Remote Communication Challenges in Agile Software Teams

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***Abstract*—Agile methods grew up around teams that shared a room. The habits of overhearing, asking at the next desk and reading faces during a stand-up were never written into the process, yet the process quietly depends on them. This term paper reviews twenty-five sources on what happens to those habits when software teams work remotely, in hybrid arrangements, or across time zones. The review is narrative rather than systematic and draws on field studies, surveys, and a few older papers on distributed work and media choice. Three patterns come through. Time separation slows work mostly by delaying answers, so what a team does with its few shared hours matters more than how many it has. Video versions of Scrum events tend to add meeting load without restoring the awareness of an office. Hybrid meetings can leave an uneven floor, although the evidence on why is thinner than people often assume. The paper links each problem to practices that teams report or that follow from theory, and ends with questions that future studies should answer.**

Keywords*—*Agile software development, remote work, hybrid teams, distributed teams, Scrum, team communication, asynchronous work, shared understanding.

I. Introduction

Among the principles behind the Agile Manifesto is a preference for talking in person whenever information has to reach a development team or move around inside it [1]. It is tempting to read this as advice about meetings. In practice it assumes a whole working environment. Cockburn [2] named the effect osmotic communication, meaning that useful information reaches people just by their being nearby, without anyone sending it. Even the Daily Scrum, capped at fifteen minutes in the current guide [3], is short because so much other talking is assumed to happen around it.

Teams lost that shared room in 2020, and many have not got it back. Studies of software companies since then describe a spread of arrangements rather than one new normal: fully remote teams, teams where each person picks their office days, and teams that rotate on a fixed schedule [4]. Companies now write work-from-anywhere into policy [5], and engineers have fairly clear views on what would make an office worth the trip [6]. Remote and hybrid Agile is a standing condition, not a stopgap.

Much of the practical advice on this topic starts with tools. This paper starts a step earlier, with what the shared office was doing for Agile teams and which of those jobs now have to be done on purpose. Fig. 1 sets out that argument in one picture. Three questions guide the review:

- *RQ1:* Which communication practices that Agile relies on weaken most under remote and hybrid conditions?
- *RQ2:* What does the evidence say about practices that offset the damage?
- *RQ3:* How can a team decide, case by case, which channel and meeting format to use?

Communication here covers talk, writing and the awareness that comes from seeing others work. Productivity, hiring and the management of remote staff come up only where they bear on communication. Section II sets out the background, Section III explains how the sources were chosen, Section IV works through the main breakdowns, Section V returns to the research questions, Sections VI and VII turn the findings into guidelines and an example, and Sections VIII and IX give limits and a conclusion.

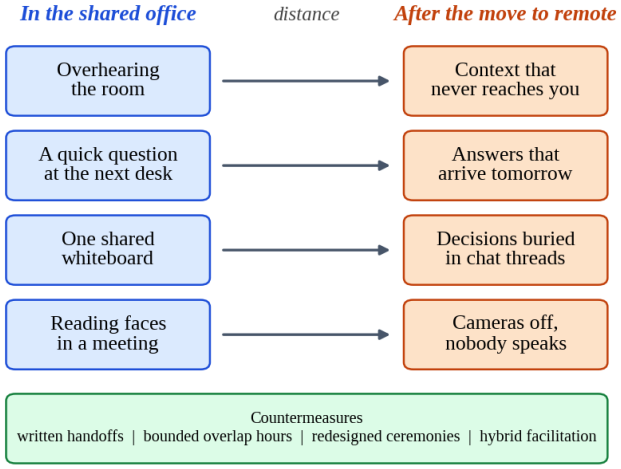

Fig. 1. What a shared office does for Agile teams without being asked, and what distance turns it into.

II. Background

A. Agile's Quiet Dependence on Co-location

Agile development is usually described through its events and artifacts, yet its authors also described conditions. The manifesto's signatories put people and their conversations ahead of process [1], and histories of the movement show how Scrum and XP spread while keeping that people-first stance [7]. Ågerfalk et al. [8] noticed the awkward fit with distribution early on: practices designed for small, co-located groups get stretched when members sit in different places and time zones.

The Scrum Guide structures a sprint around planning, a Daily Scrum, a review and a retrospective [3]. It does not say where these should be held. Most teams meet in one room, and that room quietly does extra work for them. Stray et al. [9] studied the daily stand-up through grounded theory and showed how much coordination hangs off that small meeting. They also showed how easily it can slide into a status report aimed at one person.

Table I lines up each event with the strain remote work puts on it and an adaptation. The last two columns mix reported findings with reasoning from theory, and Section IV gives the sources behind each point.

TABLE I. SCRUM EVENTS AND THE STRAIN REMOTE WORK PUTS ON THEM

Event	Purpose	Remote strain	Adaptation
Sprint planning	Agree what the sprint will deliver and how	Needs agreement on vague stories; few shared hours	Circulate written proposals first; hold the call in the overlap window
Daily Scrum	Inspect progress toward the sprint goal in 15 minutes	Slides into a status report; adds a call for everyone	Post status in writing; call only when someone is blocked
Sprint review	Inspect the outcome with stakeholders	Stakeholders at other sites watch passively	Share the increment beforehand; take questions in writing and live
Retrospective	Plan improvements to how the team works	Quiet members stay quiet; sensitive topics get skipped	Written round first; one standing question on communication

B. Media, Grounding and Distance

For Clark and Brennan [10], conversation is people jointly building common ground, and the effort that takes depends on the medium they use. Seeing the same object, interrupting, and watching a face all make grounding cheap, while plain text strips most of that away. Olson and Olson [11] applied the idea to collaboration technology. In their account distance erodes four things: common ground, closely coupled work, willingness to collaborate, and how ready the technology is.

Media synchronicity theory adds a useful split [12]. The first job is conveyance, which is getting information across and which slower, re-readable media handle well. The second is convergence, which is arriving at one shared interpretation of something unclear and which depends on quick feedback. Reporting progress is conveyance. Working out what a vague ticket really asks for is convergence. A good deal of the remote-meeting pain described later comes from using the second kind of medium for the first kind of job.

C. Terms Used in This Paper

Remote here means that everyone works off-site, hybrid means that some people share an office while others join from elsewhere, and distributed means a team spread across sites or time zones. Šmite, Christensen, et al. [4] show that real hybrid arrangements are more varied than this, since some teams align their office days and others do not. Findings below are therefore tied to the setting each study reports.

III. REVIEW APPROACH

This is a narrative review, not a systematic one. Sources were found through keyword searches (Agile, Scrum, remote, hybrid, distributed, communication, coordination) in academic databases and Google Scholar. Peer-reviewed journal and conference papers were preferred. Two practitioner documents, the Agile Manifesto and the Scrum Guide, are cited because they define the practices under discussion. A handful of older papers from 1991 to 2009 serve as anchors, since the recent remote-work studies lean on them. Table II lists the eight empirical sources that carry most of the argument.

TABLE II. EMPIRICAL SOURCES CARRYING THE MAIN ARGUMENT

Study	Setting and method	Finding used here
Herbsleb & Mockus [13]	Change records from a large multi-site project	Multi-site work items took about 2.5 times as long as single-site items
Paasivaara et al. [14]	Multiple case study of distributed Scrum	Sites needed added coordination, such as Scrum-of-Scrums meetings
Stray et al. [9]	Grounded theory study of daily stand-ups	Stand-ups coordinate work but can slide into reports to one person
Stray & Moe [15]	Longitudinal case study: surveys, observation, interviews, chat logs	Heavy meeting load; key people hard to reach; unbalanced participation
Ralph et al. [16]	Survey of developers early in the pandemic	Well-being and productivity under strain; crisis, not remote work alone
Sporsem & Moe [17]	Case study, two Agile teams, eight interviews	Work matched to place; virtual rooms lowered the cost of asking
Šmite, Moe, et al. [5]	Company case study of enforced home working	Less socialization and pairing; productivity experiences varied
Šmite, Christensen, et al. [4]	Team typology from several companies' practices	Hybrid arrangements range from flexible to aligned to rotating

Sources were kept when they met three conditions: they dealt with communication or coordination in software work and not only with productivity, they described their method clearly enough to judge, and they covered remote, hybrid or distributed settings or supplied theory that such studies depend on. Opinion pieces, vendor reports and blog posts were left out, even where they were widely shared. Evidence was weighted loosely. Measured data and multi-company studies counted for more than single-team accounts, and everything from the pandemic period was read with the caution discussed in Section IV-G.

Because the studies differ in design (company case studies, surveys, an analysis of change records, theory papers), results are compared by theme and never pooled. The aim is to see where findings agree and where one setting cannot stand in for another.

IV. WHERE COMMUNICATION BREAKS

A. Delayed Answers Across Time and Place

The most solid number in this literature is also one of the oldest. Herbsleb and Mockus [13] analysed change records from a large software project. Work items that spanned several sites needed roughly two and a half times as long to complete as items kept at one site. The authors tie much of the gap to the larger number of people involved and to slower back-and-forth between sites. Olson and Olson [11] would call this a loss of coupling: tasks that need constant mutual adjustment do badly when every question waits for the other side to wake up. Espinosa et al. [18] add that distributed groups cope better when members know the task and know who knows what, which is exactly the knowledge a thin channel is slow to build.

Fig. 2 makes the arithmetic concrete. With ordinary 09:00 to 17:00 days, an Indian team and a Central European team share three and a half hours, a European team and a US East Coast team share two, and an Indian team and a US East Coast team share none. For that last pair every exchange is a handoff. Stray and Moe [15] found in global projects that the low availability of key people was among the main barriers to coordination, which is the same problem at a smaller scale: even within one day, the person who could answer is somewhere else. Paasivaara et al. [14], studying Scrum across sites, report that teams needed added coordination layers such as Scrum-of-Scrums meetings to keep the sites aligned.

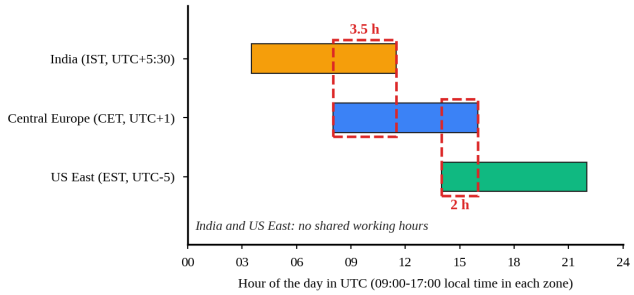

Fig. 2. Overlap of 09:00–17:00 working days in three time zones, shown in UTC (standard time; daylight saving shifts some rows by one hour).

The practical reading is that shared hours are scarce enough to be rationed. Meetings that only pass information along can move into writing, and the shared hours can be kept for questions that need a quick back-and-forth. A handoff note at the end of each person's day is a cheap way to keep the relay moving (Fig. 3): where the work stands, why decisions went the way they did, what is blocked, and who picks it up next. This is a suggestion that follows from the evidence, not a finding of any single study.

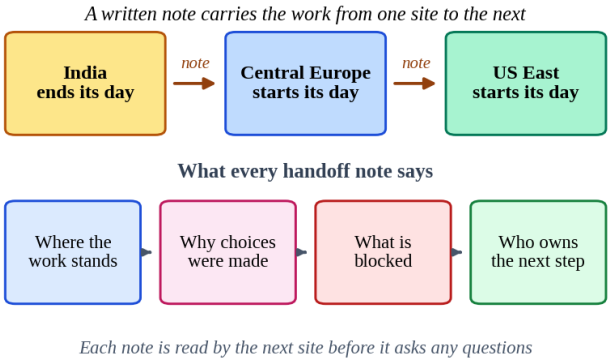

Fig. 3. A handoff note carries the work from site to site and says the same four things each time.

B. Ceremonies on Camera

Moving a Scrum event onto a video call keeps the agenda and drops most of its surroundings. Stray and Moe [15] tracked meeting time across global projects over an extended period. Their averages were about 7 h 45 min a week for planned meetings, plus another 8 h 54 min for ad hoc ones. Distributed teams were larger than co-located ones and members met a little longer each day. Two points matter here. The load is heavy, and the people who spoke up were not evenly spread, whether the setting was a meeting or Slack.

Fatigue is a second cost. Bailenson [19] traces the tiredness of video calls to four sources: faces shown close up for long stretches, the extra mental effort of sending and reading cues, watching one's own image all day, and being stuck in front of a camera. None of these is specific to Agile, but a team that holds a stand-up, planning, refinement and a retrospective on video in the same week meets all four, over and over. Bailenson also suggests small adjustments, such as hiding the self-view and allowing audio-only breaks, which a team can adopt without touching its calendar. Through the lens of media synchronicity theory [12], a fifteen-minute video stand-up that mostly reads out status is conveyance carried by one of the most demanding media available. Stray et al. [9] described how the stand-up can drift into reporting to one person. On video that drift is plausibly easier to miss, because there is no room to read.

By the same logic, sprint planning and backlog refinement are the opposite case from the stand-up. They are about converging on what a story means, which is the kind of work where a live medium earns its cost. A team short on shared hours does better to protect these events and let status travel in writing than to treat all ceremonies alike.

C. The Missing Hallway

Osmotic communication [2] is the hardest thing to export. It is nobody's task, so it appears on no board, and it stops without anyone noticing. Šmite, Moe, et al. [5] studied a software company during enforced home working. Employees described less social contact, less pair work and fewer encounters with colleagues they did not already know. Many also worked longer hours, and people judged their own productivity quite differently from one another. Miller et al. [20] studied software teams working from home in the first months of the pandemic and gave attention to social connection; their title borrows from the kind of small talk that offices produce without effort.

Chat tools fill part of the gap. In the Slack study the positive effects were greater team awareness, more informal communication and less e-mail [15]. The same study flagged unbalanced activity, with a few voices carrying most of the traffic. A familiar risk, though one not measured in the studies reviewed here, is that a conclusion reached in a thread never makes it back to the ticket.

One group likely to feel the loss most is newcomers, who used to learn by sitting nearby. Šmite, Moe, et al. [5] report fewer chances to connect with unfamiliar colleagues, and it is reasonable to expect that new joiners, who by definition know few people, lose the most. That is an inference, not something the sources measured directly.

D. Hybrid Meetings and an Uneven Floor

Hybrid arrangements bring a different problem. Sporsem and Moe [17] interviewed members of two Agile teams at a Norwegian company that allowed work from anywhere. Adjusting to each other informally became harder once some people were at home and others in the office. The teams answered by sorting work by place. Ill-defined tasks waited for days when people were together, while solo work that needed concentration went home. Big meetings moved online to keep office days free for working side by side, and standing virtual rooms made it easier to start an unplanned chat.

Notice what the teams did not do. They did not try to make every meeting equal for everyone; they matched the kind of work to the place. That fits the argument of Olson and Olson [11] that some work is tightly coupled and simply does not travel well. Why a room with one camera disadvantages the person on the screen is less directly studied. In the sources reviewed here, detailed accounts of hybrid ceremonies were scarcer than accounts of fully remote work. The common explanation, that people in the room talk to each other and the remote person cannot cut in, is therefore better treated as a plausible hypothesis than as an established result. Christensen et al. [21] trace how the work arrangements of agile teams have shifted over time, which suggests that findings about one arrangement should not be carried over to another without care.

Fig. 4 contrasts two ways to run a hybrid meeting. In the first, the room shares one camera and remote colleagues become small tiles at the edge. In the second, everyone joins on their own device and the tiles are equal. The second layout is a common practitioner rule and it follows from the

hypothesis above, but it has not been tested in the sources reviewed here.

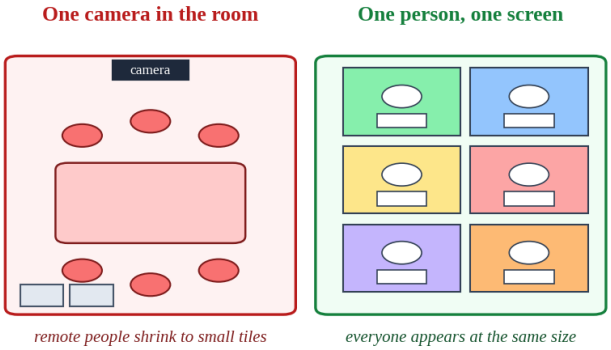

Fig. 4. Two ways to run a hybrid meeting: one room camera, or one screen per person.

E. *Words, Language and Culture*

Written channels change who gets heard. Clark and Brennan [10] list revisability and reviewability among the features of a medium. Text offers both, so people can compose a message and reread it, while giving up the quick repair that comes with speech. For people working in a second language, which describes much of global software work, that trade can favor writing, since a considered message in a ticket may represent them better than a fast reply on a call. The software studies reviewed here do not test this directly, so it stays an open point.

Morrison-Smith and Ruiz [22] also list cultural and language differences among the recurring difficulties in virtual teams, and norms about disagreeing with a senior colleague are likely to travel through a chat window as readily as through a meeting room. The implication for Agile practice is modest but real. A team that moves a retrospective online should expect some members to say much less than they did in person, and it should offer a written way to contribute.

F. *Safety, Trust and Social Debt*

Edmondson [23] used the term psychological safety for a team-wide belief that speaking up, asking or admitting a mistake will not bring punishment. It is hard to sustain from a home office, where a hesitant question has to be typed out in public or sent privately to one person. Morrison-Smith and Ruiz [22] reviewed the literature on virtual teams and place communication and trust among its main difficulties, which matches the pattern in the software studies above. Tamburri et al. [24] proposed social debt as a label for the hidden cost a project carries when its people are organised badly. Small unasked questions and unvoiced disagreements build up the way technical shortcuts do, and eventually someone pays.

G. *The Strain Behind the Screen*

Ralph et al. [16] surveyed more than two thousand developers early in the pandemic and found well-being and productivity under pressure, and they argued that the right reading was crisis, not remote work as such. Ford et al. [25] surveyed developers at one large company during the pandemic and found experiences that varied widely between individuals. Both warn against treating pandemic-era results as a clean measurement of remote work. That caution applies to most of the post-2020 evidence here, and it is one reason the voluntary arrangements in Šmite, Moe, et al. [5] and Moe et al. [6] say more about permanent models.

Table III pulls these threads together by pairing each problem with what the sources show and a practice worth trying. Some of the practices were reported by teams. Others follow from the theory and are offered as reasoned suggestions.

TABLE III. PROBLEMS, EVIDENCE AND PRACTICES WORTH TRYING

Problem	What the sources show	Practice worth trying
Delayed answers	Multi-site items take longer [13]; few shared hours (Fig. 2)	Spend overlap hours on disputes; end-of-day handoff note
Meeting load and fatigue	Heavy weekly meeting time [15]; four causes of video fatigue [19]	Move status to writing; keep meetings short; allow cameras off
Lost informal contact	Less socialization and pairing at home [5]	Open virtual rooms [17]; planned pairing sessions
Uneven participation	Unbalanced activity in meetings and chat [15]; hybrid floor is a hypothesis	One person, one screen; invite remote voices first
Scattered decisions	Chat serves as the informal channel [15]	Record each decision on the ticket within a day
Hidden friction	Social debt [24]; psychological safety [23]	Retrospective item on communication norms

V. ANSWERING THE RESEARCH QUESTIONS

RQ1 asked which practices weaken most. The sources point to three: quick questions and answers, which time separation delays; the stand-up and other recurring meetings, which grow heavier and less informative on video; and osmotic awareness, which has no place on the board and fades without notice. Hybrid participation belongs on the list too, with the caveat that the direct evidence is thin.

RQ2 asked what offsets the damage. Here the sources are more suggestive than conclusive. The clearest reported practices come from Sporsem and Moe [17]: matching tasks to places, holding large meetings virtually and keeping virtual rooms open. Paasivaara et al. [14] report added coordination layers for distributed Scrum. Beyond that, many practices in Table III are reasoned from theory rather than tested. That is no reason to dismiss them, but it is a reason to run them as experiments.

RQ3 asked how to choose a channel. Media synchronicity theory gives the most usable answer, which is to let the job decide the medium [12]. What the software studies add is context. A team with three shared hours should treat a meeting as expensive. A team in one time zone but spread across homes can afford more live contact, as long as it watches the meeting load that Stray and Moe [15] measured.

A last point concerns the manifesto's preference for face-to-face talk. The evidence does not show that the principle was wrong. It shows that face-to-face conversation delivers several things at once, such as speed, awareness, social closeness and a cheap way to check understanding, and that a video call delivers only some of them. Remote teams need to ask which of those they are missing and then supply each one deliberately.

VI. PRACTICAL GUIDELINES

The guidelines below answer RQ2 and RQ3. They are a synthesis, and a team should test them against its own setting.

- *Match the medium to the job.* Information that only needs to be passed along goes in writing; ambiguous or disputed matters get a call [12].
- *Ration the shared hours.* Spend them on blockers and disagreements, and leave routine updates to written channels.

- *Write handoffs.* Say where the work stands, why decisions were made, what is blocked and who owns the next step.
- *Level the floor in hybrid meetings.* Everyone joins on their own device, and the facilitator invites remote people to speak before the room.
- *Keep unscheduled contact cheap.* Virtual rooms that stay open make a quick question feel ordinary [17].
- Put decisions where they can be found, such as the ticket or a decision log, and not only in chat.
- *Check the social side.* A regular retrospective slot for communication norms keeps problems from piling up as social debt [24].

For the choice in RQ3, a team can ask two questions before it schedules a call. Is anything ambiguous or disputed, and does anyone need the answer today? If neither, write it down. If the first is true and the second is not, write a short proposal and give people a deadline to react. If both are true, use the overlap window. The rule, drawn in Fig. 5, is a plain application of media synchronicity theory, and it will not settle every case, but it removes a large share of routine calls.



Fig. 5. Channel choice in two questions, a plain application of media synchronicity theory.

Table IV applies the same split to jobs a team does every week. The mapping is a guide and not a law. A code review can need a call when comments pile up, and a status update can need one when it hides a worry.

TABLE IV. CHOOSING A MEDIUM BY THE JOB TO BE DONE

Job	Process type	Suitable medium	Example
Status update	Conveyance	Written post or ticket comment	What was finished and what is next
Announcing a decision	Conveyance	Written, in the decision log	Switching the test framework
Clarifying a vague story	Convergence	Short live call or shared canvas	What "done" means for a feature
Settling a technical disagreement	Convergence	Call in the overlap window, notes afterwards	Choosing between two designs
Reviewing code	Mostly conveyance	Written review; call if comments pile up	Pull request feedback
Raising a worry	Convergence, sensitive	Private message or one-to-one call	Feeling stuck on a task

A team does not need a policy overhaul to try these ideas. A reasonable start is a two-sprint trial of one or two changes, for example writing handoff notes and moving status updates out of the stand-up, with a few simple measures taken before and after (Table V). Meeting hours per week, time to first reply on a question and the days tickets sit blocked are the easiest to collect. The measures are crude and the team is its own control, so the result is a prompt for discussion in the retrospective and not proof. It still beats guessing. Anything that records who spoke should be agreed with the team first.

TABLE V. MEASURES FOR A TWO-SPRINT TRIAL

Measure	How to collect	What a change may suggest
Meeting hours per week	Calendar export for each person	Load rising or falling after the change
Time to first reply	Timestamps in chat or ticket comments	Whether written updates and handoffs speed answers
Days a ticket stays blocked	Status history in the tracker	Whether blockers surface and clear sooner
Spread of contribution	Count who spoke or wrote in each retrospective	Whether quieter members take part more
Handoff completeness	Checklist: state, reasons, blockers, next owner	Whether notes are really being written

VII. AN ILLUSTRATIVE SCENARIO

The example below is constructed for illustration and is not a reported case. Take a team of eight with four developers in India and four in Central Europe, sharing the three and a half hours shown in Fig. 2. In the shared-room version of Scrum, this team would hold a fifteen-minute stand-up each morning, plan sprints together, and talk across the aisle all day.

Applying the guidelines, the team might move the daily status into a short written post at the start of each person's day, with a live call only on days when someone is blocked. Sprint planning and refinement, which are about converging on meaning, would sit inside the overlap window. Written proposals would circulate the day before, so that the call is used for disagreement and not for reading aloud. Handoff notes would close each day and name the next owner. The retrospective would keep one standing question about communication and open with a written round, so that quieter members contribute before the discussion starts. An open virtual room during the overlap would stand in for the desk across the aisle.

The cost is real. Writing takes time, and the overlap window becomes busy. If the team finds that call load inside those three and a half hours has crept up, the first remedy is to move more of it into writing and not to add hours. The two-sprint trial described above would show whether the changes help.

VIII. LIMITATIONS AND OPEN QUESTIONS

Three limits shape how far these conclusions reach. The review is narrative, so it shows patterns across the sources read and says nothing about how common any problem is. Much of the empirical base comes from Nordic companies and a few large firms, and most post-2020 studies rely on perceptions reported during or just after the pandemic. Hybrid ceremonies, as noted, are thinly covered.

Several questions follow. Do structured turn-taking formats really even out participation in hybrid meetings, and by how much? Field studies that record speaking time, with consent, could answer this. Do written handoff notes shorten lead time in teams with no overlap, as they should if the gap found by Herbsleb and Mockus [13] is partly about slow replies? A before-and-after comparison using ticket data could test it. And what meeting load suits a distributed team, given

that the figures reported by Stray and Moe [15] describe what teams did rather than what worked best?

IX. Conclusion

Agile communication was built for a room, and remote work shows how much of that room's work was never written down. The sources reviewed point to a fairly consistent story. Delay, more than distance as such, causes the slowdown, so shared hours need to be rationed. Video meetings add load without restoring awareness, so purpose should decide format. Hybrid meetings can give some people more of the floor than others, though the evidence on why is thinner than the conclusions often drawn from it. Teams that do well appear to treat communication as something to design: they choose channels by task, write down what used to be overheard, and make casual contact easy again. None of this is new to Agile. It is the manifesto's old emphasis on conversation, applied with a clearer view of what a conversation costs when the people are apart.

X. References

[1] Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R. C., Mellor, S., Schwaber, K., Sutherland, J., & Thomas, D. (2001). *Manifesto for Agile software development*. https://agilemanifesto.org

[2] Cockburn, A. (2002). *Agile software development*. Addison-Wesley.

[3] Schwaber, K., & Sutherland, J. (2020). *The Scrum guide*. https://scrumguides.org

[4] Šmite, D., Christensen, E. L., Tell, P., & Russo, D. (2023). The future workplace: Characterizing the spectrum of hybrid work arrangements for software teams. *IEEE Software, 40*(2), 34–41.

[5] Šmite, D., Moe, N. B., Klotins, E., & Gonzalez-Huerta, J. (2023). From forced working-from-home to voluntary working-from-anywhere: Two revolutions in telework. *Journal of Systems and Software, 195*, Article 111509.

[6] Moe, N. B., Stray, V., Šmite, D., & Mikalsen, M. (2023). Attractive workplaces: What are engineers looking for? *IEEE Software, 40*(5), 85–93.

[7] Hoda, R., Salleh, N., & Grundy, J. (2018). The rise and evolution of agile software development. *IEEE Software, 35*(5), 58–63.

[8] Ågerfalk, P. J., Fitzgerald, B., & Slaughter, S. A. (2009). Flexible and distributed information systems development: State of the art and research challenges. *Information Systems Research, 20*(3), 317–328.

[9] Stray, V., Sjøberg, D. I. K., & Dybå, T. (2016). The daily stand-up meeting: A grounded theory study. *Journal of Systems and Software, 114*, 101–124.

[10] Clark, H. H., & Brennan, S. E. (1991). Grounding in communication. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 127–149). American Psychological Association.

[11] Olson, G. M., & Olson, J. S. (2000). Distance matters. *Human–Computer Interaction, 15*(2–3), 139–178.

[12] Dennis, A. R., Fuller, R. M., & Valacich, J. S. (2008). Media, tasks, and communication processes: A theory of media synchronicity. *MIS Quarterly, 32*(3), 575–600.

[13] Herbsleb, J. D., & Mockus, A. (2003). An empirical study of speed and communication in globally distributed software development. *IEEE Transactions on Software Engineering, 29*(6), 481–494.

[14] Paasivaara, M., Durasiewicz, S., & Lassenius, C. (2009). Using Scrum in distributed agile development: A multiple case study. In *Proceedings of the 4th IEEE International Conference on Global Software Engineering* (pp. 195–204). IEEE.

[15] Stray, V., & Moe, N. B. (2020). Understanding coordination in global software engineering: A mixed-methods study on the use of meetings and Slack. *Journal of Systems and Software, 170*, Article 110717. https://doi.org/10.1016/j.jss.2020.110717

[16] Ralph, P., Baltes, S., Adisaputri, G., Torkar, R., Kovalenko, V., Kalinowski, M., Novielli, N., Yoo, S., Devroey, X., Tan, X., Zhou, M., Turhan, B., Hoda, R., Hata, H., Robles, G., Milani Fard, A., & Alkadhi, R. (2020). Pandemic programming: How COVID-19 affects software developers and how their organizations can help. *Empirical Software Engineering, 25*(6), 4927–4961.

[17] Sporsem, T., & Moe, N. B. (2022). Coordination strategies when working from anywhere: A case study of two agile teams. In *Agile processes in software engineering and extreme programming* (Lecture Notes in Business Information Processing, Vol. 445, pp. 52–61). Springer. https://doi.org/10.1007/978-3-031-08169-9_4

[18] Espinosa, J. A., Slaughter, S. A., Kraut, R. E., & Herbsleb, J. D. (2007). Team knowledge and coordination in geographically distributed software development. *Journal of Management Information Systems, 24*(1), 135–169.

[19] Bailenson, J. N. (2021). Nonverbal overload: A theoretical argument for the causes of Zoom fatigue. *Technology, Mind, and Behavior, 2*(1). https://doi.org/10.1037/tmb0000030

[20] Miller, C., Rodeghero, P., Storey, M.-A., Ford, D., & Zimmermann, T. (2021). "How was your weekend?" Software development teams working from home during COVID-19. In *Proceedings of the 43rd International Conference on Software Engineering* (pp. 624–636). IEEE.

[21] Christensen, E. L., Cholvat, L. C., & Tell, P. (2025). On the evolution of agile software team work arrangements. *Journal of Systems and Software, 230*, Article 112514.

[22] Morrison-Smith, S., & Ruiz, J. (2020). Challenges and barriers in virtual teams: A literature review. *SN Applied Sciences, 2*, Article 1096.

[23] Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(2), 350–383.

[24] Tamburri, D. A., Kruchten, P., Lago, P., & van Vliet, H. (2015). Social debt in software engineering: Insights from industry. *Journal of Internet Services and Applications, 6*, Article 10.

[25] Ford, D., Storey, M.-A., Zimmermann, T., Bird, C., Jaffe, S., Maddila, C., Butler, J. L., Houck, B., & Nagappan, N. (2022). A tale of two cities: Software developers working from home during the COVID-19 pandemic. *ACM Transactions on Software Engineering and Methodology, 31*(2), Article 27.