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# LEARNING FROM THE BEST: LESSONS TO CONSTRUCTION FROM HIGH-PERFORMING TEAMS ACROSS SECTORS

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## ABSTRACT

As high-performing teams (HPTs) are critical for the success of construction projects, more attention could be given to improving team formulation and performance. This study explores best practices from globally recognized HPTs outside the construction management domain, aiming to identify learnings and improvement opportunities for lean construction teams. Based on existing literature, we summarize traits of HPTs and provide seven examples – spanning from symphony orchestras to electronic sports teams – to demonstrate how HPTs operate in various domains.

The following learnings were identified: HPTs (i) are determined to provide outstanding results and rigorously adopt emerging best practices, (ii) mirror the larger paradigm shift towards shared leadership and decentralized decision-making, and (iii) understand and effectively utilize both explicit and tacit knowledge transfer in their physical and virtual environments. Moreover, (iv) looking from outside, LC practices have strengths but also possible blind spots. Respectively, these learnings could be put into action by (1) allocating more resources for learning, (2) increasingly advocating the use of collaborative delivery models in all types of projects, (3) fostering communities of practice and mentoring practices while advocating group flow, and (4) slightly steering the development focus from project and process structures towards the development of teams.

## KEYWORDS

High-performing teams, Knowledge transfer, Cross-industry, Organizational learning

## INTRODUCTION

The importance of high-performing teams (HPTs) has become increasingly apparent in the modern project production environment. Strong performance of teams is often a key element for the whole organization and/or project to foster (e.g., Flyvbjerg & Gardner, 2023). Although construction management research has extensively investigated performance through the lenses of managers, projects, and processes, more attention could be given to exploring the performance of teams to better address their distinct challenges, such as knowledge dispersion of temporary project teams and overly hierarchical structures (e.g., Lehtovaara et al., 2022).

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In addition to inspecting team-level performance through the lenses of construction industry, construction management research could benefit from taking a larger perspective – by inspecting the traits of the other fields' elite, high-performing teams. Therefore, the aim of this study is to explore best practices from globally recognized high-performing teams, to identify learnings and improvement opportunities for lean construction (LC) teams in projects and organizations. The aim is pursued through answering the research question (RQ): *What lessons and improvement opportunities can lean construction teams gain from globally recognized high-performing teams across other sectors?* The authors hope this allows to provide an "outside view" by reflecting LC practices from other domains' perspectives, and to spark discussion among LC scholars and practitioners on creating and sustaining high-performing teams. This study takes the form of an exploratory research, reviewing and synthesizing previous literature on HPTs. The material was sought from the databases of Google Scholar, Scopus, and Web of Science by using search terms "high-performance teams" and "team performance", with a focus on results that describe HPTs in a specific context or a field. Additional material was obtained by using snowball sampling on the identified sources, identifying seminal business books, and scanning the IGLC database for related studies.

The remaining of the paper is structured as follows. First, we define the concept of high-performing team and present their widely recognized traits, followed by reviewing current lean construction practices on improving team performance. Second, we provide seven examples of high-performing teams across sectors and present their domain-specific characteristics, followed by an in-depth inspection of three of them. Third, we discuss the presented high-performing teams' attributes in the light of LC domain through formulating distinct learnings. Finally, we provide brief concluding thoughts and potential avenues for future research.

# BACKGROUND

## HIGH-PERFORMING TEAMS (HPTS)

A high-performing team is a cohesive group of (high-performing) individuals that collaboratively show extraordinary capabilities and achieve exceptional results together. They have a strong sense of purpose (Katzenbach & Smith, 1993), are highly committed on their mission, while often having a great satisfaction in their work (Dutra et al., 2015). More specifically, high-performing teams are primarily characterized by the following six traits.

First, HPTs demonstrate effective (and often shared) leadership practices, accompanied with effectively communicating the teams' shared vision and purpose, increasing motivation, empowerment (Pfutzenreuter et al., 2021), and overall performance (Thamhain, 2004). HPTs also often possess leadership that provides a shared direction (Thamhain, 2004). Second, mutual trust and psychological safety are often highly present in HPTs, supporting cohesion and performance in multiple ways, such as in increased openness and willingness to share knowledge and ideas, with increased opportunities for creativity and learning through reduced fear of failure (e.g., Edmondson, 1999). Wing (2005) further highlight the role of social awareness and team commitment in building trust. Third, HPTs' effectiveness in communication and decision-making promote situational awareness and conflict resolution capabilities (e.g., Chong, 2007); however, HPTs also value diversity of perspectives in decision-making (Saurin et al., 2013).

Fourth, clarity in the team objectives and member roles is a necessity regardless of HPTs' exact leadership and operational structures, supporting team effectiveness and alignment with overall strategic goals, while positively shaping group dynamics, accountability, and shared view within the team (Bakke & Johansen, 2024). The HPT members' skills are often complementary and provide flexibility in role-setting (Katzenbach & Smith, 1993). Fifth, HPTs possess high resilience and adaptability to challenges, allowing them to successfully operate in

unforeseen situations, further supporting conflict management and continuous team and individual improvement (often supported by extensive individual and team-based training, e.g., Saurin et al., 2013). Lastly, fostering a culture of inspiration that spark creativity (Wing, 2005) and professional learning (Bakke & Johansen, 2024) support HPTs' performance in overall.

Next, we look at how these traits have so far been materialized in the LC domain to improve team performance.

### LEAN CONSTRUCTION PRACTICES ON IMPROVING TEAM PERFORMANCE

In the context of LC, HPT traits have been put into practice through several ways. The LC research and development has had a distinct focus on processes and contractual structures, such as development of production system design approaches (e.g. the Last Planner® System (LPS) and takt production that involve teams into decision-making process and timely problem-solving through the project) and delivery models (e.g. collaborative models such as integrated project delivery (IPD) that form incentives for collaboration from the early project stages), which can be used separately or in combination to improve the formulation and performance of teams. In addition to these project-wide processes and structures, individual tools such as root-cause analyses, choosing by advantages (CBA), target value design (TVD), big room facilities, physical and digital visual management tools are used to further support teams.

Indeed, such practices have been observed to have an overall positive impact on performance. Salam et al. (2023) and Schöttle & Tillman (2018) argue that the early involvement in planning and training processes foster team performance by increasing interdisciplinary collaboration, the sense of purpose, commitment, cohesion, and understanding of the common goals of team members. LC practices furthermore build trust, resilience and psychological safety within and between project teams, that have been noted as having positive impact on performance, for example, in terms of improved learning capabilities (e.g., Häringer et al., 2024 and Saurin et al., 2013). Moreover, Lehtovaara et al. (2022) show that inducing collaborative culture and decision-making practices into projects and teams brings benefits such as increased commitment and conflict resolution capability, while improving production flow and project schedule performance.

## SEVEN EXAMPLES OF HIGH-PERFORMING TEAMS

What, then, could LC teams distinctly learn from other domains? LC practices have often been compared to other industrial settings, such as car manufacturing or shipbuilding. This is logical as such fields have many similarities with construction. However, in this paper we would like to broaden this spectrum and build on examples that are not distinctly connected to construction. Specifically, we inspect teams from professional fields in which the presence of high-performing teams has proved to be a necessity for success. Although every team in the presented field is not necessarily an HPT, we focus on such characteristics that create high performance in their represented context.

In the Table below (Table 1), seven examples of high-performing teams in their unique context are illustrated, touching upon the peculiarities of their field, the most distinct characteristics of high-performing teams in their operating context, and brief comparison of these characteristics to LC practices. As a synthesis, the following themes rise out from the presented examples: HPTs seem to share quite similar traits across domains in overall with those presented above; they put an extended effort on achieving great results and want to constantly learn new; they combine visionary and shared leadership practices; they transfer knowledge through both explicit and tacit means; and share several similarities with LC practices, for example by making use of strong interdisciplinary collaboration and focusing on improving flow. These themes provide a structure for the discussion, presented after the detailed examples.

Next, a detailed inspection of three examples – HPTs among animation movie and video game design teams, symphony orchestras, and electronic sports teams – are presented to further illustrate the most interesting notions. These three examples were selected due to their apparent disconnection to LC, while still presenting several learning opportunities.

Table 1: A list of some globally recognized high-performing teams and their characteristics.

| Team context | Peculiarities of the represented field | Distinct characteristics of HPTs | Similarities to LC practices | Related references |
|---|---|---|---|---|
| Animation and video game design teams | Project-based industry with tight project schedules and budgets<br>High pressure and workload environment<br>Highly creative environment with high technology development cycles | Thrive for the best result while constantly adapting to changing technologies<br>Balance creative endeavors and ambitious project goals<br>Combine autonomy and visionary leadership practices<br>Express high trust, adaptability, resilience and stress management | Make use of strong interdisciplinary collaboration<br>Effective management of complex, long-term projects with creative aspects<br>Effective use of visual management practices (e.g., mockups) | Catmull & Wallace (2014), Schell (2008), Schreier (2017) |
| Athletic sports teams | Constant (physical and mental) peak performance required, high internal and external pressure<br>Dynamic and fast-paced environment, calling adaptation to opponents' actions<br>Large proportion of the operations devoted to improving performance (e.g., training, recovery)<br>Strong emotions are central component | Demonstrate strong team identity with trust and cohesion around clear and unified goals (e.g. winning a championship)<br>Use facilitative leadership (e.g. coaches) combined with shared leadership during operation<br>Make strong use of both individual and team-based skills<br>Learn with very fast feedback loops, often combined with data-driven decision-making (e.g., after-action reviews) | Emphasize team building and building trust<br>Focus on learning between operations (long-term success is known to be based on continuous improvement)<br>Optimize roles based on individuals' strengths, support diversity of skills<br>Focus on holistic approach rather than optimizing individual parts of the system | Hakanen et al. (2015), Malvik (2022), Salcinovic et al. (2022) |
| Electronic sports teams | Peculiarities similar to athletics, the best practices gain inspiration from athletics<br>Operate in virtual or hybrid environment that require seamless communication and cohesion<br>Rapidly developing field in which constant learning is crucial | Combine similar peculiarities to athletics teams<br>Put extended effort on achieving excellent virtual coordination, supported by strong shared mental models for operating in hectic situations<br>Make use of the amount of data generated in their virtual environment for learning | Combine similar peculiarities to athletics teams<br>Put extended effort on good hybrid and virtual team performance | Andrejkovics (2016), Freeman & Wohn (2019), Gisbert-Pérez et al. (2024), Poulus et al. (2022), Tang (2018) |
| Healthcare (e.g. emergency room) teams | High-stakes and often unpredictable environment<br>Fast and accurate decision-making and actions required | Use clear and standardized communication & protocols (e.g. checklists), honed by training<br>Rely on strong leadership that facilitates teams' focus in chaotic situations<br>Express strong trust, psychological safety, adaptability, resilience and stress management skills | Make use of strong interdisciplinary collaboration<br>Focus on process standardization, elimination of waste, and flow (e.g. patient flow).<br>Advocate just-in-time and visual management practices | Kennedy-Metz et al. (2022), Lemieux-Charles & McGuire (2006), Salas et al. (2007) |
| Michelin-star kitchen teams | Fast-pacing environment with extremely high focus on quality and customer satisfaction<br>High pressure and workload environment | Thrive in constant high-pressure environment, adapt and learn from constant feedback<br>Rely on visionary and inspiring leadership (e.g. chef) and clear roles and responsibilities for explicit and tacit communication<br>Combine high innovation with high quality and precision | Rely on high process and role standardization, high customer-centricity, and good product design<br>Focus on process standardization, elimination of waste, and flow (e.g. patient flow). | Gottardello & Karabag (2022), Johri (2014), Mrusek et al. (2021) |

| | | | | |
|---|---|---|---|---|
| R&D and innovation teams | Knowledge-intensive environment in which balancing creative freedom and business requirements is essential<br>High level of abstractness combined with definite goals and timeframes required | Present high skill and knowledge diversity and an ability to bring abstract concepts into practical solutions<br>Possess highly facilitative leadership that supports teams' and individuals' performance and shared leadership practices<br>Combine new and old practices and technology; combine creativity with rigorous production of results | Make use of strong interdisciplinary collaboration<br>Spend extended time for design and planning to allow effective execution<br>Possess an ability to grasp and implement new concepts fast, and to drive change | Cheruvelil et al. (2014), Johnsson (2017), Taylor & Greve (2006) |
| Symphony orchestra teams | Highly skilled individuals with decades of deliberate practice<br>Traditionally hierarchical, yet recently more shared leadership practices | Combine visionary and shared leadership; balance artistic creativity and cohesive structures<br>Combine explicit and tacit communication seamlessly, in the team and with the audience | Focus on interdependence and coordination on skilled, autonomous and inherently motivated individuals<br>Pursue (group) flow | Bishop (2018), Boerner & Freiherr von Streit (2005), Koivunen (2003), Sutherland & Cartwright (2022) |

## ANIMATION MOVIE AND VIDEO GAME DESIGN: MAINTAINING LONG-TERM CREATIVITY IN COMPLEX PROJECT ENVIRONMENTS

Creating a video game or an animation movie is a long, complex project that combines the creative effort of several disciplines such as writers, visual artists, programmers and producers. Schreier (2017) elucidates that although such projects usually span over several years, they often have very tight (and unpredictable) design and production schedules. This creates a need for sustaining high creativity over very long timespans, forming a high-pressure and high-workload environment. As technology advances in fast cycles (the end users except the products to utilize the newest technological solutions), the industry players need to constantly adapt to the newest tools and software to maintain competitiveness in the fierce market (Schreier, 2017).

To excel in such conditions, high-performing animation movie and video game design teams demonstrate several distinct traits. First, they can balance creative endeavours with meticulous project goals, supported by intensive commitment and passion (Schell, 2008). The upcoming deadlines often materialize as "crunch time", an extended period of overtime work (Schreier, 2017), further requiring adequate adaptability, resilience, and stress management from the team and its members. Second, HPTs successfully combine visionary and shared leadership practices. Ed Catmull, the former president of *Pixar*, elucidates (in Catmull & Wallace, 2014) that while providing teams autonomy for their creative processes is a necessity, they simultaneously need guidance to keep the output (and the schedule) coherent and aligned with the organizational vision. Third, HPTs foster interdisciplinary collaboration by successfully bringing together individuals with varying expertise (such as creative, technical, and project management skills), allowing them to play with their strengths. Catmull & Wallace (2014) stress the importance of the composition and chemistry of a team, supported by putting rigorous effort into team-building processes. Fourth, rigorous continuous learning is ingrained in such HPTs. Pushed by rapid technological advancements, fierce competition in the market, and customers demanding excellent quality (e.g., Schreier, 2017), the best teams are also world-class in learning and adapting to new requirements and opportunities, through iteration of their work combined with studying other HPTs and market signals.

The abovementioned traits are enabled by effective and clear communication (e.g., through visual means of storyboards and mockups), reducing the fear of failure (to produce the most innovative solutions), and fostering an inspiring and positive team environment (e.g., Catmull & Wallace, 2014). Schreier (2017), who studied several high-performance game design teams, further highlights the need for inherent motivation to produce the best possible output as a

success factor. As an example, while working on their renowned action role-playing game *The Witcher 3* (published in 2015), Polish game studio *CD Project Red* and its design team initiated long periods of intense creative work, combined with several release delays (despite fierce pressure for timely release) to materialize their vision of one of the largest open world environment at the time with highest detail – to meet their creative standards and living up to the expectations of customers (by combining the presented HPT characteristics, *CD Project Red* was able to create a high-quality result that is still highly regarded among the gaming community; Schreier, 2017).

## SYMPHONY ORCHESTRAS: EMBRACING GROUP FLOW THROUGH A COMBINATION OF SHARED LEADERSHIP AND VISIONARY LEADERS

Symphony orchestras are large musical ensembles, comprising dozens of musicians playing instruments such as strings, woodwinds, brasses, and percussions, often led by a conductor who guides the group practice and performance through their artistic vision (e.g., Boerner & Freiherr von Streit, 2005). Orchestra members are invariably highly motivated and autonomous individuals, usually with decades of experience of their own instrument, combining fine motor skills and high-strain mental activities. Through centuries, symphony orchestras have adopted and formalized hierarchical structures in which conductor, followed by section leads, oversee the synchronization of the ensemble.

During the 21st century, among these traditionally led teams, shared leadership practices have begun to emerge (e.g., Koivunen, 2003) that distinguishes a high-performing ensemble. Like HPTs in animation movie and video game design domain, high-performing orchestras are able to utilize shared leadership practices that, complemented with hierarchical leadership, allows to sustain a balance between cohesive creative vision and artistic impression of the individuals (for example, through interpreting the vision and peer influence) (e.g., Bishop, 2018). As orchestra musicians (paradoxically) often do not possess the artistic freedom that would fit with their skills and thrive for creativity, shared leadership provides a medium to channel those capabilities into collective impression, supporting both individual motivation and performance of the whole ensemble (e.g., Boerner & Freiherr von Streit, 2005). While studying the leadership practices of *Tampere Philharmonic Orchestra* and *The Philadelphia Orchestra*, Koivunen (2003) found shared leadership practices demonstrate benefits such as increased happiness, individual artistic contribution through interaction, and collective creativity. However, Boerner & Freiherr von Streit (2005) note that for such balance between shared and hierarchical leadership to succeed, a cooperative climate in which musicians are convinced by the artistic vision of the conductor is a precondition.

Moreover, high-performing symphony orchestras are good in intense coordination that is required due to immediate interdependence of individual team members (Boerner & Freiherr von Streit, 2005). HPTs materialize this need by effectively utilizing both explicit and tacit knowledge transfer. By constantly utilizing verbal and nonverbal communication (such as listening) during practice, team members adapt to read and provide subtle cues to each other (Bishop, 2018), forming a unique set of strong tacit vocabulary that allow seamless interaction and synchronization during performance. This forms the basis for an outstanding concert experience – operated solely through nonverbal communication – for both the ensemble and the audience (e.g., Sutherland & Cartwright, 2022). As symphony orchestras often exhibit a high degree of stability over time, they develop a high cohesion and shared understanding which is central for effectively achieving such communication patterns. Sutherland & Cartwright (2022) further note that such tacit knowledge transfer often manifests in achieving "group flow", a "collective experience of fluid harmony similar to individual experiences of flow that Csikszentmihalyi [1997] observed", resulting in output that not only supports technical synchronization but also elevates collective artistic output of the team.

### ELECTRONIC SPORTS: FOSTERING THE PECULIARITIES OF ATHLETIC SPORTS IN VIRTUAL/HYBRID ENVIRONMENTS

Hamari & Sjöblom (2017) define electronic sports (or esports) as "a form of sports where the primary aspects of the sport are facilitated by electronic systems; the input of players and teams as well as the output of the esports system are mediated by human-computer interfaces", or in layperson terms, "competitive video gaming". Esports teams, in addition to consisting of competitive athletes, can include roles such as coaches, managers, and analysts (Gisbert-Pérez et al., 2024), often resembling athletic sports teams. Only in the last few years has the popularity and professionalism of esports rapidly surged (Gisbert-Pérez et al., 2024), also increasing the interest in researching and developing team performance within the domain.

In terms of specific HPT characteristics, high-performing esport teams have had to rapidly formalize sound and standardized team practices due to rapid growth of the domain and increased performance pressure (e.g., Poulus et al., 2022). Such practices have been dominantly sought from the domain of athletics that provide enough similarities for swift adaptation (Gisbert-Pérez et al., 2024), including procedures that consider training, coaching, recovery, mental health, player recruitment, team building, and operating models – further improving overall team performance as well as well-being of team members.

High-performing esports teams differentiate from other inspected HPTs by their output and communication dominantly happening through a virtual interface. Although high-performing esport teams seem to require similar traits to HPTs in other domains (e.g., high degree of trust, team cohesion, resilience, and adaptive mindset; e.g., Andrejkovics, 2016 and Tang, 2018), they need to form such traits primarily through a virtual medium. Perhaps partially affected by this attribute, HPTs in esports form an interesting, situation-specific combination of hierarchical and shared leadership practices. Although hierarchical structures and distinct roles are formally present, HPTs simultaneously show shared leadership attributes as several team members often contribute to leadership (and even shift operative roles) as needed (Gisbert-Pérez et al., 2024 with Freeman & Wohn, 2019), demonstrating an ability for adaptability in high-stake situations. Leadership is also often internal (in-game leadership), while the coaches often provide guidance more passively[4]. Like high-performing orchestras, such capabilities are supported by forming shared mental models and an effective combination of explicit and tacit communication. This is done by, for example, creatively utilizing internal game mechanics (such as visual cues, like "pinning"), further reducing the need for explicitly communicating by talking or writing (increasing, for example, task precision and responsiveness while releasing cognitive load for other actions; Freeman & Wohn, 2019).

## DISCUSSION: WHAT CAN WE LEARN FROM THE BEST?

HPTs seem to share similar general characteristics across domains. Although with varying emphases (and realizing in varying timespans and magnitudes), traits such as combined shared and visionary leadership practices, mutual trust and psychological safety, effective communication patterns, task and role clarity, high resilience, and inspiring environment were prevalently present in the shown examples. It could be argued that such traits are also applicable to LC teams – with a highlight on emphasizing effective interdisciplinary collaboration, which is also a necessity for success in several other fields (Table 1). Although construction industry has its unique peculiarities – such as having temporary project teams often operating in harsh environment with processes that are not trivial to standardize – on large scale, LC teams seem

[4] Gisbert-Pérez et al. (2024) elucidate that in some games such as in popular *League of Legends*, coaches [in HPTs] do not primarily intervene during matches but provide guidance between and after them; compared to games such as *Counter Strike* in which coaches can have more participative role by providing real-time support.

to seek for very similar traits as HPTs across sectors possess. Construction is sometimes characterized as complex project-based industry in which achieving high team performance is more difficult than in other domains; however, neighbouring domains (such as game design; Schreier, 2017) similarly claim that their project-based industry possesses hard challenges that are seen nowhere else – such as regarding schedule performance. This is not to undermine the peculiarities of construction, but to highlight that LC domain might have more similarities than differences with other fields in terms of achieving high team performance, supporting the claim that seeking and sharing inspiration (perhaps by engaging in two-way learning process) from other fields and general management practices could be increasingly useful.

From these premises, the most distinct findings from the presented examples are presented in a form of four learnings, answering the RQ: *What lessons and improvement opportunities can lean construction teams gain from globally recognized high-performing teams across other sectors?*

## LEARNING 1: HPTS ARE DETERMINED TO PROVIDE OUTSTANDING RESULTS AND RIGOROUSLY ADOPT EMERGING BEST PRACTICES

One striking highlight amongst the examined HPTs was the drive for the highest quality and to constantly improve and adopt the best practices within (and outside) of their specific domain – guided by both internal and external motivators, without strictly fixating on their own sectors' peculiarities. A distinct example are Michelin-starred kitchens in which making errors visible and learning from them does not contradict but rather complements customer-centricity and their satisfaction, further being a precondition for world-class quality (Table 1, Mrusek et al., 2021). On adopting cross-industry practices, a good example are the HPTs in electronic sports, which have in the last few years increased their performance by putting an extensive effort in adopting best practices from the athletic sports domain, rapidly raising the bar for competition.

Could forerunner construction companies adopt a similar mindset as in these examples? Could obsessing over quality and putting extensive efforts on improving, and learning from the market and from other fields be seen as a distinct differentiating factor, resulting in achieving a highly revered status amongst customers by offering a world-class products with the highest quality? As shown in the examples, such achievements would require constantly questioning the paradigms of the field by fostering a culture of learning, including adopting to up-to-date technology (such as in animation movie & video game design and in R&D, Table 1) use of data (such as in both athletic and electronic sports), and reducing the fear of failure (e.g., Edmondson, 1999). Enabling resources and time for improving (e.g., in the form of slack) and rigorously implementing root-cause analysis practices (supported by real-time data collection and analysis) are examples of how to put such learnings into practice.

## LEARNING 2: HPT STRUCTURES MIRROR THE LARGER PARADIGM SHIFT TOWARDS SHARED LEADERSHIP AND DECENTRALIZED DECISION-MAKING

Several presented examples illustrate a paradigm shift in which shared leadership and decentralized decision-making practices have widely gained traction during the 21st century, spanning from fields and teams that have had similar structures over centuries (symphony orchestras) to those that have found their structure during the last few years (electronic sports). To succeed, shared leadership calls for facilitative, coaching touch to leading such as in athletic sports (Hakanen et al., 2015); however, several examples (e.g., HPTs in animation movie design, Michelin-star restaurants, healthcare, and symphony orchestras) show that it is best served with a combination of visionary leadership that aligns the teams' goals into unified direction.

These notions stem with the signals within LC domain as well, in which dispersion of power and responsibility has been under discussion for at least two decades and indeed shown to be beneficial by supporting performance of projects and well-being of team members (Lehtovaara

et al., 2022). The findings strengthen the insight that the LC domain is not alone but rather on the right track. However, as the presented examples show the emergence of a larger paradigm shift, shared leadership practices should not remain as a feature of the few top teams and individual projects but rather form a larger industry standard. Embracing such traits might form a necessity in terms for meeting the pressure for increasing performance and productivity, but also especially for attracting younger generations to pursue careers in the construction industry. This paradigm shift could be supported, for example, by increasingly advocating the use of collaborative delivery models and adjacent tools in all sizes and types of projects.

## LEARNING 3: HPTS UNDERSTAND AND EFFECTIVELY UTILIZE BOTH EXPLICIT AND TACIT KNOWLEDGE TRANSFER IN PHYSICAL AND VIRTUAL ENVIRONMENTS

As noted from several HPTs' traits (and further highlighted by the examples of esports teams and symphony orchestras), HPTs effectively utilize the combination of explicit and tacit knowledge transfer for their operations and learning. Such traits are often cultivated through extensive training and team-building activities. As seen in the context of esports teams, effective knowledge transfer does not have to be bound in physical mediums but can also be fostered virtually (for example, in the LC context, though virtual big room collaboration).

Similarly, LC teams could further improve their performance by making an increased use of tacit communication channels in addition to relying on explicit and codified mediums. Codified communication is a necessity in certain instances (e.g., when communicating contractual obligations or safety observations), but might hinder knowledge transfer effectiveness if forced on every occasion. For example, could tacit knowledge transfer practices be further supported by extensively focusing on fostering communities of practice, mentoring and apprenticeship practices, Gemba walks, and simulation exercises? Moreover, a related concept to tacit knowledge transfer, group flow ("a collective experience of fluid harmony"; Sutherland & Cartwright, 2022) is akin to some flows identified in LC context (e.g., information flow; Tommelein et al., 2022), and further research effort could be put into investigating how a deliberate group flow could be achieved in the context of LC teams. Supporting such high interconnectedness could especially be beneficial in projects with very short takt time.

## LEARNING 4: LOOKING FROM OUTSIDE, LC PRACTICES HAVE STRENGTHS BUT ALSO POSSIBLE BLIND SPOTS

LC has already formed and successfully implemented several traits that directly contribute to good team performance, including deliberate involvement of teams to decision-making, building of trust, and fostering the culture of collaboration. These traits are especially put into practice through production system design (e.g., LPS and takt production) and delivery model (e.g., IPD) related processes and contractual structures. When looking from the perspective of other fields, construction projects seem to perform quite well in many frontiers, for example regarding schedule performance: Elfving & Seppänen (2022) reported (based on performance evaluation of 58 construction projects from 2020) that over 80% of projects finish on time. LC practices seem to provide, from the viewpoint of other domains, quite effective project-level structures that advocate working towards common goals and sharing the benefits for all parties involved. These are traits that other domains' HPTs could learn plenty from!

However, such strengths might also form blind spots for improvement. The rather heavy focus on developing and implementing project and process level practices might diminish the focus on performance of teams themselves and practices within them. Thus, could the conditions for HPTs in construction be further improved through slightly steering the development focus from (but not completely forgetting) project and process level processes towards implementing the HPT traits found from other fields? These include, but are not limited to, building more effective explicit-tacit knowledge transfer channels and group flow, obsessing

over quality in team-level performance, and supporting the paradigm shift towards shared and coaching leadership practices within teams.

## CONCLUSION AND FUTURE RESEARCH AVENUES

In this exploratory study, we set the stage to explore traits of high-performing teams from varying – and perhaps rather surprising – professional settings to identify new learnings and improvement opportunities for lean construction teams. To conclude, the most important learnings for the lean construction domain are: HPTs (i) are determined to provide outstanding results and rigorously adopt emerging best practices, (ii) mirror the larger paradigm shift towards shared leadership and decentralized decision-making, and (iii) understand and effectively utilize both explicit and tacit knowledge transfer in their physical and virtual environments. And finally, (v) looking from outside, LC practices have strengths but also possible blind spots. Respectively, these learnings could be put into action by (1) allocating more resources and time for learning (e.g., in the form of slack) while rigorously implementing root-cause analysis practices (supported by real-time data collection and analysis), (2) increasingly advocating the use of collaborative delivery models and adjacent tools in all sizes and types of projects, (3) fostering communities of practice, mentoring and apprenticeship practices while advocating and investigating how to achieve group flow, and (4) slightly steering the development focus from project and process structures towards the development of teams. We hope these learnings offer new insights and inspiration to further examine the performance of teams within the LC context.

In terms of limitations, the findings were drawn from a restricted number of examples, and the connections to lean construction were mainly explored conceptually. Potential future research (and development) avenues and lean construction initiatives include evaluating the identified learnings by creating and validating artefacts in construction project settings through action research, and attempting to create two-way knowledge transfer between the identified sectors to learn more from their practices, but also to disseminate the good practices of LC outside to the domain. The above-presented learnings could act as proposals for future research further examining the topic.

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