

Grassroots Initiated Networked Communities: A Study of Hybrid Physical/Virtual Communities

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Abstract

Virtual communities have been the focus of research since the beginning of the Internet. A more recent phenomenon is the hybrid networked community: a physical community extended by a network infrastructure, seeking to enhance existing social interactions, storage and dissemination of knowledge using both online and offline channels of communication.

This paper considers one specific form: grassroots initiated networked communities. These are communities of locality that have developed their own Internet and /or intranet infrastructure with minimal external support. They believe that establishing such a network will enhance communication and 'sense of community' within their geographically defined boundaries. These initiatives may offer a viable and sustainable method for overcoming multiple digital inequalities, support the development of social capital, and provide insights into the impact of near-ubiquitous social computing.

We review a case study of five such projects in the UK, identifying characteristics, methods of function, and long term aims. An outline of this work is presented and indications of likely future developments offered.

1. Introduction

The ability of the Internet to transcend distance and create virtual communities of individuals with similar interest has been the focus of academic research since the beginning of the Internet [25]. However, despite nearly 40 years of theory and research practice a significant amount of work continues to be focussed upon achieving social mechanisms that most face to face interactions take for granted. Virtual communities are hindered by the difficulties in establishing authentication procedures for identity, trust, and reputation. In virtual environments, personal characteristics are often blurred, indiscernible, or even deliberately faked [29].

Purely virtual communities are challenged by issues of trust and identity, and often appear to be seeking to emulate face to face geographically defined communities. "The death of distance" has not happened [6], and while the Internet has reduced "the friction of space" it has not diminished the importance of place [20]. Virtual communities are as often employed to support existing relationships formed and sustained by place-based interactions as they are to establish new contacts or develop new communities of interest or practice. The virtual community is often supplementary to, rather than supplanting of, a 'real' community.

Much research has focused around the development of virtual communities within the workplace - Computer Supported Collaborative Work (CSCW) - enabling work based communities of interest [15]. However as the technology has become more affordable and use of the Internet has flourished amongst a wider audience, a wide variety of socially based virtual networks have sprung up [33]. A number of these networks use online tools and services to support a physical community of locality and can be referred to as "community networks" [38]. Many can be considered a virtual community of interest focused on a particular geographical locality – as an online environment, it is not of significance whether the users reside together in physical proximity.

We are interested in community networks where a network infrastructure has been developed in addition to online tools: the physical connecting of the community with networking cabling or wireless links to ensure accessibility to all members of the geographical community. More than simply a virtual community which has as its theme a specific geographical locality, what has been created is a truly **hybrid community** of locality using both online and offline channels to communicate amongst residents, gather and store information, and support social interaction. These hybrid communities may overcome the difficulties faced by purely virtual communities, using the trust mechanisms inherent within face to face social groupings, while in turn the physical community may benefit from the additional affordances offered by a network infrastructure and online tools. Such

hybrid communities of locality are an emerging phenomenon in the UK [9] and have been embraced by policy makers and government [14]. They may be initiated by one of several bodies:

- government or academia as exploratory studies [10,14]
- commercial organisations testing markets [2,19]
- communities themselves responding to a perceived gap in provision by external providers or actively pursuing a vision of connected neighbourhoods [1,36]

Our research focuses upon projects initiated by communities themselves, which we term **grassroots initiated networked communities**. We are investigating whether they may offer a viable and sustainable solution to overcoming the 'digital divide' – the division in society between those who have access to Internet facilities and services and those who do not.

It is our concern that many 'top down' initiatives developed by bodies external to communities may not fully address all aspects of the divide, by focussing too greatly on the issue of access. We follow DiMaggio and Hargittai's work [11] and suggest that rather than a dichotomous *divide*, multiple *inequalities* must be overcome. We hypothesise that hybrid communities, initiated by the communities themselves, may offer a potential solution.

This paper reports on the initial findings of our research into five UK case studies, investigated during Summer 2003. The paper is structured as follows: section 2 provides definitions and a reference framework, based on a review of the literature. Section 3 describes the methodology used in this study; a mixture of semi-structured interviews with project initiators and more structured interviews with end users in one project. We overview the results in section 4, offer a discussion in section 5, and in section 6 indicate the probable direction of further research.

2. Definitions and reference framework

In this section we discuss related work in order to help define key terms of reference concerned with hybrid communities and the digital divide.

2.1. Virtual and hybrid communities

The term 'community' is in itself problematic, Hillery noting over 90 definitions fifty years ago [21], so it is not

surprising that there is little common agreement on the definition of the term 'virtual community'. Leimeister, Sidiras, and Krömer [24] suggest:

“A virtual community consists of people who interact together socially on a technical platform. The community is built on a common interest, a common problem, or a common task of its members that is pursued on the basis of implicit and explicit codes of behaviour. The technical platform enables and supports the community's interaction and helps to build trust and a common feeling among the members”.

The key aspect of the virtual community is therefore the primacy of the technical platform in enabling and supporting interaction. Building upon this, we suggest a hybrid community could be defined as a community consisting of people who interact together socially using both online and offline methods of communication. The community is enabled and supported through the use of multiple channels of communication, including but not exclusively Internet based tools and services.

The balance between the channels used may vary and it is feasible that a hybrid community may primarily communicate via online tools and services and only secondarily communicate through more traditional means, for example an international group of academics who meet for annual conferences, or online games players who may have occasional pub meetings. However the authors are interested in considering the effect of technological infrastructures that are grafted onto existing physical communities, and in the term *hybrid community* we seek to investigate communities where the physical interaction is extended into the virtual, rather than vice versa.

2.2. The digital divide

A key motivation for our research is to critically challenge the concept of the digital divide within society. The British Government has declared the UK will be "a world leader in the new knowledge economy" [5]. It is keen to make sure nobody will be "left behind in the new knowledge economy" [39] and is seeking to achieve "universal access" to the Internet by 2005 [5]. The UK government wishes to see all its citizens 'cross the digital divide'. Our concern is that the discourse surrounding this issue has overemphasised the importance of network infrastructure and focused upon a binary divide, to the detriment of other factors which may affect the achievement of sustained usage [13,18].

In reality, there are multiple barriers to meaningful Internet usage, and these must all be overcome in order to claim that that nobody has been 'left behind'. DiMaggio and Hargittai argue that as Internet penetration continues,

researchers should shift their focus from analysing a dichotomous *divide*, to a study of multiple *inequalities* between those who are potentially connected:

- **Equipment:** the quality of computer hardware, software, and Internet access
- **Autonomy:** the control an individual has over how they can use their connection
- **Skill:** the knowledge to make best use of the equipment and access
- **Social support:** to be able to draw on others to develop skills and overcome obstacles
- **Purpose:** to have meaningful reasons to be connected

DiMaggio and Hargittai consider these effects may have upon an individual. We extend the work by placing it within a community discourse, and furthermore consider *sustainability* to be a critical issue.

We hypothesise a potential solution is to bring individuals online as part of their local community; that by adding a network infrastructure and online tools to a community both individuals and the community itself will benefit. This *hybrid community*, enabled to communicate and store information using both online and offline channels of communication, may offer a sustainable method to overcoming the digital divide and inform the discourse surrounding virtual communities utilised within a social environment.

2.3. Community of locality

Many writers have sought to define community [21,32,41]. A key aspect is that multi-layered social interactions occur within a social grouping over a sustained time period [27]. Willmott defined community as being of one of three types: geographical locality, interest, or emotional attachment [45]. While it is possible for the three to exist separately, the mythical ideal of 'community' is often invoked when place and attachment are combined, and Crow and Allen note that 'sense of community' is likely to be strongest when at least two of three of Willmott's types of community are present [7]. We use the term **community of locality** to describe a geographical community where some level of social interaction and emotional attachment exists, or in Putnam's terms, a degree of 'social capital' [35].

A community of locality offers different challenges for the creation of a hybrid community than can be found in a workplace environment. While CSCW research can inform developments, the differing cultural environment, hierarchy, and availability of support mechanisms create a radically different dynamic.

2.4. Grassroots initiated networked communities

While geographical localities may have network infrastructures developed by external organisations, such as government bodies, academia, or commercial organisations, **grassroots initiated networked communities** are communities of locality that have developed their own network infrastructure with minimal external support [17]. These are often developed by early adopters [37] in response to a perceived gap in provision by external bodies. Such project initiators may be prompted by economic reasons (the cost of a commercial alternative) lack of provision (commercial service providers not covering area) or philosophical stance (a belief in cooperative development or self ownership of resources). As well as seeking to achieve shared access to the Internet, the projects aspire to the development of intranet services, believing that a network offers the community an additional medium to support the exchange and storage of information authored by the community of locality for internal and external consumption. The development of a virtual layer is seen as increasing the potential for social interaction and community development.

2.5. Social software

A wide variety of online tools are used or sought by grassroots initiated networked communities to enhance the exchange of knowledge. These can be grouped together as **social software** which Brady et al. describe as "software that supports the sociality of people in a beneficial way both online and offline" [4]. This description neatly follows our definition of a hybrid community as a group of people interacting both online and offline and for this reason we are interested in investigating how social software may support grassroots initiated network communities. Davies [8] asks what particular aspect of neighbourhood life may benefit from being more like an online community, and hence where social software may best enhance a community of locality. He suggests it may be most effective in resolving shared specific goals; such as trading, sharing childcare, and arranging school runs, which benefit from a codified exchange of knowledge.

3. Methodology

The present work constitutes the first phase of the research project and was chiefly concerned with initial data gathering. Five grassroots initiated networked communities spread across the UK were analysed in Summer 2003. These were chosen through initial contacts, and snowball gathering as interviews

progressed. An inductive approach was employed, aiming at developing terms and definitions to describe the phenomenon, and provide a grounding for later research. Interviews were carried out with project initiators as it was felt that they could offer the best overall view of how each project worked, but we were also interested to speak to end-users of the projects to see if their views and goals were similar to those of the initiators. The interview questionnaires were developed following a study of interviews of Internet usage both in the USA [30,31] and the UK [10,28].

Project initiators from five hybrid community projects were asked 21 questions divided into six categories [17]:

1. Community knowledge: e.g. “What is the boundary of the community?”
2. Network project: e.g. “Why should people get involved with your project rather than connect to the Internet through the national telecom provider?”
3. Knowledge and skills: e.g. “What kinds of people are involved in the project?”
4. Collaboration and information sharing: e.g. “Are you aware of other people carrying out similar projects?”
5. Sustainability and lifespan: e.g. “How does the funding operate?”
6. Training: e.g. “What training process do you have for new members?”

Questions were open ended and the interviews lasted between one and three hours.

In one community, fourteen end users were interviewed. It is intended that end users in further communities will be interviewed but only a single community has been interviewed so far as a pilot study. These interviews were based on a more structured set of questions. Eighteen questions were asked seeking quantifiable data with the opportunity for further comments by the participants (e.g. “How often do you use the computer for the following tasks”), followed by ten more open ended questions (e.g. “How do you think the community network helps you?”).

For both sets of interviews, both quantitative and qualitative data was captured: as well as identifying the scope of the projects the authors were interested in understanding the intentions of the participants. What the participants *believe* are the benefits of a hybrid community are of interest as well as the actual effect.

4. Analysis /Results

By analysing the data collected in the interviews, the authors sought to gain a better understanding of the key characteristics of the grassroots initiated network communities, and understand how well such hybrid communities may help overcome the digital divide. The data collected was used to inform the second stage of research, which will focus more on the type of social software used by projects.

The next subsections present the results from the interviews with project initiators and end users in the five hybrid community case studies. The projects studied have been given pseudonyms for the purposes of this paper.

4.1. Summary of project initiator interviews

In order to understand how well the projects offered a potential solution to the 'digital divide' we mapped responses given by project initiators in response to the interview questions to the five key dimensions of digital inequality identified by DiMaggio and Hargittai (See Table 1).

- **Equipment:** e.g. what level of equipment does each of the projects assume from their users? What do the projects themselves provide?
- **Autonomy:** e.g. how much freedom do the users have to access services? What controls do the projects place upon users?
- **Skill:** e.g. what prerequisite skills do the projects assume of their users?
- **Social support:** e.g. what support do the projects offer their users?
- **Purpose:** e.g. what is the purpose of the project?

Beyond DiMaggio and Hargittai's measures, we sought further understanding of how the projects functioned. We are interested to understand what significance is given to the opportunity presented by shared software tools, as well as the provision of a shared access to the Internet and hence noted what **online services** each of the projects currently supported.

Table 1. Key characteristics of grassroots initiated networked communities

	Southern Wired	Northern Coop	Digital Estate	Scottish Wireless	Southern Wireless
Scope	Housing association 28 / 29 houses connected Wired network Shared link to Internet	Housing cooperative 50 / 70 houses connected Wired network Shared link to Internet	Housing association 150 / 250 houses connected Wired network Shared link to Internet	Citywide subculture 20 users connected Wireless network Multiple links to Internet	Citywide subculture 80 users connected Composite wireless and wired network Multiple links to Internet
Technology	Users provide own computers Network infrastructure provided by project	Users provide own computers Network infrastructure provided by project Computer recycling scheme	Users provide own computers Network infrastructure provided by project	Users provide own computers and network equipment	
Autonomy	Unlimited access and usage	Unlimited access, usage moderated by traffic shaping software			
Skill	Range of computer literacies amongst users			Early networking technology adopters	Mixture of early technology adaptors and domain experts
Support	Informal access to experts	Informal access to experts Workshops Posters	Informal access to experts Workshops Drop-in centre	Informal access to experts	Informal access to experts Workshops Drop-in centre
Purpose	Affordable connectivity Community information resource			Affordable connectivity Umbrella support of wireless initiatives	Affordable connectivity Content sharing Umbrella support of wireless initiatives
Current online services	None	Mailing lists	Public website Mailing lists	Public website Wiki	Public website Mailing lists Wiki
Structure	Subscription based service Core of volunteers and wider group of end users			Peer network of users with core of super users	

The **structure** of each project was noted, to identify how they functioned, and what role the various actors played in developing and sustaining the initiative. Did they function in a similar manner to a workplace community of interest or community of practice [22] or is there a novel structure?

Finally, we were interested to identify the **scope** of each project: the area and number of users it currently covered, and what it aspired to reach. Virtual communities are notable for their vast geographical and numeric reach, and we were interested to establish the parameters of the hybrid communities studied.

The following subsections elucidate specific points of interest from Table 1.

Size: Each of the projects surveyed is of relatively small size, in contrast to the sometimes vast size of virtual communities. Generally, project initiators saw this as being important – that they were developing a local service for a defined and limited community, in one instance referring to Dunbar's work noting a possible maximum size of population [12]. Only in Scottish Wireless did the initiators suggest they would be happy to continue expanding as far as their membership allowed – a peer to peer network of 'early adopter' wireless network users. The projects using wired networks covered more bounded, physically defined areas and identified their network with a more specific locality.

Penetration: The projects could be divided broadly between the 'wired' and the 'wireless' projects – 'wired' projects have achieved very high levels of penetration within their defined areas, between 60 and 95% of the residents connecting. The 'wireless' projects (Scottish Wireless and Southern Wireless) are more distributed in nature, covering sections of two large urban areas, and reach only a small percentage of the population in those areas.

Autonomy: All projects offered a very open access policy to their users, at best users were encouraged not to carry out illegal activity, being reminded that log files were kept. Most of the projects used some form of software traffic management to ensure fair division of bandwidth but placed little emphasis on controlling specific usage. Peer to peer file sharing was generally tolerated and lightweight policies encouraged users' experimentation with software. Access to the network was achieved by some form of membership procedure; broadly divided between the 'wired' projects, which was usually by invitation from one of the project initiators, and in the 'wireless' projects through a peer to peer process. Membership responsibilities varied from a

written contract similar to a commercial Internet service provider, through to verbal agreements of what constituted acceptable behaviour. Access policies ranged from a firmly enforced subscription fee through to wireless networks being intentionally left open for passers by.

Skill: The projects varied in the skill level they expected as a prerequisite from their users, and what support they could offer. These reflected the nature of project and services offered, for example 'Scottish Wireless' is more of an experimental wireless network and expects a higher level of expertise from its users while 'Digital Estate' offers a more robust, low-tech network and supports more basic levels of computer literacy. The projects appear to aim at a range of demographics regarding computer ability. Project initiators offered support in connecting to the service, and considered informal support of network activity as part of the project's remit. In two cases, specific workshop training was given to encourage the use of secure http access when purchasing online, in cooperation with a local university. Informal social networks (friends, neighbours, network peers) play an important role in sustaining each individual's computer and online activity. In all cases, the projects are explicit about their 'community' rather than 'commercial' nature and assumption that the burden of support is to be shared amongst the community, that a 'commercial contract' is not being offered.

Purpose: The nature of each project depended in its intended purpose. The 'wired' projects aim to provide universal network coverage for their communities of locality – seeking to provide near-ubiquitous access [16,43] to their members. The 'wireless' projects can be interpreted as closer to communities of interest, providing coverage to early adopters within a particular subculture distributed across a broader area, and also as umbrella pressure groups promoting specific forms of connectivity. In all cases the projects perceived themselves as being different from commercial service providers, offering a 'community' service to a defined and limited group of users, that they felt themselves to be part of. Project initiators viewed the projects as long term ventures that added value to their locality, rather than being a method for generating income.

4.2. Summary of end user studies

In addition to interviewing the project initiators, we interviewed fourteen 'end users' within 'Southern Wired' in Summer 2003. We defined these 'end users' as being users of the network that had no specific responsibilities within the project beyond maintaining basic membership status (e.g. payment of subscription fees).

One of the criticisms of 'top down' driven community networking projects is that there is infrequently any design input from the users themselves, sometimes leading to a gulf between the external initiating body and the actual users. This can lead to users being disenfranchised [26,42], suffering lack of support [10], or even left without services when the external organisation has met its own goals [19]. We are keen to establish whether a grassroots initiated network project can offer a better model with project initiators and end users belonging to the same community.

The questions we posed the end users therefore varied from the project initiators. We asked more specifically about type of usage and skill levels and what they perceived as the bounds and ambitions of the networking project. We were interested to find out how closely their views matched those of the project initiators, and if indeed there was a greater shared vision. The following subsections highlight the key points of interest gleaned from this set of interviews.

Technology: Users provided their own computers within the project, and accessed the network through the project's equipment. 13 out of 14 noted they used the Internet daily, suggesting the importance of access. The two most popular usages of the computer were 'Email' (12 out of 14 on 'most days') and 'Looking for information on the web' (7 out of 14 on 'most days'). The network was seen as supplementary to existing community functions. It offers additional affordances "I'll use it when it's useful, like for sending photos to my friends", but is used in conjunction with existing social conventions "If I want a chat I'll just pop round for a cup of tea".

Autonomy: Users valued the ability to access the Internet from their own home: all users noted that their preferred point of access was their own home. Public access points such as the local library were noted as being useful "but you have to queue". Other problems of public access machines are that they are limited by when they can be accessed, the software deployed is restricted and strict usage conditions.

Skill: Users described themselves as having basic to intermediate competency in a range of computer skills, but generally rated their 'Internet skills' as higher than their 'computer skills'. One user commented that "if the computer is offline it's only 10% of the machine it is when it's online". 11 out of 14 had received some form of computer training prior to joining the network, and 13 out of 14 noted an interest in further training, though preferring shorter informal courses.

Support: Informal social support was seen as important to the majority of users. 10 out of 14 noted that they would ask a neighbouring friend for help if they had a problem with their computer, and 13 out of 14 would turn to the project initiators if they had a problem with their Internet connection. High value was placed on being able to resolve problems face to face with the technical support rather than via phone or online.

Purpose: The community network was seen as supporting existing social transactions through offering additional affordances (see 'Technology' subsection above) and an integral part of the community infrastructure. 'Southern Wired' is the only project studied which does not currently offer intranet services to its users and this was commented on as a desired extension: "this could be more than just cheap Internet access". Document repositories, discussion boards, and a shared music server were popular suggestions for services that could be offered. An initial comparison of the interviews with project initiators of 'Southern Wired' with end users suggests a close correlation between the aims and objectives of both parties. End users, like project initiators, seek low cost, reliable Internet access and the ability to offer software services to enhance community interactions.

5. Discussion

Preliminary analysis of the studied communities suggests that grassroots initiated network communities are an interesting emerging form of hybrid community. We have attempted to make an initial analysis of the data gathered so far from our first case studies and offer the following tentative findings:

a. Hybrid communities are a distinct phenomenon within social community environments. A wide range of hybrid networked communities are developing within communities of locality. As well as pilot projects initiated by external bodies such as policy makers and academia, there are an emerging number of grassroots initiated projects appearing in both urban and rural environments. This distinct phenomenon can inform both discussions of virtual communities and social integration of technology.

b. Grassroots initiated network communities offer a broad response to DiMaggio and Hargittai's five measures of digital inequality. Beyond providing Internet access, grassroots initiated networked communities address the broad range of digital inequalities that must be overcome to offer individuals meaningful Internet provision with varying degrees of success. All perceive themselves as offering a community based, holistic approach to Internet provision, and seek to integrate their technological developments in

order to support the social infrastructure of the host communities.

c. Grassroots initiated networked communities may provide a more sustainable approach to the digital divide. The studied projects are funded and supported from within the communities and are identified as located within the community. The projects have an ongoing purpose enabling community functions, and bringing the majority of the population online ensures local support for participating individuals. Project initiator and end users perceptions of the projects are similar. These factors may suggest that the projects are in the long term more sustainable than externally initiated attempts to create hybrid communities; where the funding/initiating body may have its own agenda and cease operations when its goals have been achieved [9:46]

d. Hybrid community is more important than hybrid communication. The sense of developing a hybrid community, using both offline and online methods to support social interactions is seen as more important than just providing a network infrastructure. Each of the project initiators interviewed emphasised the intention, if not current application of the network to enhance community interaction, rather than just seeking to provide low cost access to the Internet, echoing Wellman et al.'s hypothesis that such a network can support civic involvement [44]. There is a belief in achieving symmetrical communication between peers, rather than a centralised publishing model, with end users passively receiving content. The common aim is to create a more active and balanced exchange of information using multiple modes of communication and storage. Social software has been employed within some of the projects and is anticipated in the remaining case studies, and its effect on social interaction will be studied in the next phase of our research.

e. Grassroots initiated network communities may offer possible models of near ubiquitous computing. A key aspect of all the projects is to offer services to each user's home. Rather than providing a centralised public resource provided by public libraries or telecentres, the model is one of offering as many points of access as possible. The projects using wired networks seek to achieve 100% of community coverage and in each case are rapidly approaching this goal, and the projects using wireless technologies seek as high a level of coverage over their defined boundaries as possible. End users express a preference for home access, and the always on and liberal usage policies have generated interesting scenarios: it was noted that in at least two cases the computer has taken the place of the living room hi-fi, playing streamed music from neighbourhood file sharing archives. These projects may offer an insight into the

effect of ubiquitous computing within the domestic environment in the near future.

f. There are differing models of grassroots initiated networked communities. Even as a subcategory of networked community initiatives [9], it can be seen that the case studies covered in this paper can be divided into distinct types. Further work will be carried out to formalise a taxonomy of hybrid communities of locality, and even the different types of grassroots initiated networked communities. The development of a taxonomy will support the refinement of design guidelines to support specific categories of community. [23, 40]. A simplistic division could be made between the 'wired' and 'wireless' communities, the former achieving near ubiquitous penetration of a community of locality, whereas the latter could be seen as a geographically defined community of interest, seeking high penetration levels amongst a more specific demographic (e.g. electronic artists). The former appear to be networking projects *of* communities, while the latter are networking projects *in* communities. Each community has a differing operational structure, and there are both hierarchical structures and more open peer to peer model, reflecting their ambitions and role within the host communities. However, while convenient, we do not believe this technological deterministic division is significant; it is possible to imagine a tightly bounded geographical community using wireless technology, or a widely dispersed geographical community using a wired network. We intend to unpack the divisions between hybrid communities in our continuing research, and have identified possible further case studies which may populate this broader taxonomy.

6. Future work

Based on the initial results from the case study interviews, we will develop our research, and concentrate on the following aspects:

- Continued analysis of networked communities, contacting further examples of grassroots initiated networked communities, and interviewing initiators and end users. We seek to devise a taxonomy to describe the categories of hybrid communities and identify which forms best address multiple forms of digital inequality.
- A survey of social software. We will seek to develop Bashaw and Gifford's work [3] and research whether it is possible for social software to significantly support a community of locality and increase communication between members.

- Participatory development of social software within one community. Working alongside core members from one project, we will identify user needs and help implement a suitable set of software tools within the community's intranet. A test suite of applications will be deployed within the network, and usage monitored through log files and semi-structured interviews. The resulting data will be analysed to see if social software appears to effectively supplement current methods of interaction.
- Best practice guidelines. Based upon our expanded research, we seek to produce guidelines for community champions who may be considering developing their own networked community project.

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