Art and Technology Incubation
for Technology Creatives in the Northwest:
A Questionnaire Study

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ABSTRACT

The Pacific Northwest is home to a highly innovative, creative, and entrepreneurial community with unique requirements for educational resources, collaboration opportunities, and work and living spaces. In order to better understand this community of *technology creatives* at the intersection of art and technology we distributed a questionnaire, requesting information about current creative uses of technology, existing studio and work spaces, and preferences and needs to advance creative goals. We found that this community is largely comprised of individuals who had careers in technology, but were pursuing artistic interests. They were particularly interested in knowledge sharing and collaborative opportunities, with many expressing an interest in shared or membership based incubation spaces for access to other people. They reported that time was more a constraint than financial limitations. Based on our study results, we provide recommendations for the development of resources in the Pacific Northwest to help meet these needs.

Author Keywords

art, technology, creatives, creative class, Dorkbot, BRINC, Pacific Northwest, Seattle

INTRODUCTION

The Pacific Northwest is home a highly innovative, creative, and entrepreneurial community.   Seattle's long been known as providing rich soil for the *creative class*. In 2001, when Richard Florida wrote the book "The Rise of the Creative Class [2]" Seattle ranked fifth in the United States according to the Creativity Index, having 33% creative workers, and ranking third in the high tech dimension.   More recently, in 2007 EnterpriseSeattle produced a report [3] that showed that Seattle ranked 5rd in density of high-tech professionals and 3rd in density of interactive media professionals (in the US).

The talent base of developers and multimedia artists in the region is a key attraction for interactive media companies to set up shop in the Pacific Northwest. They found that relative to other metropolitarian areas in the United States, Seattle ranked 4th (at 2.4%) in its concentration of programmers and engineers, and 3rd (at 5.6%) in its concentration of multimedia artists.

This community is comprised of individuals from many disciplines employing digital, interactive, social, mobile and gaming technologies -- inventing new products, creating new art forms, exploring new narrative and curatorial platforms, and leveraging expansive social networks.   As noted by Florida, members of the *creative class* seeks out living environments that both please their creative aesthetic and provide resources for creative expression.   In other words, both the individual members of the creative class, and the surrounding economic infrastructure, benefit from enriching creative and cultural opportunities for this type of individual.

In the context of these regions of highly technical creative professionals, we have observed there's a new kind of Do It Yourself (DIY) ethic and creative aesthetic that's having a substantial impact on emerging trends in new media art. The open source culture in particular, with its emphasis on creating and sharing intellectual property, has fostered the rapid evolution and proliferation of new technologies that have meaningfully infiltrated the art world.   One such technology is the Arduino []: an easy to use, modular micro controller that allows computers to sense and respond to the real word.   In other words, inventors, makers, and geeky artists are experimenting with computers, the Internet, and electronics in their studio, and freely sharing their knowledge with each other through sites like Instructables.com Make Magazine [], or through organizations like Dorkbot Seattle [] or independent groups like the Hackerbot Lab []. As a consequence, technology has evolved as a sophisticated, yet affordable, medium for artistic expression, as much a part of the arsenal of tools available to artists as oil paints or metal. More than that, it is turning technologists into artists as they use their technical skills for creative expression.

In order to explore ways to improve resources for people working at the convergence of art, technology, and community, BRINC (Bel-Red Incubator) and Seattle's Dorkbot collaborated to develop and distribute a questionnaire. This questionnaire was designed to obtain

an overview of the educational, housing and work needs of *technologies creatives* currently living and/or working in the Puget Sound area (Seattle, Bellevue, and surrounding Eastside neighborhoods) who would be interested in future educational, networking, art studio, lab or live/work space opportunities.

We hope to convey through our study results that the creative technologist has unique resource requirements relative other types of creative individuals. We asked a number of questions not only exploring specific educational and space requirements, but we also asked questions focused on collaboration requirements. These questions were inspired by recent research [1, 5] showing that contrary to the stereotype of the isolated genius, much of innovation occurs in social and collaborative environments, rather than when working in isolation.

More about BRINC
Bellevue's redevelopment plan for the Bel-Red Corridor is rich with pioneering opportunities -- the perfect frontier for creative and entrepreneurial industry settlements. BRINC, the Bel-Red Incubator, is a proposed innovation-focused, arts/technology incubator that will include live/work lofts, shared lab/studio facilities.

More about Dorkbot
Seattle's Dorkbot is a group of artists, technologists, and scientists who get together for monthly meetings to share knowledge and collaborate. Dorkbot is an informal, grass-roots organization with over ninety-five chapters around the world. Seattle's Dorkbot is comprised of about six hundred active participants. Between fifty and a hundred people come to each meeting, which consists of presentations, workshops, and discussions. In addition we have a biannual art exhibit called "People Doing Strange Things with Electricity". The two most recent art exhibits were hosted at 911 Media Arts Center []. This summer, in conjunction with the art exhibit, we are hosting a one day conference called "Frayed Wire" [] in collaboration with 911 Media Arts Center and Youngstown Cultural Arts Center [].

As group, we are eager to explore ways to improve collaboration and knowledge exchange through incubation spaces, educational programs, and online resources.

QUESTIONNAIRE
The questionnaire asked participants a series of questions about demographic information, creative uses of technology, studio/work space, current living situation, participation in the arts/technology communities of the Pacific NW, and preferences and needs for work and living space. The questionnaire took about fifteen minutes to complete.

We posted the questionnaire online via QuestionPro [], and then distributed a link to it through emails to distribution lists, with the following call for participation:

*"Are you an arts/tech creative? Have an impact on arts/tech incubation in the NW. BRINC (Bel-Red Incubator) and Seattle's Dorkbot are joining forces to explore ways to create and improve local resources for interdisciplinary artists, designers, technologists and other hybrid thinkers working at the convergence of art, technology, and community. **Now is your chance to have an impact, and tell us about your creative needs.** If you live in the Pacific Northwest and if you use technology as a creative medium in your projects[1] please complete the following survey."*

As an incentive, and in appreciation for their contribution, we added the names of participants to a sweepstakes for a chance to win a POM POM wall dimmer [] by local arts/tech artist Maggie Orth []. For the sweepstakes we collected name information on a separate page to preserve respondent anonymity.

Mailing lists for the questionnaire distribution included Dorkbot Seattle's announce list, participants in the Salon de Technologie et Creativite [], Seattle Tech Startup [], BCWA (Northwest Burning Man community, which has a large arts/technology contingent), DXARTS [] students, Kelly Lyle's art list [], and 911 Media Arts Center mailing list [].

RESULTS

Respondents' Demographic Profile
120 respondents completed the questionnaire, 75% male, and 24% female, with an average age of 38.9 years. This is a highly educated group, with 97% having at least some college -- 55% having a Bachelor's degree, 22% a Master's degree, and 3% a Doctorate.

They are also a well-paid group. 85% had a household income of 30k or more, with 13.5% between 30k-50k, 19% between 50k-75k, 20% between 75k-100k, and 34% with more than 100k.

When asked to characterize their work situation, 28% said they worked at a company and intended to say, 19% said they worked at a company but wanted to start their own business, and 33% said they had their own business. A few
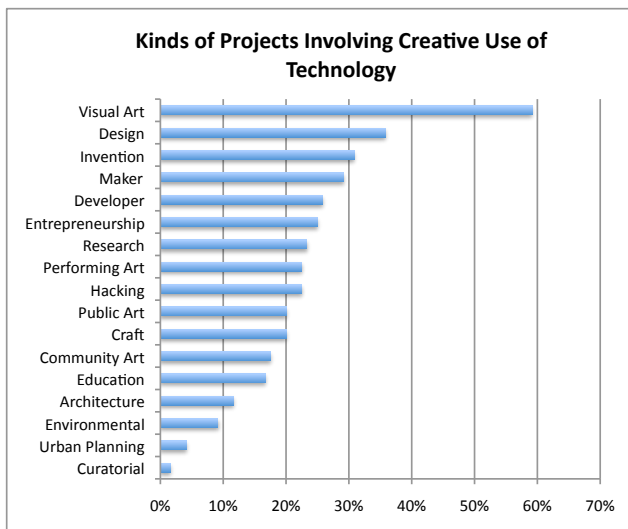
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[1] We noted in a footnote: "*Mediums and genres may include: digital art, film, video, electronics, software, internet, social media, painting, sculpture, performance, site specific temporal works, photography, microcontrollers, sensors, lighting, kinetic sculptures, RFID, projectors, 3D modeling, electronic music, design, graphic design, new media, interactive media , multimedia, visualizations, mechatronics, hackery, physical computing, locative arts, geocaching, wayfinding, landscape media, virtual theatre, mobile devices, pervasive games, open-source, mapping, media sharing, social networking, socal networking gaming, digital storytelling, data visualization, interactive design, user experience, architecture, urban design, public art -- to name a few.*"

classified themselves as "other" because they were unemployed, or had a special case such as they worked for a company but had a business on the side. When asked what percent of their income was generated from creative uses of technology, 28% said not at all, and 25% said 0-10%. On the other hand, 18% said 90-100%.

We asked them to indicate more specifically the nature of their primary employment ("how they pay the bills") in an open-ended question. There were a broad range of responses, but as expected a large majority were web developers, web designers, graphic designers, 3D artists, and software engineers.

Creative Uses of Technology

We asked a few questions to better understand the character of their creative uses of technology. We had participants select from a list the kinds of projects they created involving technology. Of those types listed, visual art was the most representative type, followed by design. See Figure 1. Another dominant type however was that of invention and maker. "Maker" is a term popularized by Make Magazine, "the first magazine devoted entirely to DIY technology projects, MAKE Magazine unites, inspires and informs a growing community of resourceful people who undertake amazing projects in their backyards,

Kinds of Projects Involving Creative Use of Technology

Category	Value
Visual Art	60%
Design	36%
Invention	31%
Maker	29%
Developer	26%
Entrepreneurship	25%
Research	23%
Performing Art	22%
Hacking	22%
Public Art	20%
Craft	20%
Community Art	18%
Education	17%
Architecture	11%
Environmental	9%
Urban Planning	4%
Curatorial	2%

basements, and garages. []" After inventors and makers, we see developer, entrepreneurship and research as dominant types. It was clear from our open-ended responses below that "music" was a neglected category of type of project.

Figure 1: Most Common Types of Creative Uses

When asked to "please describe in one or two sentences how you use technology as creative or artistic medium" the responses quite diverse. The best image of this type of person can be gleaned from reading a few of the responses provided here.

"digital media artist, printmaker, painter, create/curate art events that involve technology and community engagement, write and research artists and technology."

"Sometimes you just get an idea for some cool little widget or tool... and I use technology to make those."

"stage performances using edible paper and ink with a printer allowing people to eat themselves. am currently developing a facebook app to allow people to eat their friends. use graphic design and web design in my job. use web to facilitate non-standard narratives/literatures"

"I use computers to create visual and audio art. I do motion graphics, 3D art and electronic music using computers, music synthesizers and whatever I can get my hands on and works for the task."

"I seek to use technology as media. As egg tempera was replaced by oils, so to will current media be replaced by new. I'm working on that."

"I make installations that incorporate light and/or sound to make the viewer/participant aware of their perceptual process in a transcendent way."

"rapid-prototyping technology (CAD + Laser cutter) to create snap-together sculpture"

"Sound art installations, computer vision, data mining, computational linguistics, speech synthesis, databases, sensor networks, electronics, CNC fabrication, custom software...."

"I include technology that impacts identification, such as RFID, to raise issues regarding privacy, identity, and how our sense of self in changing through these forms of technology."

"I use LEDs and/or EL wire on wearable items or displays. I also am interested in interactive art and have created websites and am working on learning to create 'games' with Flash. I create 3D models and have made a couple of mods for Unreal Tournament."

"I use tech daily to create new devices, programs, and techniques at my job and just around the house. I invent things."

"I sketch in various computer oriented mediums as well as traditional mediums, adapt old technology to new uses, as a builder, I use found/cast off objects in collections for new creations. As a sculptor, I use technology to not only design and inform my work, but I also use extremely primitive technology for certain things I do as part of keeping that ancient tech alive (my bronze furnace is charcoal powered based on a theoretical Bronze Age design)."

"I'm an electrical engineer. Through dorkbot, I have been enspired to create art pieces using the electronics with which I am familiar. My projects so far have involved microcontroller - driven multiplexed LED and incandescent displays."

"I use digital and 3D technology to design medium scale multimedia sculpture."

"microblogs such as twitter, looking forward to further similar developments in the way we can tell stories, communicate quickly, simply"

When asked what specialized skills were required to create these project, most responses involved training in software, development, graphic design, electronics, or electrical engineering. Some responses are provided below:

"Advanced Experience/Skills with Photoshop, InDesign, Illustrator, Camera Raw, Macromedia/Adobe Dreamweaver, Flash, Acid Pro, Audacity, Garageband, Final Cut Pro. I teach Photoshop and Dreamweaver. I use computers to create art and corporate brands using all forms for technology amd media."

"Isadora, Max/MSP/Jitter, Quartz Composer, Processing.org, and many, many other programs. Basically, whatever is needed to get past some bloc kade or make/modify any sort of content needed for whatever I'm trying to do/present."

"microcontroller programming, audio editing"

"I use video and sound editing software as well as tinkering together drawing machines from cast-off electronics and toys."

"high power electronics, high voltage, digital electronics, sensors, analog, vacuum tube elecronics, assembly lang., physics, vacuum systems, glassblowing, machine shop, cad fab"

"Basic electronics skills (soldering, simple circuits), xhtml/css/javascript, Flash, Photoshop, Illustrator, 3D Studio Max, Unreal Ed"

Figure 3: Open-Ended Descriptions of Specialized Skills Used to Complete Projects

We later ask what specialized skills people are interested in developing for use in their own creative projects. Responses were quite varied, but trended towards electronics, robotics, LEDs, microcontrollers (the Arduino in particular), working with MIDI, video editing, CNC programming, some software coding, some basic metal working, and woodworking. Again, to give an idea of the range of responses, here are a few:

"learning how to work with lighthing, e.g. LEDs and sensors"

"how to use arduinos, how to play a midi key board. How to use a CNC."

"open source technology seems really important for the NW digital art scene to catch up with Europe, E. Coast US, Canada and S. America on the digital technology and arts front."

"laser modulation as input devices. audio synthesis. temporal control units (closed timelike curve monitoring and execution). ribbon controllers. robots. massive LED arrays and matrices. gravitational repulsion devices. Artificial Intelligence as a user interface concept."

"learn basic electronics, programming, arduino hardware help"

*"welding, machining, intermediate/advanced programming"*

"welding, simple electronics (soldering, LEDS, etc)"

"advanced fiberglass work, arduino 101, lower power usage electronics and networking, HAM Radio projects, location publishing, weather data publishing"

"robotics, coding, wood working, manufacturing"

Figure 4: Open-Ended Descriptions of Specialized Skills People Hoped to Learn

In order to further address what kinds of educational or collaboration opportunities people would be interested in, we asked them to rate level of interest on a scale of 1 to 7 for various types of activities. See figure 5.

Interest in Space, Education, Networking Opportunites
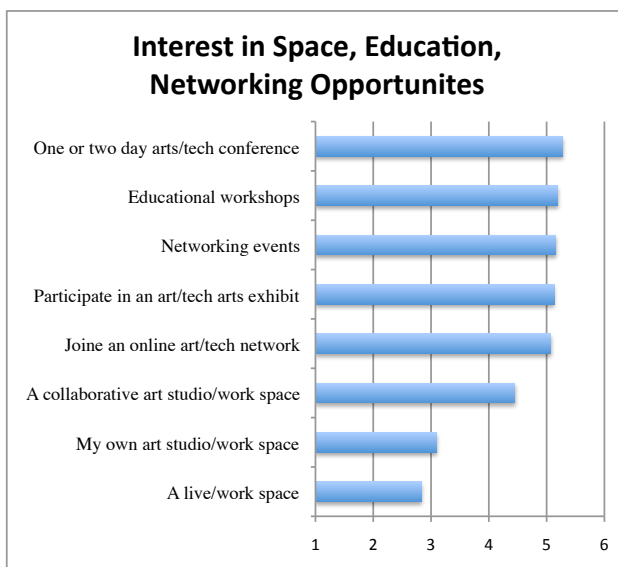
Figure 5: Interest in various opportunities and resources for artists/technologist, on a scale of 1 to 7 where 1 = not at all interested and 7 = extremely interested

Generally, we found that our participants showed a fairly strong interest in a variety of activities including conferences, workshops, networking events, arts exhibits, and an online network. About half our participants were interested in a collaborative work space, with fewer interested in their own art studio or live work space.

Collaboration

We asked a few questions to further explore to what extent people were interested in collaboration opportunities. We first asked to what extent did their projects tend to be solitary or collaborative? 15% said extremely solitary, 41% said somewhat solitary, 33% said somewhat collaborative, and 11% said extremely collaborative. When asked what specialized skills or abilities they sought out in collaborators, most mentioned they seek creative people with other complementary specialized skills, such as:

"Unfettered creative minds, electronics, drafting, sketching, writing"

"varies with project. Usually someone specialized in sound or video more than I am."

A number mentioned seeking others with similar skills:

"Similar skill sets, different specialities."

"other photographers"

A few were technologists seeking more artistic or creative collaborators:

"My artists are the 'brains' behind the technology. They make things that I simply have to 'turn on'"

A couple of people mentioned they were seeking collaborative opportunities but had not found them yet:

So far, I haven't found a collaboration, but I would be interested in doing that. In particular, I would like to provide technical support to an artist.

Whereas others sought collaboration for the sake of collaboration itself:

I rarely do things alone. I look for other people who are interested in any way to contribute in the way they can or want to.

For those who do tend have collaborative projects (N = 65), we asked on average how many people they tended to collaborate with. While the average was 6.3, as can be seen from Figure 6 the majority collaborated with 1 to 5 others. However there were some outlying individuals with extremely large numbers of collaborators.
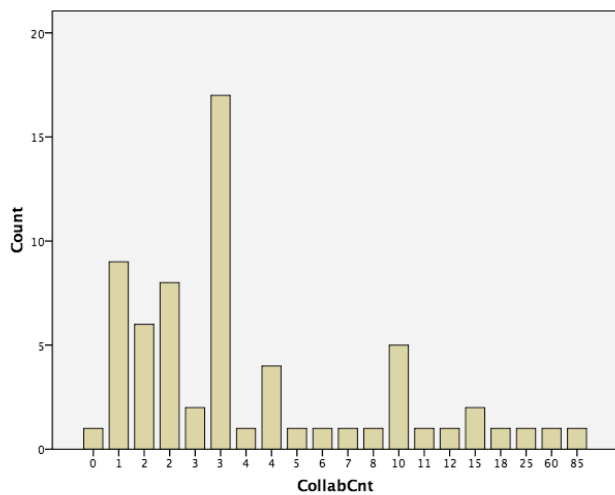

Figure 5: Frequency Distribution of Number of Collaborators on Average

Work Space
We asked a number of questions to develop a better understanding of people's existing and desired work spaces for their creative uses of technology.

We first asked how many square feet people had dedicated to creative projects at home (to give a sense of scale, we noted that a desk would be about 12 square feet, and bedroom would be about 120). 78% of our respondents reported having at least some space, averaging 223 feet each. About 18% had up to a large desk, 50% between half a bedroom up to a large room (50-150), and 30% a much larger space (over 150 square feet).

We then asked if they had regular access to an art studio, lab, or works space outside of their home. 44% said they had no access outside their home. 14% had their own art studio/work space, averaging 298 square feet each. 8% shared a space with a few others, and 10% had a membership in an art studio or work space shared by many people. Of those who did share a space (N = 24), 50% shared with 12 or less. 50% shared space with 20 or more, and they reported on average having access to a shared space of 2432 square feet (50% shared less than 1000, and 50% share more than 1000).

It is important to note discrepancies between what people currently have, and what they would ideally have. Again, we asked people what would be there *ideal* setup for a creative space.
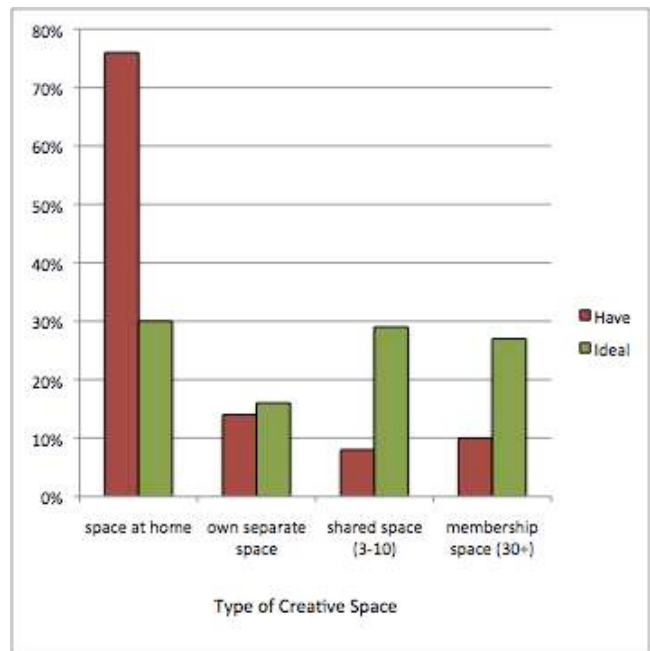

Figure 7: Discrepancy between People's Current Space Situations for Creative Projects, and Ideal Situation

As can be seen from Figure 7, while most people have access to work space at home, they would ideally have more access to shared spaces (29%) or membership spaces (27%) than they currently do. It is interesting to note that there is a *greater* preference for shared and collaborative spaces than for independent work spaces, perhaps because this need is already met through their spaces at home.

When asked how much they would be willing to pay per month for various creative space situations, 31 said they would pay $805 for a live/work space, 33 said they would pay $340 for their own art studio, 51 said they would pay $177 for a shared space (of 3-10 people), and 53 said they would pay $110 for a membership in a large space. (Note respondents were instructed to leave the question blank or write "0" if they were not interested in a type of space. These were not included in the Ns or averages.)

We then asked if they had considered participating in a shared studio or work space for creative projects, how important were various feature to them.

Although we did not find large discrepancies in ratings of various features, the most highly rated feature was specialized tools and machinery, followed closely by access to conversation and dialogue round creative projects. Interestingly, access to conversation and knowledge were

Importance of Features of Shared Space
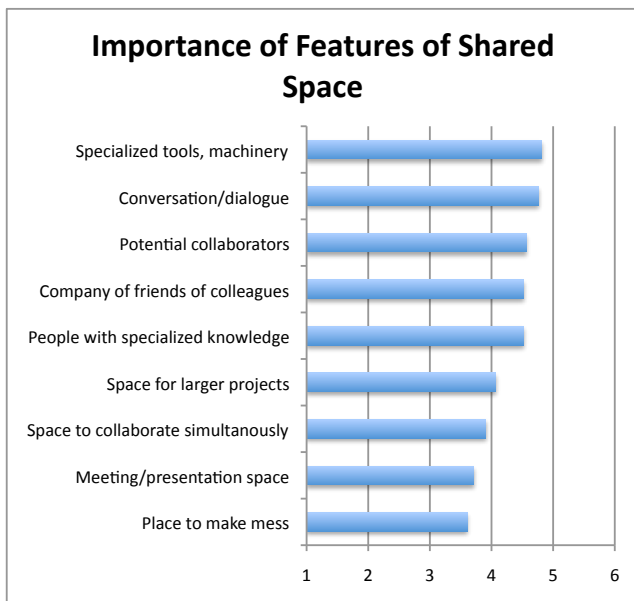
more important than capacity for collaboration within in the space. See Figure 8.

Figure 8: Ratings of Importance of Features of Shared Work Space, Where 1 = Not at All, and 7 = Extremely So

We asked respondents if they currently have or have considered participating in a shared art studio or work space, what specialized tools, materials, or machinery would they like to have access to? Generally, people requested tools and machinery for an electronics station, a metalworking station, a woodworking station, and computers/internet station. The most mentioned machines included a CNC machine (13), a laser cutter (13), milling machine (7), drill press (6), lathe (6), 3D printer (5), and rapid prototyping machine (3). Otherwise people were requesting basic power tools such as drills, saws, soldering iron, and so forth.

Participation in Arts/Technology Communities in the NW

We asked people to indicate what art and or technology community groups or projects they regularly participate in or consider themselves a member to gain a better understanding of the landscape of related groups in the Northwest. Relative to the 27 people who mentioned Dorkbot, the next most common groups were 911 Media Arts Center (9), Ignition Northwest (9), Artist Trust (4), Saturday House (3), Ignite (3), and Seattle Tech Startup (3), MindCamp (2), HackerBot Labs (2).

We also asked people to indicate how they kept up to date with information about their arts/technology community groups or the greater arts/technology culture in the Pacific Northwest. Dorkbot's mailing list (15) and Facebook (15) were mentioned the most, then mailing lists generally (9), local Burning Man group lists (5), BCWA (5), emails (5), The Stranger (3), Kelly Lyles' mailing list (2), blogs (2), Nake Magazine (2), web sites (2), Twitter (2), and newspapers (3). Certainly it is striking to note that people are generally relying on mailing lists for there information, then on Facebook. Blogs and newspapers were mentioned but to a much smaller degree.

Towards the end of the questionnaire, we invited participants to provide any final suggestions for whatever they felt they needed to support their creative efforts, or provide any final comments. A fair number mentioned "I need more time". On a related note, a few mentioned they wanted a better understanding of paths towards funding for projects. A number reiterated the desire for conversation and community:

> "More access to people. More opportunties for discussion"

> "I am quite isolated and would probably benefit by belonging to a group that I truly felt I belonged."

> "a convenient location to where I live that is both hang-out spot and a studio, ideally with class rooms and a gallery."

> "A mentor would be cool, would even be worth money to have a decent mentor. They would have to be very relaxed and easy going."

> "Materials is something that I struggle with- I have big ideas and unfortunately materials cost for electronics components is spendy! Collaboration with larger scale projects would make things like soldering hundreds of tiny components go by MUCH faster."

> "friendly community, knowledge, reference library."

> "Mostly a vibrant community of creative and/or technically inclined people. Grants and organized information/assistance related to funding for research and projects."

> "People to brainstorm collaboratively with, to help generate good creative directions to take project ideas."

> "I think an organization focused on creative uses of technology would be most welcome. We have some good places already, so I think one that takes a modular approach that allows people to select the types of services & facilities

would be ideal. Most importantly I think it should have a strong emphasis on networking of members and other interested people. Word."

CONCLUSIONS

We found that this community is largely comprised of individuals who had careers in technology, but were pursuing creative interests in the domains of visual arts, maker projects, and entrepreneurial projects. The open-ended responses to the questionnaire provide rich image of creative technologists who work in the software industry (software engineers, web designers) but who are actively interested and pursuing projects that incorporate more physical computing: wanting education and access to electronics, metalworking, microcontrollers, prototyping machines, and so forth. They were particularly interested in knowledge sharing, networking, and collaborative opportunities, with many expressing an interest in a shared or membership based incubation spaces for access to other people. Even those who worked primarily on solitary projects expressed an interest in shared spaces because of exposure to knowledge and conversation around creative projects. These results are consistent with reports of the creaetive process, such as described by Gardner in "Creating Minds" [], where he illustrates that even solitary writers such as Tolkein and were creatively inspired by regular meetings where they describe their works to each other. They commonly reported that time was more a constraint than financial limitations.

ACKNOWLEDGMENTS

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