FLWR PWR – Tending the Walled Garden

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< Imagine a garden of dream flowers, powered by duracell, made of abandoned Starbucks coffee cups, styrofoam cubes cut from the latest iMac packing materials, a brain made in Italy, a blossom made by 1/2 Tod 1/2 Bot. The flowers glow with an eerie pulsating glow, sending secret missives across a darkened room. Some flowers horde their individuality, resisting attempts to transform, to change. Others broadcast their distinctive natures broadly, encouraging nearby flowers to go with them, to be like them. Still others promiscuously adopt the patterns of others, reproducing, syncing, connecting. They live, they die. The garden flourishes, it declines.>

Introduction

Web 2.0 technologies offer us enhanced ways to interact and share information, to collate and collect perspectives, and to receive feedback on ideas and creative work. The expectations associated with these socio-technical networks are vast but there are potential issues as well. The plan for the 'flwr pwr' workshop was to create a series of shared construction exercises that could facilitate and inform discussions around 'walled gardens' and provide some common ground for thinking through the social issues involved. We call this technique 'critical making' as a way of drawing connections between thinking and conceptualization on critical social issues and shared practices of material construction.

The 'flwr pwr' critical making scenario involved the construction of a physical type of cellular automata. Using pre-assembled and coded components, workshop participants constructed simple electronic agents called 'flwrs' that 'talk' to one another using infrared light patterns. They can be programmed in various ways – to be more open or more closed, more aggressive or more sharing. These behaviors effect each agent's individual survival as well as the survival of the network as a whole.

Configuring the agents to communicate with each other in various ways serves as a method for linking and expressing various perspectives on information and networks. The agents (and the network itself) thus become a kind of boundary object (Star and Griesemer, 1999) that facilitates exchange and sharing across disciplinary boundaries as well as being a mode of engagement that explicitly connects technical work and social analysis.

The objectives of the workshop were to use the flwrs, the shared experience of making, configuring, and reconfiguring them, and the interactions we observed between them to explore the themes of the conference. Of particular interest to us was to think through some of the structural characteristics of network technologies and the possibility of individual agency and emergence within them. In order to cast light on these issues we adopted various concepts from critical literature on information and social organization and made metaphoric linkages between these concepts and particular configurations of the flwrs. More abstractly, the workshop was intended to explore some of the limits of abstract notions of 'network' and the ways this notion tends to pre-suppose discrete, homogenous, equal agents working within a space of pure and perfect communication.

It is important to note at the onset that the flwrs were not intended to be a simulation but rather a metaphor for the structures and relations of network technologies and walled gardens. Building and configuring them to communicate with each other in various ways served as a mode of engagement with the themes and issues raised in the conference. In the sections below we first provide more information about critical making, describe the flwr project in more detail, and end with some reflections on the challenges of this kind of experimental process.

Critical making

At a meta-level, Critical Making aims to focus attention of the ways in which materially-engaged activities provide cognitive resources for thinking through complex individual, social, and societal issues. In other words, critical making is an elision of two typically disconnected mode of engagement in the world – 'critical thinking', often considered as abstract, explicit, linguistically-based, internal and cognitively individualistic; and 'making', typically understood as material, tacit, embodied, external and community-oriented.

A critical making project involves three iterative stages. It begins with the review of relevant literature and compilation of useful concepts and theories. This is mined for specific ideas that can be metaphorically 'mapped' to material prototypes, and explored in the following stages. Next, groups of scholars, students, and/or stakeholders jointly design and build technical prototypes. Rather than being purposive or fully functional devices, prototype development is used to extend knowledge and skills in relevant technical areas as well as to provide the means for conceptual exploration. Finally, an iterative process of reconfiguration, conversation, and reflection begins. This process involves wrestling with the technical prototypes, exploring the various configurations and alternative possibilities, and using them to express, critique, and/or extend relevant concepts, theories, and models.

With its emphasis on critique and expression rather than technical sophistication and function, critical making has much in common with conceptual art and design practice, particularly in the tradition of critical design (Dunne, 1999.) However, it differs from these practices in its focus on the constructive process and explicit connections to specific scholarly literature. Critical making emphasizes the shared acts of making rather than the evocative object. The final prototypes are not intended to be displayed and to speak for themselves. Instead, they are considered a means to an end, and achieve value though the act of shared construction, joint conversation and reflection. Therefore, while critical making organizes its efforts around the making of material objects, devices themselves are not the ultimate goal. Instead, through the sharing of results and an ongoing critical analysis of materials, designs, constraints and outcomes, participants in critical making exercises together perform a practice-based engagement with pragmatic and theoretical issues. Our sense is that this method can be particularly useful around 'wicked problems' (Rittel & Webber, 1973; Coyne, 2005) – issues in which no consensus exists around defining the problem or potential solutions. Using a shared process of making as a common space for experimentation encourages the development of a collective frame while allowing disciplinary and epistemic differences to be both highlighted and hopefully overcome.

Exercise: tending the Walled Garden

During the two days of the 'flwr pwr' workshop, participants built electronic flowers using pre-assembled electronic components and craft materials (paper cups, styrofoam, cardboard, etc.). These flowers 'talk' to one another using infrared light patterns and, in doing so, gain and expend energy. They are programmed in various ways – to be more open or more closed, more aggressive or more sharing – which has an effect on each flower's own individual survival as well as the survival of the garden as a whole. In addition to resulting in an interesting visual display, the project opens and informs discussions relevant to the topic of 'walled garden'. Flwrs, unlike flowers, live and thrive through the exchange of numerical patterns.

Left by itself, a single flwr will only live for a short period of time, but if set within a garden of other flwrs, the constant exchange of patterns will let them all continue to blossom for a much longer period of time.

The project began before the conference with a review of social science literature. The organizers had defined the 'walled garden' as the organizing metaphor for the conference. We found this idea to be particularly evocative. Images of an increasingly 'walled-off' Internet with small enclaves of gated online communities parsing out tightly controlled bits of information made us think about information exchange and communication as highly relevant. We therefore wanted to explore notions of exchange, information value, difference, and boundaries. From a general literature review we drew three specific concepts we felt gave us and the workshop attendees some purchase. These were the idea of an information 'gift economy' (Mauss, 1925; Kollock, 1998), the notion of 'Information Commons' (Hardin, 1979; Benkler, 2003), and the concept of information 'neighborhoods' (Jacobs, 1961). This literature served to guide our development of the project hardware and software as well as serving as conceptual resources for defining social behaviors in regards to information exchange and deeping our thinking during the making process.

During this pre-conference phase, we were also carrying out technical development on the flwrs themselves. We decided to use arduino microcontrollers as the 'base' for the flwr agents, given their open hardware nature, the large base of existing code, and open community of co-developers. We leveraged existing work on using infrared receivers and transmitters with the arduino (see below for links) and extended this work to develop a more complex communications protocol. We also hand-soldered a component wiring harness which would allow the workshop participants to quickly construct their own flwr by creating a custom enclosure and plugging the harness into an arduino. The software, while complex, was coded to be easily reconfigured by participants. The section (reproduced below) included variables that could be redefined to control how the flwr behaved.

```
//-------------------------------------------------------
// The following are things participants might change

int g_ListenMSecs =1000; // Number of milliseconds during
                            which to listen for patterns from
                            other flowers
int g_TransmitTimes = 5;  // Number of times current pattern
                            will be transmitted per listen phase
int g_DelayMSecs = 100; //   Number of milliseconds to wait
                            between listen/transmission
```


FLWR PWR
Final presentation

```
int g_MyPattern = 17;              // STARTING pattern number
                                      to display (number between
                                      0 and 18)

int g_CurrentEnergyLevel = 1000;   // STARTING energy
                                      level. (When it reaches
                                      0, you die.)
int g_EnergyCostPerLoop = 2;       // Cost of living.
int g_EnergyCostPerTransmission = 10; // Cost of talking.
int g_EnergyGainPerMsgReceived = 1; // Benefit of listening.
int g_EnergyGainPerMsgAffectedBy = 8;  // Benefit of active
                                          listening.

// Specify the way to modify my pattern when I receive another
pattern
// Uncomment only one line in the following function.
void combinePats(int rcvdPattern)
{
   //g_MyPattern  ^=  rcvdPattern;   // bitwise XOR (~add)
                                       the patterns
  return combinePats_GiftEconomy(rcvdPattern);
   //return combinePats_InfoCommons(rcvdPattern);
   //return combinePats_InfoNeighborhood(rcvdPattern);
} // combinePats()

-----------------------------------------------------------
```

The hardware for each flwr includes an arduino and three other components; a blinkM programmable RGB LED for a 'blossom', and an IR LED transmitter and IR receiver to send and receive patterns (metaphorically, 'pollen'). Each flwr starts with a certain amount of energy (a state variable not linked to battery life) and when it reaches zero the flwr dies. While it is alive, it constrantly shows its pattern with a series of color changes and fades displayed on the BlinkM LED. Living costs a small amount of energy in regular installments, sending a pattern costs a bit more. Receiving patterns from other flwrs gives the flwr energy. A flwr's life consists of a constant repetition of listening for other patterns for a certain amount of time and then transmitting a certain number of times. When a pattern from another flwr is received then, depending on how the flwr is configured, a variety of responses occur:

– Gift Economy: If the flwr is configured to (metaphorically) participate in a gift economy, then any pattern received from another flwr is accepted and the receiving flwr begins to broadcast this new pattern; additionally, its energy is incremented. In this setup, all exchanges provide more energy – exchange itself, no matter what its 'content' is valued.

– Information Commons: If this flwr is configured to (metaphorically) participate in an information commons, then as in a gift economy, it will accept and broadcast the patterns it receives, but its energy is incremented only when it receives a pattern that it currently does not hold. Unlike the gift economy setup, here only difference, e.g. information, has value.

– Information Neighborhoods: If this flwr is configured to (metaphorically) participate in an information neighborhood, then it remembers (at most) the 4 most recent patterns it has received, and its energy is incremented only when it receives a pattern that it is not in this set. The idea behind this setup was that in order for the garden to survive, patterns must pass across the network as a whole.

Finally, we wanted to be able to incorporate the notion of 'walled gardens' within the flwr system. We did this by making it possible to define some flwrs as being inside the garden and others as outside. Flwrs inside the garden could receive and use patterns from flwrs both inside and outside of the garden, while flwrs outside could only receive and use patterns from other flwrs that were outside. We likened this to how many protected Web 2.0 sites function. For example, Facebook is able to link outside of its own closed network to other sites on the Internet and thereby receive value from the Internet as a whole, but other sites on the Internet are not able to link into Facebook.

What happened

We started the first session of the workshop with some short explanations of the project, its goals, and the technical characteristics of the arduino platform and the flwrs themselves. Following some discussion, the participants began to install requisite software and to use available craft materials to construct their individual flwrs. Despite the differing levels of existing technical knowledge among participants, everyone seemed to quickly engage in the activity and, despite some initial discomfort, were able to develop their own flwr. Some participants at this point remarked that they were surprised how simple it was to use the pre-made components to create their own unique object. Others, however, questioned the point of the project as a whole and desired more explicit instruction.

Point #1 –

It remains an open question for us as to how much explication is necessary for a project like this. We feel that the level of technical support (e.g. the pre-made components) worked well. However, it does seem like a longer and more explicit conversation about the relevant literature, ideas, theories, and issues being raised should proceed technical work. However, at the same time, we are not sure how much should be pre-defined – how much definition is

necessary to make sure participants feel comfortable with the structure of the event and have critical theoretical resources for discussion, without overly influencing and structuring the agency of individual participants. Since the goal of this event was to think about walled gardens in emergent, unexpected ways, it was important to leave room for new and transformative possibilities.

As the session progressed, we began to configure and reconfigure the flwrs to participate in an overall 'garden'. We first experimented with the flwrs configured to participate in what we termed a 'gift economy' – every pattern that a flwr received and adopted gave it increased 'energy' and longer life. Here participants tried setting their flwrs to survive while also ensuring the survival of the garden as a whole. During this part we discussed the value of reciprocal exchange – everyone has to give in order to survive for the long time, and the dependency of each individual on the reciprocity of the others. We also discovered an unexpected (by us) aspect of flwr behavior – within a few minutes all flwrs adopted the same pattern and the garden became homogenous.

We next tried configuring the flwrs as metaphorically within an 'information commons'. In this configuration, the flwrs could only receive value from patterns they did not currently hold. This drove us to try and maintain difference in the garden as long as possible, since with this configuration, flwrs and the garden quickly dies when all flwr patterns become homogenous. We also discovered the problems of sending too much information – if one or more of the flwrs broadcast their patterns too often, they could saturate the environment and cause no patterns – including their own – to get through.

With both configurations the flwrs tend towards the homogenization of patterns and resisting this proved difficult. However, we did discover that when we configured two or three of the flwrs inside the walled garden with the rest outside, flwrs did not quickly adopt the same patterns and the garden could achieve a kind of dynamic heterogeneity. A conversation ensued about why this might be and we began to discuss the well-known english proverb, 'good fences make good neighbors'. For the first time, we started thinking about the value of walled gardens, rather than just the issues associated with them.

Point #2 –

The discovery that heterogeneity in the patterns was only achieved by configuring the flwrs as inside and outside a wall was an unexpected outcome that transformed our thinking and our discussion on 'walled gardens'. This demonstrates the value of this approach, but also points to a challenge – how to explain this discovery to others without them over-legitimizing our insights. The danger here is that others who have not participated in the project would think we had created a social simulation that 'tested' the notion of walled gardens and thereby 'proved' their value. We address this and other challenges below.

Challenge #1: Balancing technical sophistication and ease of use, problem of tech 'capture'

An important challenge was to create an apparatus or toolkit that allowed participants of various skill levels to become quickly productive – to start exploring and analyzing the critical issues of the walled garden theme – without getting either a) too wrapped up and attached to the technical issues and problems to be solved (e.g., the technical experts, technophiles), or b) discouraged or bored by the need to address arcane technical issues (e.g., the technical novices, technophobes). Equally, we decided the flwr system needed to foster a sense of ownership in the flwr agents. This need was based on our assumption that substantive investment in the flwrs, generated through an involved craft process (hands-on material work), would result in a sense of care and desire to understand the behavior of 'my' flwr in addition to an interest in exploring the behavior of the garden as a whole. Our sense is that this balancing act was successful in the flwr project.

Challenge #2: Modeling vs. conceptual elaboration, misapplication of 'results'

A risk to be avoided was a misunderstanding of what we could conclude from the outcomes in the garden in various configurations. It is very tempting in such cases to interpret what happens as either a *model or simulation* of a theory. For example, if the participants were to use the information commons code for combining patterns described above, and if all of the flwrs died immediately, some might be tempted to conclude that information commons are 'bad' or not compatible with walled gardens. Yet, that was not the purpose of these critical making exercises. Instead, they were intended to support *conceptual elaboration*. We believe that the investment in the making and programming of the flwrs by participants, important for reasons described above, is also important for mitigating these risks as well. The engagement with the flwr at several levels of abstraction supports deeper insights by the maker into the extent to which the behavior, life and death of both the flwr and garden could be validly related to the conceptual and theoretical issues being explored, and where such connections might be more tenuous or unwarranted, hopefully preventing forms of overgeneralization common to naïve 'modeling'.

Conclusions

Overall, we found the experience to be enlightening in regard to social networks and walled gardens and extremely encourag-

ing in regards to the value of critical making. We would like to especially thank the workshop participants for their investment and dedication and the enlightening and productive discussions that characterized our interactions. We would also like to thank Virtueel Platform and specifically Annet Dekker and Annette Wolfsberger for their support of the project.

References:

Link to details on FLWR PWR and critical making
http://www.criticalmaking.com

Arduino
http://www.arduino.cc

Arduino and Infrared
http://www.arduino.cc/playground/Code/InfraredReceivers
http://www.5volt.eu/archives/14
http://www.instructables.com/id/SLEX4JEF6B7T1V2/

BlinkM
http://thingm.com/products/blinkm

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'Design could be about designing for social friction, but there is also a need to think about the next steps – friction or disobedience alone proves unproductive.'

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ACKNOWLEDGEMENTS

We would like to thank all the authors for their contribution to this book and the Walled Garden reporters and participants for their input:

PARTICIPANTS:
Emmy Alim
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Željko Blaće
Erik Borra
Maarten Brinkerink
Denis Burke
Marieke van Dijk
Janine Dijkmeijer
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Maximillian von Duerckheim
Lucas Evers
Sofia Felix
Andrea Fiore
Lorna Goulden
Thomas Gray
Timothée Guicherd
Yolande Harris
Erik Hekman
Menno Heling
Anne Helmond
Liesbeth Huybrechts
Kirsten Krans
Frank Kresin
Corinne Kruger
Walter Langelaar
Maaike Lauwaert
Rogério Lira
Theo Mereboer
Bouke Mekel
Nicola Mullenger
Tom Oosterhuis
René Paré
Nuska Peszke Dako
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Patrice Riemens
Tom Schofield
Joseph Scully
Karina Smrkovsky
Iskander Smit
Floor van Spaendonck
Auke Touwslager
Boudijn H. Uythof
Danja Vasiliev
Laura van der Vlies
Marijn de Vries Hoogerwerff
Esther Weltevrede
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This book was made possible with the support of the Netherlands Ministry of Education, Culture and Science.

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Annet Dekker
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COPY EDITING
Cathy Brickwood

IMAGE EDITING
Niels Kerssens

DESIGN
Novak, Amsterdam

PRINTING
Lecturis, Eindhoven

VIRTUEEL PLATFORM
2009