

Two Channels of a Dual Mandate: Campus Geography and Administrative Coordination in the Teams-Mediated Interaction Network of a Hybrid Academic Unit

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Abstract

Institutions with a statutory dual mandate deliver professional education and applied research and development (RDI) through the same teams, yet how both mandates are enacted in everyday interaction is empirically open. We analyse 932 platform-recorded interaction ties of a nineteen-member departmental team and its manager at a Finnish university of applied sciences, across two windows spanning a semester boundary, each tie classified by the member who maintained it. The share of RDI ties rises monotonically with organizational distance: none of 97 intra-team ties, 11.5 per cent of 719 ties within the institution, and 63.8 per cent of 116 external ties. Internal cohesion rests not on task interdependence but on campus co-location (84 per cent of internal tie weight within campus, against 51 per cent by chance) and on the manager, whose removal disconnects the network. Across the semester boundary internal connectivity falls by a fifth while campus homophily persists.

1 Introduction

Working teams are the organizational unit through which higher education institutions do most of their work, and in institutions charged with more than one mission the team is where those missions meet. Finnish universities of applied sciences (UAS) are a legally explicit case: the Universities of Applied Sciences Act (932/2014) obliges these institutions both to provide professionally oriented higher education and to conduct applied research, development and innovation (RDI) that serves regional development. Academic staff enact both mandates inside the same organizational unit, and the interactions they generate for each may differ in partner choice, organizational reach and process character.

Two things follow that the existing literature does not settle. The first is whether the two mandates are enacted as differentiated regions of a single interaction structure or as separate relational channels reaching different parts of the organizational environment. The hybrid-organization literature theorizes competing institutional logics (Battilana and Lee 2014; Denis et al. 2015) and organizational designs that either separate or blend them (Albers et al. 2023), but rarely observes the interaction behaviour through which the logics are actually carried. The second is what holds such a team together. Team network research conventionally treats internal cohesion as a product of task interdependence (Park et al. 2020), yet in a dual-mandate unit whose members may share a degree programme but not a project, and who may work from different campuses and from home at their own discretion, the sources of internal connectivity are an empirical question rather than an assumption.

This study addresses both questions with two-wave interaction data from a single departmental team at a Finnish UAS, observed across a semester boundary. Interaction records were extracted from the Microsoft Teams Collaborators view for each consenting member and then classified, in an interview with that member, by the organizational process the tie primarily served and by the organizational location of the contact. The design therefore combines platform trace data with participant classification of tie content, which is what makes the process-by-level analysis possible at all.

The article makes three contributions. To the literature on hybrid organizations it shows that a mandate assigned at team level can be met entirely through individual-level specialization, and that the relational channels carrying the two mandates need not overlap at any point: in this unit they do not. To intraorganizational network research it shows that internal cohesion in a distributed academic unit can rest on non-task mechanisms, namely campus co-location and administrative coordination, and it demonstrates both with tests. To research using enterprise platform traces it offers an explicit account of an instrument whose properties have not previously been described in these terms: the Collaborators view returns a fixed number of contacts per person, ranked into fixed-capacity frequency bands, which makes the resulting tie weights ordinal within ego and the resulting strength measures compositional across egos. We set out what that permits.

The remainder of the article situates the study in five bodies of literature, states the research questions, describes the organizational context, the instrument, the network boundary and the measures, reports results with associated robustness tests, and discusses the findings and their limitations.

2 Related work

2.1 Organizational and intraorganizational social network analysis

Social network analysis has moved from mapping small-group communication in laboratory settings to studying information flow, coordination and influence in organizations (Jacobsen et al. 2022; Park et al. 2020). Organizational SNA treats members and units as nodes and their communications as edges, making visible structural properties that govern how knowledge circulates and where coordination bottlenecks arise. Freeman's (1977, 1978) formalization of degree, betweenness and closeness centrality remains the analytic vocabulary, and Freeman (1978) also introduced graph-level centralization as a property complementary to node-level centrality. Early programmatic work established network analysis as a general framework for organizational research (Tichy and Fombrun 1979), and multilevel syntheses positioned actors as simultaneously embedded in interpersonal, intraunit and interorganizational networks (Brass et al. 2004). Multidimensional and multilayer formulations represent distinct relational domains as separate but interlocking layers of the same organizational network (Gadár and Abonyi 2019), a perspective that motivates the present treatment of educational and RDI interactions as analytically separable tie types.

Park et al. (2020) synthesize 25 years of team network research and find degree and betweenness centrality the most frequently used individual-level constructs, with whole-network measures such as density and centralization capturing aggregate properties: high centralization in meeting interaction networks predicts poorer team performance, since dependence on central actors creates bottlenecks and structural fragility (Sauer and Kauffeld 2013). Park et al. identify two priorities that this study addresses: longitudinal designs, and the use of platform interaction records rather than elicited sociometric data.

The turn toward digital trace data reflects the availability of interaction logs from enterprise platforms. Lane et al. (2024) review the affordances of digital workplace tools for research on team communication and performance. Di Perna et al. (2024) compare email-derived community structures against formal organizational charts in a large corporation and find that detected communities routinely cut across reporting lines, echoing the longstanding observation that informal ties override formal ones in horizontal coordination and in managerial work (Cross et al. 2002; Rank 2008). Wen et al. (2025) apply centrality and community detection to the Enron corpus and trace how positions shift under organizational crisis. Alongside these affordances sit well-documented hazards. Howison et al. (2011) set out validity threats specific to digitally traced data, and work on missing data in networks shows that absent nodes and unobserved ties distort centrality in predictable ways (Kossinets 2006; Borgatti et al. 2006; Costenbader and Valente 2003).

2.2 Longitudinal and temporal network dynamics

Most organizational SNA treats networks as static snapshots, although temporal dynamics carry explanatory power beyond any single observation (Jacobsen et al. 2022). Jacobsen et al.'s review distinguishes actor-driven change, relational evolution, positional stability and structural transformation, and identifies two-wave panel designs as the most common empirical strategy while noting that their temporal resolution constrains causal inference. Dörpinghaus et al. (2024) propose a generic framework for longitudinal social network analysis based on centrality measures, introducing node-level summaries of a centrality profile across temporal layers and of its change between them. Recent micro-longitudinal work extends the agenda to individual conversations: Huang et al. (2025) tracked conversation networks among interdisciplinary scholars across a 15-day programme and found that socially oriented exchange, rather than research-oriented exchange, most robustly promoted new collaborative ties, with communication mode conditioning which conversation types flourished.

Zuzul et al. (2025) analyse aggregated email metadata from more than 4,000 organizations to examine how COVID-19 altered intraorganizational communication structure, finding organizations simultaneously more siloed and less stable, a combination they term dynamic silos. Their design and ours share the logic of comparing community structure across observation windows, but they differ in level of analysis: theirs treats organizations as observations, ours treats individuals within one unit. We return to this difference when interpreting our own longitudinal results, because it bears directly on what a single team can and cannot establish.

2.3 Brokerage, structural holes and tie strength

Betweenness centrality occupies a particular place in organizational research because it captures topological brokerage: a node with high betweenness lies on many shortest paths and is positioned to mediate flows (Freeman 1977). The organizational significance of brokerage is theorized by Burt (2004), whose structural-hole argument holds that actors spanning gaps between otherwise disconnected clusters gain an information advantage with measurable consequences. Burt's own operationalization is constraint, which measures the redundancy of an actor's neighbourhood, and constraint and

betweenness are not interchangeable: one is local and neighbourhood-based, the other global and path-based. Everett and Borgatti (2015) formalize the relationship between betweenness and brokerage in weighted directed networks. We therefore report both betweenness and constraint and treat their agreement as an empirical question. Long et al. (2013) extend the brokerage framework to public-sector and health-care networks and find that brokers face role-overload risk when they become the primary conduit between clusters. This risk increases the probability of the network losing its efficiency (Long et al. 2013).

A related conceptual distinction concerns tie strength. Granovetter's (1973) definition combines duration, emotional intensity, intimacy and reciprocal services, none of which a platform contact-frequency ranking observes. Brashears and Quintane (2018) show that frequency-based and content-based conceptions of strength diverge in their structural consequences. Accordingly we use the term interaction intensity for what our instrument records and reserve tie strength for the theoretical construct we do not measure.

2.4 Co-location, distributed work and boundary spanning

The effect of physical proximity on communication is among the most robust findings in the study of organizations: Allen (1977) established that the probability of communication declines steeply with physical distance, and the finding has survived successive generations of communication technology. A multi-campus academic unit is therefore a setting in which co-location is a candidate explanation for internal structure, and one that can be tested directly when campus membership is known. Krackhardt and Stern's (1988) E-I index provides a simple summary of the balance between within-group and between-group ties that we use for this purpose.

Boundary spanning refers to activities connecting an organization's internal network to external actors, knowledge sources and resources (Alsayyed and Sweis 2025; Long et al. 2013). Boundary spanners are structurally identifiable as nodes with concentrated ties outside the focal unit. Tortoriello et al. (2012) show that effective cross-unit knowledge transfer depends not only on boundary ties but on the internal cohesion of the receiving cluster; Zobel et al. (2023) add that boundary-spanning activity is not a stable trait but shifts as actors modulate between internal coordination and external engagement. In hybrid higher education institutions the function is doubly complex, since external engagement serves both the teaching mission (practicum placements, curriculum advice, employer liaison) and the applied research mandate (industry-funded projects, consortium partnerships, knowledge transfer). Jongbloed (2015) documents the proliferation of third-mission activities in European universities, Albers et al. (2023) distinguish structural separation from blending as organizational design responses to hybridity, and Maral and Çetin (2024) find in a data envelopment analysis of 187 universities that efficiency in teaching, research and third-mission activity diverges substantially across institutions, suggesting that multiple mandates tend to be met through specialization rather than uniform engagement. The present study examines whether the same holds within a single team.

2.5 Community detection and null models

Community detection partitions nodes into cohesive subgroups by identifying regions where within-group tie density exceeds between-group density. Newman's (2006) modularity Q provides the quality function underlying modularity-maximization algorithms, of which the Louvain method (Blondel et al. 2008) is the most widely used; Traag et al. (2019) show that Louvain can return internally disconnected communities and propose the Leiden algorithm as a guaranteed-connected alternative. Javed et al. (2018) note that modularity maximization tends to subdivide communities as density falls, and Dakiche et al. (2019, 2024) survey longitudinal community detection and the matching of communities across snapshots, distinguishing genuine structural change from algorithmic artefact. Brabant et al. (2025) push temporal resolution further with continuous-time longitudinal modularity.

Two methodological points from this literature shape our analysis. First, a detected partition is not evidence of community structure unless observed modularity exceeds what the degree sequence alone would produce, which requires comparison against a degree-preserving null model (Maslov and Sneppen 2002). Second, agreement between algorithms and stability across vertex orderings are checkable rather than assumable properties, and the adjusted Rand index (Hubert and Arabie 1985) quantifies both. Small and sparse networks make these checks more rather than less important, and we report them for every partition we present.

3 Research questions

RQ1: How are Teams-mediated interactions distributed across organizational levels and across the two institutional processes, and how concentrated is that distribution across members?

RQ2: Do education and RDI operate as differentiated regions of one interaction structure or as separate relational channels?

RQ3: What accounts for internal cohesion in the team: shared task engagement, campus co-location, or administrative coordination?

RQ4: How is external boundary spanning distributed, and through which process channels does it run?

RQ5: How do these structures change across the transition between academic semesters?

4 Data and methods

4.1 Organizational context

The unit studied is a departmental team at a Finnish university of applied sciences, an institutional type whose statutory mandate combines professionally oriented higher education with applied RDI serving regional development. Finnish UAS are hybrid organizations in the sense of Battilana and Lee (2014) and Denis et al. (2015): staff enact teaching and research roles within the same unit, and the institution must balance the logic of educational delivery against that of applied knowledge production. Comparable

institutional types exist across Europe, including German Fachhochschulen, Dutch hogescholen and other polytechnic sectors, so the case is an instance of a wider category rather than a national peculiarity. What is distinctive in the Finnish arrangement is not that individuals both teach and research, which is common in higher education generally, but that the applied-research and regional-development mandate is statutory, externally funded for the most part, and assigned to the same unit and the same staff who deliver the degree programme.

Five features of this particular team matter for interpreting its interaction structure, and each was reported by the unit rather than inferred from the network data.

The team comprises 19 members plus a manager. All members teach in the same English-language business administration degree programme, which is the team's common denominator: there is no division into disciplinary subteams with separate subject matter.

RDI participation is required of the team as a unit, not of each individual. No member carries an individual obligation to engage in applied research, while the team as a whole is expected to contribute. This distinction is central to the interpretation of our results, because it means that specialization is institutionally permitted by design rather than a deviation from expectation.

Courses may be taught by one teacher or by several, and co-teaching occurs both within the team and across team boundaries. Shared teaching duties therefore generate ties inside the team and, at least as often, to colleagues in other teams within the institution.

The team is distributed across two campuses in two cities. Members decide the proportion of their work performed remotely at their own discretion. Microsoft Teams is the institution's standard channel for work communication and, in a two-city unit with discretionary remote work, the primary medium through which coordination is conducted.

The team has existed for five years, and no personnel changes occurred between the two observation windows. Whatever structural change we observe across the semester boundary therefore cannot be attributed to entries or exits.

The manager organizes the team's work without participating in the same teaching or RDI tasks as its members. The manager's ties to members are thus coordination ties rather than shared-task ties, a distinction that becomes important in Section 5.4.

4.2 Instrument and data collection

Interaction data were extracted from the Microsoft Teams Collaborators view, which displays a user's recent interaction partners along a frequency gradient covering a four-week retrospective window (Fig. 1). Data were collected at two timepoints. The first window covers the four weeks preceding the Christmas break in December 2025, that is, the closing weeks of teaching in the autumn term. The second covers four full working weeks in February 2026, after the spring term had begun. In Finnish

higher education, the spring semester starts within the first two weeks of January. Neither window contains a holiday period, and both consist of ordinary working weeks, so the contrast is between the end of one teaching term and the start of the next rather than between a working period and a vacation. The combined dataset spans eight working weeks across two organizationally distinct moments.

The instrument has three properties that determine what the resulting data can support, and we set them out explicitly because they are not evident from the view itself.

First, the view returns a fixed number of contacts, distributed across four frequency bands with fixed capacity: five contacts in band 1 (most frequently contacted), nine in band 2, twelve in band 3 and nine in band 4, giving 35 contacts per person per window. It does not return all of a person's collaborators, and it does not return a count of interactions. A member with more than 35 collaborators in a window has an unobserved tail, which the interface itself signals with a "+n" indicator.

Second, because the number of slots is fixed, band membership is a within-person rank rather than a quantity. Band 1 for one member may correspond to a very different volume of messages than band 1 for another, and the bands cannot be assumed equidistant. Following the practice of the previous literature we convert band to a numeric weight as $\text{weight} = 5 - \text{band}$, so that the most frequently contacted receive weight 4 and the least frequently contacted weight 1, and we treat the resulting values as ordinal within ego. Section 4.4 states the consequences for aggregate measures and Section 5.6 reports how results behave under alternative weighting schemes.

Third, the fixed capacity imposes a constant-sum constraint. Summed weights per member per window average 76.9 (SD 3.2) in December and 76.7 (SD 3.6) in February. Any two process categories therefore compete for the same fixed budget, and their summed weights are necessarily negatively related: across members the correlation between educational and RDI tie weight is -0.97. This is a property of the instrument, not a finding about specialization, and it is why we report process engagement as shares of each member's observed ties rather than as sums, following the standard treatment of compositional data (Aitchison 1986).

A fourth consequence follows for longitudinal comparison. Because the number of observed contacts per member is fixed, the instrument cannot register a change in communication volume. Total coded ties are 467 in December and 465 in February, and this near-identity is an artefact of fixed capacity rather than evidence of stable communication activity. What the instrument can register is a change in the composition and targeting of each member's most frequent contacts. All longitudinal claims in this article are of that second kind.

Some participants' views included private, non-work contacts. These were removed manually before coding. Because the full complement is 35 slots per member per window, the number removed per member is recoverable as the shortfall from 35: 23 contacts were removed in December and 25 in February, 48 in total, or 4.9 per cent of the 980 available slots. Two members had no removals; the

largest individual removals were six contacts. The observed band distribution across the pooled data is 138 / 244 / 317 / 233 against a full-capacity expectation of 140 / 252 / 336 / 252.

4.3 Participant classification of ties, and reactivity

Process type and outreach level were not inferred from the platform records. After each participant's contacts had been extracted, the resulting personal network map was returned to that participant and reviewed in a short interview, in which the participant characterized each tie: the organizational process the interaction primarily served (RDI; education; both; or other) and the organizational location of the contact (fellow team member; colleague or a student within the institution but outside the team; actor outside the institution). Codes were assigned from these accounts, so that classification reflects the substantive content of each relationship as reported by the person who maintained it.

This design is not non-reactive, and we do not claim that it is. Participants saw a representation of their own most frequent contacts after the first window and before the second, and were asked to reflect on each tie. Exposure to this feedback could in principle have altered subsequent behaviour. Three considerations bound the concern. The exposure was uniform: every participant received the same procedure at the same point, so differential reactivity cannot explain between-member differences, which is where most of our analysis lies. The exposure concerned contact identity and frequency ranking rather than any structural metric: participants were not shown centrality scores, community memberships or comparisons with stakeholders. And the aggregate quantities that change across windows, notably the loss of internal ties, run counter to what reactive self-presentation would predict, since a participant conscious of being observed in a study of team interaction would have reason to sustain rather than reduce visible collegial contact. Reactivity nonetheless remains a limitation of the two-wave design, and Section 6.5 states it as such.

The alternative design, extracting interaction records administratively through the platform's reporting interfaces, would be genuinely non-reactive and would return interaction counts rather than ranks, resolving both the reactivity and the ordinality problems. It would also lose the participant classification of tie content on which the process-by-level analysis depends. We regard the two designs as complementary rather than ranked.

4.4 Network boundary and roster

The team comprises 19 members and a manager, 20 actors in total. Fourteen members consented to the extraction of their own Collaborators view. Five members declined to share their own map, and the manager did not participate. Non-participants nonetheless appear in the data as contacts named by participants, and were identified as team members or as the manager by the unit.

The observation window is therefore precisely specifiable. Every tie with at least one participant at one end is observed. Ties between two participants are observed from both ends. Ties from participants to the five non-participating members and to the manager are observed from one end only. Ties among non-participants are not observed at all. The internal network analysed below is thus complete with

respect to participant-incident ties and structurally censored with respect to ties among the six non-participating actors; degree and centrality values for those six are lower bounds.

We treat this as a property of the design to be reported for two reasons. Substantively, non-participation is itself informative: the actor most central to the team's internal network is one who did not participate, and that fact is only visible because participants named him. Methodologically, the literature on missing network data shows that omitted nodes bias centrality in known directions (Kossinets 2006; Borgatti et al. 2006), and reporting which parts of the structure are observed from both sides, one side or neither is a more useful disclosure than a single completeness figure.

Actors are labelled consistently throughout the article. The fourteen members who shared their own contact map are TM1 to TM14, the five members who declined to share their own map but appear as contacts named by others are TM15 to TM19, and the manager is MGR. The distinction between TM1 to TM14 and TM15 to TM19 is therefore a distinction in observation, not in organizational membership: all nineteen are members of the same team, and only the first fourteen are observed from their own side as well as from others'.

Analyses of internal structure are reported for two boundaries: the 19 members, and the 19 members plus the manager. The latter is our main specification, since the manager is functionally part of the unit's coordination, and the former serves as a sensitivity check.

Across both windows, 932 ties were coded: 97 at team level, 719 at institutional level and 116 at external level. The institutional level is heterogeneous by design. It contains every contact inside the institution but outside the team, which in a teaching-intensive unit includes both colleagues in other teams and students. The code records the organizational location of a contact, not the role that contact occupies, so staff ties and student ties at this level cannot be separated in the present dataset; Section 6.5 states the consequences for interpretation. By process, 764 (82.0 per cent) were educational, 156 (16.7 per cent) RDI, 11 (1.2 per cent) other and 1 (0.1 per cent) both.

4.5 Measures

Directed, weighted graphs were constructed per window using *igraph* (Csardi and Nepusz 2006) in R, with visualizations produced in *ggraph* (Pedersen 2022) using a stress-minimization layout (Gansner et al. 2004). The internal network is the subgraph induced on the 20 team-level actors, converted to an undirected representation with reciprocal ties collapsed by summing weights, retaining all actors as nodes so that isolates remain visible.

Interaction intensity is the band-derived weight described in Section 4.2, ordinal within ego.

Betweenness centrality is computed with inverted weights as distances (distance = 1/weight), so that more frequent contacts are treated as shorter paths. We report it both for the full network, where a member's position reflects all their contacts at every level, and for the internal network, where it reflects

position among stakeholders only. These are different quantities and we keep them distinct: a member can be a global bridge through shared institutional contacts while being peripheral inside the team.

Burt's constraint and *effective size* are computed on the internal network as neighbourhood-based measures of structural-hole access, reported alongside betweenness so that their correspondence can be assessed rather than assumed.

Process share is the proportion of a member's observed tie weight in a window that is classified to a given process. We use shares rather than sums throughout, for the compositional reason given in Section 4.2. *External share* is defined analogously; because external ties are the substantive interest in RQ4 and are not subject to a within-member trade-off with any other level of comparable size, we additionally report external strength as a sum.

Campus homophily is assessed with the within-campus share of internal tie weight, the E-I index (Krackhardt and Stern 1988), and a permutation test in which campus labels are randomly reassigned 5,000 times to yield the null distribution of the within-campus share. The manager, who belongs to no campus, is excluded from these calculations.

4.6 Community detection, null models and robustness

Communities in the internal network were detected with the Louvain algorithm (Blondel et al. 2008) and, as a check on the known connectivity problem of Louvain partitions, with the Leiden algorithm (Traag et al. 2019) and with walktrap; agreement is reported as the adjusted Rand index (Hubert and Arabie 1985). Stability was assessed by re-running Louvain on 100 random vertex orderings of each network.

Because a detected partition is not in itself evidence of community structure, observed modularity was compared against a degree-preserving null model: 1,000 randomizations per window, each rewiring the observed graph while preserving its degree sequence (Maslov and Sneppen 2002) and reshuffling the observed weights across the rewired edges, with Louvain applied to each randomization. We report the null distribution of Q , the empirical p-value, and the standardized deviation.

Given the relatively small sample size, we ran robustness checks. Leave-one-out analysis removes each actor in turn and recomputes internal betweenness for the remainder, reporting the Spearman rank correlation with the full-network ordering. Weight-scheme sensitivity recomputes betweenness and the Louvain partition under binary weights, under inverse-band weights ($1/\text{band}$), and under a steeper convex scheme $((5 - \text{band})^2)$, reporting rank correlations and partition agreement with the baseline.

5 Results

Results follow the five research questions. All figures reported as counts refer to coded ties; all process figures reported as shares refer to proportions of observed tie weight, for the compositional reason given in Section 4.2.

5.1 Distribution and concentration of interaction (RQ1)

Of the 932 ties coded across both windows, 97 (10.4 per cent) connect team-level actors, 719 (77.1 per cent) reach stakeholders inside the institution but outside the team, and 116 (12.4 per cent) reach outside the institution. The distribution is stable across windows at institutional level (367 and 352 ties) and at team level (53 and 44), while external ties increase from 47 to 69.

The dominant organizational location of interaction is therefore the rest of the institution. This is consistent with the unit's reported organization of teaching: courses are taught by one or several teachers and co-teaching crosses team boundaries, so the everyday coordination of educational delivery routinely involves stakeholders outside the team. Part of this volume is not coordination among staff at all: students are also contacts at this level, so institutional-level educational ties combine the coordination of teaching with its delivery. The sparseness of the internal network, taken alone, would suggest a weakly integrated unit; read against the institutional-level volume, it instead reflects where the educational work is organized and, in part, to whom it is delivered.

Concentration across members is substantial but not extreme. In the internal network including the manager, mean degree is 4.40 (SD 2.89, maximum 13) in December and 3.50 (SD 2.52, maximum 11) in February, with Gini coefficients for degree of 0.319 and 0.360 and for tie strength of 0.369 and 0.377. Freeman degree centralization is 0.503 in December and 0.439 in February. Betweenness is far more unequally distributed than degree, with Gini coefficients of 0.711 and 0.728, and a single actor holds 23.3 per cent and 25.3 per cent of all internal betweenness in the two windows respectively. Section 5.4 identifies that actor.

A skewed degree distribution with a small number of high-degree actors and a majority of low-degree actors is among the most common findings in network research and is generally understood in terms of preferential attachment (Barabási and Albert 1999). We note the consistency and claim nothing more from it: with 20 nodes the functional form of a degree distribution cannot be tested, and we make no scale-free claim. What is substantive here is not the skew but its composition, which is the subject of the following sections.

5.2 Two channels of the dual mandate (RQ2)

The share of ties serving RDI rises monotonically with organizational distance from the team, and the pattern is nearly identical in both windows (Table 1, Fig. 3).

Table 1
Process composition of ties by organizational level and observation window

Level	Window	Ties	Education	RDI	Other	RDI share
Team	December	53	52	0	1	0.0%
Team	February	44	44	0	0	0.0%
Team	Both	97	96	0	1	0.0%
Institution	December	367	325	39	3	10.6%
Institution	February	352	306	44	2	12.5%
Institution	Both	719	631	83	5	11.5%
External	December	47	15	30	2	63.8%
External	February	69	22	44	3	63.8%
External	Both	116	37	74	5	63.8%
RDI share counts ties classified as RDI or as serving both processes. The single tie classified as serving both processes falls at institutional level in February. The institutional level covers all contacts inside the institution but outside the team, including both colleagues in other teams and students; the code does not distinguish the two.						

Table 2
Internal network descriptives, 19 members and the manager

Measure	December	February
Ties	44	35
Density	0.232	0.184
Components	1	2
Isolates	0	1
Mean degree (SD)	4.40 (2.89)	3.50 (2.52)
Maximum degree	13	11
Gini, degree	0.319	0.360
Gini, tie strength	0.369	0.377
Gini, betweenness	0.711	0.728
Freeman degree centralization	0.503	0.439
MGR's share of internal betweenness	23.3%	25.3%
Louvain communities (Q)	3 (0.319)	5 (0.361)
Null-model Q, mean (SD)	0.294 (0.028)	0.322 (0.031)
Empirical p, Q observed vs null	0.182	0.099
Ties excluding the manager	31	24
Components excluding the manager	2	2

Table 3
Member profiles by window

Member	Int. degree Dec / Feb	Int. betw. Dec / Feb	Global betw. Dec / Feb	RDI share Dec / Feb	External strength Dec / Feb
MGR	13 / 11	56 / 57	–	–	–
TM1	5 / 4	22 / 17	270 / 214	0.45 / 0.48	28 / 30
TM2	5 / 5	5 / 1	290 / 222	0.00 / 0.00	0 / 0
TM3	2 / 2	0 / 2	0 / 0	0.46 / 0.43	8 / 22
TM4	6 / 7	55 / 52	912 / 395	0.00 / 0.00	7 / 0
TM5	5 / 4	11 / 26	802 / 1210	0.00 / 0.00	5 / 0
TM6	3 / 3	0 / 3	432 / 640	0.51 / 0.74	15 / 20
TM7	4 / 2	0 / 0	512 / 236	0.15 / 0.20	0 / 6
TM8	3 / 4	0 / 6	287 / 924	0.43 / 0.36	12 / 30
TM9	10 / 7	37 / 40	1543 / 1150	0.00 / 0.00	4 / 0
TM10	5 / 1	13 / 0	800 / 0	0.07 / 0.00	6 / 10
TM11	5 / 2	30 / 0	1238 / 240	0.24 / 0.34	16 / 13
TM12	1 / 0	0 / 0	0 / 0	0.00 / 0.00	0 / 0
TM13	3 / 3	0 / 1	0 / 31	0.05 / 0.05	0 / 3
TM14	2 / 2	0 / 0	0 / 28	0.12 / 0.16	3 / 17

Internal degree and internal betweenness are computed on the network of 19 members and the manager (MGR); global betweenness on the full network of all coded contacts. RDI share is the proportion of a member's observed tie weight classified to RDI or to both processes. TM1 to TM14 are the members who shared their own contact map. Members TM15 to TM19 did not share their own map and are observed only as contacts named by others, so their values are lower bounds and their process and external measures are not defined; their internal degrees are 5 / 4 (TM15), 1 / 1 (TM16), 5 / 3 (TM17), 3 / 3 (TM18) and 2 / 2 (TM19), with internal betweenness 4 / 17, 0 / 0, 9 / 2, 0 / 0 and 0 / 2 respectively. MGR's process and external measures are likewise not defined, since the manager's own contact map was not collected.

Table 4
Robustness checks

Check	December	February
Modularity vs degree-preserving null (p)	0.182	0.099
Louvain vs Leiden partition (ARI)	1.000	1.000
Louvain vs walktrap partition (ARI)	0.486	0.488
Louvain stability over 100 vertex orderings (mean ARI)	1.000	0.967
Leave-one-out, internal betweenness (mean Spearman)	0.981	0.951
Leave-one-out, worst case	0.886	0.816
Betweenness under alternative weights (Spearman range)	0.969–0.996	0.996–1.000
Louvain partition under alternative weights (ARI range)	0.357–0.824	0.806–1.000
Campus homophily, permutation p	0.0002	0.0024

Inside the team, not one of the 97 ties recorded across the two windows served RDI. Ninety-six were educational and one was classified as other. At institutional level, 83 of 719 ties (11.5 per cent) served RDI. Applied research and development in this unit involves staff and external partners rather than students, so these institutional RDI ties are presumably collegial, but the coding records location rather than role and the inference cannot be verified with these data. Outside the institution, 74 of 116 ties (63.8 per cent) served RDI, a proportion identical to the first decimal in December and February.

The two mandates are not differentiated regions of one interaction structure: they run through separate relational channels that do not intersect at team level at all. Education is enacted both inside the team and outward into the institution; applied research and development is enacted only outward, and predominantly beyond the institution's boundary. Whatever the team is as a structure for delivering education, it is not a structure through which RDI interaction passes.

Individual process profiles are correspondingly polarized. RDI shares of observed tie weight range from zero to 0.51 in December and from zero to 0.74 in February. Four members (TM6, TM3, TM1, TM8) hold RDI shares above 0.40 in both windows; five members (TM2, TM4, TM5, TM9, TM12) hold a share of exactly zero in both, and a sixth (TM10) falls to zero in February. TM6 moves from 0.51 to 0.74, the largest single shift in the dataset. TM12 is the limiting case: 70 ties across the two windows, all educational, all at institutional level, no RDI tie and no external tie in either window.

Given the constant-sum property of the instrument, we do not interpret the negative association between educational and RDI weight as evidence of a trade-off; it is arithmetic. What is not arithmetic is the categorical absence of RDI at team level and the persistence of zero-RDI profiles across two windows in a unit where the RDI mandate applies to the team as a whole. The finding is that a team-level mandate is being met by roughly a quarter of its members, through ties that lead out of the unit.

5.3 What holds the team together (RQ3)

Two candidate mechanisms for internal cohesion can be tested with these data, and a third can be ruled out.

The mechanism that can be ruled out is shared RDI work: since no intra-team tie serves RDI, applied research cannot be generating internal connectivity. That leaves educational task interdependence, campus co-location and administrative coordination.

Campus co-location. The team is distributed across two campuses in two cities, with twelve members on one and seven on the other (Fig. 2). Within-campus ties account for 84.3 per cent of internal tie weight in December and 83.7 per cent in February, against a chance expectation of 50.8 per cent and 50.7 per cent respectively under 5,000 random reassignments of campus labels. The permutation p-value is 0.0002 in December and 0.0024 in February, and the E-I index is -0.685 and -0.673 (Fig. 4). Campus co-location is thus a strong and stable organizer of internal interaction, and the effect is unchanged across the semester boundary even as the volume of internal interaction falls.

Campus does not, however, coincide with the detected community partition. The modularity of the campus split itself is 0.193 in December and 0.164 in February, lower than the modularity of the Louvain partition (0.319 and 0.361), and the adjusted Rand index between campus and Louvain communities is 0.279 and 0.409. Campus therefore operates as a coarse constraint within which finer groupings form, rather than as the partition itself. This is what Allen's (1977) proximity finding would predict in an organization where remote work is discretionary: distance suppresses interaction probability without wholly determining who interacts with whom.

Administrative coordination. The most central actor in the internal network in both windows is the team's manager (MGR), with degree 13 of a possible 19 in December and 11 in February, and the highest internal betweenness in both windows (56.5 and 57.5 against 55.0 and 51.5 for the next-ranked actor, TM4). Ties to the manager are almost entirely educational (12 of 13 in December, 11 of 11 in February) and highly intensive, with mean frequency bands of 1.85 and 1.64 on a scale where 1 is the most frequent.

Removing the manager from the network demonstrates the dependence directly. In December the internal network including the manager forms a single connected component with no isolates; with the manager removed it falls into two components, one member becomes fully isolated, and density drops from 0.232 to 0.181. In February, where the network is already in two components, removal reduces density from 0.184 to 0.140. In December, therefore, the team was a connected structure only by virtue of its manager.

Burt's constraint corroborates the picture from the neighbourhood side: MGR has the lowest constraint of any actor in both windows (0.20 and 0.23), with TM4 and TM9 next. Constraint and internal betweenness correlate at -0.795 in December and -0.947 in February, so in this network the two

operationalizations of brokerage largely agree, although the December divergence shows that they are not interchangeable.

Taken together, these results indicate that internal cohesion in this unit rests on co-location and on administrative coordination rather than on task interdependence in either mandate. The manager, who by the unit's own account organizes work without sharing in the teaching or RDI tasks of members, is the structural centre; the two campuses define the regions within which members connect to each other.

A note on non-participation. That the most central internal actor is a person who did not participate in the study is worth stating plainly, because it has a methodological implication beyond this case. Ego-ranked platform data recover central actors even when those actors do not participate, provided participants name them; but their positions are visible only through others' reports, and are therefore lower bounds. The five members who did not share their own map occupy peripheral to moderate positions (TM15: degree 5 and 4; TM16: 1 and 1; TM17: 5 and 3; TM18: 3 and 3; TM19: 2 and 2), so the pattern is not that non-participants are systematically central. MGR is central because of the role, not because of absence from the participant pool.

5.4 External boundary spanning (RQ4)

External ties are the channel through which the RDI mandate is enacted, and they are held by few members. External ties increase from 47 in December to 69 in February, with the RDI share constant at 63.8 per cent in both windows. The top three members by external strength account for 56.7 per cent and 54.3 per cent of all external tie weight, and Gini coefficients across the fourteen participants are 0.545 and 0.557. Four members have no external tie at all in December (TM2, TM7, TM12, TM13) and five in February (TM2, TM4, TM5, TM9, TM12).

TM1 holds the highest external strength in both windows (28 and 30) and combines it with a high RDI share (0.45 and 0.48), which makes this member the unit's most persistent boundary spanner. TM8 shows the largest increase (12 to 30), concurrent with a rise in global betweenness from 287 to 924, a pattern consistent with the surge dynamics described by Zobel et al. (2023). TM3 and TM14 also increase substantially (8 to 22 and 3 to 17). TM6, the member with the highest RDI share in both windows, holds moderate external strength (15 and 20) but almost no internal position (internal degree 3 in both windows, internal betweenness 0.0 and 3.0), an exteriorized profile that the internal-network view alone would render invisible.

The heterogeneity of process types among external ties matters for interpretation. Roughly two-thirds of external ties serve RDI and one-third education, and the two are held by largely different members: those with high RDI shares reach outward through research and development channels, while others reach outward through practicum, employer and curriculum channels. The institution's dual external mandate is thus met through a division of boundary-spanning labour rather than through general multi-functionality.

5.5 Change across the semester boundary (RQ5)

Between the close of the autumn semester and the early weeks of the spring semester, internal connectivity declines and external connectivity rises, while the structural principles identified above remain in place.

Internal ties fall from 44 to 35, a decline of 20 per cent, and density from 0.232 to 0.184. The network moves from one connected component to two, and one member (TM12) becomes fully isolated. Internal degree falls for nine of the fourteen participants, most sharply for TM10 (5 to 1), TM11 (5 to 2) and TM7 (4 to 2), and rises for one (TM4, 6 to 7). Mean internal degree falls from 4.40 to 3.50. Over the same interval external ties rise from 47 to 69, and the number of members with no external tie rises from four to five, so the increase is concentrated among members who were already externally active.

Global betweenness is redistributed substantially. TM11 loses the bridging position it held in December (1,238 to 240), TM10 falls from 800 to zero and TM4 from 912 to 395, while TM8 rises from 287 to 924 and TM5 from 802 to 1,210. Fourteen-member rank orderings are therefore not stable across a single semester boundary, which is itself a finding about the volatility of positions in a unit of this kind.

Detected community counts rise from three to five (Louvain, $Q = 0.319$ and 0.361). Observed modularity does not differ significantly from a degree-preserving null model in either window.

Three features of the design bear on the interpretation of this change. Personnel were unchanged between the windows, so entries and exits cannot account for it. The instrument cannot register a change in interaction volume, only in composition and targeting, so the decline in internal ties means that colleagues inside the team occupied fewer of each member's most frequent contact slots in February, not necessarily that less communication occurred.

5.6 Robustness

Null models. Observed modularity of the internal network is 0.319 in December against a degree-preserving null distribution with mean 0.294 (SD 0.028), giving an empirical p of 0.182 and a standardized deviation of 0.91. In February observed modularity is 0.361 against a null mean of 0.322 (SD 0.031), with $p = 0.099$ and $z = 1.27$. In neither window does the partition exceed what the degree sequence alone produces.

Algorithm agreement and stability. Louvain and Leiden return identical partitions in both windows (ARI = 1.000). Walktrap differs substantially from both (ARI = 0.486 in December and 0.488 in February), splitting the network at different points; since walktrap optimizes a different objective, we treat the Louvain and Leiden agreement as the relevant check and the walktrap divergence as a further reason not to rest substantive claims on the partition. Re-running Louvain on 100 random vertex orderings, with memberships aligned by actor name, yields a mean adjusted Rand index of 1.000 in December (the same partition every time) and 0.967 in February (minimum 0.765), so the reported partitions are not artefacts of vertex ordering.

Leave-one-out. Removing each actor in turn and recomputing internal betweenness for the remainder yields mean Spearman rank correlations with the full ordering of 0.981 in December (minimum 0.886) and 0.951 in February (minimum 0.816). In both windows the most consequential single removal is TM4. The ordering of internal positions is thus robust to the loss of any one actor.

Weighting scheme. Betweenness rank orderings are highly robust to the choice of weighting scheme: Spearman correlations with the baseline are 0.969 to 0.996 in December and 0.996 to 1.000 in February across binary, inverse-band and steeply convex schemes. Community partitions are less robust: the adjusted Rand index against the baseline partition ranges from 0.357 to 0.824 in December and from 0.806 to 1.000 in February, with binary weighting the most disruptive in both windows and the detected community count varying between three and five.

Sensitivity to boundary definition. Excluding the manager, the internal network has 31 and 24 ties, densities of 0.181 and 0.140, two components in both windows, and one isolate in both. The longitudinal direction is unchanged under either boundary; the difference is that with the manager included December is a single connected component.

6 Discussion

6.1 Two channels, not one differentiated network

The central empirical result of this study is the monotone gradient of Table 1: zero per cent RDI inside the team, 11.5 per cent at institutional level, 63.8 per cent outside the institution. The dual mandate in this unit is not carried by one network with research-leaning and teaching-leaning regions. It is carried by two channels with different reach, and they do not meet at team level.

This qualifies the design typology of Albers et al. (2023), which distinguishes structural separation from blending as organizational responses to competing logics. In this unit the formal design is blended: one team, one degree programme, both mandates. The relational reality is separated, and separated along the dimension of organizational distance rather than along the dimension of organizational unit. A typology framed in terms of units will not detect this, because the separation occurs inside the unit it treats as blended.

It also gives a cross-level counterpart to the institution-level finding of Maral and Çetin (2024), who show that universities rarely achieve efficiency in teaching, research and third-mission activity simultaneously. Here the same specialization appears within a single team of nineteen, with roughly a quarter of members carrying the RDI channel. The reported context makes the mechanism intelligible: the RDI obligation is assigned to the team, not to individuals. A mandate that is collective in its assignment can be met through concentrated individual specialization, and the interaction structure is where that becomes visible. Whether this arrangement is efficient or fragile is a question our data cannot settle, but its structural signature, a mandate with no internal relational substrate, is at least a candidate

explanation for the difficulty institutions have in sustaining third-mission activity through teaching-oriented units.

6.2 Cohesion without task interdependence

Team network research generally treats internal cohesion as arising from the work itself. In this unit it does not. RDI generates no internal ties at all. Educational work generates internal ties, but far more institutional-level ones, because co-teaching crosses team boundaries and because students are contacts at that level. What is left holding the team together is where people sit and who organizes their work.

Co-location is the stronger of the two in statistical terms: 84 per cent of internal tie weight stays within campus against a chance expectation of 51 per cent, in both windows, with permutation p-values below 0.01. That campus does not coincide with the detected partition is equally informative: proximity constrains rather than determines, exactly as Allen's (1977) formulation implies, and in a unit where remote-work proportions are individually chosen, the persistence of so strong a proximity effect through a platform-mediated channel is notable in its own right. Teams-mediated interaction is not geography-free interaction.

Administrative coordination is the more structurally consequential of the two. The manager is the highest-degree and highest-betweenness internal actor in both windows, holds roughly a quarter of all internal betweenness, has the lowest constraint, and is the reason the December network is connected at all. Whether members in formal leadership roles become communication hubs by virtue of the role is an open question in the team network literature; in this unit the answer is unambiguously yes, and the hub is not merely central but load-bearing.

This has a direct implication for the hub-dependence argument that the organizational literature makes on performance grounds (Sauer and Kauffeld 2013; Long et al. 2013), and for the team-competence literature's emphasis on distributing governance and coordination capability across members rather than concentrating it in one role (Linstead et al. 2009; Stavrou et al. 2023). The risk in this unit is not that a highly central colleague might be reassigned, but that the unit's internal connectivity is a managerial artefact. Cohesion produced by coordination rather than by collaboration may be perfectly functional for delivering a degree programme, and simultaneously unable to support the kind of lateral knowledge flow that an RDI mandate requires. The absence of internal RDI ties and the presence of a managerial star are, on this reading, the same structural fact seen from two sides.

6.3 The semester transition: a candidate mechanism, not a demonstrated one

Internal connectivity fell by a fifth between the two windows, the network split in two, and one member became isolated. A semester-driven analogue of the dynamic silos documented by Zuzul et al. (2025) is the natural reading, and one that could be advanced as the study's key contribution. We do not advance it, for four reasons, and state the finding as a hypothesis instead.

First, identification. Two windows cannot separate a semester effect from anything else that differs between the end of one teaching term and the start of the next. A holiday interruption is not among those differences, since both windows were placed in ordinary working weeks, but the accumulated state of a term in progress against a term just started, project and funding cycles, and any December-to-February difference unrelated to the academic calendar all remain. A design capable of separating these would compare the same calendar month across years, or add windows at other points in the academic cycle.

Second, the instrument. Because the Collaborators view returns a fixed number of contacts, the near-identical total tie counts across windows (467 and 465) are an artefact of fixed capacity and not evidence that communication volume was stable. It follows that we cannot use volume stability as an argument that the change was structural reorganization rather than a general decline in activity, and the decline in internal ties must be read as a change in the composition of members' most frequent contacts.

Third, the statistical status of the community result. Zuzul et al. infer siloing from increased modularity across more than 4,000 organizations. Our modularity does not differ from a degree-preserving null in either window, so the community-count comparison cannot bear the same interpretive weight, whatever the direction of the change.

Fourth, level of analysis. Their observations are organizations; ours are individuals within one unit. A single team cannot establish that a calendar rhythm produces fragmentation in hybrid academic organizations generally; it can establish that fragmentation occurred here, describe its shape, and specify what would test the proposed mechanism.

What the design does contribute on this point is a constrained set of alternative explanations. Personnel were unchanged, so turnover is excluded. Campus homophily is unchanged, so the decline is not a matter of one campus withdrawing. The decline is concentrated in members whose internal degree fell while their external ties held or rose, which is consistent with a reorientation from shared teaching coordination toward project and external work, and inconsistent with a general reduction in activity. A three-wave or four-wave design, adding a start-of-autumn window and a repeat of the December window a year later, would allow the proposition to be tested with stochastic actor-oriented models (Snijders et al. 2010), which two waves cannot support.

6.4 What an ego-ranked, fixed-capacity instrument can show

The Collaborators view is an attractive data source: it requires no survey administration, it reflects manifested rather than reported interaction, and it is available to any member of the organization. Its properties nonetheless constrain inference in ways that to our best understanding are not stated in the literature on platform trace data, and which generalize to any interface that ranks a fixed number of collaborators.

It is censored from above. Only the top 35 contacts per person per window are returned, so members with wider networks have unobserved tails. Concentration measures computed on such data are lower bounds.

It is ordinal within ego and not comparable across egos. Band membership is a rank in a fixed-capacity display, so the same band means different volumes for different people, and equidistance between bands cannot be assumed. Our robustness analysis shows that centrality orderings survive alternative weight schemes while one of the two community partitions does not, which suggests that path-based measures tolerate the ordinality better than partition-based ones.

It is compositional. With summed weight per member effectively constant, process-specific sums are shares of a fixed budget, and any two process categories are mechanically negatively related. Analyses that treat such sums as independent quantities, including any composite index that averages them, will reproduce arithmetic as substance.

It cannot observe volume change. Because capacity is fixed, longitudinal comparison speaks to the composition and targeting of frequent contacts, not to how much interaction occurred.

None of this makes the instrument unsuitable; it makes it suitable for a specific class of question. Questions about who occupies whose most frequent contact slots, about the process and organizational location of those contacts, and about how that composition changes, are answerable. Questions about interaction volume, about absolute tie strength, and about the complete contact set are not. We would add that the measurement properties matter more, not less, in small units, since there the temptation to read a table of aggregated sums as a description of individual behaviour is strongest.

A further methodological observation concerns participation. The most central actor in this team's internal network did not participate in the study, and is observed only through the reports of those who did. Ego-based collection is thus partially robust to non-participation, in that it recovers the position of non-participants who are named by others, while being systematically conservative about them: their observed degrees and centralities are lower bounds, and ties among non-participants are invisible. Reporting which parts of a structure are observed from both ends, one end or neither is more informative than a completeness rate, and we recommend it as standard practice for ego-aggregated designs.

6.5 Limitations

This research is not without limitations. First, the two-wave design constrains causal inference, and three or more waves would be required for stochastic actor-oriented modelling of network evolution (Snijders et al. 2010). Both windows were placed in ordinary working weeks, so a holiday interruption is not a competing explanation for the observed change; what two windows cannot separate is the semester phase from any other difference between December and February.

Second, the study observes Teams-mediated interaction, not interaction. Face-to-face conversation, email, telephone contact and student information systems are outside the instrument, and the bias is

unlikely to be uniform: educational coordination in a two-city unit is plausibly more Teams-mediated than co-located teaching itself, while RDI work involving external partners may run through channels the institution's platform does not capture. The 82 per cent educational share of coded ties is therefore partly a property of the channel and should not be read as a direct estimate of how members divide their attention. We have named the construct accordingly throughout.

Third, classification of process type and outreach level rests on participant accounts given in a single interview per window, and was not independently verified. The procedure exposed participants to a representation of their own contact patterns between the two windows, so the design is not non-reactive, as Section 4.3 sets out.

Fourth, five of nineteen members and the manager did not participate; their positions are lower bounds and ties among them are unobserved. Campus membership, role and the manager's identity were reported by the unit and not independently verified. External contacts are aggregated into a single category, so we cannot establish whether RDI-oriented and education-oriented boundary spanners reach distinct external communities, a distinction with direct implications for understanding the dual mandate at the level of partnerships.

Fifth, the institutional level mixes staff and students. The outreach code records where a contact sits in the organization, not what role that contact occupies, so ties to colleagues in other teams and ties to students fall into one category. Two consequences follow. The institutional-level volume cannot be read as staff coordination alone, since part of it is the delivery of teaching to students; and the 11.5 per cent RDI share at that level is a share of a heterogeneous denominator. Neither the team-level nor the external-level results depend on this distinction, because the team level contains only members and the manager and the external level only actors outside the institution, but replications should record role alongside location.

Finally, this is one team in one institution. The case supports analytic rather than statistical generalization (Yin 2018): it identifies mechanisms and specifies what would test them elsewhere. The team is an instance of a well-defined population, Finnish UAS departmental teams under the same statutory mandate, and of a broader European category of applied higher education institutions, but nothing in this design establishes how typical it is.

6.6 Future research and practical implications

The most valuable extension is temporal. Adding a start-of-autumn window and repeating the December window a year later would separate semester phase from calendar season and would bring the design within reach of actor-oriented models. The second is comparative: the same instrument and coding protocol applied to two or more teams in the same institution, or to comparable units in another country's applied higher education sector, would establish whether the two-channel structure, the campus effect and the managerial star recur. We regard the protocol itself, ego extraction followed by participant classification of process and level, as portable, and the boundary specification in Section 4.4

as the part most worth reusing. One change we would make to the protocol is to record the role of each contact, staff or student, alongside its organizational location, which would remove the heterogeneity of the institutional level described in Section 6.5.

Three more specific questions follow from our results. Whether a unit with no internal RDI ties can develop them, and what would generate them, is answerable with a longitudinal design around a deliberate intervention such as shared project assignment. Whether managerially produced cohesion behaves differently from collaboratively produced cohesion under disruption is answerable by comparing units that differ in this respect. And whether the exteriorized profile we observe in TM6, high RDI share with negligible internal position, is a stable role or a transitional state requires more waves.

For those responsible for hybrid academic units, three implications follow directly. First, an RDI mandate assigned to a team does not by itself create the relational structure through which applied research is conducted; in this unit it created no internal RDI ties whatsoever, and the mandate is met by a minority of members through ties that leave the unit. Managers who wish RDI capability to be a property of the team rather than of four individuals will need to create the occasions that generate internal RDI ties, since the mandate alone does not. Second, internal connectivity that depends on a single coordinating role is vulnerable in a specific way: if the coordinator's attention shifts, the structure does not degrade gracefully but disconnects, as the December removal analysis shows. Distributing coordination responsibilities across members would reduce that exposure. Third, campus co-location continues to shape interaction even in a platform-mediated, discretionary-remote unit, so cross-campus ties are the ones least likely to form on their own and the ones most worth deliberate investment. If the semester-boundary decline we observe proves to recur, the start of a term is the point at which such investment is most needed.

7 Conclusion

This study analysed 932 Teams-mediated interaction ties recorded by fourteen members of a nineteen-member departmental team and its manager at a Finnish university of applied sciences, across two windows spanning a semester boundary, with each tie classified by the participant who maintained it according to the process it served and the organizational location of the contact.

The dual mandate of the institution proved to be enacted through two structurally separate relational channels. The share of ties serving applied research rises monotonically with organizational distance, from none of the 97 ties inside the team, through 11.5 per cent of the 719 ties to institutional stakeholders, to 63.8 per cent of the 116 ties reaching beyond the institution. A mandate assigned to the team as a collective was met by a minority of its members, through ties that led out of the unit; the team was not a structure through which RDI interaction passed at all.

What held the team together internally was neither mandate. Campus co-location accounted for 84 per cent of internal tie weight against a chance expectation of 51 per cent in both windows, and the single most central internal actor in both windows was the manager, whose removal disconnected the

December network. Cohesion in this unit was produced by place and by administration rather than by shared work.

Across the semester boundary internal connectivity fell by a fifth, the network split into two components and one member became isolated, while campus homophily held constant. We present this as a candidate mechanism rather than a demonstrated one: two windows cannot separate semester phase from calendar season, the instrument cannot observe changes in interaction volume, and the community-count change does not survive comparison with a degree-preserving null model. What the design does establish is that personnel change, holiday interruption and campus withdrawal are not the explanation, and what it specifies is the additional observation required to test the proposition.

Methodologically, the study sets out the properties of a widely available platform instrument whose ego-ranked, fixed-capacity design makes its weights ordinal within ego and its aggregate strengths compositional, and it offers a network boundary specification in which non-participation appears as a structural property of the observation window rather than as missing data. Both are portable to other studies that build organizational networks from platform traces.

Declarations

Ethics approval and consent to participate.

Interaction records were collected only from members who gave written informed consent, and were processed in accordance with applicable data-protection and research-integrity requirements. Members who declined to share their own records appear in the dataset only as contacts named by consenting participants, in pseudonymized form.

Competing interests.

The authors declare no competing interests.

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Author Contribution

Both authors contributed to the study conception and design. Data collection and coding were performed by SH and VS. Analysis was performed by SH. The first draft of the manuscript was written by SH, and both authors commented on subsequent versions. Both authors read and approved the final manuscript.

Data Availability

The coded interaction dataset describes the complete Teams-mediated interaction network of one small, identifiable organizational unit, including individuals who did not consent to participate. Therefore, the dataset used for this research cannot be shared. A de-identified subset sufficient to reproduce the reported results can be made available from the corresponding author on reasonable request and under a data-use agreement, subject to the terms of the participants' consent.

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Figures

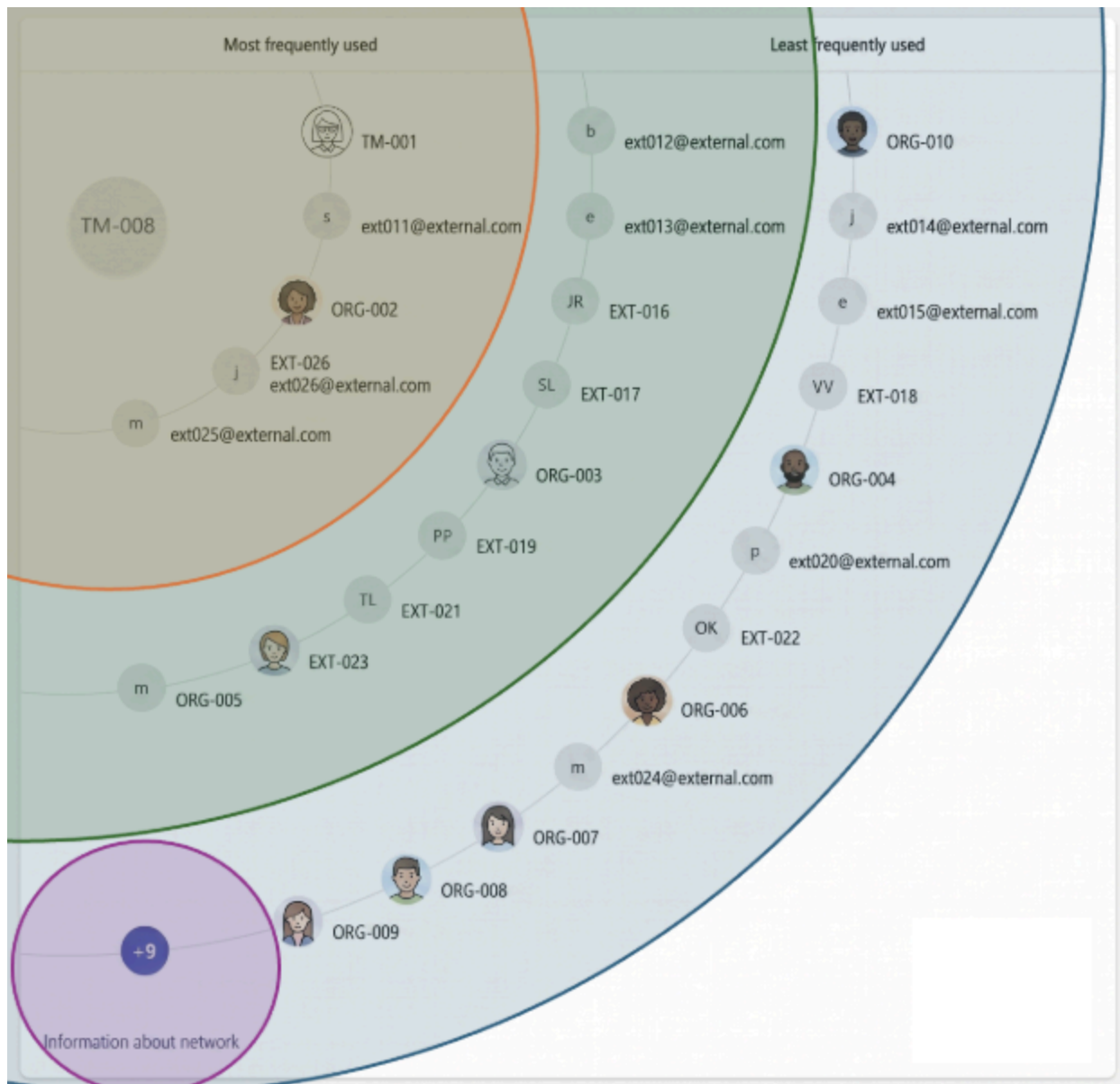
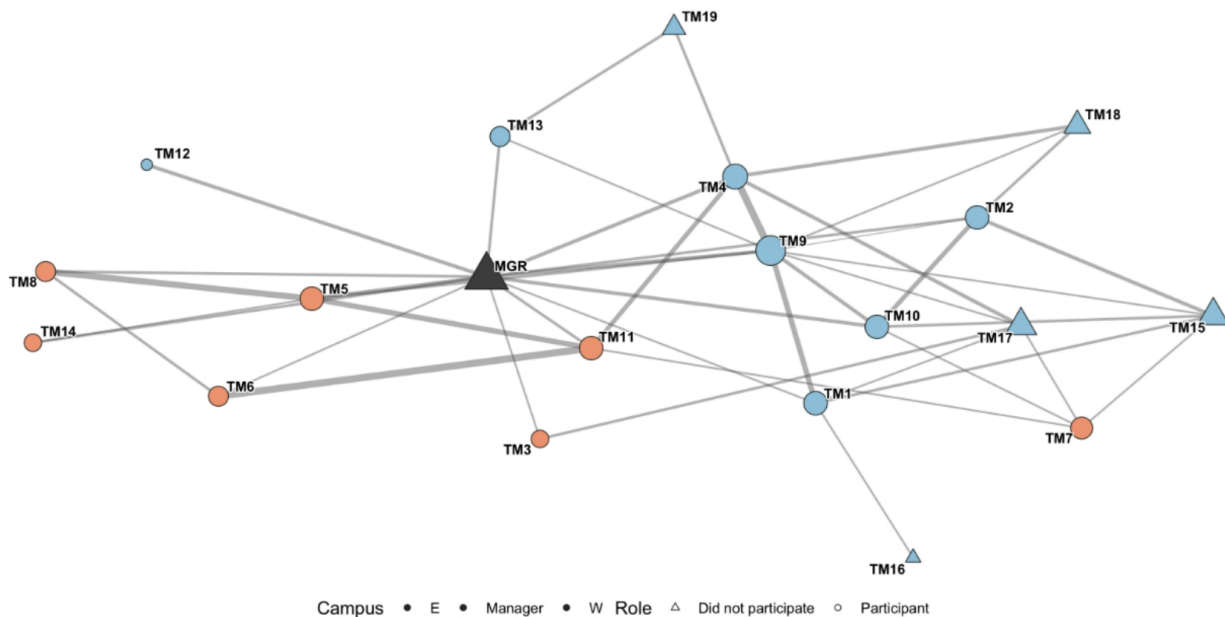


Figure 1

Anonymized illustration of the Microsoft Teams Collaborators view, the instrument from which interaction records were extracted. The focal member is at the upper left; contacts are arranged along a frequency gradient from most frequently contacted (left) to least frequently contacted (right). The four shaded bands are the fixed-capacity frequency levels, holding five, nine, twelve and nine contacts respectively. The “+9” marker at the lower left indicates contacts beyond the displayed capacity, which the instrument does not return and which are therefore not observed. All names, addresses and affiliations in the illustration are fictitious

December



February

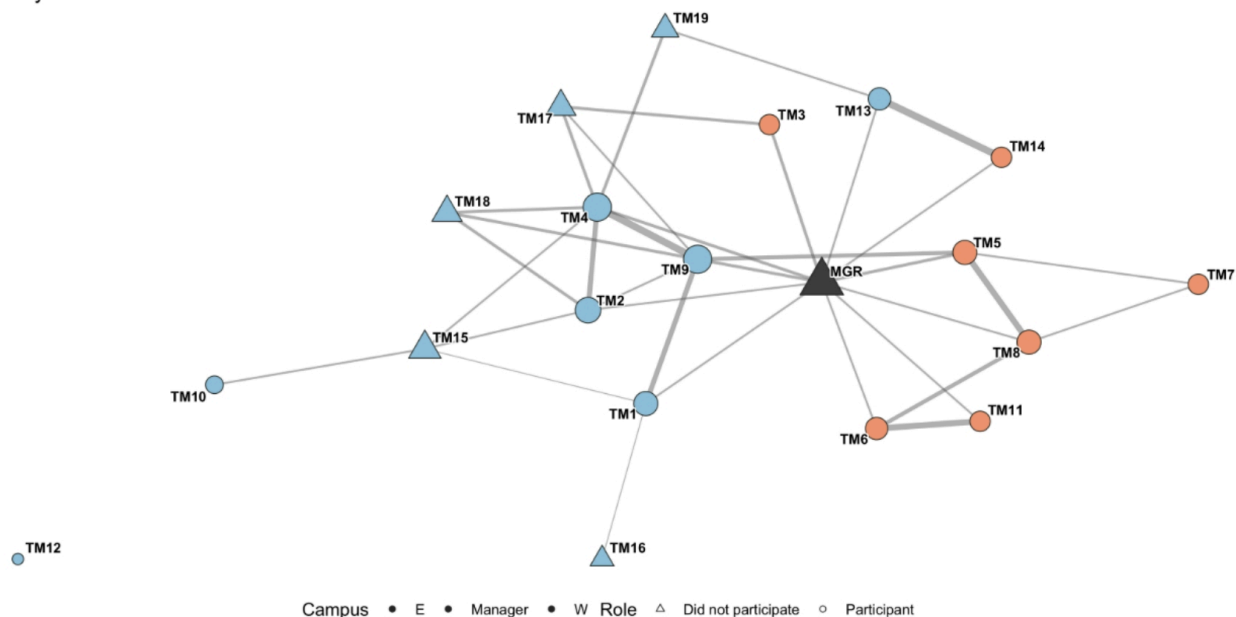


Figure 2

Internal interaction network of the team: **a** December, **b** February. Undirected projection of ties among the nineteen team members and the manager, with reciprocal ties collapsed by summing interaction intensity. Node fill denotes campus and shape denotes observation status: circles are the fourteen members who shared their own contact map (TM1 to TM14) and triangles the five who did not (TM15 to TM19); the manager (MGR) is the dark triangle. Node size is proportional to degree and edge width to summed interaction intensity. All twenty actors are plotted, so isolates are visible. In December the

network forms a single connected component with no isolates; in February it forms two components with one isolate (TM12)

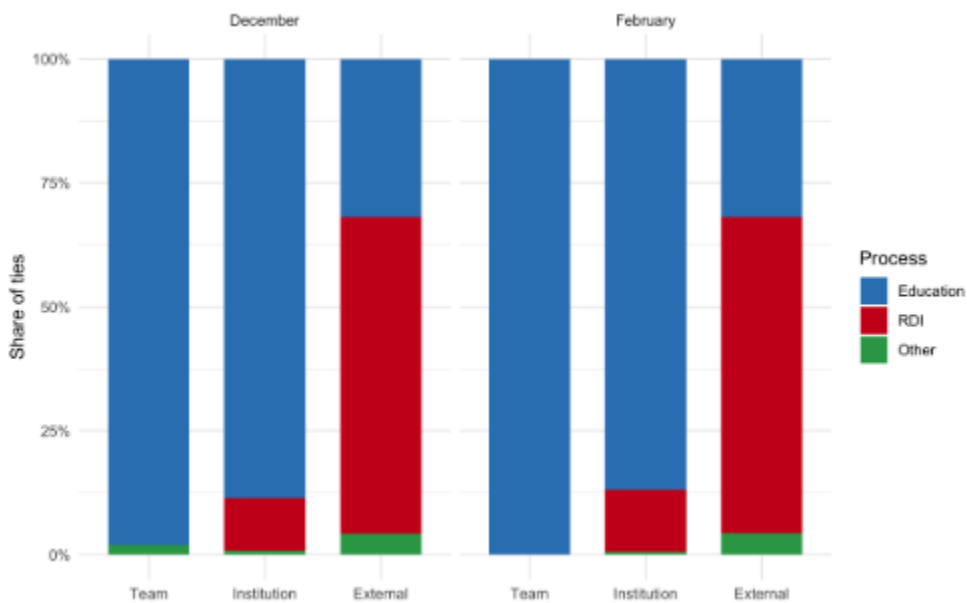


Figure 3

Process composition of ties by organizational level and observation window. Stacked shares of educational, RDI and other ties among team-level ties (n = 53 in December and 44 in February), institutional-level ties (n = 367 and 352) and external ties (n = 47 and 69). Ties classified as serving both processes are counted with RDI. The RDI share rises monotonically with organizational distance in both windows and is zero at team level in both

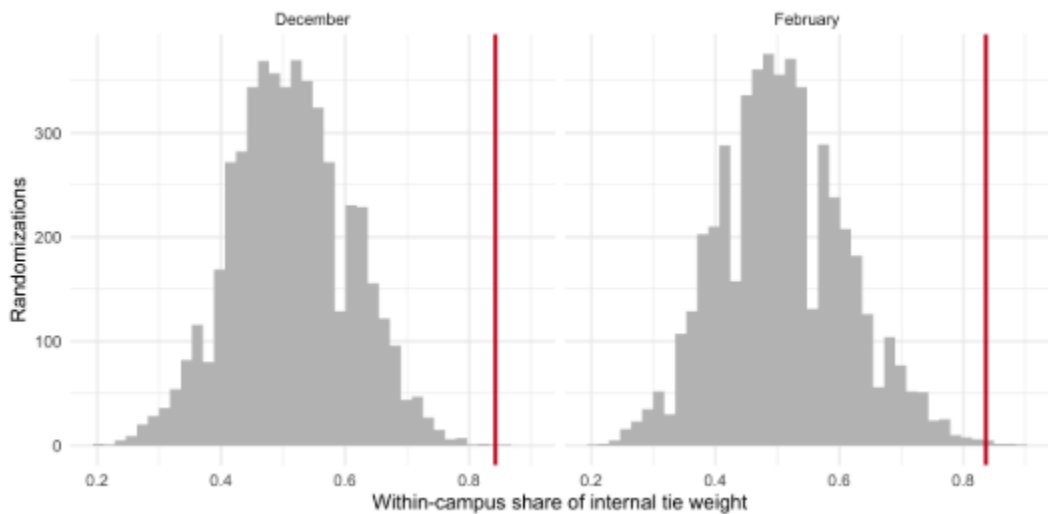


Figure 4

Campus homophily against chance. Distribution of the within-campus share of internal tie weight across 5,000 random reassignments of campus labels, with the observed share marked by the vertical line, for

each observation window. Observed shares are 0.843 in December and 0.837 in February against null means of 0.508 and 0.507 (permutation $p = 0.0002$ and 0.0024)

Supplementary Files

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- [Appendix.docx](#)