Using the Deictic Function of Pronouns to Map Perspective and Knowledge in Research Design: A Study of Computer-Supported Cooperative Work and Participatory Design in a Multinational Enterprise Context

Abstract

The purpose of this article is to illustrate how the deictic function of Pronouns in language can be applied in qualitative research studies, in order to unfold knowledge zones acquired through different perspectives. In illustration of the method, the different types of knowledges needed when building software for computer-supported cooperative work (CSCW) across organizational departments is mapped and analysed. Working with the assumption that knowledges are obtained via different perspectives, the deictic function of Pronouns in language is used to unfold a four-quadrant model of knowledge zones known as the Götheborg IV or G4 model. This four-quadrant model helps to identify various perspectives that can be applied in a participatory design (PD) framework in building a CSCW environment. This article illustrates how relative perspective and knowledge can be defined and applied in a systematic manner towards creating a better CSCW environment. This study uses as example, three departments in a European based MNE that collaborate daily with each other in serving their global customer base. At the broader contextual level of qualitative research design and framework of analysis, the relativity and dynamism encompassed by the G4 model potentially allows for the model to be applied in differing contextual situation towards prescriptive purposes.

Keywords: Research Design, Linguistics, Human-Computer Interaction, Participatory Design, Knowledge mapping

Introduction

In a multinational corporate working environment, a consistent main challenge in project management seems to be able to accommodate and account for the diverse points of view of individuals wants and needs, especially in a context of increasing work load pressures and shared technological platforms across departments. As a qualitative research design framework that could perhaps be transferred as a model for future project management frameworks, the purpose of this article is to illustrate how the deictic function of Pronouns in language can be applied in qualitative research studies, in order to unfold knowledge zones acquired through different deictic perspectives. In illustration of the method, the different types of knowledges needed when building software for computer-supported cooperative work (CSCW) across organizational departments is mapped, analysed and presented in this article.

Working with the assumption that knowledges are obtained via different perspectives, the deictic function of Pronouns in language is used to unfold a four-quadrant model of knowledge zones known as the Götheborg IV or G4 model. This four-quadrant model helps to

identify various perspectives that can be applied in a participatory design (PD) framework in building a CSCW environment. The illustrates how relative perspective and knowledge can be defined and applied in a systematic manner towards creating a better CSCW environment. This study uses as example, three departments in a European based MNE that collaborate daily with each other in serving their global customer base. At the broader contextual level of qualitative research design and framework of analysis, the relativity and dynamism encompassed by the G4 model potentially allows for the model to be applied in differing contextual situation towards prescriptive purposes.

Re-perspectivising user needs analysis in human computer interaction: the case of European founded MNE TioNLabs

In view of increased company growth towards 2020, a European founded MNE, TioNLabs, expected sales volume in its product-service to more than double in the next five years. About forty persons across three departments had to coordinate their main tasks on a daily basis in order to bring their product-service to the end customer. This meant coordinating and consolidating different types of knowledges residing in different individuals across the departments. TioNLabs tasks are heavily computer-supported, and it requires hours of cross-departmental, cross-regional cooperation between its divisions. Their tasks can be said to characterize the core of computer-supported cooperative work (CSCW). Through combined division meetings of top managers, it was decided that improvements could be made to the software architecture platform shared across three departments that shared proximity in a common workplace. To that purpose, the consultancy service of a software architect company, WareCHI Ltd, to which I was part of the research design team, was enlisted to help create an overview of the current workflow between the three departments of TioNLabs. The active researcher perspective in this study presented is positioned from that of WareCHI. The goal of WareCHI was to make improvements to the existing software tools that would help improve work efficiency for TioNLabs.

WareCHI took a participatory design (PD) approach to this project pegged in a three months time frame for TioNLabs, wanting to integrate as many system user voices as possible when building new software infrastructure. Data was collected in a tripartite manner from the respondents that included (i) long interviews with semi-structured questions that allowed for the respondents to steer the conversation to what concerned them the most, (ii) questionnaires and (iii) focus group discussions with groups who shared specific software platforms for their coordinated tasks. The first steps of user needs analysis was intentionally designed to be inclusive, the goal was to involve all individuals from the three departments in the activity of building their future work platform.

WareCHI prioritized an action-based approach in this project. Efforts of data consolidation and user needs analysis focused mainly towards improvements in TioNLabs' software architecture. Many questions revolved around what the respondents needed in software improvements in order to be more efficient in their daily operations. It soon became apparent from data collected however that software support was one part of a larger work environment context towards efficiency and that the solution provided will need to account for two entities – (a) management under uncertainty / ambiguity and (b) the organization as a continuous learning entity that evolves – supported by a shared platform of computer software technology.

To that end, WareCHI had to go back to re-perspectivising their user needs analysis and research design to broaden their scope of topics to be addressed (not only looking at software related work activities) in TioNLabs if they wanted to manage their company growth towards 2020.

This article specifically addresses the realization that an integral perspective of the various facets of CSCW and PD is needed, if a solution was to be provided for a more efficient future work environment for TioNLabs, answering the question of not just what types of knowledges are needed to give a holistic perspective of computer-supported cooperative work (CSCW) that contributes to a more efficient work environment, but how to represent that in a visual model.

Literature review: computer-supported cooperative work and participatory design as evolving processes

CSCW and PD are core features of the research focus of the field of Human-Computer Interaction (HCI) studies (Jacko, 2012; Dirckinck-Holmfeld *et al.,* 2000). Positioned at the intersection of social / behavioural sciences and computer / information technology, the multidisciplinary field of HCI incorporates multiple types of knowledges, drawing from cognition science, behavioural psychology (Green *et al.,* 1996), organization studies and culture (Kyriakoullis and Zaphiris, 2016) and system thinking, with the view that users are relational entities embedded in a technological system network (Heimgärtner, 2013). To that extent, HCI can be viewed as emergent in two aspects. The first is that, as an entity, the field of study evolves. The second is that much of the research focus of HCI is the study of processes that in themselves have emergent properties. HCI processes exist and evolve in a context of uncertainty and change. The evolution of the field of HCI theories and research is described to now be in its third wave, characterized by an increasing dissolution of permeating technology between the work place and homes (Bødker, 2015; Adkins and Premeaux, 2014; Bødker, 2006). Technologies have become not just capable in handling more task complexities but they are also more integrated, embedded in distributed networked systems (Bødker, 2015; Berkowsky, 2013; Dirckinck-Holmfeld *et al.,* 2000).

The multidisciplinary nature of HCI research lends the field an eclectic and broad theoretical and methodological foundation not in the least because it contributes to novel approaches in managing knowledge for improving work performance as well as induces change in the organization's strategy, administrative processes and systems (Černe *et al*, 2013; Damanpour and Aravind, 2012). Prominent within the Nordic academic circles is action research and activity theory in studying system development. Beginning during the 1970s, Nordic scholars (or scholars that studied HCI from a Nordic perspective) studied computer-supported cooperative work (CSCW) and participatory design (PD) (Bødker, 1996) that focused not only on technology design tailored to the needs of the users, but rather had the users of technology influence the design and future applications (Ehn and Kyng, 1987). Beyond the Nordic circles, the perspectives of CSCW and PD are inherently user focused (Vines *et al.* 2015). User knowledge is tapped in various contexts, in terms of the challenges, problems and concerns they face not only when using software (Iivari, 2009) but using software in relation to its wider organizational context (Hyysalo and Johnson, 2015; Cordeiro-Nilsson and Hawamdeh, 2011; Heath and Lehn, 2008; Sharrock and Anderson, 1994).

Respondents and data

Three departments in a European founded MNE, TioNLabs, were studied. Data was collected from about forty individuals including department managers. As an active researcher, I make part of WareCHI, an external software architect consulting company engaged to help TioNLabs improve workflow efficiency. TioNLabs wanted their computer-supported tasks to be better coordinated between departments towards delivering a product-service to their globally located end customer. A qualitative approach to data collection and analysis was taken in this study. Semi-structured long interviews, were coupled with focus group discussions, two departmental meetings and questionnaires were sent to all respondents. The response rate for the questionnaires was seventeen. All long interviews were transcribed and a concordance software was used to sort for salience in topics. Salient topics are reflected in the four quadrants in Figure 2.

Method

Applying deixis in mapping perspectives and knowledge zones: the Götheborg IV model

With a myriad of perspectives to work with and various knowledges to uncover in the process of improving the workflow at TioNLabs, I turned to the study of language in use and the use of Pronouns in linguistic studies in order to systematically uncover the various perspectives of *I, We, It / Its* and the knowledge zones of these perspectives.

75% of the world's language typology currently includes a Subject, Verb and Object in its sentence construction (Crystal, 1990, 1997). In language, the use of noun, noun-phrases and pronouns in Subject position renders the various perspectives of actors or doers of an action, while noun, noun-phrases and pronouns in Object position denotes who/whom are affected by the action of a verb in a sentence.

Perspective relativity and dynamism in qualitative research design

Figure 1 illustrates the deictic function of Pronouns in language, unfolding into a dynamic four-quadrant model that encompasses eight different knowledge zones and basic research methodologies. Based on the deictic functions of language Pronouns, Figure 2 shows the G4 model four-quadrant knowledge zones in modelling a dynamic and relative perspective of CSCW and PD.

In this study, this four-quadrant eight perspectives model will be referred to as the Götheborg IV or G4 model (Fig. 2). The G4 model is an applied linguistics perspective to the Uppsala model of internationalization processes in the context of uncertainty and change (Cordeiro, 2016; Vahlne and Ivarsson, 2014; Johanson and Vahlne, 1977).

Each perspective is relative, and can encompass an intra- or extra-, singular or plural vantage points. These vantage points reveal multiple levels of knowledge zones, unfolded in the G4 model shown in Figure 2. As noted by WareCHI when working with TioNLabs, different types of knowledge are needed when building software for CSCW across the departments. In order to identify these knowledges, perspectives needed to be identified and defined. In this study, the following perspectives were adopted as entities of observation: the (i) Individual,

(ii) Group, (iii) Enterprise (MNE), (iv) Technology, (v) Group network (vi) MNE network and (vii) Technology system, Figure 2 illustrates the relative and dynamic dialogic interactions between these entities and how they form the larger context of CSCW and PD. The model is an illustration of some examples of perspectives and types of knowledge that are neither exhaustive nor mutually exclusive to each other. All entities observed are intrinsically related to the other. Technological systems cannot be built without the value commitment of the MNE and technology will not be effective if the users (Individual or Group level) have no say in how it is built or if they refuse use.

In the Upper Left (UL) quadrant for example, the perspective adopted can be that of the Individual user of the technology or the Enterprise (the MNE) when considered as a singular entity. In the Lower Left (LL) quadrant, the perspective adopted could be that of the culture of the Group as users of a technology or the intra- / extra- culture of the MNE. In the Upper Right (UR) quadrant, the adopted perspective can be defined as that of the Technology being investigated, and the corresponding Lower Right (LR) quadrant is the system of Technologies investigated, or else the social / business network of the Group / MNE.

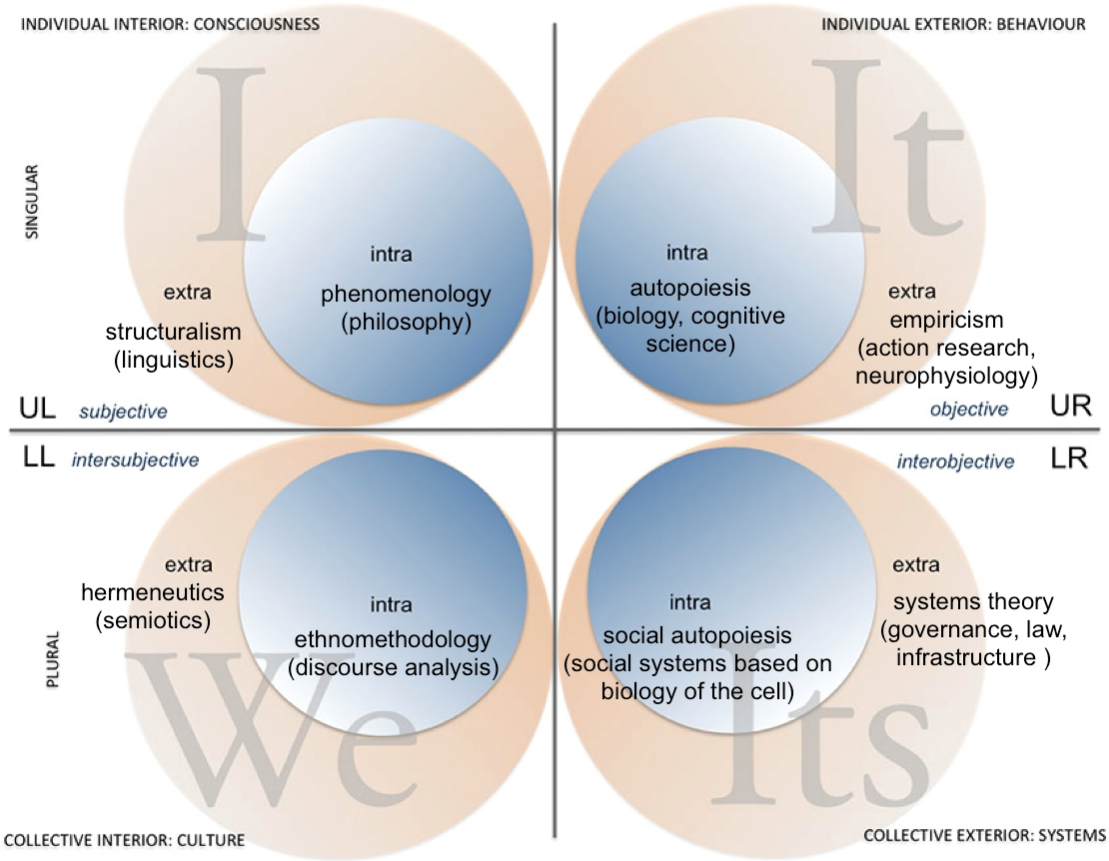

Figure 1. The deictic function of Pronouns, "I", "We", "It" and "Its" in language is used to map knowledge zones in a dynamic four-quadrant model. This model illustrates the basic eight methodological perspectives of research design.

Knowledge zones

The UL quadrant is the knowledge zone of the *subjective, individual*. The study of *You* is

implied if the adopted perspective is exterior to *I.* This zone pertains to individual interiors and if one were to take the perspective of the enterprise as a unit, the UL quadrant is the zone of organization ideology (vision) and psyche (commitment). This distinction is important in CSCW and PD in HCI because the behaviour of colleagues who share the use of a single software platform might influence behaviour and needs of each other. In order to obtain a more accurate overview of the workflow, knowledge of perspectives outside of the immediate user *I,* is needed. The Lower Left (LL) quadrant is the knowledge zone of the *collective, intersubjective*. This quadrant maps the collective interiors of the group or enterprise culture. The study of *They* is implied if the adopted perspective is exterior to *We.* These interior UL and LL knowledge zones can at times be expressed and observed in the exterior quadrants through behaviour and networks. The Upper Right (UR) quadrant is the knowledge zone of the *singular, objective*. This quadrant takes the perspective of the singular objective. This zone maps what can be observed exteriorly in the behaviour of the individual, group, organization or enterprise. This zone maps the predominant knowledge of much of action research theory and empirical work done within the field of HCI with regards to CSCW and PD studies. The Lower Right (LR) quadrant is the knowledge zone of the *collective, interobjective.* This pertains to knowledge about the collective exteriors of enterprise and firm structures and systems. Within HCI, this quadrant would map the potential interactions and influences between software systems for example when used in the context of TioNLabs, in reference to its enterprise software architecture.

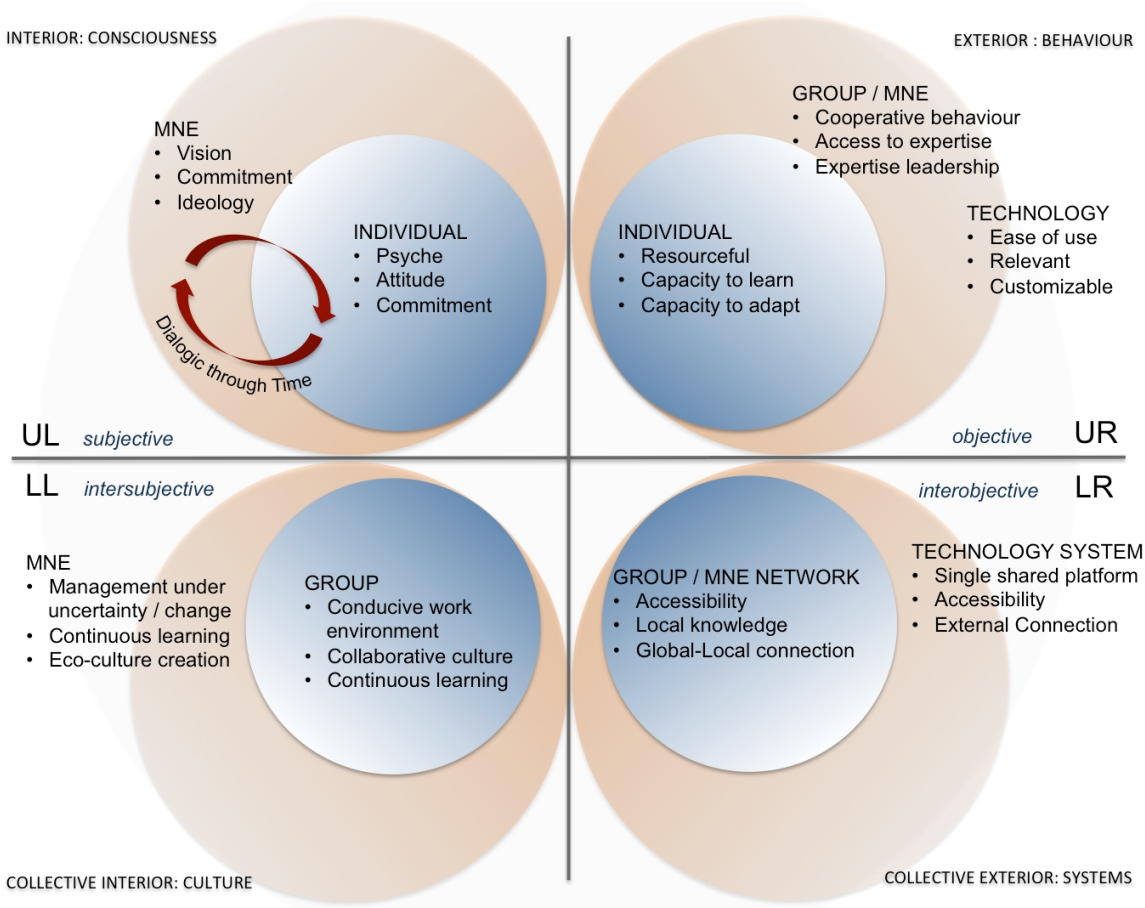

Figure 2. The Götheborg IV model: visualising relative perspective and knowledge zones in computer-supported cooperative work and participatory design in human-computer interaction.

Findings and discussion

Figure 2. visualizes the data from the study in the G4 model from the various perspectives and knowledge zones with regard to CSCW and PD in HCI. Reflected in the quadrants are the top three most salient topics of concern from each perspective studied, the other topics are explained in more detail in the sub-sections below.

The concept of Time is represented in the dialogic feedback loop arrows, indicating that all processes take place in and through Time that supports change. Although the dialogic processes are indicated in only the UL quadrant in Figure 2, the processes are understood to occur throughout the contextual fabric of all four quadrants, between the observed entities. Although the model presented looks fairly neat, in practice, the various perspectives are intrinsically related, with overlapping knowledge zones. These are a necessary as part of the evolving eco-system of CSCW, PD and HCI.

The Individual perspective and knowledge zone

Although many Individuals made the team, it was found that knowledge and expertise of the job and software use resided with the Individual. Individual knowledge at TioNLabs was dispersed across mainly two quadrants in the G4 model. The UL quadrant for example, reflected Individual knowledge in terms of the person's own interior consciousness and awareness of the context of situation. The cognitive maturity, adaptability to environment and person's dexterity towards the task is housed in this quadrant. These mindscape interiors of the Individual are often reflected in explicit sayings and behaviour reflected in the UR quadrant where in a Group, they come across as resourceful individuals who are helpful with the capacity to learn and adapt to a changing work environment with new technologies. TioNLabs currently have about twenty different software applications for daily tasks; most Individuals however use at most three different types of software on a daily basis. Their main concerns are that the software is easy to use and that it is relevant to their job. Important for them is also how easy it is to teach a newcomer how to use the software. A salient challenge for newcomers to the team or outsiders (department outsiders, suppliers or customers for example) is to find the person with the right knowledge and expertise for the task, or the one who has responsibility for the task.

The Group perspective and knowledge zone

Group perspective spans mainly the LL and UR quadrants, which is where organization culture at group level is situated and then reflected in-group behaviour. These quadrants put focus on a different type of knowledge needed when looking at CSCW and PD in building software technologies because the manner in which the group functions together, the values in which they hold, and how things get done (organizational procedures) are important contributions towards how work is organized and computer-software supported. To that extent a salient topic of interest for the group was sitting and office space arrangement so that they physical proximity to the colleagues they worked most with across departments would enhance their CSCW. A salient challenge at group level is reflected in the overlapping portfolios of the different departments. In the instance of departmental portfolio ambiguity, when supported by technological platforms, the technology might in effect become a barrier rather than facilitator of job tasks. In order to build a more efficient software tools and platform, group discussions are needed in order to define departmental scope and explicitly

state which functions belong to which group and assign or build appropriate computer-support tools for that purpose. The continuous group discussions act as buttresses of organizational change, because it is only through group meetings and departmental meetings that feedback is obtained and considered for future purposes.

Group leadership occurs at two levels, both of which are of equal functional importance to group dynamics and technology building. The first is the official leadership designation by title, the departmental manager, who holds an overview of administration for the department. The second is the shifting, facilitative leadership depending on context and situation. In this instance, the group gravitates towards the person with most expert knowledge and experience at the task to be team leader. This duo-level leadership fosters at Group level, an atmosphere of collaborative behaviour and helps build trust between departments.

The Enterprise (MNE) perspective and knowledge zone

Taken as a point of observation and an entity, the perspective of the MNE can be found in all quadrants pertaining to different types of knowledges. TioNLabs had a rather centralised decision-making MNE administration that influenced organizational projects to a large extent. The departmental changes in software application upgrades for example, would not occur without the vision and mission support of the MNE that channels finance into the project. MNE ideologies are the corporate values that are found not only in the home country but also across all subsidiaries of TioNLabs worldwide. The centralized decision making power of the MNE have advantages and disadvantages, the former of which is that if the MNE saw value in the activities of the Group level and lent its support, projects faced less barriers both internal and external to the MNE. Projects not supported by the MNE have been known to let die mid-way through its project timeline. It is a decision not easy to take, and can leave a large part of the talent resources disheartened. To that end, communication channels and thus the dialogic feedback loops are crucial for the functioning of the entire MNE eco-system supported by technology for work purposes.

The Group / Social Business Network perspective and knowledge zone

Group social and business network perspective occurs mostly in the LR quadrant. At a geo-physical level, where one would not think physical space mattered when building software for future CSCW, the knowledge in this LR quadrant directly reflects the intersubjective Group perspective in the LL quadrant where the respondents at TioNLabs indicated a clear preference to re-arrange their office workspace to better facilitate / coordinate CSCW across departments. This is so that the social networks across departments can be leveraged, outside of what everyone considered ‘work hours’ because daily conversations move fluidly between work related topics and private sphere related topics. A close social network facilitated by proximate workspaces would help in their everyday tasks supported by computer software. Time spent on a social basis at the workspace also gave creative space to ideas to build new software features. New ideas were said to often come forth during informal chats or coffee breaks at the office.

The Enterprise (MNE) Business Network perspective and knowledge zone

It is difficult for any task to be accomplished if not for either the existence of a social or business network that supports the efforts of the Group. The network perspective occurs mainly in the LR quadrant, with accessible knowledge connections between an existing web of TioNLabs’ international business network established through its foreign subsidiaries. To

that extent, the external consulting company WareCHI could also leverage TioNLabs' business network in order to help build the software infrastructure for TioNLabs' 2020 vision. Ideas from similar platforms from other Groups might be absorbed by the European based Group and implemented with a shorter lag time. Feedback from suppliers or customers can be obtained directly through TioNLabs' global local offices, which provide useful insight into new features that might need to be incorporated in the newer software architecture platform.

The Technology perspective and knowledge zone

The Technology perspective and knowledge falls in the objective UR quadrant. But to many respondents, Technology was object personified, so that when speaking, Technology could be seen as a collaborative partner in helping them do their job. It was not unusual that people put emotions into Technology, saying, "The software in my computer is throwing a tantrum, it's not talking to me today." Even if object personified, Technology is mostly viewed through the Individual or Group who is user and builder of the technology. The software envisioned for TioNLabs 2020 should be easy to use, easy to teach to a newcomer and it should empower the user. Technology that empowers was a salient topic for many respondents who thought that they should be given greater freedom to control how and what they used a piece of software for in their daily tasks. Parameters set on the software for them outside of their own personal knowledge made the respondents generally unhappy because they felt less empowered in their own work situation. In this sense, Technology, if not object personified, was seen as a tool, and an extended part of the human body space that enabled the task at hand to be completed.

The Technology System perspective and knowledge zone

The Technology System perspective and knowledge falls in the LR quadrant. The Technology System could refer to the shared software platform across the three departments at TioNLabs, but it could also be seen as the MNE's own global technological platform that comprised the Group's technologies. To this end, the MNE's technological system could be leveraged on a global scale, taking the technologies already available and in use in other parts of the MNE TioNLabs and applying it for their own cross-departmental use. A single shared platform might be part of TioNLabs' 2020 vision, but it is also here that the Group faces a myriad of challenges that include Individual commitment to change in environment or acceptance of new technology. Some Individuals and Groups prefer their own software architecture platforms as they exist, even if they agree "things could be done different and more efficiently", citing that the learning curve is more painful than is worth the time invested. So as much as the MNE has a Technological System that many Groups can leverage upon, the localization of the Technology will need some thinking and agreeing to by the users. From in-group challenges to Technological System change and implementation, to out-group perspectives on the Technological System – the respondents who worked closely with suppliers or customers tended to be concerned that their own Technological System should be compatible with those of their suppliers or customers. The platform compatibility would save time and would allow for certain synching of information across organizational borders, creating a smoother workflow. In order to do this, discussions will need to be held on a continuous basis together with the software architect of the supplier or customer organization in order to come to an agreement on what types of technological synchronization can be had to facilitate a sharing of information between organizations.

Conclusion

As noted by WareCHI when working with TioNLabs, in answer to RQ1 of this study, different types of knowledge are needed when building software for CSCW across the departments. Knowledges are obtained via different perspectives, so if the perspectives can be identified, the knowledge zone is easier to delimit and scope to be applied in creating a better CSCW environment that encompasses PD. The multi-dimensionality of the field is also encompassed in current HCI literature that acknowledges a rich cross-disciplinary theoretical foundation upon which the discipline is built. In the case of TioNLabs, feedback not only come from respondents on what they wanted in their future work tools, but contextual perspectives of the Group and the MNE together with their current technological platforms need be considered when building better CSCW environment.

This article specifically addresses the realization that perspectives and knowledges are relative to the point and entity of observation. By focusing the researcher lens on each perspective and in answer to RQ2 of this study, perspectives can be identified in a systematic manner, as illustrated by the application of the Götheborg IV or G4 model.

Although the findings as examples come from a specific instance of TioNLabs' software architecture, the features of the model are generic in that they illustrate the abstraction of dialogic between the different levels of perspectives and the various knowledge contexts for capturing the workflow of CSCW and PD. Because the G4 model is systematic in approach, grounded in the basic functions of language, the model can be used for prescriptive purposes. The relativity and dynamism encompassed by the G4 model means that it could potentially provide a reconciliatory perspective in the current third wave of HCI with the disappearing borders between work and home technological systems and use of technologies by first defining perspective.

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