The Engel Method
Psychological Insights and Practical Guidelines for Interdisciplinary Research Collaboration

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A. Introduction

Societies today face challenges that defy simple solutions: growing disparities in wealth and opportunity, demographic shifts that strain existing institutions, and the disruptive impact of new technologies on work, privacy, and civic life (Lyall, Bruce, Tait, & Meagher, 2011). Addressing these problems demands more than disciplinary expertise – it requires research teams capable of integrating different ways of thinking about systems, incentives, rules, and human behavior (Jacobs & Frickel, 2009; Klein, 1990). Yet while interdisciplinary collaboration is widely seen as essential to tackle these "wicked problems" and billions in research funding are invested in interdisciplinary science each year, many teams discover that combining diverse perspectives is harder in practice than in principle (Cummings & Kiesler, 2005). Many teams falter – not for lack of expertise, but because they underestimate the human dynamics of collaboration (Stokols, Hall, Taylor, & Moser, 2008; Fiore, 2008).

Every interdisciplinary team holds hidden knowledge, but often these insights remain locked away unless the right conditions make it safe and worthwhile to share them (Stasser & Titus, 1985; Edmondson, 1999). Interdisciplinary science promises creativity, but too often delivers confusion, status conflicts, or premature fragmentation (Khan, Dyaram, & Dayaram, 2022; Cauwelier, Ribiere, & Bennet, 2019). Understanding why some teams harness their diversity to generate breakthroughs while others descend into misunderstanding and inertia is therefore a central challenge for contemporary science (Wax, Asencio, Bentley, & Warren, 2024). Part of the answer lies in recognizing that interdisciplinarity is not merely an organizational or logistical challenge, but fundamentally a psychological one (Edmondson, 1999; Cannon & Edmondson, 2005). Of course, structural and institutional barriers play a role: misaligned incentives such

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as tenure criteria privileging disciplinary outputs, or funding and recognition systems unsuited to collaborative work, as well as coordination complexity and difficulties in harmonizing data and tools (Cummings & Kiesler, 2005) make it difficult to sustain interdisciplinary projects. These dimensions are essential to address at policy and institutional levels. Yet even if structures and logistics are perfectly aligned, collaborations can still falter when psychological foundations – trust, openness, shared purpose, and a willingness to revise one's own assumptions – are not in place. This paper therefore focuses on the psychological and relational factors that determine whether diverse expertise becomes a source of progress, and offers evidence-based recommendations for building teams capable of transforming complex societal problems into actionable insights. In our examples we focus on interdisciplinary work in science, but most of the conclusions should be general enough to generalize to other areas as well.

B. Defining Interdisciplinarity

"Interdisciplinarity" at its core describes different ways of connecting knowledge across fields. Multidisciplinarity places disciplines side by side without true integration, interdisciplinarity combines perspectives into shared frameworks, and transdisciplinarity reaches beyond academia to co-produce knowledge with practitioners and stakeholders (Klein, 1990; Jacobs & Frickel, 2009; Lyall, Bruce, Tait, & Meagher, 2011). These forms sit on a continuum of integration: from loose cooperation to deeply joint problem-solving (Stokols, Hall, Taylor, & Moser, 2008). The higher the level of integration, the greater the psychological demands on researchers – coordination, trust, and openness to other ways of knowing.

From a psychological perspective, the challenge is not only that disciplines offer different answers, but that they ask different questions also concerning the same topic. Concerning the topic of how to generate knowledge in the scientific process, for example, economists may model incentives, psychologists study cognition and motivation, and legal scholars interpret institutions and rules. Such divergent perspectives make collaboration difficult, but also create the potential for insights that no single field could reach alone (Fiore, 2008; Salazar, Lant, Fiore, & Salas, 2012). Multiple perspectives might allow generating a multi-dimensional understanding of the topic, while keeping with one disciplinary perspective only can reduce the complexity of the topic onto a single dimension. In

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this paper, interdisciplinary collaboration is understood as the intentional integration of disciplinary perspectives into shared insights and multidimensional mental models.

C. Barriers and Psychological Foundations

Interdisciplinary collaboration is widely expected to generate breakthroughs, yet many initiatives struggle to deliver on this promise (Cummings & Kiesler, 2005). While institutional incentives and logistical arrangements shape outcomes, they rarely determine them. This can be due to the fact that the mental model of group behavior fails to take into account important dimensions. Even well-resourced projects can lose momentum if, for example, the interpersonal and psychological dynamics within the team are not addressed. The following section therefore examines the underlying psychological mechanisms that help explain why some teams thrive while others stall.

I. Barriers Concerning Language, Methodology, and Epistemological Approach

One basic challenge in interdisciplinary work lies in the fact that sciences often use different subject-specific language both for matters of content as well as methodology. During their academic studies, researchers develop explicit and implicit knowledge concerning theories, concept definitions, methods, and paradigms. As a result, there is shared knowledge in the field concerning the meaning of technical labels (i.e., words), which allows communicating more efficiently. In psychology, for example, there is a shared knowledge concerning what dissonance, attitude, and reactance mean since these concepts have been developed in their respective theoretical frameworks. In economics, there is a shared understanding concerning the meaning of (orthodox) rationality, or Nash-equilibrium etc. Often these terms are related to certain research paradigms that are used in the respective field to conceptualize situations and to test theories such as social dilemmas, the gambling paradigm, or game theory.

A shared understanding of the meaning of terms allows discussion on a higher level of abstraction. Because humans can only hold a relatively small number of information units (i.e., 3 to 7 “chunks”) active in working mem-

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ory, prior knowledge is required to use larger information units (i.e. more abstract chunks) to capture the complexity of real-world problems that typically contain much more pieces of information. Knowledge of the concepts from neighboring disciplines could help achieve a more comprehensive understanding of the problem, without overcharging human memory.

In interdisciplinary work, challenges concerning concept labels can arise on three different levels: (a) individuals might not understand the technical labels of the other discipline at all (lack of knowledge), (b) the disciplines might use the same label to refer to different concepts (an interdisciplinary "jingle fallacy"), and (c) different labels are used to refer to the same concept or method (an interdisciplinary "jangle fallacy").

For an interdisciplinary research team, it is crucial to take sufficient time to develop a shared understanding of the most relevant concepts, theories, and paradigms for the problem at hand. To cover basics and more comprehensive thoughts, this can involve (a) joint workshops reading and discussing textbook chapters (e.g., on game theory), (b) paper clubs reading current relevant papers from all fields, and (c) mutually presenting and discussing own scientific work in early and later stages.

In the optimal case, these discussions lead to a deeper and broader understanding of the concepts, to the identification of weaknesses and blindspots of the own disciplines' theories, and acknowledgement of similar work and related concepts from other fields.

Additionally, disciplines apply different epistemological approaches. That is, disciplines differ in their commonly accepted methods for generating and updating knowledge and standards used to evaluate evidence. The quantitative empirical approach, often applied in psychology, uses empirical data to update beliefs about relations in the world that are summarized in theories. Results are evaluated concerning whether proper (experimental) research designs were used (i.e. assuring internal and external validity) and proper statistics were applied to analyze the data. A theoretical approach, applied for example in theoretical economics or mathematics, often starts from minimal basic assumptions or axioms and derives predictions using rules of logic and other mathematical operations to explain and predict phenomena in the world. These derivations have to be reproducible and free of errors, and generate new insights by deriving many predictions from minimal assumptions. In law, hermeneutic approaches dominate, focusing on interpreting written text and the construction of consistent arguments, with validity evaluated by the conclusiveness of the argument or measures of consensus.

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These epistemological differences are reinforced by divergent disciplinary languages (as introduced above), standards for presenting work, and assumptions about legitimate knowledge. They interact with group dynamics such as ingroup favoritism, collusion within disciplines, and differences in status or reputation. In such contexts trust in sources and appreciation of others' expertise are indispensable. Successful integration depends on remaining critical while staying open to belief revision, even when this challenges deeply held assumptions (e.g., debates about deception in experiments).

II. Relational Barriers to Integration

Establishing a shared language is an important foundation, but it does not remove all challenges. Interdisciplinary collaboration frequently confronts teams with high levels of epistemic uncertainty, diverging methodological assumptions, and the need to integrate heterogeneous standards of evidence (Jacobs & Frickel, 2009; Stokols, Hall, Taylor, & Moser, 2008).

Three relational mechanisms are particularly important. First, psychological safety and error culture shape whether researchers are willing to take interpersonal risks and treat mistakes as learning opportunities rather than threats (Edmondson, 1999; Cannon & Edmondson, 2005; Wax, Asencio, Bentley, & Warren, 2024). Second, the hidden profile problem demonstrates how easily unique knowledge is overlooked when groups focus on shared information rather than eliciting unshared expertise (Stasser & Titus, 1985; Dayeh & Morrison, 2020). Third, perceived hierarchies and power asymmetries across disciplines can marginalize certain perspectives, reducing the diversity of voices and limiting integration (Cauwelier, Ribiere, & Bennet, 2019; Khan, Dyaram, & Dayaram, 2022).

Taken together, these relational barriers underline that interdisciplinarity is not only about reconciling language, theories or methods; it is equally about cultivating trust, openness, and mutual respect (Fiore, 2008; Salazar, Lant, Fiore, & Salas, 2012). Without such conditions, epistemological differences become sources of division rather than opportunities for synthesis. The following section therefore turns to relational barriers to interdisciplinary collaboration.

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1. Psychological Safety and Error Culture in Interdisciplinary Research Teams

Interdisciplinary work confronts researchers with ambiguity and the constant need to engage across boundaries of method and evidence. Under such conditions, psychological safety, the shared belief that the context is safe for interpersonal risk-taking, becomes a decisive factor in determining whether collaboration succeeds (Edmondson, 1999; Wax, Asencio, Bentley, & Warren, 2024). When researchers feel safe, they are more likely to voice doubts, challenge assumptions, and propose unconventional ideas; when safety is absent, silence, self-censorship, and disciplinary retreat are more likely (Cauwelier, Ribiere, & Bennet, 2019; Khan, Dyaram, & Dayaram, 2022).

A critical component of psychological safety is the treatment of errors. Disciplines differ markedly in their error cultures: in some fields, mistakes are framed as personal failings, while in others they are considered natural by-products of innovation. Where teams cultivate an open error management culture, mistakes become opportunities for learning and reflection; where blame dominates, members censor themselves and innovation stalls (Cannon & Edmondson, 2005; Oliveira, Santos, & Ratten, 2022). Leaders play a key role by modeling vulnerability, acknowledging their own limitations, and rewarding openness rather than punishing missteps (Agarwal & Farndale, 2017; Ahmad & Umrani, 2019).

Psychological safety also helps to mitigate status asymmetries that are common in interdisciplinary teams. Perceived prestige differences, such as between quantitative and qualitative methods, can silence scholars from less dominant traditions (Cummings & Kiesler, 2005; Khan et al., 2022). Safety provides the conditions in which all voices can be heard, allowing unique disciplinary perspectives to be expressed and integrated (Fiore, 2008; Salazar, Lant, Fiore, & Salas, 2012).

In practice, fostering psychological safety in research collaborations requires deliberate strategies. Teams benefit from norm setting and role models that emphasize respect, inclusion, and the value of dissent (Edmondson, 1999; Wax, Asencio, Bentley, & Warren, 2024). Equally important are transparent decision-making and error-handling procedures, which reduce ambiguity and strengthen trust (Stokols, Hall, Taylor, & Moser, 2008). In collaborative science, this transparency extends to research practices themselves. Open science tools such as preregistration, registered reports, and shared data and material repositories institution-

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alize an error-friendly culture by making it legitimate to report null results, deviations from hypotheses, and unforeseen challenges (Nosek et al., 2018; Chambers, 2019). Such practices protect researchers from reputational risks that often undermine psychological safety, while simultaneously improving the robustness of scientific outputs.

Policy and institutional frameworks can further reinforce these dynamics. Funding agencies and journals are beginning to recognize that the success of research collaborations depends not only on scientific merit but also on transparent processes and a culture of learning. By incentivizing preregistration, replication studies, and open sharing of protocols, institutions reduce the stigma of error and create structural conditions that align with psychological safety (Nosek et al., 2015). Moreover, initiatives that explicitly reward collaboration quality – such as team-based evaluations, cross-disciplinary grants, and recognition for open practices – signal that innovation depends on openness as much as on disciplinary expertise. Ultimately, psychological safety and error culture are not peripheral concerns but foundational to whether interdisciplinary research teams can move beyond disciplinary defensiveness and harness their diversity for cumulative, transparent, and impactful science.

2. Hidden Profiles and Information Sharing

Even when interdisciplinary teams establish a climate of psychological safety, they face a persistent cognitive barrier: the hidden profile problem. Classic research shows that groups tend to spend the majority of their time discussing information already shared by all members, while unique expertise and unshared insights remain overlooked (Stasser & Titus, 1985; Wittenbaum, Hollingshead, & Botero, 2004). This bias toward common information undermines the very rationale of interdisciplinarity, which depends on surfacing and integrating distinct disciplinary perspectives (Mesmer-Magnus & DeChurch, 2009).

The mechanisms behind hidden profiles are well documented. Teams prefer shared information because it feels more fluent, socially validating, and easier to process (Stasser & Stewart, 1992; Lu, Yuan, & McLeod, 2012). For interdisciplinary collaborations, this challenge is amplified. Scholars not only hold different pieces of information, but also rely on divergent epistemological assumptions, methods, and standards of evidence. These differences increase the likelihood that unique disciplinary knowledge is not voiced (Cummings & Kiesler, 2005; Salazar, Lant, Fiore, & Salas,

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2012). Research further shows that perceived competence shapes information sharing: members who see themselves as less competent relative to others are paradoxically more likely to share and seek information, leading to better decisions, while those who feel more competent often withhold their unique knowledge (Dayeh & Morrison, 2020). In interdisciplinary settings, this dynamic risks silencing precisely those disciplinary contributions that are most needed for integration.

Addressing hidden profiles requires structured processes that counteract natural tendencies. Explicit protocols such as assigning roles, conducting "rounds" for unshared insights, or using structured decision-making techniques (e.g., Delphi procedures) have been shown to increase the disclosure of unique information (Stasser & Stewart, 1992; Sohrab, Waller, & Kaplan, 2015; Wittenbaum et al., 2004). Ultimately, the hidden profile literature highlights a paradox at the heart of interdisciplinarity: the knowledge that most needs to be voiced is least likely to be shared spontaneously. Overcoming this paradox requires deliberate structuring of collaboration processes, recognition of disciplinary asymmetries, and reinforcement of norms that value the surfacing of unique information. A simple solution in interdisciplinary teams is that (e.g.) the leader of the group ensures that each discipline provides their perspective on the topic at hand by directly asking "what does [discipline] say to this topic?", and appreciating the elicited answers.

3. Perceived Hierarchies and Power Dynamics

Interdisciplinary teams not only bring together different domains of expertise but also researchers with varying levels of mastery in methods, theories, and certain knowledge areas. These asymmetries create implicit hierarchies between perceived "experts" and "novices" that can strongly shape collaboration processes. Expertise often affords status, making it more likely that an individual's contributions will be taken seriously, while those who are newer to a field or less confident in their methodological skills may hesitate to speak up (Boix Mansilla, Lamont, & Sato, 2016). These dynamics can have both costs and benefits. On the one hand, experts anchor discussions and provide legitimacy to methodological choices. On the other hand, they may inadvertently dominate conversations, dismiss alternative viewpoints, or steer decisions toward familiar solutions rather than innovative integrations. Novices, by contrast, may bring fresh perspectives precisely because they are less constrained by dis-

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ciplinary conventions, but only if they feel encouraged and empowered to voice them (Edmondson, 1999; Khan, Dyaram, & Dayaram, 2022).

Power dynamics also shape how errors and uncertainties are handled. Research shows that members with lower status are less likely to admit mistakes or raise doubts, fearing reputational costs, whereas high-status experts may downplay their own errors to maintain authority (Cannon & Edmondson, 2005). These patterns undermine the open exchange of knowledge, especially in collaborations where methodological complexity means that no single member can oversee all aspects of the project (Hall, Vogel, Huang, & Crowston, 2018). Overcoming these barriers requires structuring participation so that both experts and novices contribute meaningfully. Explicit invitations for input from less experienced members can redistribute influence and create a more balanced environment (Salazar, Lant, Fiore, & Salas, 2012; Boix Mansilla et al., 2016). Training that emphasizes humility for experts and confidence-building for novices can further help teams avoid reproducing rigid hierarchies and instead use differences in expertise as a resource for creativity and integration. A pragmatic measure is asking less experienced persons (e.g., PhD students) to provide their opinions first, and the leader of the group to speak last. Generally, it should be assured that critical thoughts concerning the dominant opinion (potentially established by high-power persons) are voiced and encouraged (Janis, 1971).

In this way, perceived hierarchies are not inherently detrimental. When managed well, they can provide structure and clarity while still leaving space for learning, innovation, and the constructive questioning of established assumptions. When unmanaged, however, they silence valuable contributions and reinforce defensiveness – precisely the opposite of what interdisciplinary collaboration requires.

III. Cognitive Diversity and Belief Revision

Cognitive diversity – the presence of different perspectives, heuristics, and problem-solving strategies within a team – lies at the heart of interdisciplinarity. By combining varied lenses, teams increase their potential to generate creative insights, uncover blind spots, and develop more sustainable solutions (Page, 2007; Hong & Page, 2004). In interdisciplinary collaborations, cognitive diversity is not incidental but constitutive: each field brings distinctive assumptions about causality, methods, and evi-

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dence, which together expand the space of possible solutions (Salazar, Lant, Fiore, & Salas, 2012; Hall, Vogel, Huang, & Crowston, 2018).

Yet cognitive diversity is a double-edged sword. While it increases the potential for innovation, it also raises coordination costs and the risk of conflict (Mello & Rentsch, 2015; Mannix & Neale, 2005). Disagreements over fundamental assumptions can stall progress if team members are unwilling or unable to revise their beliefs. Interdisciplinary collaborations thus depend critically on the ability of researchers to not only present their views but also to update them in light of unfamiliar evidence and reasoning.

Belief revision is a demanding psychological process. Studies show that individuals exhibit confirmation bias and motivated reasoning, preferring information that aligns with their prior views (Nickerson, 1998; Taber & Lodge, 2006). These tendencies are amplified in group settings where disciplinary identities are salient, making it easier to defend one's own paradigm than to integrate competing ones. At the same time, cognitive conflict, if managed constructively, can lead to deeper elaboration, more systematic processing of information, and ultimately better decisions (De Dreu & Weingart, 2003; van Knippenberg, De Dreu, & Homan, 2004).

Successful teams develop the ability to surface, evaluate, and combine diverse perspectives while maintaining a climate of mutual respect (Salazar et al., 2012). Leadership and team processes are key: transformational leadership, structured deliberation, and explicit emphasis on critical reflection all increase the likelihood that cognitive diversity will translate into innovation rather than gridlock (Wang, Kim, & Lee, 2016; Boix Mansilla, Lamont, & Sato, 2016). Importantly, belief revision is facilitated by trust: members are more willing to adjust their assumptions when they regard colleagues as competent and benevolent (Dirks & Ferrin, 2001; Edmondson, 1999).

For interdisciplinary science, the challenge is not to eliminate cognitive diversity but to harness it. Teams must learn to tolerate prolonged periods of uncertainty, to hold competing representations in play, and to adopt procedures that encourage genuine updating rather than defensive entrenchment. When achieved, this capacity transforms disciplinary plurality from a source of friction into a wellspring of creativity and resilience. Without it, collaborations risk dissolving into parallel monologues, with each field defending its own territory rather than building something new.

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D. Recommendations for Practice

The mechanisms reviewed in this chapter: barriers concerning language and methodology, psychological safety, error culture, information sharing, expertise dynamics, and belief revision highlight not only why collaborations falter, but also what is needed to create effective conditions for interdisciplinarity. The goal is not simply to remove obstacles, but to design environments where diverse expertise can flourish. There are many examples for successful interdisciplinary scientific work, often relying on different approaches. In this section we use the organization of an interdisciplinary research group at the Max Planck Institute for Research on Collective Goods by Christoph Engel as a case-study to illustrate a solution that worked extremely well in practice and had substantial long-term consequences. We refer to the distilled approach as the *Engel-Method.*

I. Develop a Shared Language and Epistemological Awareness

An ideal interdisciplinary environment requires a common language that allows researchers to communicate across disciplinary boundaries and make their contributions mutually intelligible. Without it, collaborations risk misinterpretations and the persistence of disciplinary silos.

Christoph Engel created multiple structures to foster this shared language. He established paper seminars and a common corpus of readings so that everyone could engage with the same foundational texts. Joint methods seminars and summer schools gave researchers the opportunity to compare their approaches and identify common ground. Presentations of the same topic from different disciplinary perspectives encouraged participants to recognize both divergences and overlaps in their conceptual frameworks. Practical tools such as a joint glossary and shared "work horse" projects (i.e. projects with a joint research paradigm, cf. Betsch & Bröder, 2025) further anchored collaboration in a common vocabulary.

Engel also modeled the translational work himself by moving across fields – law, game theory, behavioral economics, psychology, meta-science, and computer science – becoming a novice every few years. By experiencing the disorientation of learning a new field, he demonstrated both the necessity and the value of building a shared language for integration. Combined, these strategies provide the cognitive infrastructure that

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allows teams to operate at a higher level of abstraction and to integrate diverse insights into coherent solutions.

II. Create a Culture of Psychological Safety and Constructive Error Management

At the foundation of an ideal collaborative environment lies a culture in which researchers feel safe to voice doubts, challenge assumptions, and admit a lack of knowledge. Psychological safety is cultivated when leaders model vulnerability, curiosity, and frame errors as learning opportunities (Edmondson, 1999; Cannon & Edmondson, 2005). Christoph Engel consistently embodied this principle by openly discussing how his own papers and results had come about – not only the successes, but also the manipulations that failed and the effects that could not be shown. Some of his publications, as he frequently explained, had emerged directly from such failures and the need to rethink assumptions. When teaching new methods, first in Stata and later in Python, he would deliberately demonstrate where analyses could go wrong, which assumptions had to be revised, and how his own thinking evolved over time. He also invited external experts, such as David E. Jaeger for statistics, to tackle open questions alongside students, making clear that even senior researchers continue to learn. By sharing these experiences candidly, Engel normalized error as part of scientific progress, signaling that not knowing is never a problem – only the refusal to engage and learn is.

III. Ensure Systematic Information Sharing

Interdisciplinary teams achieve their potential best when all members' unique expertise is surfaced. Environments that institutionalize structured information sharing – whether through rotating facilitators, formal "information rounds," or the facilitation of informal discussions – make it less likely that valuable insights remain hidden (Stasser & Titus, 1985; Mesmer-Magnus & DeChurch, 2009). Beyond individual projects, infrastructures such as shared databases, joint seminars, and transparent communication platforms can embed these practices into the daily routines of collaborative research.

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Christoph Engel actively created such conditions at the Max Planck Institute. He introduced a mentorship system that paired senior and junior scientists from different research areas, encouraging informal exchanges outside of large meetings and lowering the threshold for asking questions. The physical environment reinforced these opportunities: the table tennis court and the institute's garden became central spaces for spontaneous conversations, allowing researchers to discuss viewpoints and problems in smaller, more relaxed rounds. The environment encouraged joint lunch and coffee breaks across disciplinary borders. Engel also shaped seminar formats so that a junior researcher would present a paper or method, supported by a senior colleague. This practice both empowered early-career scientists and ensured that disciplinary boundaries were bridged in constructive ways.

Engel himself modeled and encouraged information sharing by raising respective questions – famously asking, "what does [*psychology*] say to this?" – and by consistently bringing new methods, ideas, and results to the group, making them available for everyone to use. These practices demonstrated that information sharing was not only encouraged but expected, and that knowledge was a collective resource rather than an individual possession. In this way, Engel embedded both structures and informal mechanisms for exchange into the daily fabric of the institute, ensuring that valuable insights surfaced and interdisciplinary collaboration became the norm rather than the exception.

IV. Balance Expertise with Opportunities for Growth

Ideal interdisciplinary environments balance the authority of established experts with opportunities for novices to learn, contribute, and develop. Without such balance, collaborations risk either being dominated by senior voices or leaving less experienced researchers without pathways to growth. Environments that deliberately recognize the expertise of all members, regardless of career stage, create the conditions for both integration and innovation (Boix Mansilla, Lamont, & Sato, 2016).

Christoph Engel consistently worked to achieve such balance within his institute. He ensured that senior and junior researchers were paired in complementary ways, and when the distribution of staff was uneven, he invited external scholars to fill gaps, maintaining diversity of perspectives and methods. Importantly, Engel emphasized that every junior researcher

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was an expert in their own right: they brought specialized knowledge of a content area, and regularly highlighted these contributions in group discussions. This recognition elevated junior members from passive learners to active collaborators, reinforcing the idea that interdisciplinary work depends on drawing from everyone's expertise.

Knowledge growth was further accelerated through extensive summer schools, where researchers, regardless of seniority, moved quickly through in-depth courses and their own first experimental projects. These intensive programs compressed learning and experimentation into a short time, allowing juniors to gain rapid confidence in their methods and insights. Notably, Engel was not only the teacher in these settings but often also a curious student himself – participating in the same curriculum, engaging in discussions, and modeling the humility required for continuous learning. By creating structures in which senior and junior voices were intentionally balanced, and by positioning himself as a co-learner, Engel ensured that expertise flowed in multiple directions. This approach both empowered younger scientists and reminded established scholars of the value of openness and curiosity.

V. Embed Reflexivity and Belief Revision

Interdisciplinary teams thrive when belief revision is built into their routines. This requires more than ad hoc discussions: it calls for institutionalized reflexivity – regular workshops where assumptions are questioned, methods are debated, and integration is made explicit. In ideal environments, disagreement is not seen as a threat but as a signal of productive diversity, provided it is handled in a climate of trust.

At the Max Planck Institute, Christoph Engel established precisely such an environment. Reflexivity was not confined to formal workshops but woven into the everyday routines of research. Opportunities to meet and openness to discuss were abundant: many projects began over lunch or during informal conversations in the garden or hallway. This somewhat grass-roots, even "anarchistic" approach ensured that new ideas could surface quickly and without the burden of rigid hierarchies. The architecture and meeting culture reinforced this openness. Offices had open-door policies, feedback was given quickly and constructively, and researchers could rely on colleagues who had no other commitments than to focus on science and the facilitation of new ideas. This created conditions in which

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"flow states" of collaboration were supported and reflexivity became a natural part of daily interaction.

Engel also institutionalized specific practices that encouraged belief revision. He allowed for fast appointments of seminar presentations – sometimes even opening the 2 p. m. lunch slot – so that ideas could be tested and refined without delay. The internal discussion paper series provided friendly but rigorous feedback, offering a safe forum for critical exchange before external submission. Across these formats, there was a strong perception that colleagues were eager to help and discuss – not only in scheduled meetings, but also in the spontaneous encounters that made reflexivity a lived, collective norm. Through this combination of openness, flexibility, and institutionalized feedback mechanisms, Engel created an environment where assumptions were continuously surfaced and revised, not as an exception but as the everyday practice of interdisciplinary science.

E. Conclusion

Interdisciplinary research succeeds when structural support and institutional incentives are matched by environments that foster openness, curiosity, and respect. Psychological safety, information sharing, balanced expertise, and reflexivity help ensure that disciplinary diversity becomes a resource rather than a barrier.

Christoph Engel showed us what such an environment can look like. By treating errors as opportunities, by honoring the expertise of juniors alongside seniors, by creating spaces for spontaneous exchange, and by stepping into new fields as a learner himself, he built a culture where curiosity, openness, and mutual respect were the norm. All these experiences teach us that interdisciplinarity is not only about combining knowledge – it is about building communities of trust where learning never stops. Christoph Engel applied a very unique, both deeply humanistic and scientific approach, which justifies referring to it as the Engel Method.

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References

Agarwal, P., & Farndale, E. (2017). High-performance work systems and creativity implementation: The role of psychological capital and psychological safety. *Human Resource Management Journal*, *27*(3), 440–458. https://doi.org/10.1111/1748-8583.12148

Ahmad, I., & Umrani, W. A. (2019). The impact of ethical leadership style on job satisfaction. *Leadership & Organization Development Journal*, *40*(5), 534–547. https://doi.org/10.1108/lodj-12-2018-0461

Betsch, T., & Bröder, A. (2025). The wheels of scientific progress: Integrative theory building in decision science. *Zeitschrift für Psychologie / Journal of Psychology, 233*(4). https://doi.org/10.1027/2151-2604/a000605

Boix Mansilla, V. B., Lamont, M., & Sato, K. (2015). Shared cognitive-emotional-interactional platforms. *Science Technology & Human Values*, *41*(4), 571–612. https://doi.org/10.1177/0162243915614103

Cannon, M. D., & Edmondson, A. C. (2005). Failing to learn and learning to fail (intelligently): How great organizations put failure to work to innovate and improve. *Long Range Planning, 38*(3), 299–319. https://doi.org/10.1016/j.lrp.2005.04.005

Cauwelier, P., Ribiere, V. M., & Bennet, A. (2019). The influence of team psychological safety on team knowledge creation: A study with French and American engineering teams. *Journal of Knowledge Management, 23*(6), 1157–1175. https://doi.org/10.1108/jkm-07-2018-0420

Chambers, C. (2019). *The seven deadly sins of psychology: A manifesto for reforming the culture of scientific practice.* Princeton University Press.

Cummings, J. N., & Kiesler, S. (2005). Collaborative research across disciplinary and organizational boundaries. *Social Studies of Science, 35*(5), 703–722. https://doi.org/10.1177/0306312705055535

Dayeh, V., & Morrison, B. W. (2020). The effect of perceived competence and competitive environment on team decision-making in the Hidden-Profile paradigm. *Group Decision and Negotiation*, *29*(6), 1181–1205. https://doi.org/10.1007/s10726-020-09701-2

Dirks, K. T., & Ferrin, D. L. (2001) The role of trust in organizational settings. *Organization Science, 12*(4), 450–467. https://doi.org/10.1287/orsc.12.4.450.1064

Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(2), 350–383. https://doi.org/10.2307/2666999

Fiore, S. M. (2008). Interdisciplinarity as teamwork: How the science of teams can inform team science. *Small Group Research, 39*(3), 251–277. https://doi.org/10.1177/1046496408317797

Hall, K. L., Vogel, A. L., & Crowston, K. (2019). Comprehensive collaboration plans: practical considerations spanning across individual collaborators to institutional supports. In *Strategies for team science success: Handbook of evidence-based principles for cross-disciplinary science and practical lessons learned from health researchers* (pp. 587–612). Cham: Springer International Publishing.

https://doi.org/10.5771/9783748947257-757 https://www.inlibra.com/de/agb - Open Access - CC BY

Hong, L., & Page, S. E. (2004) Groups of diverse problem solvers can outperform groups of high-ability problem solvers. *Proc. Natl. Acad. Sci. U.S.A., 101*(46), 16385–16389. https://doi.org/10.1073/pnas.0403723101

Jacobs, J. A., & Frickel, S. (2009). Interdisciplinarity: A critical assessment. *Annual Review of Sociology, 35*, 43–65. https://doi.org/10.1146/annurev-soc-070308-115954

Janis, I. L. (1971). Groupthink: The desperate drive for consensus at any cost. *Psychology Today, 5*(6), 43–76.

Khan, N., Dyaram, L., & Dayaram, K. (2022). Team faultlines and upward voice in India: The effects of communication and psychological safety. *Journal of Business Research, 142*, 540–550. https://doi.org/10.1016/j.jbusres.2022.01.009

Klein, J. T. (1990). *Interdisciplinarity: History, theory, and practice*. Wayne State University Press.

Lu, L., Yuan, Y. C., & McLeod, P. L. (2011). Twenty-five years of hidden profiles in group decision making. *Personality and Social Psychology Review*, *16*(1), 54–75. https://doi.org/10.1177/1088868311417243

Lyall, C., Bruce, A., Tait, J., & Meagher, L. (2011). *Interdisciplinary research journeys: Practical strategies for capturing creativity*. Bloomsbury Academic.

Mannix, E., & Neale, M. A. (2005). What differences make a difference? The promise and reality of diverse teams in organizations. *Psychological Science in the Public Interest*, *6*(2), 31–55. https://doi.org/10.1111/j.1529-1006.2005.00022.x

Mello, A. L., & Rentsch, J. R. (2015). Cognitive diversity in teams. *Small Group Research*, *46*(6), 623–658. https://doi.org/10.1177/1046496415602558

Mesmer-Magnus, J. R., & DeChurch, L. A. (2009). Information sharing and team performance: A meta-analysis. *Journal of Applied Psychology*, *94*(2), 535–546. https://doi.org/10.1037/a0013773

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of general psychology*, *2*(2), 175–220. https://doi.org/10.1037/1089-2680.2.2.175

Nosek, B. A., Alter, G., Banks, G. C., Borsboom, D., Bowman, S. D., Breckler, S. J., … & Yarkoni, T. S. (2015). Promoting an open research culture. *Science*, *348*(6242), 1422–1425.https://doi.org/10.1126/science.aab2374

Nosek, B. A., Ebersole, C. R., DeHaven, A. C., & Mellor, D. T. (2018). The preregistration revolution. *Proceedings of the National Academy of Sciences*, *115*(11), 2600–2606. https://doi.org/10.1073/pnas.1708274114

Oliveira, M. F., Santos, E., & Ratten, V. (2022). Strategic perspective of error management, the role of leadership, and an error management culture: A mediation model. *Journal of Economics Finance and Administrative Science*, *28*(55), 160–175. https://doi.org/10.1108/jefas-01-2022-0028

Page, S. E. (2007). Making the difference: Applying a logic of diversity. *Academy of Management Perspectives*, *21*(4), 6–20. https://doi.org/10.5465/AMP.2007.27895335

Salazar, M., & Lant, T. (2018). Facilitating innovation in interdisciplinary teams: The role of leaders and integrative communication. *Informing Science: the Inter-*

https://doi.org/10.5771/9783748947257-757 https://www.inlibra.com/de/agb - Open Access -

national Journal of an Emerging Transdiscipline, 21, 157–178. https://doi.org/10.28945/4011

Salazar, M. R., Lant, T. K., Fiore, S. M., & Salas, E. (2012). Facilitating innovation in diverse science teams through integrative capacity. *Small Group Research*, *43*(5), 527–558. https://doi.org/10.1177/1046496412453622

Sohrab, S. G., Waller, M. J., & Kaplan, S. (2015). Exploring the hidden-profile paradigm. *Small Group*

Research, *46*(5), 489–535. https://doi.org/10.1177/1046496415599068

Stasser, G., & Stewart, D. (1992). Discovery of hidden profiles by decision-making groups: Solving a problem versus making a judgment. *Journal of Personality and Social Psychology*, *63*(3), 426–434. https://doi.org/10.1037/0022-3514.63.3.426

Stasser, G., & Titus, W. (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. *Journal of Personality and Social Psychology, 48*(6), 1467–1478. https://doi.org/10.1037/0022-3514.48.6.1467

Stokols, D., Hall, K. L., Taylor, B. K., & Moser, R. P. (2008). The science of team science: Overview of the field and introduction to the supplement. *American Journal of Preventive Medicine, 35*(2), S77–S89. https://doi.org/10.1016/j.amepre.2008.05.002

Taber, C. S., & Lodge, M. (2006). Motivated skepticism in the evaluation of political beliefs. *American Journal of Political Science*, *50*(3), 755–769. https://doi.org/10.1111/j.1540-5907.2006.00214.x

Wang, X., Kim, T., & Lee, D. (2016). Cognitive diversity and team creativity: Effects of team intrinsic motivation and transformational leadership. *Journal of Business Research, 69*(9), 3231–3239. https://doi.org/10.1016/j.jbusres.2016.02.026

Wax, A., Asencio, R., Bentley, J. R., & Warren, C. (2024). Safety first! Psychological safety as a driver of learning in functionally diverse, self-assembled teams. *Team Performance Management, 30*(7/8), 173–194. https://doi.org/10.1108/tpm-02-2024-0017

Wittenbaum, G. M., Hollingshead, A. B., & Botero, I. C. (2004). From cooperative to motivated information sharing in groups: Moving beyond the hidden profile paradigm. *Communication Monographs*, *71*(3), 286–310. https://doi.org/10.1080/0363452042000299894

https://doi.org/10.5771/9783748947257-757 https://www.inlibra.com/de/agb - Open Access -