

# Co-Creativity in Art + Technology

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*When artists and technologists collaborate, who is in control?  
Should technologists support the artists or should they be equal partners?*  
In artist-in-residency studies, these have emerged as vital questions.

## 1. Introduction

In 1960s, a few pioneers in art and digital technology were working largely in isolation and with little recognition that what they were trying to achieve bore any relationship to art practice. Individuals and small groups worked at the boundaries between art, science and technology, very much against the prevailing cultural wisdom of the traditional arts world. At that time, their efforts were more likely to be viewed as closer to crude manifestations of science fiction.

In 1968, a landmark exhibition, ‘Cybernetic Serendipity’ held in London, was a public demonstration of the state of the art in art and technology. It was about this time that **AARON**, the pioneering automatic art creating computer program, written by the painter **Harold Cohen**, was born. People hailed the new “infant”, who could draw only in black and white at that time, as a signal that autonomous machine creativity was truly with us and was set to challenge our notions about the uniqueness of human creativity. Since then AARON has grown up: he is over thirty years old and has graduated to colour and complex figurative compositions. It is interesting to see that his human creator does not claim that what the program does is “creative”.

“I used the term “new, original images,” not “creative.” I use the word “creative,” on those rare occasions when I use it at all, to refer to the ability of the individual---human right now, program potentially---to move forward, to develop, to introduce new material. These imprecise terms give a flavour, not a definition. To put it more precisely, I believe the word properly attaches to continuous change, not to single events. There is no question that AARON has moved forward and developed over its 30-year existence, but the agency of change and development has been me, not AARON.”[1].

So, whilst AARON is now a better painter, more importantly, Cohen is a better artist.

Today, the world of art and technology has changed remarkably since those early beginnings and there is much more diversity in the new generation of digital creations. What was then conceived of as “computer art”, where the control of the creative process and the making of artefacts belonged to the machine, has given way to new ways of working both with digital technology and with other people. We call this *Co-Creativity* where the collaborator may be human, may be a computer, or may be both.

## 2. Practice-Based Research in Art + Technology

The idea that interaction with digital technology plays a significant role in the creative process has driven the work we have been doing at C&CRS, Loughborough University for some time. We want to understand how this process works and what it tells us about the nature of creativity in the context of art + digital technology. However, opportunities to investigate such events are limited and we want to avoid laboratory-style experiments that might strip the evidence of the richness that real events provide. Our approach was to establish the Creativity and Cognition Research Studios for exploratory art + technology projects and to make artist residencies the vehicles for research into the creative process.

### ***Creativity and Cognition Research Studios***

C&CRS provides an environment where artists and technologists work as collaborators. The Studios were established in 1999 as a joint venture between the School of Art and Design and the Department of Computer Science. New initiatives in creative digital art provide a mechanism for informing our general understanding of the creative processes and the role of the technologies involved.

In the COSTART project, funded by the Engineering and Physical Sciences Research Council (EPSRC) [2], expertise in both Human Computer Interaction and Digital Art combined to support residency projects. The starting point was to ascertain what the artists' needs and expectations were, not only in terms of the technology required, but also access to the skills and knowledge of other experts. Artists were identified from the respondents to a survey and were invited to a workshop to discuss requirements with prospective support staff and researchers. The idea was to conduct a series of artist residencies for which expenses were allocated in the manner typical of artist bursaries. In addition, each artist was made a visiting fellow to enable them to continue their work for one year after the residency itself was completed. It was particularly important that artists were prepared to participate in the research actively. This involved recording events as they happened in field diaries and discussing the work during their time in residence and during the post residency fellowship period.

We are now just half way through the project and have learnt much already that has made us re-examine some of our initial assumptions. The ideas that led the practice-based research approach, along with first hand accounts by the artists themselves can be found in a new book, *Explorations in Art and Technology* [3]. To give a flavour of the projects, two examples by artists Mike Quantrill and Anthony Padgett are shown next.

### **Drawing with a SoftBoard**

The *Soft-Board* is a whiteboard that connected to a computer and is designed to support business meetings. The whiteboard is similar to any conventional whiteboard except it has a laser matrix across its area. The matrix enables pen and position data to be transmitted to the computer. The Soft-Board does not use an input device, such as a graphics tablet or mouse and therefore, complete freedom of movement is possible for the artist. This freedom allows the work to evolve in a way that overcomes some of the usual constraints usually associated with electronic media and the need to make allowances for them. A number of artists have deployed the Soft-Board for different artistic purposes

**Figure 1: COSTART Project Mike Quantrill working with the 'SoftBoard'**

### **Interaction and the Sensor System**

The Sensor System consists of an array of infrared position sensors located in a physical space and connected to a computer. A display is projected onto a screen on one side of the grid and a sound system is connected. People moving in the space do not have to be conscious of the connection to a computer. They can move about freely and as they do, the computer transforms the movement into visual representations that are projected onto the large screen.

### **Figure 2: COSTART Project: Anthony Padgett and the Sensor System**

## **3. Observations about Co-Creation in Art + Digital Technology**

“The main support I observe artists needing is that of people support. It is not enough to have systems that artists can use, they need real contact with people who understand the technologies and that can effectively communicate with the artists. These people would be more than technicians. For the best results they would need to be sympathetic to the artists concerns and not just interested in solving technical problems”. [4]

Learning new skills and techniques is an important facilitator of creative practice. If the artist does not have the skills, the role of a collaborator is essential. Some artists may want to take full control of the technology because it is pivotal to the way they work whilst for others, a temporary need can be met by a technology expert. However, technologists with little knowledge of art practice do not easily make good collaborators. Artists need collaborators who understand their need to exercise control for themselves. Working through the eyes and hands of the person who provides technical expertise is not right for the core creative activities although it might be acceptable for the more mundane ones.

### ***Support is never enough***

The first major lesson that came out of the first residencies was to do with the concept of “support” itself. In responding to the demand from artists for technological facilities and expertise, the preparation for the residencies concentrated on two things:

1. the technology itself: that is, the required software packages and hardware devices needed to carry out the artist’s project and
2. people with the technical knowledge to enable the use of that technology.

For the technology, we had an established base of “high-end” computing equipment, network facilities and a repertoire of office and drawing software as well as specialised packages for 3-D modelling and a position sensing system. Where a specific piece of technology was needed, that was acquired for the purpose of the residency project. Whilst a number of the artists had well developed skills in the use of some technology, because the projects were set up with a view to exploring *new* digital forms, we anticipated the need for help from experts in the more advanced technology.

For the technical knowledge, we established a network of willing experts inside the university. We envisioned artists driving the projects and technical people supporting the process in response to their requirements. This did happen, of course, and the programmers in particular, found their skills in 24 hour demand for the duration of the residencies. The support provided was, in fact, never really enough but there was no doubt that the artists appreciated the time and commitment that was given. That said, having access to support for specific activities such as programming or digital video editing, was only part of the story from the artists’ point of view.

### ***From Assistant to Partner***

One of the interesting things we observed was how much further the artists themselves wanted to extend the supportive relationship of their “assistants”. A significant number were looking for more than technical know how but rather were seeking a *partner* for an artistic exploration. For that to work, the assistants needed to engage more actively in the creative process and to resist imposing a standard technical solution. Likewise, the artists needed to be more open about their intentions and to be prepared to reveal tentative ideas that would normally remain hidden until they reached a more mature state.

### **Figure 3 about here: COSTART: Esther Rolinson and Mike Quantrell**

For a large part of the time spent in the lab/studio, the collaborators discussed their work in pairs whilst seeking out more private spaces for individual tasks such as programming or shooting video clips. A pattern of regular, planned contact rather than intermittent, chance meetings seemed to indicate a more productive collaboration style.

### **Figure 4 about here: COSTART: Joan Ashworth and Manumaya Uniyal**

## **4. Success Factors for Co-Creativity**

The COSTART residencies identified several issues about the nature of art-technology co-creativity, in particular, that the artist is likely to be seeking more than access to technology and the supporting expertise. Being able to develop a partnership, as distinct from having an “assistant” relationship, was a significant plus for the success of collaboration between artists and technologist.

### ***Complementary Interests for Mutual Benefit***

In a true partnership, complementary interests exist even where the outcomes by each individual may differ. Indeed, one of the most successful ongoing partnerships operates in such a way as to serve convergent interests but, at the same time, produces quite distinct artistic outcomes. In this way, the partners are able to achieve mutual benefit but, at the same time, retain ownership of their individual achievements. To be able to enjoy such mutual benefit, requires the relinquishing of individual control of the creative process: having differential but complementary roles appears to be best suited to achieving that end. Having a respect for differences in methods is also important to a successful partnership. The trick is for the people concerned to identify in what way their differences in approach can benefit one another and, by contrast, when they do not really matter in the larger scale of events.

### ***Art Versus Technology Lead***

Where the partnership is perceived as *art-led* by both parties, this leads to a better relationship. The *technology-led* situation, on the other hand, may have the effect of placing the non-technologist at a disadvantage both in terms of control of the creative process and the eventual outcomes—the art forms. If the implications of adopting a particular technology solution are not fully understood by the artist, then it may not be possible to steer the direction of the work to suit, resulting in a loss of artistic control. For the technologist, the disadvantage of an art-led situation lies in a lack of ownership of the project. This may occur even as they are providing critical input to the process through such contributions as (say) programming design. Where the relationship is of the assistant type, it is more productive if the artist explicitly acknowledges the value of the technologist’s contribution and actively tries to learn from it.

### ***Sharing Knowledge***

An effective working relationship exists where both parties exchange knowledge resources in order to progress the work and resolve difficulties of both a technical and artistic nature. The sharing of knowledge is an important facilitator of creative collaboration. It also depends upon the parties having complementary skills rather than at the same level. A partnership that aims to be self-sufficient must also know its limits and be willing to carry out the necessary research when the knowledge is insufficient. Indeed, self-sufficiency in technical know-how, or at least the quest for it through research, can be in itself a stimulus to creative thought. Being able to learn through knowledge sharing is beneficial and it particularly applies where a having direct contact with a new way of thinking stimulates the generation of options. In one such case, as the process of programming became clearer, the artist was able to understand more fully the basic logic. This enabled her to consider more carefully her options and how the aesthetics of the piece could operate.

### ***Communication Skills***

Naturally the ability to communicate well with others is an important part of the collaboration process but art-technology collaborations have particular problems. For successful partnerships, the being able to have a longer-term relationship during which trust and confidence can be built up, has real advantage. A communication barrier may manifest itself in a whole variety of different situations, bringing with it frustrations and problems. For example, a high degree of openness and flexibility and a willingness to engage fully facilitates the partnership whereas a lack of flexibility may indicate that there are unspoken differences about the way the project is developing. Difficulty with the language of communication sometimes reflected a different way of thinking about the problem in hand and how to go about solving it. Developing a common language (particularly when discussing technical issues) that both parties can understand and work with is essential if anything useful is to be achieved. Where an “assistant” style of collaboration operated, there was more difficulty in finding a shared vocabulary.

## **5. Successful Collaboration Can Be Learnt**

It follows from all this that learning *how* to collaborate successfully is very important and cannot be assumed to be a natural to everyone. Of course, we can facilitate it by making the conditions suitable but we need to be more aware of the critical human issues at play. For media centres and any organisations wishing to promote collaborative creativity, there needs to be more attention to developing learning strategies for successful collaboration.

Based upon the experience of this research, some key requirements for sound and productive partnerships are:

- Devise a shared language and foster its development
- Develop a common understanding of the specific artistic intentions and vision
- Engage in intensive discussions and “what if?” sessions
- Give time to establish the relationship and to recover from misunderstandings

Artists need:

- a network of resources for a broad range of requirements and approaches
- access to high end facilities and tailorable digital systems
- access to appropriate human expertise that is communicated well
- an ability to reflect and learn from technologists

Technologists need:

- good communication skills as well as technical skills
- an ability to *listen* and learn from listening
- an ability to suppress the urge to promote a course of action that is technically feasible but not artistically valid

Understanding how good partnerships work is very important, as is providing the means for sustainable relationships. A number of artists have continued their association with the C&CRS and new people have joined. To be successful over time, creative partnerships needed appropriate organisational support. An environment that supports co-creativity involves much more than the choice of which technologies and technical skills are needed, vital though that remains. Fostering co-creativity through sustainable partnerships is a key requirement for successful art + technology collaboration.

## Notes and References

1. Harold Cohen, A Self-Defining Game for One Player, Leonardo Journal: Special Section on Creativity and Cognition, Volume 35, No 1, February 2002.
2. Information about Creativity and Cognition Research Studios, Loughborough, UK and the COSTART project may be found on the Web at [www.creativityandcognition.com](http://www.creativityandcognition.com).
3. Linda Candy and Ernest Edmonds: Intersection and Correspondence: Explorations in Art and Technology, Springer, 2002.
4. Michael Quantrill, Integrating Computers as Explorers in Art Practice, In Intersection and Correspondence: Explorations in Art and Technology, L.Candy and E.A.Edmonds, Springer, 2002,

## About the Author

Dr. Linda Candy is Senior Research Fellow at Loughborough University in the Department of Computer Science. She has considerable experience in research into creative uses of computers over the last fifteen years and is currently principal researcher for the EPSRC project: 'Studies of Computer Support for Creative Work: Artists and Technologists in Collaboration'. Her main research areas include creativity research, interaction design and methods for usability evaluation. She has published widely on these topics. She is Co-Chair of the International Symposium on Creativity and Cognition sponsored by the ACM Special Interest Group on Computer Human Interaction and also is Co-Chair of the 3<sup>rd</sup> International Conference on Strategic Knowledge and Concept Formation. She has been invited to present her work in Europe, Japan, Australia and the USA.