

What's in a Pattern: A Vocabulary to Articulate Group Routines and Practices

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ABSTRACT

When people come together as part of a community, oriented towards a collective activity, over an extended period of time, they develop and maintain different routines for the way they are organized, delegate, and carry out their activities. These routines involve a mixture of artifacts and technologies, and are shaped by key common dimensions such as how regulated an activity is, or whether it must follow a particular order. The routines also become inherited by new members of the community who use and develop them in their activity. We propose that similar routines, taking place across different communities, with their technologies and dimensions can be expressed and understood as a pattern. We present four patterns as examples that highlight the ways in which communities carry out routines related to organizing and engaging in their joint activity and discuss how such ways of addressing patterns may support the design of new community technologies.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in collaborative and social computing**; **Collaborative and social computing theory, concepts and paradigms**.

KEYWORDS

Routines, patterns, communities, collectives

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1 INTRODUCTION

Communities are dependent on information technology to organize and carry out their activities. Digital tools and online services can be essential to recruitment and communication, organization and

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information sharing, and in interacting with broader communities, institutions and services [11]. In the midst of this, studies of a range of different communities showcase the dynamics of and challenges in finding and choosing appropriate technologies, use and maintenance issues, community design [10, 30, 66].

These communities make decisions about what services and platforms to use for communication, collaboration and articulation work among members, collectively in terms of building up the community, and for how they face the general public [cf 10]. Such decisions and choices are inherently complex and uncertain, balancing multiple (known and unknown; articulated and tacit) considerations such as familiarity, usefulness, availability and cost, integration with existing tools, etc. For communities, it can be a very difficult challenge to get an overview of and assess possible technologies [12], or even identify if their challenges are related to inadequate features, a bad fit between the technology and how they are appropriated, or even if frustrations with current tools can be resolved by a 'better tool on the horizon' [11]. To further complicate these decisions, technologies often undergo frequent development, and we see these communities having spent considerable resources only to have the technologies become obsolete e.g. when key members leave the community or lose interest [10].

In community research and cases [67], there is a tendency to begin with or stay with the technologies (and artifacts), e.g. an analysis of specific technical platform devices and such that are present, before expanding to understand the routines and behavior, e.g. [11, 24], to study the community as a context for design without necessarily going into depths with the details of the communal life, e.g. [15, 64, 67], or, the other way around to do research to study specific communities that are often dependent on one platform [12]. While these approaches are informative, what we aim for in this paper is to consider a community's activities as sets of routines that involve a mixture of actions with technologies, and from these routines, to articulate particular *community patterns*, involving routines and technologies beyond the very specific.

The term pattern reflects our intentions, but we are also aware that other constructions make use of the same term in architecture [1] and software design [26]. Where Gamma et al. [26] and Alexander [1] share a common interest in providing the repeatable core of a solution to a problem, the types of problems differ not only from the respective domains of software design and architecture, but also in their origin and the intended audience. In Alexander's case, patterns are developed by the community over time, as a response to needs and product of communal life. In software design, patterns are the products of software engineering practice and seen

as best-practice solutions by software developers. At first glance, both types of patterns are ‘for’ the people who are engaged in building, but where Alexander differs is in that the solution is to one of human activity and flourishing – how people live and exist in space – software design patterns have no relation to the end-user’s interactions and experiences with the software.

“A pattern is a careful description of a perennial solution to a recurring problem within a building context, describing one of the *configurations which brings life to a building*.” [1, our emphasis].

The phrase ‘configurations which bring life’ is our focus. Our interest in patterns begins with this and moves into the more general context of collectives of people and their activities. We are not interested in articulating patterns as a problem–solution pairing as these other works do. Patterns serve, for us, to analyze and understand, and from that foundation, as a way to consider how something could be changed (or designed for). From the perspective of a community we also see routines and patterns as potential ways to reflect on and discuss their technological choices.

Before proceeding with patterns, we need to introduce *collectives* and *routines*. When we talk about collectives, we take inspiration from Petrovsky’s concept of collectives defined as “[...] a group of people united by the common aims of their activities, subject to the aims of the society” [48, p.4]. This includes developing shared values, social relations and common understanding of the joint activities through being part of and participating in the activities of the collective. We use it as a theoretical concept to complement the looser everyday notion of community, as a stronger and more developed notion than ‘group’¹, and as an important concept in theorizing about communities, their activities and use of technology. When we talk about collectives (and communities for that matter), these are groups that spend a considerable amount of time working together toward common objectives, and not communities defined by a singular shared interest, platform or characteristics. We use collectives as the theoretical and analytical concept, and community when referencing concrete communities. However, for the present contribution, an introductory understanding of collectives is enough and for a large part can be replaced by community in reading. Our interest in collectives regards the practices and routines specifically at the collective/community level, rather than the level of the individual.

When we refer to routines in the context of a collective, as regards the order and regularities of human activity that the group undertakes, in service of some outcome, typically with some frequency. From the perspective of the collective, the routines are meaningful activities that each member understand and can account for in relation to other activities and purpose, although their commonplace nature may prompt some reflection on the course of action. In this way the routines of a collective are the recognizable patterns of interdependent action that make up a collective’s activities and practices². Routines may be mundane or extraordinary, but the way

in which the routine is configured will involve some amount of technology (where technology is understood to broadly to include also e.g. artifacts, protocols, checklists and other low-tech means). The choice of technology is entangled with the routine – they both serve to mediate each other, and they have been developed in interconnected processes [34, 35]. Routines take time, both to be carried out, and in terms of their changing development, see e.g. [33]. The way the routine is carried out may change with the circumstances, see e.g. [61, 62], but regardless of the variations, they do not lose their status as routine or become obscure to the members of the collective. There are aspects of a routine that require some type of ordering of events (e.g. chopping or mixing ingredients must be done before they can be assembled and cooked) while in other cases the ordering may be less important. Examples of routines would be: An organic food community gathering weekly at a physical place to assemble boxes of organic food to be distributed to members; a housing collective engaging in cooking a shared meal; a group of foodbank volunteers doing their weekly food distribution run; or, any such NGO doing their annual general assembly. To reiterate, we understand patterns to be a description of the routine that is less bound to a particular technology, ideally observed across multiple (similar or different) collectives. Importantly, patterns are named and can be talked about by the collective, in line e.g. with Erickson’s [21] discussion of patterns as a ‘lingua franca’ for a community. They may be crystallized into e.g. community manuals of various kinds. The purpose is to abstract from the empirical entanglement in order to articulate a vocabulary that is useful for research, design and use. Some patterns may critically depend on a particular division of work, set of rules, tools, order or sequence of an activity, where other patterns are less dependent on specific divisions of work, sets of rules, tools, orders or sequences of an activity. In some cases, the purpose of the activity is critically depending on a pattern, whereas other patterns may cut across purposes, or are concerned with articulation work, or collectivity of the collective. In short, we understand patterns to be abstracted from the routine and technology, while also respecting the fact that an implementation of a pattern requires both, and their entanglement. Patterns are at a level where they can be articulated within the community (introductions, manuals, learning how “we do things here”) and they can travel with variation between communities, including also across use and design. We elaborate on both routines and patterns in our related work, but in short: Routines and technologies are what we observe, patterns are what we take away from those observations, that have meaning and can be talked about.

A pattern can therefore refer, for instance, to regular meetings among members to carry out a core task to consider the practice of using a shared space, a collaborative shared activity involving sorting and distributing goods. Technology may play a role in different parts of how this routine could be organized, such as scheduling, using the physical space, internet access on-site, etc. Another example, building on work by Bødker & Lyle [13] is how different communities engage in disseminating updates about a community as a pattern, in which different technologies (e.g. social media, mailing lists) are employed. In both these cases, the pragmatic ‘how’ of the pattern, as observed as a routine, shapes, and is shaped by, the technologies that are used.

¹Petrovsky developed his concept of collectives as an alternative to the weaker notion of group in social psychology, for more see [48–50]

²Feldman and Pentland [23] define routines a repetitive, recognizable patterns of interdependent actions in relation to organizational routines. Discussing the difference between organizational routines and collectives variants is outside the scope of this paper. Here we refer to [23, 68]

How can we conceptualize the interplay between communities and technologies? To this we contribute the answer 'patterns'.

We approach this question by reflecting on prior empirical work with a number of community cases. We provide a detailed examination on the rationale, pros and cons, and impact on how a community interacts, based on said community's adoption of different cooperation, articulation and communication platforms as part of their daily practice.

We draw on prior work with communities and present four patterns, drawing on anecdotes and existing case studies, detailing how they manifest as routines and technologies: The general assembly; planning and delegation; new membership induction; and the productive core activity. These four patterns highlight examples of what collectives do, and so we discuss what these mean for researchers and practitioners wanting to both better understand these aspects, and to act on them.

By conceptualizing regularities of use of technologies in the space between theoretical concepts and empirically unfolding use activity, we contribute to a vocabulary/tools for researchers to generate and articulate concepts based on theoretically grounded empirical work. We discuss how patterns may be used to analyze the use and development of technological platforms, hence helping communities choose and tailor their technological artifacts.

2 RELATED WORK

The related work of interest is connected to communities, regularities, ways of addressing technologies for communities and patterns in general and specifically for communities.

2.1 Regularities and technologies

In and around collaborative technologies and communities, there has in recent years been various attempts to understand and characterize technological platforms, functionalities and uses with the starting point in the technologies: Sutherland and Jarrahi [63] use the term affordances to point to a series of interim-level functionalities that collaborative technologies have and serve to their users. Gheity et al. [27] develop a predictive ethnographic method, in the form of a heuristic set of questions to ask, and a categorization of these heuristics. Fedosov et al. [22] worked to identify sharing economy design cards, in particular to aid designers of sharing economy platforms, and in this they develop named patterns. They see their cards as translational resources between research findings and design. These references hence share a lack of explanation as to how categories have been reached, what kind of abstractions they are and how they can be exemplified?

Bødker et al. [12] take their starting point in a classification of mechanisms and functionalities in known and used sharing economy platforms, leading to a discussion of what standard solutions are available or not for sharing and caring communities. Bødker and Lyle [13] study specific communities and look at their use of technological mechanisms, hence abstracting from the empirical.

The community-oriented literature presents other more orthogonal ways of approaching the relationships between community and technology such as community artifact ecologies: Bødker and Klokose [9]. Bødker et al. [14] point to the significance of shared practices and routines as they extend the notion of artifact ecology

to encompass communities utilizing multiple artifacts. They explicitly address the dynamics of such ecologies, hinting also at how users get artifacts and inspirations for use from others in communities of which they are members. In these studies, communities utilize available technological artifacts in their overlapping practices, borrow technological artifacts from other communities and appropriate what technological artifacts they have available for local use, in what Lyle et al. [41] talks about as community artifact ecologies (see survey in [41]).

2.2 Patterns

The notion of patterns comes from a long history where it was brought into software design and construction from architectural design, where it was first introduced by Alexander [1]. In the software literature, patterns have largely become about software and a well-established tradition of how to build it [26]. Nonetheless there has for the duration of this development been a number of researchers who have tried to make the original concepts of Alexander useful outside this narrow frame.

Schuler has done extensive work within the scope of Computer People for Social Responsibility to activate patterns to deal with as discuss societal challenges that are affected by technology at a larger scale [56]. With an international team he gathered and refined patterns from across the globe to inspire communities of politicians, activists and technologists. With his collaborators he devised an entire system to review and revise these, and made them public online [57]. Schuler [56] points out that with these patterns it does not quite make sense to see them as timeless in quite the same way that Alexander does for buildings and dwelling, and he discusses how patterns can point ahead and not only be conserving existing practices. With collaborators [57] Schuler is very interested in dealing with big societal challenges such as climate change. While an impressive collection, it seems that for our purpose in this paper, the patterns are a little too distant from the everyday life, technology and cooperation that makes for active communities as we have studied them in our empirical work.

Many authors have discussed the possible roles of patterns in relation to collaborative technologies. Herrmann et al. [28] point out that patterns "*not only refer to technical features but also to the interplay between the technical system, the users, their tasks and organizational constellations.*" [28, p. 349] Lyle and Bødker [13] use patterns to describe possibilities as well as problems or bottlenecks of the socio-technical situation with inspiration from Herrmann et al. [28] as well as from Bødker et al. [7].

Herrmann et al.'s [28] presentation of pattern is: "*Our argument is that patterns were not meant to be a mere analytical tool. The power of patterns lies in their design-oriented approach, their main purpose being in helping to solve reoccurring problems.*" [28, p.350]. While we are interested in looking beyond patterns as analytical tools, we do not subscribe to the notion that their power lies in a design oriented approach.

Erickson coins the notion of patterns as a common language, and states that Patterns provide ways of allowing the results of workplace studies to be reused in new and different situations so that they are accessible to the increasingly diverse set of people involved in design. [21]

Martin and Sommerville [44] use ethnomethodological studies of human collaborative practices to explore the possibilities of using patterns to convey findings, in particular to designers of CSCW technologies, as well as to fellow researchers: *“From our studies, and other related research, a number of recurrent topics, that are of repeated concern to researchers across studies, have arisen. These provide a critical background to our patterns work.”* [44, p.63] They focus on regularities in terms of everyday accomplishment of work or activity involving technology, *“how the order of work is socially produced — how this order is achieved, maintained and repaired”* [ibid.] addressing also the ecology of settings and the design of artifacts to support or hinder this order. Hence, Martin and Sommerville see their patterns as resources to be used as background to or within the process of design. The patterns as they see them support reuse of knowledge from and across ethnographic studies, providing a common language for these processes.

Liu and Ram [36] identify a number of patterns extracted from a detailed, quantitative study of initiatives by Wikipedia editors. Lyle et al. [37, 38, 39] looked across empirical studies as a basis for developing initial design patterns for engaging with food communities in Australia [40]. Bødker and Lyle [13] focuses on patterns as a ‘lingua franca’ [21] across the research process, with end-user developers and for the future choice of technological platforms in such communities. This was inspired also by the discussion of pattern languages by Dearden and Finlay [16].

Patterns in this way take many forms but they are interesting for our work here because they take their starting point in empirical matters, both regarding order and regularities of human activity and regarding technologies as they are used in the activity. They help ‘lift up’ regularities from this empirical ‘mess’ and there are examples where the ways this is done are theoretically informed (see more below). They are seen as providing a common language between use, research and design. However, they are not particularly clear as to what kinds of theoretical thinking may aid understanding of how patterns are brought about and which patterns to focus on in those processes.

3 THEORETICAL FRAMING

In Lave’s [32] early work on Communities of Practice, she points out how young apprentices become members of such communities by participating with their more capable peers, and mastering a number of increasingly more advanced types of activities. These are named and community members share among them, and talk about understandings of what the central and more peripheral member can do, and hence also the journey from peripheral participant to full member. These regularities are hence named and can be carried out routinely by members of the community of practice, such as in Lave’s case, the tailors of Monrovia. Rogoff [53] uses Dewey to further point to the connection between communication, doing and community: *“There is more than a verbal tie between the words common, community, and communication. [People] live in a community in virtue of the things which they have in common; and communication is the way in which they come to possess things in common”* [17, p. 5]. In other words, routines and regularities that can be recognized and talked about within the community. They reflect what communities do together with their common

possessions (things, tools, technologies) and also help communicate about the ways in which they come to possess these, i.e. the future, and possibly design.

At the same time as communities are held together by routines, things and tools, communities and their activities are not static. The routines are carried out and recreated every time members of the community carry out the activity in question and it is in the skillful improvisation (see e.g. [18]), the problem solving ([61]), the break-downs that happen in the meeting with the material world ([5]) that development of the community and its routines happen. With Activity Theory (e.g. [19, 25]) human beings (as individuals and as communities) have and develop a number of routines that offer various ways of doing the same or overlapping activities/actions. All activity is done by individuals/members, held together by the language, rules and tools of the community, and the shared purposes (hence the individual and joining activity mirror each other). There is variation and choice when people do stuff but it is at the same time this variation that makes the community adaptive, developing and resilient (because people develop new routines and new uses).

The fact that members of communities create and recreate these routines does not mean that all is created from new all the time. Shotter [59, p. 70] talks about the structure of human exchanges and how the communities we establish between ourselves and others *“[...] implicate us in one another’s activity in such a way that, what we have done together in the past, commits us to going on in a certain way in the future.”* He further points out how human beings join, and stand on the shoulders of others as follows: *“The members [...] need not necessarily have been its originators; they may be second, third, fourth, etc. generation members, having ‘inherited’ the institution from their forebearers.”* Although there may be an intentional structure to the activities, members of the community need not be aware of the reason for such a structure. *“For them, it is just ‘the-way-things-are-done.’”*[59, p.70]

In this manner, human conduct is anchored in shared practice where certain tools or artifacts are used and can be communicated about, and in this use practice also develops to encompass new tools. For any activity, human beings have access to constellations of artifacts [69], some of which get used in carrying out the specific activity. Like Suchman [62], Roth & Lee [54] see artifacts as resources for actions, and through actions new resources become available. Roth & Lee [54] treat artifacts, be they tools, rules/language and means for division of work as similarly important resources for action, emphasizing the role for communication, coordination among members of the community.

Members of the community are hence part of creating and recreating the joint activities and use multiple artifacts in carrying these out. In addition they may have access to other artifacts from other activities in or around the community. Engeström [20] and e.g. Roth & Lee [54] point out that contemporary human beings and human activity belong to several over-layered activity systems or communities, each with their motives, routines and artifacts. Bødker & Klokmose [8] talk about artifact ecologies as a way of capturing the multiple technological artifacts that are either used by people to supplement, replace or support other artifacts over time or in the specific activity (see also [3, 6]) or as artifacts that are available and offering possibilities of use in the activity.

Artifacts are made by humans based on a conception of a certain use. Bærentsen [2] carefully documents the development of hand guns. He illustrates how they are crystallizations of past routines and they are then part of also changing the routines in which they get applied. At the same time, however, these processes include breakdowns and there is no guarantee that people use artifacts in the way they were intended by the designer, or in the same way as in the tools genesis or original practice from which they were crystallized [51, 65]. Hence, artifacts mirror routines in a dialectical manner, but neither determines the other.

People use more than one artifact at the time, and these artifacts in various ways substitute or supplement one another as use unfolds. In this way, each artifact stands on the shoulders of other artifacts, past or contemporary, while the human use also stands on the shoulders of human practice as it has developed both culturally, in a particular community of practice and through the appropriation of the individual.

The notion of a collective [50] is used by Petrovsky to analyze and understand the development of a group of people, who together are engaged in socially meaningful activity, and through this build their social relations and sense of collective identity. While Petrovsky's collectives is built from social psychology, it shares some focus with activity theory, and revolves around a core concept of mediation (e.g. people, artifacts, objectives of activity, and social relations all serve to mediate each other) are central to their understanding. Collectives are not loosely connected groups (e.g. members of transaction or event focused groups, such as people who provide a driving or delivery service for global sharing economy platforms), as collectives have clear, directed efforts to build the interpersonal relations of the collective members, as well as to develop the core activities and identity of the collective. This understanding of collectives is fundamentally developmental: The maturity and capabilities of the collective and its routines are in a constant state of change.

4 PATTERNS IN DEVELOPMENT

It is in these developing regularities that we want to rethink and reconsider with patterns. Routines, and their related artifacts, have purposes and can be talked about by members of the community, and hence they can be studied in research by paying attention to not only what people do together, but also how the community talks about them. Hence, patterns may be useful analytically in describing the regularities of human routines with technology, and they may be identified also by how members of the communities name them and share the regularities as a lingua franca (See also Dearden and Finlay [16]).

By titling this section 'patterns in development', our intent is to emphasize that patterns themselves are not merely developed through analysis, but that they are subject to iterative and continuous development as, for instance, their assumptions are tested through their application.

These patterns addressed here, based on general meetings, delegation, member induction, and joint activity, reflect our observations of both empirical and anecdotal examples of collectives, in domains of food and housing. For each pattern we give a brief description, before going into the relevant examples to show how

it takes place as a routine. We then consider the different artifacts and technologies that are important to the routine, and serve to crystallize routine knowledge and practice, for instance with documentation or instructions.

We refer to two examples of urban food communities. The first is that of Northey Street City Farm³ (hereafter referred to as Northey Street, or NSCF), a city farm and non-profit community organisation located in Brisbane, Australia. This community has been previously studied as part of work by Lyle et al. [37, 40], and comprises 4 hectares of flood prone land close to the centre of a large city (over 2 million people), and have a number of garden areas which all have different goals (i.e. growing food for a local market, a prototypical backyard garden as a teaching example). Their activities, in addition to these different gardens, include a market, a nursery, and a number of educational courses to promote sustainability and increase food and agriculture literacy (with a focus on permaculture). NSCF has 13 part time paid staff, in addition to over 220 members, and they report more than 120 days of volunteer effort per month⁴.

The second is the Aarhus Økologiske Fødevarerfællesskab⁵ (referred to as AOFF in this paper), an organic community supported agriculture community, located in Aarhus, Denmark. This has been previously studied as part of work by Bødker et al. [10, 11, 14], who have documented the progression of the community from initial stages through several iterations of technology. Their primary activity is in the bulk ordering and distribution of locally grown organic produce from nearby farms, on behalf of over 900 members (who contribute financially as well as with their time as volunteers), and over 40 active volunteers [10]. Their values, outlined in a manifesto⁶, partially translated by Bødker et al. [11, pp. 1145–6] speak to a desire for organic food to be affordable, sustainable, with a good selection, and to serve as an educational example about food, health, collaboration and sustainability.

The other examples refer both to housing project in Denmark, including co-housing, and public housing. Regarding co-housing, Denmark has a large number of projects of varying size from 10 households and upwards (see e.g. Larsen [31]). Co-housing exists in other countries as well and [45] is often seen as the bible for setting them up. The idea is for people to have their own houses while also living collectively, with shared facilities and caring for one another. Co-housing projects are hence member-controlled, characterized by member democracy, equality and often affordability.

The Blue Hill⁷ is one such co-housing project. It consists of 25 houses, and a large shared common house that is used for the communal production of the shared evening meal, for eating this meal, and for many other activities. The surroundings are suburban. The co-housing project houses about 55-60 people of all ages, and was started and built in the 1980s, at the same time as many similar projects. The community mixes families and single households of different income levels.

Most co-housing projects have some formal of communal dining as a central activity. There is a lot of variation in how to participate, and also how many days a week communal dinners are cooked. At

³'NSCF homepage', accessed 2021-01-20

⁴'NSCF 2019-2020 Annual Report', accessed 2021-01-18

⁵'AOFF homepage', accessed 2021-01-20

⁶'AOFF Manifest', accessed 2021-01-21

⁷<http://sharingandcaring.eu/>

the Blue Hill, dinner is offered every day, and all adults and older children partake in the planning and cooking of daily evening meals. The decision hierarchy is flat and all adults participate equally in all decisions.

According to [4] public housing around the world is organized very differently, and models for residents' influence take different forms. Danish public housing is organized as associations where tenants are members and hence, together own their dwellings *"In Denmark residents are at the same time landlords and tenants, but do not own anything and are subject to strong legal and municipal regulation."* [4] Among these regulations are strict demands for transparency of governance of the association, including the set-up of a board and the general assembly.

4.1 Pattern #1: General Assembly

A generally assembly is something that most Danish organizations have, and hence also all our three Danish cases. As a routine, members altogether (or at least as an event open to all) meet as part of a ritual to address and reflect on aspects of their collective activity and identity. This meeting occurs with a level of regularity or is at least the result of predictable triggering events.

The general assembly is not enshrined in law, although tradition means that there are provisions for how to interact with banks, authorities, insurance services and so forth⁸. An association also configures a set of rules they decide upon regarding decisions and bylaws; a purpose and a definition of who can become members (and also rules for exclusion); a definition of the limitation of the finances (e.g. that members do not pay anything other than membership fees, and that the board is responsible for managing these finances and has no other financial commitment). Most associations delegate the daily business to the board but there are also many other ways of delegating to sub committees (and to not even have a board). The general assembly is a meeting held with some regularity (often once every several months, or once per year), and serves as a time and place in which particular rituals and decisions about the future of the community are brought into focus.

Another way in which this type of routine appears was seen by [37], whose empirical work involved participation in a number of key meetings to engage in a consultation process among members of Northey Street City Farm, to overhaul their operating procedures and organisational structure⁹. These meetings were scheduled, and followed a protocol for participation (for instance, how to indicate support, or opposition to any given proposal). A particular custom in Australia, common to a variety of different events, and seen, for instance, in the annual reports of Northey Street, is to begin meetings with a sign of respect towards the first nations people, with an acknowledgment of Aboriginal Australian elders, past and present, and acknowledging the name given to the land in which the gathering takes place.

Within collectives, there is a need to engage in processes that organise the collective, and to enact their core activities. Its manifestation implies a particular order to parts of the routine (e.g. you cannot cook food that has not yet been prepared), and implies certain technical functionalities (e.g. some means of cooking).

Key artifacts for a general assembly pattern include the agenda, which serves to show and direct how an individual instance of the routine unfolds, and the bylaws, which are the crystallisation of the decisions of the past within the community. The level of rigidity in the agenda (i.e. when it is allowed to have items added, removed, or reordered) may vary, and be shaped both by the history of the collective's development, as well as changing external regulations. The bylaws may come by another name, or be represented in a particular way (via a community constitution), and may be informed or shaped by legislation at a higher level (e.g. government). We use bylaws as a shorthand to refer to any of these such representations. A related artifact output of general meetings includes contributions to annual reports, often as a way of consolidating and reflecting on a year of events and activity.

The key dimensions that define a general assembly include: A high level of regulation in how it unfolds (around which there is also metacommentary or tactics employed), including the setting of an agenda, and how/when items can be added to the agenda; bound to specific temporal expectations that set how often and when the meetings would be; and procedural in how it follows a particular order of operations, in how it unfolds following an agenda.

4.1.1 General Assembly Synopsis. As a pattern, there are common types of artifacts and dimensions that key to understanding how and what a general assembly is to a particular collective. Is it a general assembly, a participatory meeting, or titled something else? How does the collective speak about its structure (and how the structure is shaped)? Perhaps in terms of bylaws, codes of conduct, scheduling and an agenda. A general assembly is generally led by a small subset of the collective, and attended by the majority, and may include specific roles to chair or record notes. The goals of this pattern often serve as a formality in which the collective can progress their broader activity or organizational goals, such as to expand, change, contract or even dissolve. Such a meeting often occurs with some regularity and predictability, perhaps once a year, or more frequently when there are complicated or known matters that require the focus of the collective, perhaps at a higher level to reflect more broadly on their identity or activity. Finally, the pattern involves a number of tools that both serve the goal of the meeting, such as recording notes, and are supported by artifacts such as calendar invitations, website announcements, newsletters.

4.2 Pattern #2: Planning and Delegation

It is a routine within a collective to plan and delegate, and thus this pattern concerns the process through which sub-activities within the collective are initiated, and the relationship of this new activity back to the rest of the collective. This pattern is concerned with the way that creating a different set of responsibilities happens, and the interaction between a subset of the collective and the collective as a whole, rather than being focused on the particularities of the sub-activity (we consider this more in-line with Pattern #4 below).

In the case of urban gardening, an example would be the way in which an allotment garden plot is assigned to someone (or a small group) to maintain. This exact example can be seen at Northey Street, where space for an allotment garden may be rented by

⁸<https://frivillighed.dk/guides/saadan-starter-i-en-ny-forening>, accessed 2021-01-19

⁹This is reported in NSCF's 2012 newsletter, accessed 2021-01-05

members¹⁰. The way in which this has been formalized, with requirements (becoming a member, paying a fee) and routinized (so it can be repeated for other people) is demonstrative of a more mature routine. As mentioned above, with the different activities that NSCF engage in, and as part of the website they advertise a number of areas where volunteers can contribute, including maintaining the gardens, cooking, animal care, construction, along with tasks that are further removed from the garden such as assisting with events and administration¹¹. There are designated members (such as the paid staff) who take responsibility for these sub-activities and help to coordinate the volunteers working with them.

Many co-housing projects have descriptions of their overall meal planning processes on-line¹². There is a difference between how central communal meals are to the communities. Many, but not all, communities have industrial kitchens, and they have a variety of ways of managing the meals and the cooking. One major difference is whether members sign up for meals or sign off when they do not eat. Also some communities have take-away arrangements while others don't.

Most communities deploy some sort of grouping of members who are then in the groups responsible for planning and cooking for particular, repeating days or weeks. The flexibility of these schemes vary between communities. Similarly most communities seem to have decisions for the meal-time and when cooking starts.

Looking at the Blue Hill, all activities involved in this pattern have names and all members, even the children recognize these and their regularities, e.g. when the food bell rings you leave whatever you are doing and go to the common house where you sit down and awaits the serving of the meal. All recognize what it entails to 'Go to food meeting' or 'Go cooking.' Certainly, despite the regularities there are improvisations and breakdowns of the routines that are handled as needed. There are no-gos, and not showing up for your (self-)assigned cooking task, without attempts to find replacement, is one of them.

The process of bringing a new sub-activity into a collective can be formalized, for instance, within an association through the formation of subcommittees or working groups, which may involve some overlap with Pattern #1 above, both in terms of creating the group, as well as reporting back to the collective as a whole.

The technologies that are used as part of a sub-activity relate primarily to the organizational and communication acts of configuring it, but are influenced by the actual artifacts related to the sub-activity (how they are procured or used for other activities), communicative and activity related artifacts.

While we have found an example (<https://www.langeeng.dk/app-alicious/>) of a large housing community that deploys an online technology to manage the registration and planning for meals, the Blue Hill, e.g. mainly use a small number of paper forms: One for signing off and on for meals that also provides overview of numbers and e.g special diets; one for announcing the menu one week at a time, and one for ordering groceries, to provide overview for those who shop, and also to feed back information from the shopper to the cooking team. The team are for one week and meets on Sunday afternoons to plan.

¹⁰'NSCF Allotment Gardens', accessed 2021-01-21

¹¹'Volunteer @ NSCF', accessed 2021-01-19

¹²See e.g. <https://bofaellesskab.dk>

Key to the pattern is the regulation of the process. If it is a regular thing (i.e. being assigned a garden plot in an urban gardening collective), it will follow a clear structure. If it is the first time a garden plot is assigned (i.e. being assigned a garden plot in social housing where they have not previously done this), then there will be more negotiation involved, which will lead to something that can be more regular.

These activities are named and can be talked about within the community, which is part of the ways in which they are shared and hence patterns.

4.2.1 Planning and Delegation Synopsis. The pattern goes by various names (either in terms of the activity, or by the related work group, for instance) in the collectives, but it generally named and recognized by a name by members. This pattern is concerned with planning of central activities in the collective, and assignment and delegation of responsibility to members or subgroups. In some instances the pattern is also central for the enrollment of new people. The frequency and rhythms of this pattern is dependent on the frequency and regularity of the activities that are planned and delegated, and hence are in some instances e.g. weekly, in others mainly happening when need occur, such as new garden plots becoming available. The tools of this pattern mainly serve to assist communication, in some instances web-based in others lists and written procedures, that are more or less formalized and well-specified.

4.3 Pattern #3: New Member Induction

Once a collective has formed and developed, in even a basic way, it creates the circumstances for other people to join. This pattern refers to the routine of joining a collective, and includes the initial signing up, plus the associated induction and process of learning the 'standard' procedures. This also includes being exposed to the language of the collective, how they talk about their different activities and tasks, and what it means to be a member in terms of values.

NSCF provides resources to help new volunteers, including a handbook¹³. While membership to the farm involves an annual financial contribution as the only requirement, for the purposes of this pattern we are considering membership in a more active way, specifically those who volunteer their time. Northey Street expect that potential volunteers first take part in one of the weekly tours, where you will get exposed to the layout and different concurrent activities taking place on different parts of the farm. This was a crucial part of the induction process. The tour outlines the different parts of the farm, and how the people who work there talk about them and the activities that take place, such as a shared lunch prepared from the kitchen garden. The tour also conveys the overall values of the collective. For Northey Street, this includes the focus on permaculture and how that has led to particular garden designs, the choice of what to grow. Values governing interpersonal connections, are also present, as new volunteers are expected to read and agree to a behavioural code of conduct document¹⁴. In the previous pattern, we also mentioned that volunteering is already associated with a number of different possible sub-activities

¹³'NSCF Handbook', accessed 2021-01-15

¹⁴'NSCF Code of Conduct', accessed 2021-01-20

on the farm, all of which would have their own operational and organizational artifacts that are relevant for a new volunteer.

Membership to AOFF involves a commitment to contribute both financially as well as through volunteering time, in most instances, to the weekly box packing and distribution. The process of becoming a member begins by completing an online form, and to begin volunteering, Bødker et al. [10] report that work shifts are organized through a scheduling tool as part of the website.

The artifacts of the new member routine, in the case of NSCF, the volunteer handbook, code of conduct, farm map and even website generally all serve as important artifacts as part of the induction process, to gain familiarity with the activities and identity of the collective. For the AOFF, both creating an account and using the scheduling tools for volunteering position the features of the website as crucial for the process of becoming involved. Common to both of these however is a financial commitment as part of becoming a member, and thus having either digital means through which to accept payment, or if it is done on-site with cash, point to a need to handle financial transactions.

The key dimension of this pattern that we have seen is in its procedural nature: There is a sequence of steps or events that take place, often in a particular order. For Northey Street, and communities like them, the process is further shaped by a weekly tour – one cannot just begin to volunteer at any time or place, it must follow this. Once this is done, volunteers can arrive in the morning on days they wish to participate, and get engaged in whichever of the available activities they would like (which are able to accommodate them). The AOFF, by contrast, offers more flexibility to sign up, but more structure around getting involved, via the use of a scheduling system.

4.3.1 New Member Induction Synopsis. The way in which people talk about inducting or onboarding new members and volunteers will likely be similar across communities. The key people involved in this pattern are the new potential member, and another member (or group) that act as a point of contact (a tour guide, or someone who advises around a scheduling system, or to process membership applications). Once getting involved in activity the new member may interact with other groups or members. In Communities of Practice terms, this pattern best reflects the early stages of legitimate peripheral participation. Its goal is to build up and maintain the collective, as new members coming (by contrast to other members reducing their involvement or leaving entirely) help to shape the ongoing development and evolving direction and values of the community. The both signing up, and actually beginning to participate as a volunteer, can be subject to temporal rhythms, fixed schedules, or be more open and flexible. The tools are a mix of organizational and communicative. Tools such as a handbook serve to introduce new members to the language of the collective, in addition to setting expectations about what can be done.

4.4 Pattern #4: Joint Collective Activities

This pattern concerns the activities of a collective that relate primarily to the production, distribution and consumption of goods and to the services that take place. It is not necessarily economic activity in a financial or market sense, but relates to process by which these aspects (production, distribution and consumption) take place.

The pattern is hence concerned with the regular execution of joint activities between members.

For examples of what we mean by this, we turn to the AOFF community. A core activity of the community is the way they purchase organic food from local farmers. These foods are then distributed and sold to the community members. Central to this is, according to [11], sharing a physical space on Thursday afternoons. This also plays an important yet subtle role in the way the community shapes itself. Having a place to distribute the weekly bags of vegetables is a defining trait of the community and an integral part of its activities. In the beginning, the community worked out of a basement borrowed from a political youth party organization. Later, they moved to a residents' house run by volunteers in a larger neighborhood in the city. In addition to aid the physical handling and sorting of produce, the physical activity on Thursdays also serves visibility of the activity, as a place to attract members and make them better aware of the joint activities.

For another example, we look to the way in which the co-housing project produces its meals: Meals get planned and produced each week by the team of members for the week. They decide the menu and assign members to shifts. One person in each shift is responsible for the meal that day: Ordering food items, recipes, and plans to ensure that food will be ready at 6pm. The cooking team meets in the kitchen at 4pm, so that the meal can be served two hours later.

The technologies relevant to the AOFF example include the scheduling system used to determine which volunteers will be performing which tasks at each meeting; the tools on the day to keep track of what needs to be packaged into which boxes; and, the ability to process payments. In the co-housing project, the main technologies are the shopping list and sign-off sheets, industrial cookers, dishwasher and oven, in addition to the spatial layout that also makes it possible to e.g. separate dirty vegetables from meat, dirty dishes from clean, and generally to provide enough space for parallel activities of 3-4 people.

In the case of the AOFF, members meet regularly. Using a shared space, members coordinate their efforts to sort and organize the food into boxes for purchase. This requires particular types of technologies, including the ability to schedule people, handle payment. It also requires devices and infrastructure in the form of laptops, point-of-sale machines, and on-site internet access, which was discussed extensively in [10]. As discussed in [11] AOFF got their inspiration for these procedures from a sister community in Copenhagen, and developed their routines as they moved to new and better locations and also as e.g. possibilities of different forms of payment shifted [10].

In the case of a co-housing community communal dinner, similarly, the use of the physical space, the scheduling technologies and the kitchen utensils are important. In contrast to the AOFF these do not have to be set up from one activity to the other, since all are left available in the kitchen for the next team. Other matters are however up to improvisation: Some meals are simpler than others and require less planning, coordination, timing and fewer steps, some members are more confident in carrying out the different processes, and some may be more productive than others. The Blue Hill kitchen was originally designed with inspiration from other co-housing projects, and in some sort of balance with experiences from private kitchens and large industrial kitchens. It has been

reconfigured some over the years and in particular one experience is important and sets it off from private kitchens: Open shelves and drawers support the cooking processes better than closed, hence aesthetics do not count.

4.4.1 Joint Collective Activity Synopsis. This pattern is very close to whatever is the productive activity of the collective. Such activity is important to the example communities presented and perhaps less predominant in other forms of collectives. The pattern is recognized by its conventional name in the community, and these names in the examples refer to the productive practices. Typically the pattern involves community members in groups or shifts, with certain members among them in charge. This means that the member in charge is also a role by rotation, and not always the same person. This pattern has a rhythm of once a day, once a week or whatever suits the productive needs of the collective. As pointed out the physical layout of the joint workspace is important in this pattern, whether this workspace is permanent of set up for each occurrence. Artifacts towards the goal are included, be they cooking utensils, payment systems or something third. Visibility and availability of these are important, also for the induction of new members. Lists and calculations of numbers and amounts of orders or meals are important.

5 DISCUSSION

5.1 How to understand artifacts across patterns?

To start the discussion, we reflect on common aspects of the patterns, and how they serve work in, and beyond, the core activities of the collective. Given that artifacts are crystallisations of, and support for, some aspects of routines, artifacts also represent parts of the pattern. The role of manuals, regulations, guides, and other documentation as crystallisations of the routine is present across all patterns. These can be formalized and cross-collective, e.g. common ways of organizing as we saw with the association model, and bylaws, guides and manifestos within a collective. They may be present in official guides from government websites, e.g. “how to start an association”. Parts of the routines may also be formulated in local guides and manuals, and signs within a community space on important information (similar to what one would observe within a workplace). These artifacts can play a role in introducing new members or mitigate issues related to a larger groups of members, as we have seen in the organic food communities [11]. Finally, in terms of technologies, routines may be embedded in the tailoring or organization of particular tools, e.g. how they are laid out in the physical space (see [11]) or forms on a website, similar to how external interfaces often reflect how internal processes are organized in organizations. Hence, when a community engages in developing or appropriating technologies, write-up of guides and manuals, or in (re)organizing a part of their practice (see e.g. [10]), they also reflect on their routines. Implicitly, perhaps, in these reflections and discussions, they are putting words on and discuss their routines as patterns. The communities discussed use surprisingly few information technologies beyond email and simple spreadsheets and webpages. Bødker and Lyle [13] however makes a supplementary analysis of these same types of communities by following how e.g.

email lists and Facebook are used in particular ways across the communities. These two analyses supplement each other but they also illustrate that the starting point for community technologies need to be outside the technology supported specific functions or tools.

The tools of the collective or particular routines *are not* the pattern or reflect the routine one-to-one. Technologies are part of routines as resources for both situated action and articulation work or communication, coordination among members of the community (cf [54, 55, 62]). From organizational studies, Orlikowski [47] reminds us that similar patterns of use observed empirically does not mean that collectives understand or use the technologies in the same way. Hence, this emphasizes that the local appropriation of technologies is not only a matter of how, but also of why technologies are brought into use. When comparing these insights to analyses of the artifact ecologies, a pattern-focused analysis allow for more complicated and multidimensional ways that artifacts may be connected in and across multiple routines. This in turn can help highlight how artifacts tend to linger in collectives [cf 11].

5.2 What do patterns do in a community?

Patterns and routines can potentially take focus away from ‘one tool at a time’ and specific artifact ecologies and (supposedly) from ‘systems’ at the other end. We have seen examples, such as the AOFF which has been on a continuous quest for the website that will fill all their needs, with endless frustrations, replacements of web platforms and developers of these to follow [10]. Bødker et al. [12] illustrates that in particular regarding collectivity, it is difficult to identify technical support at a functional level and we see the example patterns presented here as covering exactly that challenge: To identify appropriate levels on which to discuss technologies for collectivity within communities. Patterns are hence useful for the early stages of a collective so that the collective can know, instead of functions and tools, what they might need to look for, or what to expect. This is indeed closely connected to the kind of experiences and tool set-ups that may be shared across communities as we discuss below. At all stages of a collective, patterns may help communities articulate, discuss and make decisions on how to develop their routines or appropriate technologies based on their existing practices. The starting point for such intrinsic development is to look for routines that are named, shared and even written down, rather than for singular tool ‘fixes’, we suggest.

5.3 What do patterns do across communities?

Some patterns are shareable across communities no matter their purpose, whereas others pertain to the purpose (the kitchen, the Thursday). E.g. managing members is a matter of the size of the community more than of purpose. The general assembly as well.

Communities crystallize their routines into in books, checklists, in regulations, in technologies/platforms such as websites. Some of these are shared across communities of similar kinds (co-housing) or more generically (procedures for general assemblies).

This allows a community or particular community members to do the work to find out the extent to which a pattern ‘matches’ a community’s routine. However, this requires work by somebody and does not come for free. In some instances it may also require

assistance from the outside, e.g. in the form of legal or technical assistance.

In general there is work to be done to name and articulate patterns, even possibly to re-articulate them. And as seen in many examples, communities struggle with introducing and maintaining technological tools in particular.

With respect to sharing and maintaining such tools, there may be a role for NGOs or projects that seek to connect community groups in offering solutions, an approach that is entirely different from offering single technologies that somebody can eventually make a lot of money from. We should be careful not to be naive regarding interoperability a.o. issues when it comes to sharing and setting up support for patterns instead of tools, and this discussion does indeed merit future work. An example of such a projects that seeks to connect different community groups is Commonfare¹⁵ that has previously grappled with the topic of language and a *lingua franca* [42, 43, 58]. For such a project, entering into different communities with a clear set of patterns to unpack could provide hints about what to look for in developing an understanding of how the contrasts between communities.

5.4 What can patterns offer community research?

First of all, patterns offer another level to consider than tools or artifact ecologies/activities, as we discussed earlier. Hence we see these analyses as supplementary because they give an orthogonal view on the community practices and technologies.

For each of the patterns, it becomes possible to look for the common types of artifacts that represent, reflect or are part of activating them within a context. E.g. if trying to understand new member induction, it is possible to see if there is manual for newcomers, and how that manual is used. If trying to understand a general assembly, it is equally important to study the bylaws (or equivalent written externalizations of rules and procedures). Where we have found that artifact analysis otherwise seems to become somewhat piecemeal, it seems that a focus on patterns may create a unity where artifacts of many kinds can be analyzed next to one another as part of the holes of the pattern, and even as replacing or substituting each others in these [3].

5.5 Where does that leave design?

Our goal in shifting away from the problem-solution framing of other works applying the term patterns is not to take away from possible insights that patterns might provide in terms of action and change. Rather, the ambition is to shift the focus onto patterns as a way of both framing a researcher's understanding of commonly found routines, and to provide hints and guidance for what to look for in a collective.

This has some implications as to how designers might approach and focus design activities and interventions, e.g. instead of designing individual tools (in isolation), patterns (and routines and artifact ecologies) direct out attention toward ecological understandings of practice and design, and in turn, focus on developing tools and systems that can 'tie' existing tools together in routines. Thus, for design and designers, we iterate the points made by Kaptelinin and

Bannon [29] on supporting intrinsic design (rather than extrinsic design or design from 'nowhere' [60]). This extends to the technological level as well where there is, following [29, 46, 52], significant room for more ecologically oriented designs.

For researchers, and designers it becomes important to study and activate the ways in which communities name and talk about patterns. As a matter of fact we find the understanding of how communities, and people at large, talk about their technologies a somewhat neglected topic in Human-Computer Interaction at large, and in particular we believe that the focus on patterns could be one way for researchers and designers to help develop community practices qua conceptual development combined with the possible introduction of new technological artifacts.

5.6 Summary

In addition to presenting patterns and discussing routines, we have argued that this is the preferred level at which to talk about community technology, rather than, for instance, at the level of a tool, or the level of an entire ecology or activity. In this manner we see patterns as a supplement that is almost orthogonal to analyses of specific community artifact ecologies [41] or functionalities of platforms [12].

This way of addressing patterns is a way that connects the inner functioning of a community; its routines, regularities, purposes, language and tools, with the development of the community in terms of ways of sharing ways of doing and particular activating technologies, as well as with extrinsic activities be these community research or design of technologies for communities.

6 CONCLUSION

We have proposed a re-purposing of patterns in community settings to shift away from the problem-solution framing towards patterns as a way of both framing a researcher's understanding of commonly found routines, and to provide hints and guidance for what to look for in a collective, from inside or outside the collective. With patterns of the nature identified here, we have been able to provide a level of discussing routines as something that is shared in collectives and that uses and is dependent on not one technological artifact, but several, that supplement and some times even substitute each other.

Though this process we have identified several kinds of future work, and in particular we find it necessary to explore more how this form of patterns may be activated in specific participatory activities involving researchers and possibly also designers. This makes it possible to bridge between the intrinsic and extrinsic use of patterns in supporting and developing how collectives use technologies. This needs however to be explored more. Patterns as we have proposed them also present a new way of focusing on the relationship between practices and technologies for research. Even here, we believe that more can be said and that it is possible to offer new ways of interim abstractions to help research point ahead to new technologies. This discussion is too extensive for the current paper and we aim to pick it up in later work.

¹⁵Project website: <https://pieproject.eu/>, Platform: <https://commonfare.net>

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