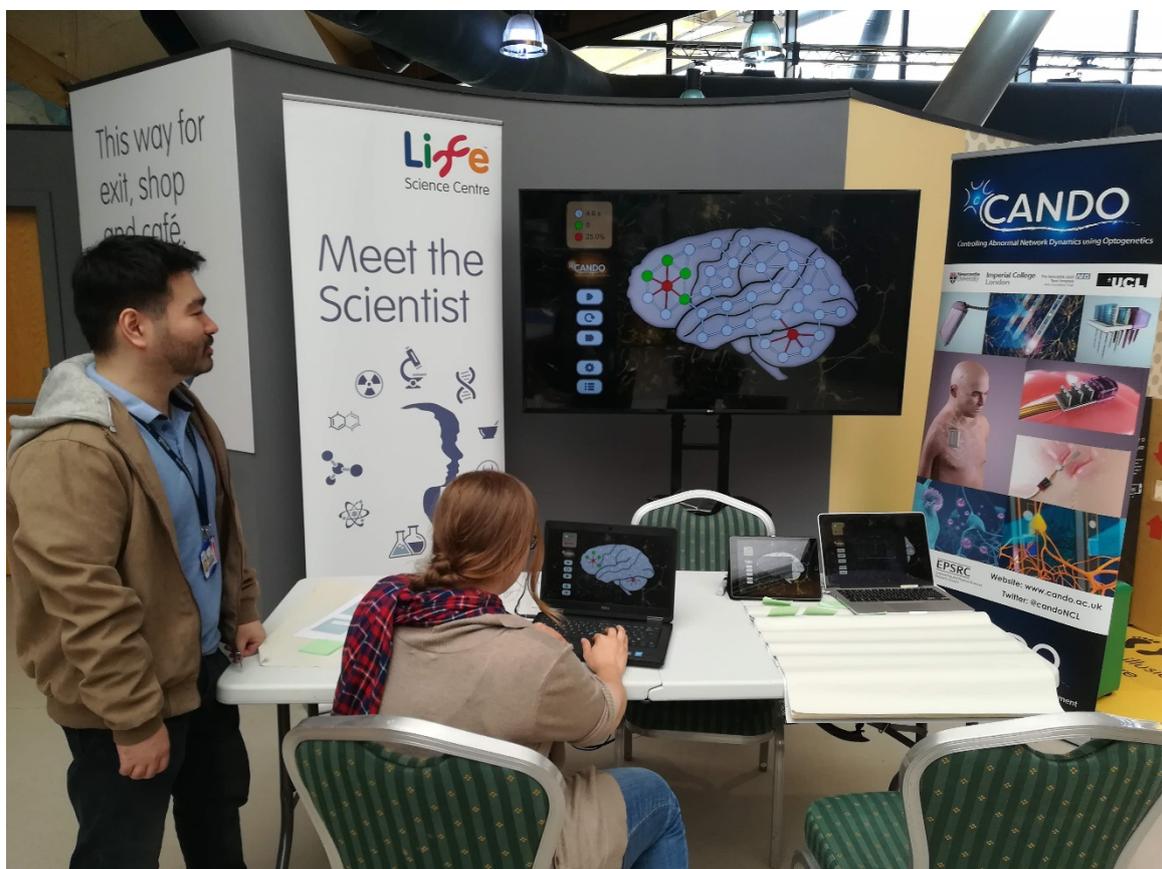
As highlighted in the first part of this paper, a collaboration between artists and scientists can provide a range of benefits. To obtain these benefits, everyone involved should be clear about what it is they are wanting to get out of the project. For scientists, do they want to get a different perspective of their research, increase public understanding and awareness of their work or create a conversation that will help shape the direction of their work? Scientists and artists will not necessarily approach a collaboration with the same vision and expectation. This may be down to a different understanding of each other's work and working practices or because of differing levels of ambition. In order to ensure a successful project, from the very beginning it is important for all parties to come together to discuss their hopes and expectations. From this dialogue, mutually compatible aims can be agreed that are acceptable and exciting for all parties. This can help to avoid confusion, disagreement and disappointment.

With this in mind, care should be taken to identify the story that the project wishes to tell. Like a research question, a story revolves around a problem that needs to be overcome. Therefore, the story may be as simple as the reason the research is being done. Alternatively the story may be about the people who will be helped by the research and why they need helping. People respond better to stories as opposed to individual images or facts, engaging more emotionally. Identifying a story within a project can also provide artists with a focus to work from, ensuring their work remains relevant to the research.

In addition to the story, it should be agreed across parties as to the target audience for the collaboration. What group of people is the project intending to reach? This could be those with an interest in science, those with an interest in art, the young or old, or maybe a patient population. The target audience will depend upon the intended outcome of the project. But knowing the target audience will go a long way to shaping what the project output will look like, how it needs to be publicised, where it should be presented and the sort of language that needs to be used within a project. Following on from this, it should be possible to reach an understanding on the expected format of the output of the project. If a theatre piece is being written, how long is it expected to be, a full length play, one act or even a series of separate but connected shorts? How is it expected to be performed? Will it be a

live performance in front of an audience or will it be filmed for distribution online? For artists, are they expected to produce a single piece of artwork or a whole gallery exhibition?

It is necessary to highlight that for true collaboration to take place, artists must be free to interpret the research in their own way. If the scientists are expecting an output that merely explains their work via an image then this is not a true sciart collaboration. This is because an artist is merely illustrating the work instead of actively responding to it. For a successful collaboration there must be room for an open, supportive dialogue that allows for creativity and interpretation.



Public engagement event at a regional science centre. Photograph by Michael White.

Understand working practices and project timelines

While science and art share a lot of similarities in the working process, scientists and artists may potentially have very different methods of undertaking this process. Understanding how people work, the timelines of the project and how a project might be affected by other work being undertaken in parallel can avoid confusion and dissatisfaction. Any artist or artistic group will also want to have an understanding of what the scientists will provide for the project and this can come in many degrees and forms. There could be provision of time, money or access to other resources. If the scientists are part of a larger research group, it must be understood how involved other researchers, research assistants and students might be and whether they will be allowed time to support engagement activities. If an artist is introduced to scientific techniques, they may wish to utilise aspects of these techniques within their artistic work. This may include utilising or copying engineering, laboratory or imaging techniques for example. Before they are allowed to do so, it may be necessary to undergo training so that they can safely use the equipment. If equipment is used by other projects, will there be the time and resources available to allow access to the equipment without affecting academic research?

When planning project timelines, it is important to identify key dates such as a gallery exhibition or show opening that people need to work towards. Other dates can then be worked out for when people can expect to see details of work, draft scripts or ideas. Departments such as publicity and marketing may need details about exhibitions or shows months in advance. People will need to be aware of these dates so that clear information can be provided to marketing departments to achieve maximum output. A vague or inaccurate press release could damage an event in either failing to grab the interest of the press or result in false expectations.



Alex Elliott from Operating Theatre at the Illuminating the Self preview event at Hatton Gallery. Photograph by Colin Davison.

Project funding

Issues over money can easily derail a project causing disagreements and a failure to meet project aims. This can be mitigated by setting and understanding a budget early. Any budget will need to be split across a number of different areas and an understanding of any flexibility that may exist within the budget should be made clear to all involved. For any artists to work effectively, they must know what funding is available to develop their ideas so that those ideas can be adapted into the budget. Should an artist's ideas cost more than was expected so that their budget is spent before work is completed, there should be a plan as to what will happen. Will additional funding be found from a different part of the budget or will the artist be expected to absorb any further costs necessary to complete the work? If this is clear at the start of the project, then it will reduce the possibility of disagreement later on.

The production materials fee available will influence the scale of a project. This is particularly relevant to theatrical outputs. Complicated sets, props, sound and lighting can all end up being very costly. The scale of a production and production budget may also influence the type of venue used. Bigger venues will be able to handle more complicated shows and hold larger audiences but will cost more to hire, potentially resulting in fewer shows. Simpler shows which can be performed in smaller venues may allow for more performances and in different venues but extended runs will increase cast and crew costs.

Another consideration for the funding is how it will be managed. Will all of the funds be managed by one institution or will artists be provided with a lump sum of money to manage themselves? This would allow them to purchase materials or employ support faster than if run through an institution but will require an artist to keep accurate financial records. This may or may not be complicated by including an amount for expenses such as travel and subsistence. Expenses could be paid as they are incurred or people provided with a single payment to cover expenses for the entire project. It may also be necessary to make clear what expenses will be covered as this may vary from institution to institution and so expectations on what can be claimed may be different. It is important when identifying budgets to correctly identify those costs that will incur VAT. Having an unexpected extra 20% added on to costs, as the current VAT rate in the UK is, could have a severe impact on a project budget requiring cuts to other areas if not properly taken into account.

Project staffing

Depending upon the size of the project, additional support may be necessary. A lead investigator may not necessarily have the time and resources to be able to manage the day to day administration themselves. Having a project manager who can oversee the project, manage project funds, arrange meetings and deal with other administrative tasks may therefore be required. However, having such a person will incur a cost and would need to be budgeted for. Some institutions may be willing to provide administrative support but it should not be expected that institutions will have the capacity to do so without impacting the day to day running of an academic department.

It is also important to clarify for anybody involved in the project whether they classify as self-employed or should be listed as being employed by the institution managing funds. The classification of contractors as self-employed has been identified by HMRC in the UK as a potential method of tax avoidance. Institutions are therefore required to ask a number of questions of self-employed vendors under HMRC IR35 guidelines (HM Revenues and Customs, 2020). If the guidelines for classifying as self-employed are not met then there will be additional funding implications such as employer NI and pension contributions.



In Praise of the Scope, Andrew Carnie. Photograph by Colin Davison.

Venues

Visual and performance art generally requires a venue or location to showcase the finished work. However, as the COVID-19 pandemic has shown, engagement and events can also be successfully taken online. A venue can simply be a building or space that is hired or could be an organisation that is more involved with the project. While it is not always necessary to decide a venue at the start of the project, how a piece of work comes across will be shaped by the venue it is in. It must therefore be chosen with care.

For *Illuminating the Self*, we had commitment from two art galleries before applying for funding. This provided support to the application as well as giving the artists clarity from the start in regards to the scale they would be working in. This allowed the space to become an element within the work. Meanwhile, theatre group Operating Theatre developed two pieces of drama responding to CANDO. For both pieces, venues were not identified early on but the work was developed with smaller, more intimate spaces in mind. This provided us with flexibility as we were not constrained to fully fitted theatres. This enabled us to take the work into communities, where we performed in churches, accessing audiences who may not ordinarily visit a theatre. Additionally, when the COVID-19 lockdown hit in March 2020, leading to the cancellation of a number of performances, the nature of the piece meant that it could be adapted into a film, allowing engagement to move online.

Choosing a venue, however, is not just about the space but should include other considerations as well. What provision will there be from a venue in regards to marketing and publicity? A venue might have their own brochures detailing upcoming events, social media outlets and private mailing lists which could help boost visitor numbers, but getting venues to use these channels may come at a price. Similarly, if tickets are required for an event then a venue may have their own box office and be able to process tickets but are again likely to charge an additional fee to do so. Therefore using a free online ticketing website such as Eventbrite may be the solution but at the cost of a more limited reach.

Marketing

In order to ensure good audiences for events, it will be necessary to engage in a publicity and marketing campaign. This can be done at a number of levels ranging from within an institution to garnering coverage in newspapers and magazines. Large institutions may have a marketing department willing to be involved in writing and disseminating press releases and it is recommended that their knowledge and expertise should be used where appropriate. Alternatively, specialist Public Relation organisations could be utilised who have wider contacts across the media world.

Whoever writes the press release for newspapers, magazines and other media outlets will need to understand the aim of the release. Having a story that the project has been developed around will be hugely beneficial in this regard. As will understanding the target audience that the project is trying to reach. Targeting different outlets such as newspapers as opposed to scientific or artistic publications will require a different vocabulary, focus and tone. When a release has been written, it may be necessary for it to be reviewed by various parties within the project. Each party may have different comments and suggestions but these may not all be compatible. Therefore, it should be clear where ultimate responsibility for the press release lies and who will make the decision about what goes in. It should be kept in mind that a press release is intended to catch the interest of journalists so that it results in a piece within their publication. The more publicity there is, the more likely it is that there will be good visitor numbers.

As well as press releases, advertising can also be done through a number of other lines such as listings magazines, posters, billboards and fliers. All of these are useful ways to get information out about upcoming events. However, any adverts or posters will require designing, printing and distributing, processes that come with their own costs. Projects should expect to allocate a reasonable chunk of their budget to marketing. An extreme example of this is Hollywood where marketing budgets of movies can often be more than the production budget (Olson, 2018: 67). While this may be inappropriate for a sciart collaboration, the difficulty and cost of manufacturing an audience should not be underestimated.

Exhibition and production materials

Any exhibition, show or performance provides a good opportunity to share additional informative materials about the project or research. The work produced by artists should create interest from audiences and a desire to learn more. Therefore, means should be available to fulfil that desire, offering explanations about the work and people involved. This material can come in many different forms and formats. It could be as simple as a sheet of A4 paper or something more complicated like an interactive app or guide. The use of links such as QR codes can allow people with smart phones to access further images, videos or information.

Projects wanting to engage with families should think about interactive materials and activities that children can be engaged with and that provoke discussion within families. This could be as simple as a word search, picture to colour in or activities and workshops that get people to produce their own artistic response. These activities and workshops may or may not require someone to lead them but can provide different and interesting evaluation data. As with everything, plans must be made in regards to who will design these materials, write any text involved and source or provide images. Any material must then be printed which all involve costs. The more complicated and the higher the required quantity and quality, the greater the cost.



School workshops using embroidery techniques to explore the project. Photograph by Susan Priestley.

Complementary events

Many projects may expect to plan around a large, singular event at the end of the project. But there may be numerous opportunities for smaller workshops and talks throughout the duration of the project. These can have the benefit of helping to develop ideas while also increasing awareness and interest in the planned finale. Especially if people feel like their comments or input will be a part of the final work, as they will be more likely to follow up on the project and talk about it with friends and family building word of mouth. Therefore, consideration should be taken as to how to maximise these opportunities and to incorporate them fully into work. We linked into established events such as European Researcher's Night and North-East Science Festival, Palace of Science, to help extend the project's reach.

Many galleries, museums and theatres will already have outreach programmes set up that link into schools, colleges or local community groups. It may be possible to work with venues to run workshops with these groups. For the *Illuminating the Self* project, we worked with young local artists to provide workshops to schools and community groups identified by the galleries we worked with. Using these established networks was a lot quicker and easier than building those connections from scratch. These were managed by the project with support from local artists.



Meet the Scientist event at Centre for Life, Newcastle. Photograph by Michael White.

Completion of the project

The end of the project does not always mean the end of decisions. Something that needs to be agreed at the start of the project is what will happen at the end to any work produced. If there is artwork created, who will own the work and be responsible for storing or displaying the work long-term? Not all institutions may necessarily have the space to display or store work. Ownership of the work is also important in case someone looks to sell the work and might profit further from the work.

For written work such as a piece of drama, literature or poetry, it will be necessary to decide who will retain rights. Asserting copyright on something is straightforward, occurring automatically with no application or registration needing to be undertaken. Copyright can be clarified by using the copyright symbol and detailing the writer and year of creation (Intellectual Properties Office). Charging other people to use project work may even act as a source of income in the future should copies of the work be bought or performed. Alternatively an agreement might be made that the rights for performance are released for free. This can increase the reach of any piece, especially amongst amateur groups with limited resources looking for new, challenging pieces. However, this potential loss of long-term income may mean that artists request a slightly larger fee.

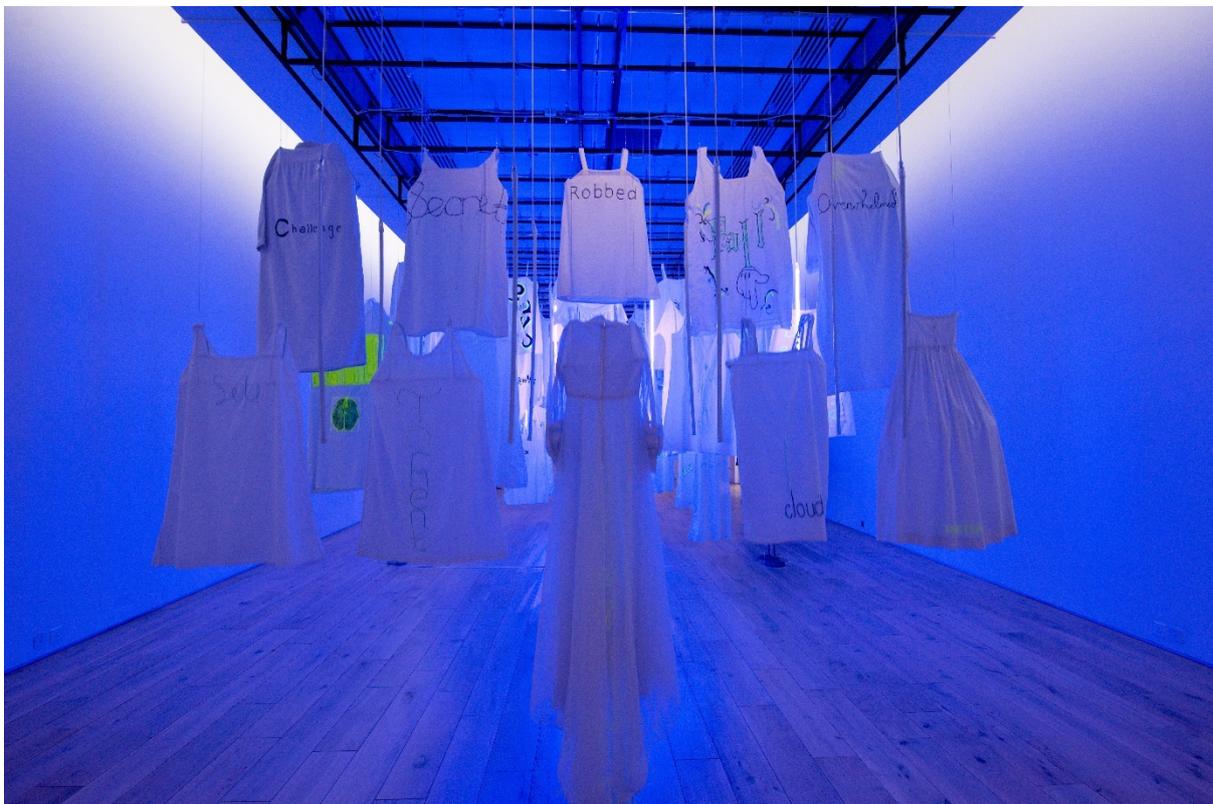
Any other resources developed throughout a project such as photographs, videos, and workshops that could potentially be shared widely on the internet, will also have copyright issues. Creative Copyright could be set to allow people to use and share images from the project without requiring permission on condition of crediting the creator. Some Creative Copyright settings allow users to manipulate images for their own work, however some artists may not allow this. Many of the answers to these questions may be set as a condition of any funders to the project, requiring that any resources developed during the project are shared freely in order to help increase engagement around STEM topics.

10 GOLDEN RULES FOR A SUCCESSFUL COLLABORATIVE PROJECT

- 1. Ensure that everyone within the collaboration is involved for the right reasons.** Successful collaborations do not result from tick box exercises.
- 2. Agree mutually acceptable aims for the project.** A successful project will not occur if people are working at cross-purposes.
- 3. Understand what all parties will bring to the project.** This may be skills, knowledge or space amongst others.
- 4. Agree an acceptable budget and how it will be managed.** Poorly managed budgets will lead to frustration and missed opportunities.
- 5. Find a suitable venue for showcasing work.** This should be based on an understanding of the advantages and limitations associated with the venue.
- 6. Create a marketing and publicity plan towards the start of the project.** Allowing time to understand and review options ensures appropriate decisions can be made.
- 7. Agree at the beginning what will happen to outputs at the end.** Nobody wants to end a successful project on a sour note do they?
- 8. Be open and receptive to new ideas.** Don't allow yourself to become too comfortable. Pushing the boundaries may lead to unique opportunities.
- 9. Establish a supportive relationship.** Creativity thrives in an environment where ideas are listened to, supported, positively challenged and explored.
- 10. Be humble.** Not everyone will have the chance to work with other disciplines. Take the opportunity to learn and benefit from their skills and knowledge, in the way that they will learn and benefit from working with you.

SUMMARY

All of these questions in some form or another relate to art and scientific collaborations, although depending upon the size of the project, some may be more or less relevant. By asking each question, projects will be able to decide for themselves their relevance. Ignoring or failing to agree answers may result in problems or issues later on in the project when misunderstandings arise. This may ultimately lead to disappointment in how a collaboration pans out, funding difficulties or low visitor numbers. The unique nature of collaborations means that each project will have its own answers and agreements. What works for one group may not work for another or what worked in one project may not necessarily work in a different project. However, by undertaking sufficient planning groups may reduce the risk of encountering problems, while maximising the impact and enjoyment of their collaboration.



Out of the Blue, kinetic installation of 100 antique embroidered garments, Susan Aldworth, 2020. Photograph by Colin Davison.

ACKNOWLEDGEMENTS

This work was supported by the CANDO project (<http://www.cando.ac.uk/>) funded through Wellcome (grant number 102037) and Engineering and Physical Sciences Research Council (grant number NS/A000026/1) through an Innovative Engineering for Health grant. The *Illuminating the Self* project was supported by Wellcome (grant number 102037/Z/13/A) through a Provision for Public Engagement grant and a grant from the Catherine Cookson Foundation.

PUBLIC AND PATIENT INVOLVEMENT STATEMENT

Members of the public and people with epilepsy were involved in the engagement project which did not require ethical approval. No patients or public were involved in the planning or writing of this paper.

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