

Conceptualizing Virtual Collaborative Work

Towards an Empirical Framework

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Abstract. The purpose of this paper is to define the phenomena associated with virtual collaborative work from both a cognitive and social cognitive perspective. The authors put forth an approach that assumes all people are natural sense-makers, sense-givers and organizers. The authors posit that the collaborative work we observe within both informal (ad hoc teams or communities) and formal (organizational) environments derives from fundamental, ubiquitous cognitive and social behavior intimately tied to context-specific problems or situations. The paper begins by challenging the need to re-define terms like “virtual” and “team” in a manner which works to subtly shift the focus of study from “proximal vs. distributed” to the more fruitful “fundamental behavior vs. technological constraints.” The paper then presents a framework for virtual collaborative work and discusses its implications on issues related to teams, leadership, creativity, and the design and use of information technology.

1 Introduction

In a very short period of time the Internet has become the primary environment for organizing and coordinating virtual collaborative work. The potential for this globally networked hyperspace is truly immense; thus, it is fruitful for scientific research to address the issue of how to structure this environment in a manner that maximizes the effectiveness and efficiency of collaborating. It is safe to assume that

face-to-face and virtual environments are different. However, we are slowly learning about the relative merits of these two environments and the significance of these differences. We assume that the differences of most significance are those that lend insight into how each environment constrains natural collaborative processes. This leads to the question of which constraints associated with a face-to-face environment should be applied to structure the Internet and which constraints, unique to the Internet, need to be further developed in order to optimize collaborative work. This is in contrast to, for example, following the constraints suggested by the technology itself, or carrying forward constraints inherited from print and broadcast technologies, or assuming that organizational constraints developed in face-to-face contexts are equivalent for the Internet. The aim of this paper is to present a new perspective on collaborative work based on the assumption that natural, ubiquitous collaborative processes exist and suggest that it is upon these processes that research on teams, leadership, creativity and the design of new technological environments should be centered.

As a recent historical lesson, virtual reality (VR) research was being fully funded before the emergence of the Web. VR was envisioned as having a very realistic but nevertheless simulated world in which a user or users would move around and interact with actual or virtual counterparts. This vision and the research approach for developing it was very much a technology-driven effort (a solution looking for a problem). What dramatically reduced the funding and interest in VR however were human sensory perquisites, for example, very exacting synchronization between visual and auditory cues which was one of the causes of “simulator sickness” in virtual environments [1] and the huge expense required to meet these requirements. Although this represents more of an ergonomic issue, we believe that a lesson to take away from VR research is that we need to look carefully at the human perquisites for collaborative work on the Internet earlier rather than later. In other words, we should apply inherited constraints, as they are applicable *only after* we have addressed the baseline human perquisites. The relevant human perquisites under consideration for collaborating would be mainly cognitive and social rather than ergonomic given that thus far the Internet does not emulate the sensory presence of VR.

As we look at the emerging research on virtual collaborative work, we note that it is relatively common practice of any scientific research domain to construct terminology that works to reify commonly referenced phenomena [2]. Scholars within the domain of “virtual organizing” have already begun this reification process [3, 4, 5]; not unlike many domains, they have chosen to reconstruct the meaning of terms that have previously been reified by larger communities—those composed specifically of actual “workers” within organizations—for the purposes of communicating within the smaller communities of scholars interested in studying organizing. The codified results of the larger communities can presumably be found in a number of commonly published dictionaries while those of the academic communities can be found in, for example, peer-reviewed publications. Ultimately, these larger communities populate the organizations and—hopefully—“practice” what the academic community is “preaching.” In the spirit of Peter Drucker’s educated person [6], we wish to explore the vernacular before moving too quickly to the reconstruction of commonly communicated words. It is through such terminology that we feel the notions, theories, and findings of scholars will most

likely be communicated to those who work within the organizations that operate within the larger marketplace (corporations, not-for-profit organizations other than universities, etc.).

More importantly, it is through the application of the *relationships among the phenomena* to which these concepts refer that enable an academic community to create a more valid understanding of our world. We challenge the need to reconstruct the meanings of commonly used terms like *team*, *organizing*, *virtual* and further suggest that the inherent tensions between the vernacular and uses within academic communities helps to illustrate the tensions inherent in the phenomena of interest. We suggest that, although it is common *practice* to apply these terms when referencing a seemingly “common” phenomena, that the referenced phenomena itself is being too easily overlooked. For example, this appears to have led to a common practice of treating the notion of a “team” as a “black box” in much the same way cognitive psychology references terms like “attention” and “memory” (but for different reasons), [7, 8, 9, 10, 11, 12, 13]. While we agree that it might be functional and/or practical to do so in some cases, we hope to open the black box of virtual collaborative work—if only to “take a peak”—to see if we can better understand (1) what the phenomena are, (2) how they function and interrelate and (3) explore the implications of various composition and behavior factors on “virtual collaborative work.”

Continuing with our example, the term “team” is a relatively new idea, at least as applied to people. According to etymological dictionaries, “team” first appeared, in the mid-1550s, in the context of a group of animals harnessed together to pull a wagon or cart (actually, the term has German roots). The first time the metaphor was applied to people, in 1828, it was recorded in the Oxford English Dictionary as “teamwork” (“a group of people acting together to bring suit”). In any case, collective life [14] involved well-understood roles and functions for participants.

There are at least three types of advantages associated with having a group of individuals strive for the same goal: Sheer strength in a brute force sense, as in a team of oxen (a sales-force, [15]); and comprehensiveness in the sense of ‘two heads are better than one’ (a collective mind, [16]); or a combination of both in the sense of most team-based competitive environments (a team-based athletic environment, [17]). It is important to point out that behaviors pursuing one of these advantages can interfere mightily with behaviors pursuing the other. The modern organizational term is seemingly a metaphor derived from a “team” of oxen, that is, one where a common control and orienting mechanism are paramount [18]. And there seems to be a dearth of conceptual work focusing on the phenomena themselves that work to *naturally* “yoke” individuals to each other. Certainly the type of task (known parameters versus unknown parameters) makes a difference in which behaviors are appropriate. Performance criteria (mostly efficiency criteria from a management perspective) exist, but these criteria provide no insight into which behaviors actually maximize the effectiveness (outcome measures) *and* efficiency (process measures) of team efforts through organizing manipulations. The behaviors in between, specifying the task and examining outcomes, are in a “black box” that obfuscates those phenomena. It would seem that understanding these behaviors and being able to argue for one over the other is the essence of organizing and managing.

We treat the individuals on teams as if they are still somehow “yoked,” but seemingly less directly so than a team of oxen joined by a wooden yoke that functions to *physically* join them and facilitates direct control. In terms of being physically yoked, humans are not literally tied together and are often not even co-located but rather are loosely joined through some form of Information Technology (IT), Internet-based or otherwise. At great remove we might assume that the human team members have more autonomy than, for example, a team of oxen. But do they? Both the oxen and humans are yoked. The oxen by physical yokes and the humans by behavior that is collaborative in nature, something by which the oxen are simply not capable of being tied. To the oxen we physically place a wooden yoke across their shoulders. As we discuss below, to the humans we present “the problem” (to solve). However, it seems that control remains a central issue. With oxen, we steer the yoke itself and the oxen follow accordingly. With people how do we know what to control and why?

The popular notion of virtual collaborative work—groups of people “linked” by network technology—is becoming pervasive. We suggest that the tension inherent in the definition (and application) of *virtual* helps one to remain vigilant to the fundamental issues related to, for example, *virtual* teams. That is, we believe it is more fruitful for researchers to focus on “the essence” of the phenomena as it is, in this case, the essence of a team (that which works to yoke individuals) to which “virtual” refers. Otherwise, we could intuitively “see it” and “hold it” and simply call it a team. Virtual implies that you cannot intuitively “see it” or “hold it” *yet* we would still assume or perceive a functioning team. What is it about what teams do that allows this to happen? It is on this essence of virtual collaborative work—specifically, the action of collaborating—that we focus this paper.

We proceed by suggesting that researchers’ first move the focus of research on collaborating, from that of individual differences and how these differences interact across multiple contexts (team dynamics, [5]), to that of differences across multiple contexts of “problems” and how they interact within the dynamic of ubiquitous human behaviors. Further, we propose new applications and refined definitions of previously used terms. We then proceed by showing how this shift of focus from individual differences to ubiquitous behaviors has implications on how one might perceive “team,” “leadership,” “creativity” and the design and/or understanding of technology.

2 Towards a Conceptual Framework Suitable for Inquiry

In this section, we develop a framework by articulating a series of assumptions and definitions of terms while articulating how they combine to form a new framework for the discussion and study of virtual collaborative work.

In order to frame our assumptions and definitions, we will introduce the framework here and then proceed by further defining its components. The framework centers on the assumption that if all of its aspects are appropriately addressed then collaborative (team-based) behavior will result. Determining the reliability, effectiveness, and efficiency of the resultant behaviors is intricately tied to context (the problem being addressed, expertise or experience of the respective team

members, technological constraints, etc.); thus our concern is with the nature of collaborative behavior that we posit to be fundamental to being human.

While teams are often defined by their membership or collective expertise, we place “problem” at its nexus and view team as more of a series of collaborative behaviors geared to address a *specific* problem that is a common focus of its members. Otherwise, we would simply have a collection of individuals. While we do not question the validity of approaches characterized in terms of, for example, traits, personalities, skills, or structure, we suggest that an undo amount of variability, complexity, and ambiguity is introduced by trying to balance such vast array of potential variables. These variables focus on the group members’ characteristics to specify behaviors and performance rather than on the problem or task context. We choose to focus on behaviors from the perspective of the problem or task because we posit that the behaviors are ubiquitous across all humans and that they are robust behaviors that do not vary when viewed at a fundamental level: sense-giving, sense-giving and organizing. These components are discussed below in detail. However, for now, it is sufficient to discuss these components in general terms.

We begin by juxtaposing individual notions and collective notions of sense-giving [19, 20]. In general, we assume that humans construct meaning (or “their reality”) based on previous experience [21]. We assume that this process cannot be inhibited voluntarily or otherwise. If one is cognizant, one is sense-making. Whether “making sense” to others around them, or not, they are sense-making. Sense-giving is essentially redefining problem and constraints in such a way that others are able to sense-make in a more reliable, effective, and efficient manner, or not; the existence of sense-giving behaviors is not dependent on the outcome. Unlike sense-making, sense-giving can be inhibited by self-imposing or imposing an array of constraints (intentional behavior working to inhibit communication). However, we would view a case where collaborative behavior exists without any sense-giving behavior to be rare, if even possible. Finally, these behaviors require a type of structure in which to work. These structures can be imposed as in a formal structure and regulations of an organization [18] or emerge as in social practices [22, 23].

We suggest that collaborative action will result if a group of individuals experience all of these components in a *functionally similar manner*. Each is intricately tied to the other as sense-making, sense-giving and organizing; all interact in a manner that complement each other and the problem at hand (to a small or large degree). A functioning *team* is a case of collaborative behavior where shared experience outweighs that of individual experiences requiring “over-writing” before becoming functionally compatible [21].

We suggest that system design should align with these behaviors as opposed to designing technology with an implicit reliance on the robustness of these behaviors as they interact with the technology. In short, we suggest that systems should not become a problem, but a constraint reinforcing sense-making, sense-giving, and organizing. People will “figure out” how to address a problem whether technology enables them to or not—again, humans do this naturally. We suggest, however, that design not impose complexity into the issue of how to organize or how to redefine the problem *given the technological constraints*. Instead, it should simply enable people to address problems in as natural a way as possible. It is this “natural way” we wish to expose and eventually apply to system design.

We now move to a more detailed description of the components of this perspective with the hopes of adding clarity, but also moving a seemingly intangible overarching discussion of collaboration to one that is tied to specific definitions and assumptions. We believe that progress within this area (and field) can progress after the discussion results in a set of agreed upon definitions and assumptions from which to build theory and then application.

2.1 Assumptions and Definitions

To begin, we need to specify several assumptions and definitions related to sense-making, sense-giving, and organizing that anchor our cognitive and social cognitive perspective.

2.1.1 Sense-making

- The existential human condition is to make sense of a constantly changing environment in order to survive and prosper [19, 24]. Making sense of changes in the environment makes this essentially a creative cognitive behavior. In other words, sense-making is the cognitive observational behavior that is the antecedent to action [21, 24].
- All behavior is focused or “situated” in terms of a specific situation [19, 21] or problem [25, 26] as perceived by the individual(s) involved. This means that cognizing is “about” some set of conditions that are anchored in time and space.
- Individuals cognitively perceive sets of changing or novel conditions as a projection into the future from their current time and space context¹. Often (but not always) this projection can be seen as having a desired outcome in terms of specific situational conditions and/or in terms of values desired. This projection is a dynamic representation, one having sequential temporal conditions, of the perception(s) and is a socio-cognitive construction grounded in past sense-making (both direct and vicarious). We call this construction a “problem” which is a preliminary product of sense-making that is necessarily constrained by the past experiences of the individual. In a very real sense, this existential behavioral sequence is the beginning of a logically necessary sequence of steps we call “organizing” which begins with defining the problem.
- Constructing a problem definition essentially means to accept (or create) a certain set of constraints over all possible perceptions as well as envisioning a desired end-state or goal.
- Subsequent to constructing a problem, other constructions are possible if the individual decides to address the problem (ignoring it is much more likely

¹ Dervin [19] has pointed out that we often do this from a point in time/space prior to the present. For example, when we find ourselves in a problematic situation and we might ask: “How did we get here?” Clearly, this is projecting from the past into the present.

in practice). Various solution scenarios are constructed in terms of steps² and sequences of steps that might be taken. Some of these steps involve seeking resources to help better determine additional steps and potential outcomes.

- Resources can include other individuals who have better or more experience with similar problems and these resources are tapped directly either face-to-face or via some technological interaction medium, or indirectly via information or data. The experience, whether direct or indirect, must be substantively related to the problem at hand; all else constitutes noise—whether perceived or not.

2.1.2 Sense-giving

The foregoing addresses the sense-making of an individual, which must precede involving other people. Sense-giving [13, 20, 27] now becomes essential.

- Collaborating with others improves the observational and movement potential of individuals [19, 24, 28, 29]. This means that others have more or different experience and multiple perspectives increases the chances to prosper [21, 24]. From this perspective, collective action becomes a more probabilistic event rather than a proscriptive sequence of actions.
- Being human implies a fundamentally collaborative “stance” towards one’s environment. In other words, “reality” is socially constructed [31] and maintained through interpersonal collaborating.
- This stance is realized largely through linguistic interaction throughout one’s life. Cognitively, this collaborative interaction can be seen as a series of language-based sense-making and sense-giving behaviors (e.g., listening and talking) with others.
 - Language is a very general notion and includes all symbols and/or signs intended—whether explicitly or not—to convey meaning.
 - A meaningful utterance [32] is composed of BOTH a topic (or what I am talking about) and a comment (or what that topic means to me).
- Sense-giving is NOT an automatic function of presenting meaningful utterances—it is a negotiation of meaning that is most effectively *and* efficiently accomplished in conversation (i.e., people talking and listening to each other either face to face or via technological media) about a particular problem or context [33]. There must be a certain amount of agreement (both definitional and procedural) among the individuals involved in order to proceed.
- Others are seen as knowledgeable to the extent that they have more or better experience in the past with the problem at hand or because they have experience with other step-taking behaviors (e.g., sense-giving, planning, technical skills, etc.). Knowledge then is experience with the problem at hand or related problems [21].

² We employ Dervin’s [19] (see also [24]) notion of “step” to refer to any cognitive behavior, i.e., the cognition preceding action or movement. We wish to avoid the confusion between Kaplan’s [30] “act meaning” and “action meaning.”

- Information and data resources are technological artifacts of past sense-making efforts (therefore are vicarious or indirect) and are intended (not always successfully) as sense-giving resources.
 - This type of resource is very often less accessible in a sense-giving fashion because the basic sense-making/ sense-giving dynamics are absent (and usually assumed). Specifically, while “topic” is usually explicit, the “comment” relationship between the artifactual resource and the problem solver(s) is not negotiable as is practiced routinely in a face to face interaction.
 - This type of resource is also much less accessible because of the forms we have inherited from publishing and broadcasting technologies. For example, the one paragraph that might be useful is buried in a book that is in turn buried in a collection that is only accessible efficiently through a type of organization logic (e.g., Library of Congress Subject Headings) that is not natural in the same way that face-to-face sense-giving and sense-giving are.

2.1.2.1 Task Scenarios

As resources (human or artifactual) address uncertainty in defining a problem, it becomes possible to construct potential solutions to the problem, which we will call “task scenarios.”

Collaboratively, task scenarios are potential solutions in the form of steps taken over time.

- In arriving at agreement on the selection of steps (individual or collective behavior), selection and type of resources needed (including other people), roles, sequencing of steps, and dealing with coordination among them [34] it is likely that criteria are articulated (or assumed).
- Before a specific task scenario can be chosen, agreement or buy in on each of these dimensions is necessary in order to functionally define the task. The task represents an agreed-upon method of movement that constitutes the functional constraints on the task and those involved in its solution.³

2.1.3 Organizing

Establishing steps, selecting resources, defining roles, sequencing steps, and articulating criteria are all organizing behaviors.

- Organizing behavior is emergent and ongoing [20]. Organizing is an existential set of behaviors that occur naturally in individuals and groups.
- Constraints to organizing originate internally (limited by an individual’s experience/expectation or by agreement among members of a group) or externally (formal organizational structure).
- Organizing is a subset of sense-making and when more than one individual is involved, then sense-giving and negotiation of meaning become paramount and pervasive.

³ See Kim [14] for a more thorough discussion of the logically necessary temporal sequence of agreements in collaborative or team organizing.

2.1.4 Problems, Tasks, and Constraints

So far, we have specified both problem and task as sources of definitional constraint. In order to actually begin the task, we also need to address functional constraint. Policies, rules, norms, cultures, practices, etc. are all functional constraints on problem solving behavior. Given our assumptions that sense-making, sense-giving and organizing are all natural behaviors mandated by a constantly changing environment, constraints function to *cognitively bind* the individual to the group and the group members to each other as they work to define and eventually act. These restraints are necessary for effective and/or efficient results, otherwise the probability of productive movement would be prohibitively small.

3 Implications

In the following section we will explore the implications of this position on some perennial research foci associated with virtual work to illustrate our conceptual framework. Specifically, we will briefly look at the concepts of teams, leading, and creativity. In addition to addressing implications, we hope to illustrate how this perspective can be viewed as more valid both conceptually and pragmatically. From a systems perspective, these implications will likely not be seen as crucial. However, from an organizational perspective, the implications for linking organizational behavior (managing) to system design is of considerable importance so we include this discussion here to address this pragmatic concern.

3.1 Team

Teams are viewed as the primary working unit within any organization. Following from our argument, teams should emerge from a problem definition because a team is a collection of resources appropriate for a given task. Team composition, “team dynamics,” “teamwork,” and related notions of “team behavior” all follow from problem definition which works to constrain the naturally occurring behaviors of sense-making, sense-giving and organizing. In other words, defining team absent a specific problem or task is relatively meaningless given the necessary relationship between “a team” and the problem context. In this sense, teaming is a sub-set of organizing behavior.

Thus, attempts to “manage” a team potentially work to interfere with a naturally occurring process centered on *the problem*. In this sense, it would potentially be more beneficial to “manage” the problem as opposed to the people who are naturally making and giving sense as well as organizing. Although subtle, this *shift* in perspective will produce better outcomes than those derived from perspectives focused more on “control,” “stability,” etc. of *people*. Experience has shown us that controlling people is even more difficult and fruitless than herding cats. (We can’t even get people to read the manual!)

For example, research on highly reliable organizations [35] focuses on teams charged with managing specific problems such as nuclear reactors, landing an airplane on an aircraft carrier, and surgery on a patient. They succeed in spite of the high probability for negative outcomes. It is important to note that these tasks are

relatively constant over time, enabling a continuous and nuanced refinement of both problem and task definition. Counter to this type of scenario are those that involve a continuously changing problem like those found in any for-profit competitive environment. While many perspectives on “team” and how to “manage” a team suggest that they require a top-down, mandated structure, they often do so in the absence of discussing the centrality of problem. Yet, in such a context, problems are constantly changing or evolving leaving the practitioner in the position of “chasing” the problem with this or that team as opposed to “owning” the problem and allowing individuals to “figure it out.”

3.1.1 Leadership

Stemming from the more traditional perspective on teams, leadership is viewed as central, often assuming leadership to be a quality of *an* individual (the leader). As noted above, leading is a sense-making, sense-giving and organizing behavior making it fundamentally similar to all other behaviors associated with a given task. The implication of our perspective is that leading is nothing more than a more pronounced and recognized form of sense-giving although one that is often informed by constraint from beyond the scope of the task (budget, legal parameters, etc.). It is important to note that this behavior can be shared or distributed, as the problem requires. In other words, leading results from the focusing on a common experience and reconstructing it in such a way that others now make different sense of the experience than they did before. This can result in not only differences in perception, but also differences in how the problem is commonly defined. Once this “shift” has been made, appropriate shifts in task definition and organizing will follow. Additionally, the presence of a “leader” becomes less important than the presence of *leading behavior*, regardless of its source.

The implication is that behaviors can be identified that effectively address the perquisites of the problem at hand regardless of whether or not the behavior is performed by a single individual or by a number of individuals. This allows for one team member to have more experience with the problem at hand without necessarily being responsible for all the leading behavior; in essence this allows for more distributed responsibility for leading behaviors. Particularly in virtual environments, this opens up many possibilities for efficient and effective collaborating. An organization’s ultimate performance is based on the manner in which the problems that define that organization are addressed rather than by personality-level characterizations of the individuals involved *per se*.

3.2 Creativity

Similar to our conceptualization of leading, creative behaviors are sometimes appropriate for certain problems. Creative behaviors essentially transcend existing constraints that generate potentially useful, if different, steps, roles and sequences of steps in a given problem or task definition. (This is why outside consultants can be very effective). This is especially useful in open-ended tasks or tasks that have changed so much that existing constraints are dysfunctional. We explicitly include creativity because of the need to respond quickly to changing conditions (for

example, agile manufacturing, emerging IT) and to avoid carrying over constraints from one problem to the next. Explicitly rewarding creativity as a matter of course improves the probability of a team's efficient and effective problem solving in a manner that is not as limiting as a one-size-fits-all physical yoke.

4 Methodological Discussion

In inquiry, there are “stages” of understanding that have a logically necessary sequence. For example, we must be able to accurately *describe* a phenomenon before it can be *explained*. Likewise, we must be able to adequately explain a phenomenon before we can *predict* it. All too often methods are employed that do not take this logical necessity into consideration and so we see an experiment conducted (probably in order to employ quantitative measures) before there has been adequate description of the basic phenomena. The importance of virtual collaborative work to modern society and organizations is such that we strongly advocate beginning with some robust description. Given how recently the Web was introduced to the public (April, 1995) and the present near-ubiquitous use of it, we feel it especially important for scholarly inquiry to proceed on a firm descriptive foundation based on a clear, coherent conceptual framework. This is especially important for influencing future technology design.

Given that efforts to date have employed terms like the metaphorical “team” without coherent conceptual specification, it seems clear that we must begin with some descriptive studies to better understand specifically what behaviors fulfill sense-making, sense-giving, and organizing functions in effective virtual collaborative work.⁴ Similarly, we need to describe specific control mechanisms and the interactions among them to establish the relationships between organizing behaviors and teamwork behaviors. Finally, we need to describe the advantages and disadvantages of different existing information and communication technologies to support the sense-making, sense-giving, and organizing in virtual teamwork.

5 Conclusions

In this paper we attempted to specify the phenomena associated with virtual collaborative work from cognitive and social cognitive perspectives. We put forth a series of definitions that assumes all people are natural sense-makers, sense-givers and organizers; we posited that the collaborative work we observe within both informal (ad hoc teams or communities) and formal (organizational) environments derives from fundamental, ubiquitous social behavior intimately tied to context-specific problems. The paper began by challenging the need to re-define terms like “virtual” in a manner which works to subtly shift the focus of study to “proximal vs. distributed” from the more fruitful “fundamental behavior vs. technological constraints.” The paper then presented a framework for virtual collaborative work and discusses its implications on issues related to teams, leadership, creativity and

⁴ Please see [36] for an illustration of this kind of methodological approach to generating a descriptive structure suitable for structuring virtual collaboration designs.

the design and use of information technology. We now conclude with some closing thoughts.

The approach put forth in this paper offers a new perspective on collaborative work and suggests that much of what we do as humans is (1) natural and (2) collective. Thus, it would benefit designers, users, managers and “leaders” to align strategies and expectations with these naturally occurring behaviors. While we realize that we are advocating a slight shift in perspective from “people” to problem, we also realize that it is this subtle shift combined with the potential for better outcomes that makes it worth sharing, discussing, and pursuing. It is in this manner that we will be able to align multiple perspectives as they would all be tied to a common problem, common behaviors, and, at a fundamental level, a shared process for understanding any context. Ultimately we believe that this approach will allow us to provide user-based structures for virtual collaborative work in a coherent, effective and efficient fashion.

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