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Effective communication in globally distributed Scrum teams

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Full research paper

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Abstract

Trends in information systems development include the use of globally distributed teams and agile methodologies such as Scrum. Globally distributed (GD) software development challenges team communication and adopting Scrum may exacerbate or reduce these challenges. Before we can evaluate effective communication in GD teams using Scrum, we need to know what effective communication means in that context. This study captures the understanding of effective communication of industry professionals working in GD Scrum teams based on interviews. From these interviews, we developed a model consisting of communication transparency, communication quality, and communication discipline that lead to the alignment of team understanding (i.e., a shared mental model). This paper contributes to practitioners' knowledge of effective communication in GD Scrum. The theoretical contribution of the study is a model of effective communication laying the ground for future research to evaluate the effect of Scrum practices on communication in GD contexts.

Keywords agile software development, communication transparency, communication quality, communication discipline, global software development, shared mental models.

1 Introduction

Information systems development includes the use of globally distributed (GD) software teams (Drechsler et al. 2019; Herbsleb et al. 2003) and agile methodologies (Baham et al. 2022; Maruping et al. 2020). The agile method Scrum is commonly used for systems development and using Scrum in GD software development is a recent trend (digital.ai 2021; Stavru 2014).

Effective communication is one foundation for success in system and software development (Defranco et al. 2017) and agile methods, in particular, require intensive communication (Alzoubi et al. 2016; Hummel et al. 2013). Traditionally, Scrum uses face-to-face interactions in small co-located teams with direct communication among team members and customers to facilitate successful development work (Strode et al. 2022). In GD agile teams, many of them using Scrum or its variants, face-to-face communication is limited and is known to be problematic (Alzoubi et al. 2016; Bundhun et al. 2021). Systematic literature reviews of agile research identify a lack of research on the social and behavioural aspects of agile development and specifically mention communication (Diegmann et al. 2018; Hoda et al. 2017). A systematic review by Alzoubi et al. (2016) of geographically distributed agile development, found many communication challenges and mitigation practices have been identified, but a significant gap in the research is to identify how efficient and effective geographically distributed agile development communication is achieved in practice. There is also a lack of theory development to explain communication in the context of geographically distributed agile development (Alzoubi et al. 2016).

To understand how Scrum improves communication in GD teams, we first need to understand what 'effective communication' means in this context. Improving our understanding of effective communication in GD Scrum teams by developing theoretical models of this phenomenon should help researchers understand effective communication in GD Scrum. They can then use this knowledge to identify Scrum practices, combinations of practices, and tools for effective communication.

Effective communication, in small teams and virtual teams, is well understood (Marlow et al. 2018). Communication practices in agile contexts have been explored (Hummel et al. 2013) and communication in co-located Scrum is understood to be a significant factor in supporting effective teamwork (Strode et al. 2022). Studies of communication in GD Scrum, however, are rare and do not define 'effective' communication, rather they identify the challenges and elements of communication (Alzoubi et al. 2016; Amar et al. 2019; Hummel et al. 2013). We located one case study of GD Scrum that mentions that Scrum improved communication in a large-scale distributed environment (Paasivaara et al. 2008). Therefore, to better understand effective communication in GD Scrum teams and provide a basis for future research evaluating Scrum's effect on communication in GD contexts, we posed this research question: *What is effective communication in globally distributed Scrum teams?*

We answered this question using interviews and qualitative analysis to explore the experiences of practitioners regarding their communication. The analysis led to a model of GD Scrum team communication with the elements of communication transparency, communication quality, communication discipline, and alignment.

The paper is organised as follows. We review current knowledge of effective communication in GD teams and GD Scrum teams. We explain our method including, sampling, data collection and analysis. We then present a model for effective communication in GD Scrum teams. We answer the research question and explain how the model contributes to existing knowledge on effective communication in GD Scrum teams and to practice. Limitations are addressed. We conclude with a summary of the key findings and consider future work.

2 Literature Review

2.1 Communication in Globally Distributed Teams

Communication is a recognised challenge in all forms of globally distributed teams because physical, in-person, face-to-face interaction is rarely possible. Gibson & Gibbs (2006) argue that communication challenges among virtual teams are caused by different native languages, different national and organisational cultures, time differences (e.g., time zones, work schedules), and geographical distance. For example, team members may lack adequate English-speaking skills (English is the language used in software development worldwide), cultural differences can embarrass and cause misunderstandings between people, and the difference in time zones can make it challenging to participate effectively in meetings due to biological sleep needs. Using mathematical modelling, Espinosa et al. (2003) showed that software development teams working in the same office are more efficient than distributed teams. This may be because face-to-face interaction is generally replaced with online interaction. Technologies

such as online video conferencing are popular and convenient for physical face-to-face interaction and meetings, but this technology can impede the spontaneity and richness of the physical face-to-face interaction needed for novel and complex tasks such as software development (Dennis et al. 2008). Problems are not just a lack of face-to-face communication. Anwar et al. (2019) reported multiple barriers and facilitators that affect knowledge sharing in global software development. Their literature review of knowledge-sharing studies from 2010 to 2017, reported 22 individual, technological, organisational, cultural, and geographical barriers to knowledge-sharing in global software development organisations, and 20 knowledge-sharing facilitators.

Effective communication in GD software development was studied by Bhatti et al. (2017). Their four-factor model for effective communication in GD software development model contains stakeholders' involvement (where stakeholders are external parties providing requirements), acculturation, usage of appropriate tools and technology, and information availability. Their model focuses on practices that enhance communication rather than defining the components of effective communication. Although potentially useful, the model focuses on communication in GD software development teams and its applicability to Scrum teams is not clear.

2.2 Communication in Globally Distributed Scrum Teams

The agile method Scrum is described in the Scrum Guide (Schwaber et al. 2020) and the founder's book (Schwaber et al. 2002). These guides describe Scrum for small co-located projects and teams. For large-scale software development, SAFe (Scaled Agile Framework), LeSS (Large-Scale Scrum), and SoS (Scrum of Scrums) are available (Ebert et al. 2017). No specific Scrum-based methodology is designed for distributed or globally distributed development but Scrum is now adopted in global software development (Vallon et al. 2018).

The agile manifesto states that "*The most efficient and effective method of conveying information to and within a development team is face-to-face conversation*" (Beck et al. 2001), and many Scrum practices are designed to facilitate effective team communication. Co-location is recommended to support unscheduled group and one-to-one communication, and frequent regular meetings such as sprint planning, reviews, retrospectives, and daily stand-up meetings ensure that the whole team is aware of the project and product status.

Effective communication in geographically distributed agile software development can positively influence both project functionality (i.e., functional requirements are met) and quality (e.g. customer satisfaction) when using agile enterprise architecture, as reported by Alzoubi et al. (2020). When focusing explicitly on GD Scrum, however, a single case study by Paasivaara et al. (2008) reports that Scrum improved communication in a large-scale distributed environment. Other studies report challenges. Dorairaj et al. (2011) explored communication challenges in GD agile software development teams based on the experiences of 18 practitioners working on 14 projects using Scrum and Scrum hybrids. Their study found a lack of appropriate communication tools, poor teamwork, time zone differences, and language issues were key challenges. Stray et al. (2013) in a case study of multiple teams, found that daily Scrum meetings are critical to ensure a project completes successfully because they are the way the team stays in touch, assists each other, conducts their tasks, and discusses problems. A large single-case study of agile global software development by Stray et al. (2020) reported that scheduled Scrum meetings and Scrum-of-Scrum meetings, unscheduled meetings, and using the communication tool Slack ™ facilitated communication. These few studies of GD Scrum focus on communication challenges, practices, and tools. They focus on the elements of communication in general rather than understanding what 'effective' communication means in GD Scrum contexts.

Amar et al. (2019) presented a theory of communication for Scrum-based distributed projects. In that 5C model, the components that influence communication are competency, correlations, contentment, comprehension, and commitment. The findings are based on 25 interviews conducted in various geographical regions. The 5C model consists of actions or practices that contribute to communication, e.g., 'planning and scheduling, 'promptness', and 'managing workload'. The 5C model does not explicitly define 'effective communication'.

In summary, we found no study that defines effective communication in GD Scrum. Therefore, we chose to address this gap, and better understand what 'effective communication' means in GD Scrum based on the experiences of those involved.

3   Methodology

This study aimed to understand effective communication in GD Scrum teams. We chose to use in-depth interviews because our research question could best be answered by talking to people with recent experience in communication in globally distributed Scrum teams. In-depth interviews are considered optimal for collecting data on an individual's experiences and perspectives (Bickman et al. 2008). The open-ended questions asked during the interviews provided the participants with the chance to reflect on the topic, and share their thoughts, beliefs, and experiences in an informal discussion. Before the interviews, ethics approval was granted by Whitireia Polytechnic, and participants received an information sheet, consent form, and guiding interview questions.

Sample selection and recruitment. Potential participants were found by identifying IT professionals with experience in coordinating communication in GD Scrum teams, as displayed in their profile information on LinkedIn™. LinkedIn™ is a networking and career development website used by professionals. Initially, four participants were selected using LinkedIn™ searches and were contacted by direct message. A further five participants were found by sharing a LinkedIn™ post across one researcher's LinkedIn network. The post briefly described the research and asked the network to help find suitable participants. One person was an indirect work contact of one researcher. No participants were known to the researchers before the study began. To confirm the participants' experience was appropriate for our study, each participant completed a short online questionnaire developed using Google Forms. To proceed to the interview stage, the questionnaire responses were used to confirm that participants had experience in organising or managing communication in GDST, they worked in or with a globally distributed Scrum team, and held or recently held, roles with the responsibilities of Scrum Master, Product Owner, or Agile Coach or similar roles common in Scrum (Schwaber et al. 2020). We assumed that these roles were more likely to have experience in organising communication in GDST (Table 1 shows the position and experience of participants). A team was considered a Scrum team if at least one Scrum practice was used and the team was considered a globally distributed Scrum team if at least one team member was located overseas. Note that, for this study, we refer to a Scrum team as one team working on one product. A team can have sub-teams that are 'pieces' of a team that are in different locations.

Data collection. We captured the participants' experiences using semi-structured interviews. Each interview followed a similar procedure but allowed for variation in responses. The interview questions were open-ended and based on the research question, so the questions focused on how the participant defined effective communication and their experience of communication in GD Scrum teams. We interviewed 10 participants over five weeks during April and May 2021. The Zoom™ online interview sessions were recorded. Online interviews were used because close physical contact was discouraged due to the coronavirus pandemic. This also meant interviewees could be in any location in the world.

Data analysis. The interview data was transcribed from the recorded interviews using Otter™ (otter.ai) software. We used qualitative content analysis to analyse the transcripts (Schreier 2014) and Microsoft Word tables to organise the analysis. Schreier (2014) explains that the content analysis method involves the systematic description of data through the development and application of a coding framework. The coding framework was first developed by checking every single part of the material that was relevant to the research question. Based on guidelines by Schreier (2014), the procedure we used consisted of the following steps. These steps were carried out by one researcher and the final framework was reviewed by another researcher. For available source data see Kostin (2021).

   a)   Collect material. This step includes selecting participants, interviewing, transcribing, checking and cleansing the transcripts of transcription errors.
   b)   Build an initial coding frame. This is based on a first pass of reading carefully through the transcripts. Based on one main category (i.e., communication), we developed analytic codes for each idea about communication found in the transcript.
   c)   Evaluate and modify the coding framework as the analysis progresses. To do this, we grouped the codes into sub-categories of communication that were based on common themes identified by the researcher. We defined each sub-category, reviewed the transcripts for indicators (i.e., example quotes), and then checked that the sub-categories were mutually exclusive.
   d)   Main analysis using the developed framework. This involved reviewing all of the transcripts against the sub-categories in the framework, refining the framework if necessary, identifying and defining any new codes or sub-categories, and collapsing categories if they were not substantial or mutually exclusive.
   e)   Present and interpret the findings.

Validity in the data and findings was achieved by following the four guidelines of Creswell et al. (2016). 1) Triangulation validates that the data and findings are free of bias (i.e., comes from multiple sources) and includes a variety of perspectives. We triangulated by collecting data from experienced professionals from nine companies in four countries in six relevant positions. 2) Transparency validates the study conclusions. We aimed for transparency by explaining exactly how the research was organised and actioned in the method section, and how we transformed the raw data in the interview transcripts into the conclusions in the findings section. Full transparency is necessarily limited in a conference format paper. 3) Rich data collection validates that the data collected in the interviews were detailed enough to capture people's experiences and ideas. We aimed for rich data by using open-ended questions and detailed coding of anything related to the research question. 4) Finally, member checks validate that data is collected without bias. This procedure involves sharing the transcribed text of an interview with the interviewee so they can check and confirm that the data accurately reflects what they said. We were not able to do this because of the high workload of participants, which they communicated during the planning of the interviews.

4   Findings

This section presents the profile of the participants followed by the findings on effective communication and presents the model of effective communication in GD Scrum teams. The participant profiles are displayed in Table 1. The participants had a range of senior roles in agile projects and their experience ranged from 1 to 5 years. The projects were concerned with IT, financial services, and healthcare. The residency, team location, and headquarters indicate the global distribution of the participants and their Scrum teams.

Table 1 Participant profiles

	Residency	**Headquarters**	**Team location**	**Position**	**Field**	**Exp**
P1	USA	UK	China, Taiwan, UK, USA	Product Manager	Fintech	5+
P2	Philippines	Ireland	Australia, Philippines, USA	Senior Project Manager	IT	1+
P3	Denmark	Denmark	Denmark, France, India, Spain	Scrum Master	Health	5+
P4	NZ	NZ	NZ, Vietnam	Agile Coach	Fintech	3+
P5	NZ	NZ	Australia, China, India, NZ, Singapore	Senior Project Manager	IT	3+
P6	NZ	Argentina	Argentina, NZ	Founder	IT	3+
P7	NZ	NZ	Australia, NZ	Senior Manager	Fintech	5+
P8	NZ	NZ	Brazil, NZ	Product Manager	IT	3+
P9	NZ	NZ	NZ, UK	Scrum Master	IT	3+
P10	NZ	NZ	Australia, NZ, UK	Scrum Master	IT	3+
Key	P (e.g., P1) refers to the participant number and is used in the quotes in this paper; NZ refers to New Zealand, and the UK refers to the United Kingdom; Exp refers to the experience level of the participant in years; P9 and P10 were from the same company; other participants were from different companies.					

4.1   Findings on effective communication

The final grouping of codes and concept definitions that contributed to our model of communication in GD Scrum teams are presented in Table 2. The interviews resulted in 131 pages of transcript and the analysis created 130 codes. Each code was supported with one or more quotes from the interviews. 12 codes were associated with the understanding of effective communication in GD Scrum teams. The remainder of the codes are not presented here, because they are related to tools, Scrum ceremonies, and communication challenges. Each concept in the model is defined based on standard dictionary definitions combined with the ideas conveyed in the interviews.

The following sections describe the findings for each communication concept and integrate literature that supports the relevance of each concept. The final sub-section depicts the model and the model concepts and how they are related.

Table 2 Effective communication in GDST: first level and final category codes with definitions

First-level code	Communication category [times mentioned] and concept definition
• Be on the same page (i.e., have a shared understanding) • Aligning priorities	**Alignment** [4] is a state of agreement between distributed team members about all aspects of the work (i.e., product, priorities, process, and work progress).
• Be open and honest • Convey clear expectations	**Communication transparency** [6] is clear communication that is open, honest, and readily understood. This includes the conveyance of clear expectations in the team.
• Interact face-to-face • Give/get quick replies • Have listening and speaking equality • Give/get feedback • Have one-to-one direct communication	**Communication quality** [11] is the conciseness, speed, equality, and responsiveness of communication in the team.
• Use an appropriate communication tool • Follow through on instructions • Keep stakeholders informed	**Communication discipline** [2] is when people communicate in a controlled way by following agreed norms about who to communicate with, what to communicate (e.g., task completion), and to use appropriate communication tools.

Exemplar quotes in the following sections are edited lightly as follows. Ellipses (…) indicate elided text that is not relevant (e.g., 'so', 'you know, 'like'), underlined words or phrases highlight the keywords relevant to the assigned code, and words in square brackets [] are inserted to clarify a phrased (e.g., to clarify what 'it' refers to in the transcript text).

4.1.1 Alignment

Alignment in GD Scrum concerns the development and maintenance of a shared understanding among all those involved with the work. Alignment codes conveyed the opinion that communication is effective when the priorities of the team, its sub-teams, and any other stakeholders are understood and everyone in the team is said to be 'on the same page' with agreement on priorities. Being on the same page is an idiom meaning "*Of two or more people, thinking in the same manner; having the same general outlook or position.*"[1]

P3 stated, "*…effective communications, is of course, … getting everybody on the same page… and understanding the vision and priorities and so on, is something I think about when I communicate or try to communicate effectively*".

Alignment is a well-established concept in psychology where alignment in communication is when a shared mental model occurs about a situation within a dyad or group (Wachsmuth et al. 2013). A team mental model, which is a team-wide shared mental model, is considered critical to effective teamwork (Salas et al. 2005) and is a factor in the success of globally distributed large-scale software development when coordinating work efforts (Espinosa et al. 2001). Shared mental models research in agile and Scrum teams is nascent. A single study of co-located Scrum teams shows that a shared-mental model between the Product Owner and the development team affects client and team satisfaction (Edmondson et al. 2020).

4.1.2 Communication transparency

Transparency in GD Scrum concerns open and honest communication in the team. This was the most frequently mentioned indicator of communication effectiveness. For example, P10 considered effective communication as being transparent. P10: " *it's about being open again, …, being transparent about your current situation …*" as did P9, who said, "*Open and honest communication would be successful communication for me.*"

P1 viewed being open to questions as a communication advantage for his team and said "*…in my teams, we're very open to any questions anytime. So, the team member can come to me and say like, 'we got*

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[1] According to the Free Dictionary https://idioms.thefreedictionary.com/on+the+same+page

those questions' or 'we got some delays can we talk about that?' and we are talking about that. This improves communication a lot".

In the categorising of the analytical codes, 'open and honest' communication was categorised as Transparency. During the analysis, trust, transparency and honesty were all identified. Yue et al. (2019) found that transparent communication is associated with trust between team members in a study of organisational change. Eckstein (2013) stated that in an agile environment, trust can only be established by transparency and Hennel et al. (2021) found that agile team resilience is influenced by transparency and open and honest communication. Because these aspects of communication are linked in our findings and related literature, we concluded that 'open and honest communication' is bounded by communication transparency.

4.1.3 Communication quality

Communication quality concerns the conciseness, speed, equality, and responsiveness of communication. P9 thought effective communication has to be concise and speedy: *"Effective communication for me, and my team would look like information being shared or requested is as <u>concise</u> as possible. And responses coming in <u>as quick as possible</u>."*

Equality is important for effective communication and involves listening and speaking equally among all team members. P4 said, *"So for me, ... effective communication is where <u>equal parts of listening and speaking</u> take place. So, it's a true conversation of both parties... And if I give you an example of how we'd set up the current cross-shore team, with the different time zones, it was very important for us to communicate at the end of the day with each other. So, we are all on the same page of how things are progressing towards our goal, our sprint goal. And that was communicating from both ends. So it was not just expecting that the across-shore distributed team, which is sitting in Vietnam, is the only one who's responsible for communicating to us, it's <u>both parties communicating equally</u>. And that involves listening as well as speaking."*

Responsiveness was mentioned in different ways. P10 mentions responsiveness as acknowledging that a message has been received and responding in a timely way. *"For me, effective communication ... it's about responding. ... effectively. ...It's important that you are giving the other person, who is expecting an answer from you, ...<u>to acknowledge</u> saying that, ... ' I have read your message, this is what you want, it's going to take me some time to get you the answer.' But then, 'yes, I'm here to do that for you. Just give me some time'. ... saying that, ..., 'currently, I'm working on this, but I will get back to you, by the end of the day, or whichever time you need in order to get that question answered'.*

P10 continued, *"Because I've seen in my previous experience, people, if they're not able to do something, they just wouldn't respond to that message or email for a long time, they would say, ... I'll get to it, when I have time, ..., the right thing to do is acknowledge it, and answer it whenever you can. So that's one very <u>crucial thing, especially for global level communication</u>."*

P6 talked about 'message receiving' in communication and how senders should consider the situation of the receiver, and choose when to send and how to send a message. *"...effective communication depends mostly on the recipient of the message. So, if I am at a different time zone, and I just sort of throw something to you, because you need to know, but I'm not accounting into the fact that maybe it's, ..., 3 am in the morning for you, and then you're going to wake up, and at the first time in the morning you won't read that, then that's not going to be that effective. So effective communication abilities through the team to me is <u>about accounting for whoever receives the message that is in a proper situation or appropriate environment to receive it</u>".* P6 continued later, saying that for any communication of value *"if it's not received properly, then the communication fails."*

Direct person-to-person communication was viewed as a way to support responsiveness. P4 explains: *"... if you're trying to build a high-performing team, then you need to make sure that <u>each individual can communicate with the other and the team</u>...".* P4 continued: *"it's individuals communicating with each other at their level, but being able to listen, being able to communicate back. So, it's both sides, not just listening, but also speaking, and speaking your mind, and being able to effectively say - this is the problem and hey, I need some help, or Hey, I can help you out. So listening, if someone needs help by saying – 'Hey, I'll be able to help with that because I know, I've resolved that problem before'."'* P9 mentioned the interactive nature of effective communication, *"An <u>equal</u> kind of <u>back-and-forward or two-way flow of information</u>."*

Communication quality in our model is similar to closed-loop communication, which is a factor in effective teamwork in all team types, proposed by Salas et al. (2005). For agile teams, Strode et al. (2022) argue that whole-team closed-loop communication is critical for effective teamwork. Salas et al.

(2005, p. 561) consider close-loop communication as "*the exchange of information between a sender and a receiver irrespective of the medium*" and involves following up with team members to ensure the message was received, acknowledging that the message was received, and clarifying with the sender of the message that the message received is the same as the intended message. Our findings concur with this idea that giving and acknowledging replies or feedback within the team is a factor in effective communication in GD Scrum teams.

4.1.4 Communication discipline

Disciplined communication means following accepted norms for communication. In our findings, this encompassed who to communicate with (e.g., teammates, stakeholders), what to communicate (i.e., following through on tasks and communicating task status), and using appropriate communication tools. The Scrum framework sets out the broad norms for communication where, for example, daily Scrum stand-ups, sprint planning and reviews, and retrospectives are recommended in each Sprint to communicate among team members and with stakeholders (Schwaber et al. 2020).

Communication discipline includes the first-level code 'Keep stakeholders informed' because regular, frequent, and consistent communication with stakeholders affects teams, projects, workflow, and product quality. Stakeholders are closely involved in Scrum teams because they can provide financial, social, and political support and timely information about requirements. For example, P2 explained that communication with the stakeholder about requirements and acceptance criteria are important to avoid problems. P2: "*... the requirements and basically the acceptance criteria, those requirements are well understood, such that..., during the sprint review or during ... when we demo the application, or even during going live ..., then it is smooth and it will not face ... red flags for the customer or client like, 'wait, that's not up to what we discussed'...*".

The importance of what to communicate is evidenced in the code 'following through on instructions' to achieve effective communication. P5 explained it this way. "*Yes, it [communication] can be 100% effective, but it's your propensity to pick up an instruction, follow it through, complete it, and then report back as being completed*".

Using an 'appropriate communication tool' for the situation and the subject matter was also important. P6: "*So, effective communication abilities through [the] team to me is about accounting for whoever receives the message, that is in a proper situation or appropriate environment to receive it, sometimes that means that certain conversations have to be a video call, for instance*". P9 said: "*I think they're [communication tools are] all efficient in their own way, just depending on what we want to achieve*".

We found no single theory, framework or model focusing on the same or similar ideas that we identified as 'communication discipline'. Norms in agile software teams have been identified by Stray et al. (2016) but her findings are not confined to communication.

4.1.5 A model of effective communication in GD Scrum teams

The analysis identified four concepts for effective communication in GD Scrum teams: alignment, communication transparency, communication quality, and communication discipline. We argue that alignment, which is a shared understanding in the team (i.e., a shared mental model), is an outcome of transparent, high-quality, and disciplined communication. Therefore, alignment can be considered equivalent to effective communication in GD Scrum teams. This argument is supported by the ideas in media synchronicity theory (Dennis et al. 2008), which poses that group communication has two main processes; conveyance of information and convergence of meaning (i.e., developing shared meanings). Our concepts of communication quality, transparency, and discipline are concerned with conveying information. For example, information is conveyed (sent and received) with high quality (concise and responsive), transparently (open and honest), and in a disciplined manner among all team members. Convergence of meaning is evidenced in alignment, which is the presence of a shared understanding. A shared understanding is achieved only after some level of conveyance is achieved. Using this distinction, our model includes conveyance and convergence. Figure 1 shows the model.
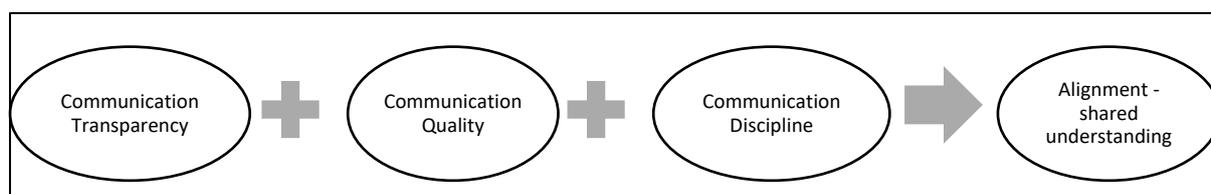

Figure 1. A model of effective communication in globally distributed Scrum teams

5   Discussion

Based on the understanding and experiences of industry professionals, we answered the question, 'what is effective communication in GD Scrum teams?'. We used qualitative content analysis to analyse the responses and developed a model of effective communication in GD Scrum teams with four communication concepts. Three concepts are about conveying information, namely transparency, quality, and discipline, and the fourth, alignment, represents the convergence of these communication efforts. Although our model includes some concepts that occur in other studies of communication, we have assembled them uniquely based on empirical evidence and argue that alignment (i.e., a shared mental model) is equivalent to effective communication in GD Scrum teams. By defining 'communication effectiveness' in GD Scrum teams in a model, we have begun to address the research gap identified by Alzoubi et al. (2016) in identifying how effective geographically distributed agile development communication is achieved in practice.

We have discussed some of the related literature in the sections where we describe each concept in our model. The closest model to our own is by Bhatti et al. (2017). As described in our literature review, their focus is effective communication in GD software development. Their model focuses on practices to support effective communication, whereas our model focuses on abstract concepts. For example, transparency and quality have no place in their framework, although our discipline concept includes the idea of using appropriate communication tools. Another difference is that Bhatti et al. (2017) focused on external stakeholders whereas our focus was on the GD Scrum team. This difference might be explained by the nature of Scrum, and other Agile approaches where there are no direct managers and the key stakeholder, i.e., the Product Owner is considered a team member.

We have presented an empirically based model with contributions from existing literature. The model is simple and unique and poses the idea that alignment (i.e., a shared mental model) is equivalent to effective communication in GD Scrum teams. The model has implications for studies of agile software development involving communication and coordination, and for studies of alignment in achieving successful systems development. Further research to map agile and Scrum practices to our model to show which practices, or sets of practices, support each concept would contribute further to knowledge about communication in GD Scrum. Research to see if our model is relevant to other agile development contexts that do not have the global characteristics of time zone and language differences may be useful.

Scrum Masters, Agile Project Managers, and professionals in Scrum teams and their trainers can use our communication model to understand what to aim for when communicating (transparency, quality, and discipline). This research also draws attention to the importance of a shared mental model (alignment) for successful development in global Scrum teams.

The study has limitations. We had a small number of participants from one source, LinkedIn™, and all English-speaking. This issue was mitigated by ensuring we had specific selection criteria; all participants were involved closely in GD Scrum teams, were involved in managing communication, and had multiple experiences across several countries. The study did not include developers, which is a limitation that should be addressed in future studies of communication. Another limitation was that all interviews were remote due to Covid-19 restrictions and geographical distribution. Remote interviews meant the interviewer may have missed some cues that interviewing in person might reveal. Another limitation is that we did not capture the exact influence of specific Scrum practices in our model. There are also limitations in the data analysis. We were unable to carry out member checking, so the words or intent of the participants could have been misinterpreted. The transcripts were fully analysed by a single researcher and checked by another researcher; this could also have led to the risk of misinterpretations.

6   Conclusion

Effective communication in GD Scrum teams concerns four elements: transparency, quality, and discipline, which together contribute to effective alignment. Alignment is equivalent to effective communication in GD Scrum teams. This model helps to address the lack of understanding of what effective communication means for GD Scrum teams. This communication model is also suitable for future investigation with other research methods. Future work could include studies of GD Scrum communication using in-depth case studies to closely investigate sub-team communication, and elaborate on the concept of alignment in GD Scrum, including types of mental models and which mental models are more important and when during development. A better understanding of how and what Scrum practices assist with communication transparency, quality, and discipline, and support effective alignment is needed. This knowledge would be valuable for Scrum practitioners and improve the success of GD teams using Scrum and its variants.

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