39. Međunarodni kongres o procesnoj industriji

Negotin, 3. i 4. jun 2026.

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(Negotin, 3. i 4. jun 2026)

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Savez mašinskih i elektrotehničkih
inženjera i tehničara Srbije (SMEITS)
– Društvo za procesnu tehniku –
Kneza Miloša 7a/II,11000 Beograd
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PREDGOVOR

Procesna industrija ulazi u period velikih promena, u kome se od kompanija očekuje da proizvode efikasnije, smanje emisije, uvode obnovljive izvore energije i koriste digitalne alate.

Pred Vama je zbornik radova 39. Međunarodnog kongresa o procesnoj industriji - Procesing '26, kongresa koji već tradicionalno predstavlja ključnu tačku preseka naučne misli, tehnološkog razvoja i inženjerske prakse u procesnoj industriji.

39. Međunarodni kongres o procesnoj industriji Procesing '26, u organizaciji Društva za procesnu tehniku, pri Savezu mašinskih i elektrotehničkih inženjera i tehničara Srbije (SMEITS), u saradnji sa Katedrom za procesnu tehniku Mašinskog fakulteta u Beogradu i pod generalnim pokroviteljstvom kompanije Elixir Prahovo - Elixir Group, održan je 3. i 4. juna 2026. u svečanoj sali La Moara u Negotinu, gde se uspešno organizuje drugu godinu zaredom. Kompanija Elixir Group je po treći put pokazala da je pouzdan partner u organizaciji Procesinga, ove i prethodne godine u Negotinu, a prvi put u Šapcu 2023. godine. Kompanija Elixir Group nije samo formalno bila pokrovitelj već je uzela učešće u kreiranju programa Procesinga i predložila teme, moderatore i učesnike panela. Pomoć u organizaciji Procesinga '26 dali su predstavnici drugih fakulteta i instituta iz Srbije, među kojima su predstavnici Tehnološko-metalurškog fakulteta Univerziteta u Beogradu, Fakulteta organizacionih nauka i predstavnici Institut za nuklearne nauke "Vinča".

Pored generalnog pokroviteljstva od strane Elixir Prahovo – Elixir Group, finansijsku podršku skupu obezbedile su sledeće institucije i kompanije:

- *Ministarstvo nauke, tehnološkog razvoja i inovacija, Republika Srbija*
- *Inženjerska komora Srbije,*
- *Institut za nuklearne nauke „Vinča",*
- *Beo čista energija, Beograd,*
- *Numikon, Zagreb,*
- *Geotaur, Beograd,*
- *Grundfos Srbija, Beograd,*
- *Kazantrade Srbija, Beograd i*
- *Wilo Beograd.*

Osnovni ciljevi Procesinga '26 su uspešno realizovani spajanjem nauke i industrije, kroz umrežavanje i stručno usavršavanje inženjera i istraživača u oblastima procesne tehnike, energetike, inženjerstva zaštite životne sredine i menadžmenta kvaliteta i standardizacije. Pored tradicionalne podrške razvoju novih inženjerskih rešenja, težište ovogodišnjeg skupa usmereno je ka održivosti, primeni obnovljivih izvora energije, smanjenju štetnih emisija i implementaciji principa cirkularne ekonomije. Uz jasnu viziju potpunog zatvaranja ciklusa od otpada do novog proizvoda, kongres trasira put ka ostvarivanju ciljeva održivog razvoja u procesnoj industriji. Ovakva razmena iskustava i definisanje pravaca daljih istraživanja predstavljaju direktan doprinos modernizaciji postojećih kapaciteta i zelenoj tranziciji domaće privrede.

Ovakav sveobuhvatan pristup stvara ključne preduslove za podizanje tehnološkog razvoja naše zemlje i uvođenje naprednih, ekološki odgovornih tehnologija. Da su ovi preduslovi već uveliko u fazi realizacije, svedoče upravo radovi sabrani u ovom Zborniku. Publikovana istraživanja jasno pokazuju da domaća naučna zajednica uspešno ide u korak sa globalnim trendovima, nudeći konkretna rešenja za transformaciju

tradicionalnih procesa i optimizaciju raspoloživih resursa. Ujedno, ovi tekstovi donose jasnu viziju o tome kako oblikovati novi inženjerski kadar, sposoban da iznese teret ove kompleksne zelene i tehnološke tranzicije.

Kongres Procesing '26 je organizovan prema pravilima definisanim za međunarodne skupove što određuje svrstavanje i kvantifikaciju radova autora. U Naučnom i Organizacionom odboru Procesinga '26 bili su uključeni predstavnici mašinskih, tehnoloških i drugih fakulteta iz Srbije (Beograda, Novog Sada, Niša, Leskovca, Kragujevca, Kraljeva i Zrenjanina), kao i iz zemalja regiona i sveta, u okviru kojih je oblast procesne tehnike zastupljena u nastavi i istraživanjima (Podgorica, Sarajevo, Tuzla, Skoplje, Zagreb, Temišvar, Maribor, Trondhajm, Madrid, Vankuver).

Pored naučnih i stručnih radova, program skupa su obogatili i paneli posvećena najaktuelnijim pitanjima procesne industrije, Industrija i veštačka inteligencija: od digitalne spremnosti do Industrije 5.0, zatim Industrija i klimatski zahtevi: smanjenje emisija gasova sa efektom staklene bašte, monitoring i regulatorni okvir, kao i tradicionalni panel posvećen opremi pod pritiskom, kao jednoj od najvažnijih i najzahtevnijih oblasti procesne industrije. Učesnici su kroz pažljivo odabrane teme dobili konkretna znanja i jasne preporuke za unapređenje rada. Na ovim dinamičnim platformama za otvoreni dijalog, razmenu iskustava i kreiranje smernica za dalji razvoj sektora, učestvovali su vodeći stručnjaci iz industrije, predstavnici akademske zajednice, nadležnih ministarstava i vodećih domaćih i međunarodnih kompanija.

Kao i na prethodnom Procesingu, ovogodišnji skup je obogatio i sajamski prostor, gde je u izložbenom delu bio organizovan sajam opreme koja se koristi u procesnoj industriji, i koji je okupio brojne izlagače i učesnike.

Kongres je završen stručnom posetom učesnika skupa Industrijskom kompleksu Eliksira u Prahovu, odnosno Ogranku Eco Energy - Postrojenju za energetsko iskorišćenje otpada u Prahovu, gde su imali priliku da se upoznaju sa skorim početkom rada postrojenja, savremenim procesima upravljanja i energetskog iskorišćenja otpada, kao i o standardima zaštite životne sredine koji se u njemu primenjuju. Takođe, učesnici skupa su imali priliku da obiđu i muzej, jedinstven u Srbiji, jer predstavlja svedočanstvo o izgradnji i razvoju jedne hemijske industrije od 1960. do danas.

U Beogradu,
jula 2026.

Sadržaj

Projektovanje, izgradnja, eksploatacija i održavanje procesnih postrojenja

Menadžment kvaliteta i standardizacija u organizacijama

Inženjerstvo životne sredine i održivi razvoj u procesnoj industriji, cirkularna ekonomija

Originalni naučni rad

Ključne reči:
kvalitet timskog razvoja; kohezija; hibridni rad; komunikacija, organizaciono ponašanje

KVALITET RAZVOJA TIMOVA I KOHEZIJE U HIBRIDNIM RADNIM OKRUŽENJIMA

Key words:
team development quality; cohesion; hybrid work; communication; organizational behavior

QUALITY OF TEAM DEVELOPMENT AND COHESION IN HYBRID WORK ENVIRONMENTS

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U savremenom poslovnom okruženju, organizacije se suočavaju sa sve većim pritiskom da usvoje hibridne modele rada koji kombinuju tradicionalno prisustvo u kancelariji sa radom na daljinu. Ovo istraživanje fokusira se na analizu kvaliteta timskog razvoja i kohezije u hibridnim okruženjima, sa posebnim osvrtom na izazove u komunikaciji, jasnoću uloga i nivo međusobnog poverenja među članovima tima. Ključni cilj istraživanja je identifikacija promena koje se dešavaju u dinamici tima usled prostorne distance, kao i analiza faktora koji direktno utiču na socijalnu i koheziju usmerenu na zadatak. Kroz empirijsku analizu stavova zaposlenih koji rade u hibridnom režimu, istraživanje teži da utvrdi kako tehnološki alati i liderski pristupi mogu prevazići osećaj izolovanosti i neravnopravnosti. Na osnovu dobijenih rezultata, rad pruža smernice i preporuke za preduzeća kako bi efikasno unapredila timsku povezanost i osigurala efikasno poslovanje u digitalnom okruženju.

In the contemporary business environment, organizations face increasing pressure to adopt hybrid work models that combine traditional office presence with remote work. This research focuses on analyzing the quality of team development and cohesion in hybrid environments, with reference to communication challenges, role clarity, and the level of mutual trust among team members. The key goal of the research is the identification of changes that occur in team dynamics due to spatial distance, as well as the analysis of factors that directly affect social and task-oriented cohesion. Through an empirical analysis of the attitudes of employees working in a hybrid mode, the research aims to determine how technological tools and leadership approaches can overcome the feeling of isolation and inequality. Based on the results obtained, the work provides guidelines and recommendations for companies to effectively improve team bonding and ensure efficient business in the digital environment.

1. Introduction

Teamwork and cohesion represent one of the priority factors of business success in modern corporate systems. The hybrid model of work, which includes a combination of office environment and remote work, caused the redefinition of previous concepts of organizational behavior and brought specific challenges in terms of team dynamics, trust, and communication in the digital environment. The challenges that management faces often center on the uneven flow of information, the feeling of

isolation of members working outside the office, and the difficulty of maintaining social connectedness.

The motivation for research stemmed from the perceived gap between the speed with which the hybrid work model is becoming the dominant organizational form and the slow adaptation of management practices to this change. In the domestic business context, teams are increasingly functioning in conditions of physical separation, but the question of the quality of team development and cohesion is rarely systematically examined.

The objective of the paper is to identify, through theoretical analysis and empirical research, the key factors that influence the quality of development and cohesion of hybrid teams, and to propose concrete measures to improve team efficiency based on that. The research was carried out using a questionnaire on the Google Forms platform, on a sample of 212 respondents from the mechanical and manufacturing industry sector in the Republic of Serbia.

2. Hybrid work model and team dynamics

In a hybrid environment, coordination, information exchange, building trust, and maintaining cohesion depend primarily on the organization of processes and rules of communication, and not only on the physical proximity of members [1]. Office work relies on spontaneous, informal contacts, while remote work requires clearly defined goals, roles, and performance criteria. The sustainability of cooperation requires uniform evaluation criteria based on work outcomes, because the visibility of contributions can no longer rely on physical presence.

2.1. Specificities of team development in contemporary business

During development, the team goes through recognizable stages that differ in the dominant forms of interaction, the level of clarity of roles, and the degree of acceptance of common rules. In this framework, four phases are distinguished [2]: forming, storming, norming, and performing. Each phase carries specific challenges and conditions with different needs in terms of coordination and management.

In modern business, team formation takes place in a dynamic and often hybrid environment, with a strong reliance on digital communication, which changes the way of establishing relationships and develops cohesion. Already in the initial phase, in addition to defining goals and tasks, it is crucial to clearly arrange communication channels and the availability of information, because otherwise there will be inconsistencies and different interpretations [3].

The storming stage represents a critical period for cohesion, as differences in expectations, working approaches, and priorities come to the surface. In hybrid teams, these tensions can be amplified by unequal access to information and inconsistent communication quality, increasing the risk of misunderstandings and conflict. When roles and norms remain ill-defined, mistrust, subgroup formation, and declining collaboration tend to follow. However, if differences are channeled through clear procedures and open communication, this stage can strengthen shared norms and contribute to long-term team stability [1,4].

The norming stage carries greater significance in hybrid settings than in traditional ones, as norms must increasingly be defined in advance, through explicit agreements on communication, meetings, reporting, and shared documentation, rather than emerging organically through day-to-day interaction. This is particularly important in hybrid work, where physical separation can undermine equal participation and information flow, making clear and verifiable norms central to stability, cohesion, and the quality of team development [1,5].

2.2. Team cohesion as a factor of organizational effectiveness

Cohesion represents the degree of internal connection between team members, which manifests itself as a force that maintains belonging, encourages cooperation, and directs behavior towards preserving joint work and achieving common goals [6,7]. In the literature, two dimensions are most often distinguished: social cohesion, which concerns interpersonal relations, a sense of belonging and emotional connection, and task-oriented cohesion, which implies a focus on common goals, discipline in work, and commitment to a common performance [6,7]. Both are important because one without the other rarely produces good results.

Task-oriented cohesion concerns the extent to which team members have the same understanding of what needs to be done. They not only know what the goal is, but also understand it in the same way, agree on priorities, and consistently respect agreed standards and deadlines. When this type of cohesion functions well, differences in work styles and competencies cease to be a source of disagreement and are transformed into an advantage. Each team member contributes in his own way, but in the same direction. This results in less unnecessary work, fewer subsequent corrections, and fewer situations where it turns out that someone did something in a completely different way than the rest of the team [7].

When a team works hybridly, social cohesion becomes more sensitive than usual. There are almost no spontaneous conversations, and interactions between employees are limited to scheduled video calls and formal channels. In such conditions, connectivity does not build by itself, but requires a conscious effort: predictable communication, equal participation of all in meetings, and visibility of the contributions of those who work remotely, so that no one remains invisible and the team is not imperceptibly divided into "those in the office" and "those at home" [3]. The weakening of the quality of task-oriented cohesion is reflected in the growth of ambiguity about responsibilities and unequal access to information. These two factors, as the research results will show, represent the most pronounced challenges in hybrid teams.

3. Analysis of employee perceptions of team cohesion quality in hybrid work settings

The study was conducted on a sample of 212 respondents from the territory of the Republic of Serbia, primarily from the mechanical and manufacturing industry sector, with full gender balance (50% male, 50% female). The age distribution is strongly skewed toward younger respondents: the 19–34 age group accounts for 71.7% of the sample, the 35–55 group for 25.5%, and the 56–65 group for 2.8%. Given that younger generations are most intensively exposed to changing work practices and digital communication, the findings can be considered representative of the population most directly affected by the hybrid work model.

By employment status, 49% of respondents are full-time employees, while 42% are students in employment, reflecting heterogeneity in terms of organizational involvement. The most prevalent work arrangement is hybrid (46.7%), followed by office-based (34%) and predominantly remote (19.3%) (Figure 1). The presence of all three groups enabled a comparison of perceptions across different work modes, directly addressing the subject of the research.

When interpreting the results, it is important to note that the proportion of respondents who have been in their current team for less than six months is considerable (33%). This suggests that a significant part of the sample is in the early stages of team development, where ambiguities in roles and communication norms tend to be most pronounced and where the quality of team development has not yet stabilized.

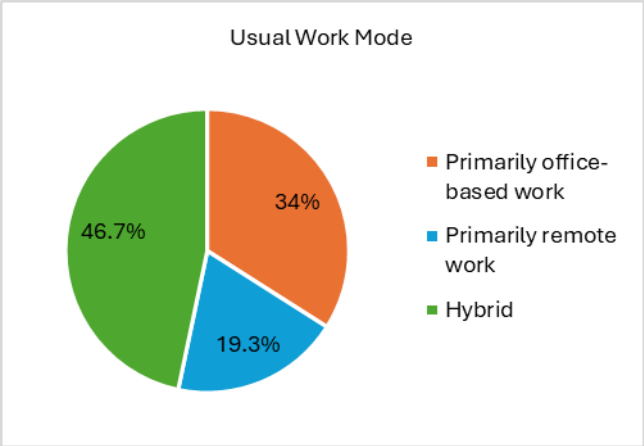

Figure 1. Distribution of respondents by work mode

One of the more significant findings concerns information flow. Nearly equal shares of respondents report equal access to information (45.8%) and occasional delays (45.3%), while 9% feel entirely excluded due to informal decision-making taking place in the office (Figure 2). This distribution points to the presence of informational asymmetry — differences in access to context and informal knowledge — which can gradually undermine trust, the sense of belonging, and the overall quality of cohesion within the team. A direct consequence of uneven information flow is ambiguity around roles and responsibilities: more than half of respondents (50.9%) report occasional confusion about who is accountable for what, while 10.4% experience frequent uncertainty around priorities. In hybrid work, this type of ambiguity carries greater consequences than in office-based settings, since gaps are harder to address without direct contact.

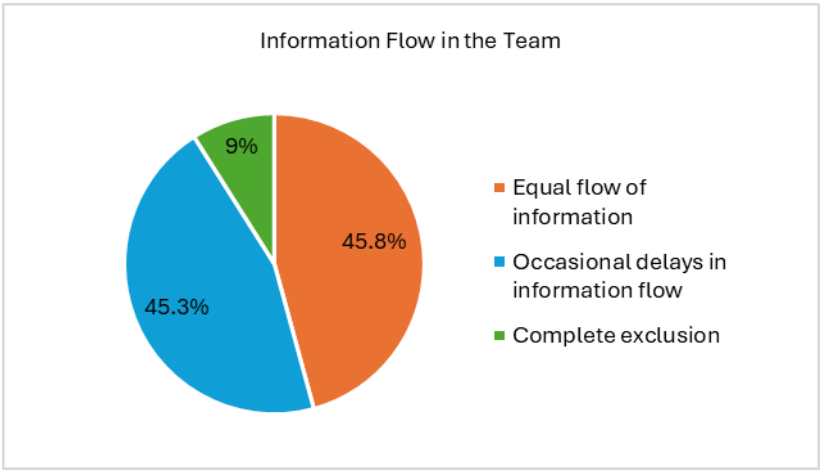

Figure 2. Assessment of information flow within the team

As many as 57.1% of respondents report difficulties with inclusion in mixed-format meetings or the dominance of physically present participants, suggesting that simply providing a video connection is insufficient to ensure genuine equality of participation (Figure 3). This finding has a direct bearing on social cohesion: the largest share of respondents (41.5%) feel connected primarily to their immediate project colleagues, while 18.9% report a sense of isolation and communication reduced to operational topics. This pattern suggests that social cohesion is increasingly narrowing and giving rise to subgroup formation within teams.

Trust within teams exists, but for 52.4% of respondents, it is accompanied by heightened status reporting, and 10.4% report the presence of micromanagement. This distribution suggests that many organizations remain in a transitional model — caught between monitoring presence and managing

by results — which directly affects the psychological safety and motivation of employees working outside the office. Contributing to this is the reduced visibility of workload in hybrid settings: for 43.4% of respondents, peer support is activated only after an explicit request, rather than in response to an observed need.

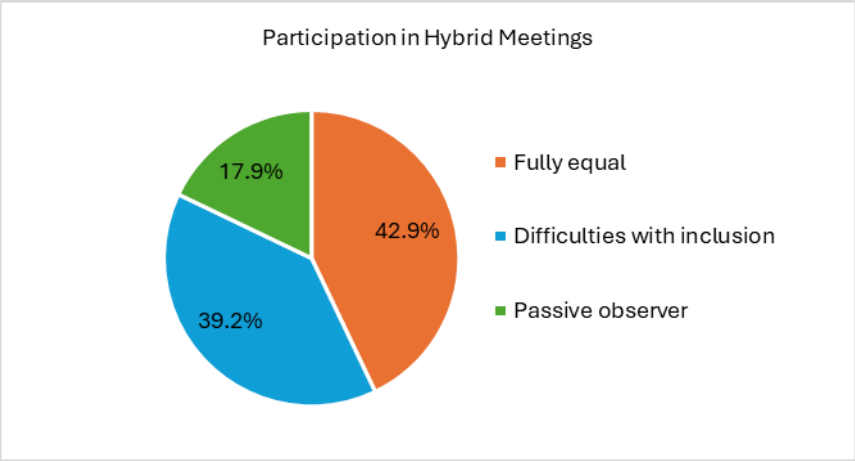

Figure 3. Experience of participation in mixed meetings

Half of the respondents report that conflicts within their team are resolved constructively through direct conversation. However, the share opting for avoidance and disengagement remains high (34.9%), as does the incidence of indirect conflict through dysfunctional communication patterns (15.1%). In a hybrid context, where rapid clarification is impeded by asynchronous communication, such patterns carry an elevated risk of escalation and accumulated tension. Compounding this is the issue of availability: nearly 56% of respondents report being expected to respond outside of working hours, either occasionally or routinely, which over time increases the risk of burnout and declining quality of collaboration (Figure 4).

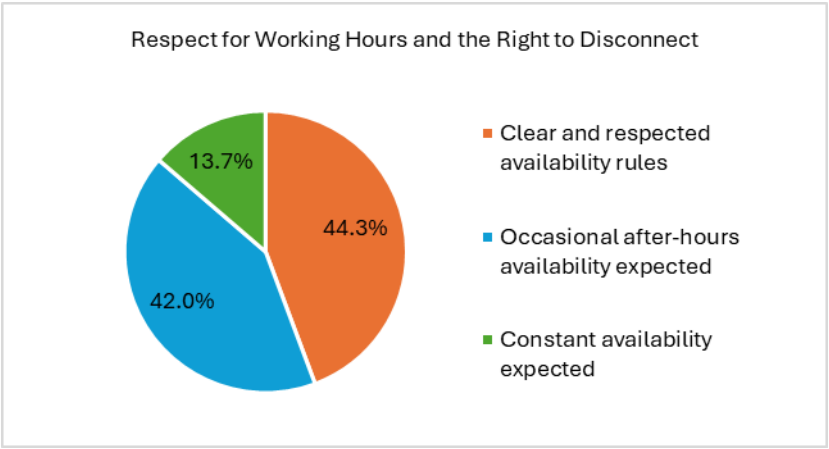

Figure 4. Respect for working hours and the right to disconnect

The majority of respondents rate the impact of technology on collaboration as positive (42.9%) or satisfactory (45.3%), indicating that technological infrastructure is not identified as the primary constraint on team cohesion quality. Nonetheless, the share viewing technology as an obstacle (11.8%) is not negligible and may affect meeting quality and coordination effectiveness.

When asked about priority measures for improving team cohesion, respondents highlighted: clearer definition of roles, goals, and work rules (47.2%), more frequent in-person meetings (42.5%), organized team-building programs (37.7%), greater leader involvement (34.4%), and online meetings dedicated to connection rather than operations (22.6%). Respondents thus identify structural measures

— clearer role definition and work protocols in hybrid settings — as the primary solution, rather than technology (Figure 5).

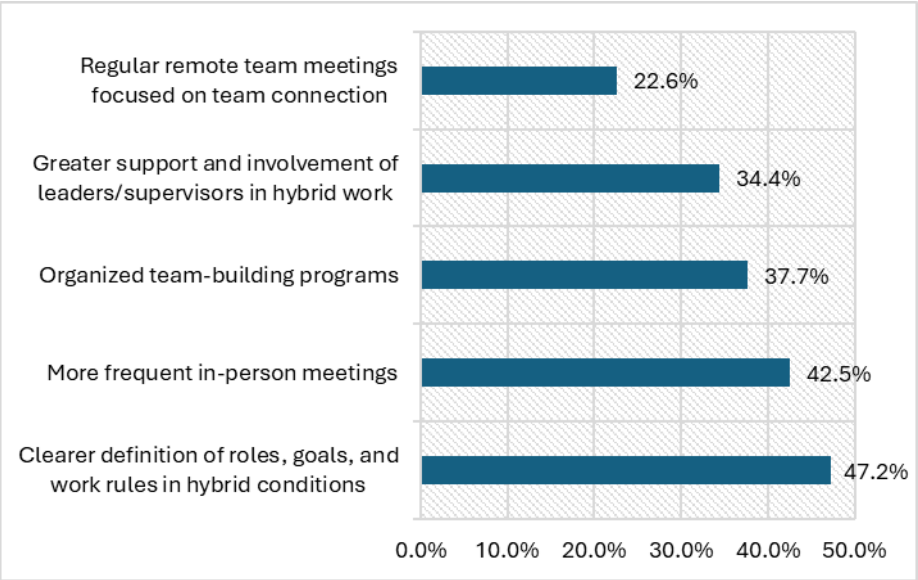

Figure 5. Priority measures for strengthening team cohesion

3.1. Recommendations for improving the quality of team cohesion in hybrid work

The research findings clearly indicate that hybrid teams cannot rely on the kind of spontaneous coordination that works when everyone shares the same physical space. Physical separation need not be a problem in itself; it becomes one when it is not accompanied by clear rules, transparent communication, and a deliberate effort to ensure that all members feel equally included.

Among the most consistent findings is the uneven distribution of information across team members. The remedy lies in equalizing information access for all employees: all key decisions, tasks, and changes in priorities must be documented in a single location accessible to everyone, not merely communicated verbally in the office. In addition, roles and responsibilities should be formalized through concise descriptions of duties and boundaries of authority, with periodic checks on shared understanding, particularly following changes in team composition. When information is universally accessible and roles are clearly defined, the scope for misunderstandings narrows considerably, and misunderstandings in hybrid work tend to escalate more quickly than in office-based settings.

When part of a team is physically present, and another part joins via video, inequity can arise without anyone intending it. The research found that as many as 57% of respondents experience some degree of exclusion in mixed-format meetings. Management should introduce clear meeting protocols, structured turn-taking, mandatory inclusion of remote participants in discussion, and a prohibition on parallel in-room conversations that are inaccessible to the rest of the team. Equal participation in meetings directly affects social cohesion: when every voice is heard, the risk of subgroup formation and feelings of isolation diminishes. Beyond formal meeting rules, it is equally important to periodically plan interactions and activities that are not purely operational in nature, as these are the spaces in which interpersonal trust and a sense of belonging to something larger than one's own task are built.

More than 60% of respondents identify heightened status reporting or micromanagement as features of working outside the office. Management should shift its focus from monitoring presence

to tracking outcomes, a change that directly affects the psychological safety and motivation of employees working remotely. Rather than addressing problems only after they become visible, regular brief check-ins on priorities and workload are recommended, so that support is activated proactively rather than only when an overburdened team member explicitly asks for help.

The research shows that nearly half of all disagreements are either ignored or resolved indirectly. In a hybrid context, where rapid clarification is more difficult, this tendency can escalate. It is therefore important to foster an organizational culture in which disagreements are addressed through direct conversation focused on facts and agreements. Alongside this, clear rules on availability, urgent communication channels, and response time expectations are not bureaucratic formalities; they are a practical necessity. They create the conditions for sustainable long-term work and prevent the gradual decline in collaboration quality that comes with burnout.

Transparency, clarity, and inclusive participation do not arise on their own in hybrid work; they require deliberate organizational effort. When their effects are monitored and rules are adjusted based on feedback from within the team, these measures can contribute to building a more stable and cohesive hybrid team over the long term.

4. Conclusion

The results of the conducted research indicated that the hybrid work model brings specific organizational challenges that go beyond the issue of technology infrastructure. The key problem is not that the team does not share the same physical space, but that managerial practices have often not adapted to that change, and the consequences are most clearly visible precisely in the quality of team development and cohesion.

Research has shown that information asymmetry, role ambiguity, and inequality in mixed meetings represent three interrelated factors that together weaken the cohesion of hybrid teams. Trust exists, but in many organizations, it is accompanied by control mechanisms that are a legacy of the office work model. Social cohesion is restricted to immediate associates, while over a fifth of respondents describe a feeling of isolation. At the same time, technology did not appear to be a limiting issue, which shows that solutions for improving the quality of cohesion should be explored in organizational processes and managerial practices.

Certain limitations of this research should be kept in mind. Since it relies on the self-assessment of the respondents, there is a risk of subjectivity and portraying socially desirable attitudes. The sample was formed voluntarily, which limits the application of the findings to the larger population. In addition, the research represents a cross-section of the situation at one point in time and does not address the long-term consequences of hybrid work on cohesion and organizational culture.

These limitations open directions for future research. A longitudinal study following the same teams over a longer period would provide insight into how cohesion changes during the various stages of hybrid work and which techniques provide long-term outcomes. Expanding the sample to other sectors, such as IT, service activities, or public administration, would create space for comparison and greater generalization of the results. It would be interesting to examine how age, work experience, and type of role in the team influence the perception of cohesion, as well as to what extent organizational and national culture shape the acceptance of the hybrid model.

5. References

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