

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

185,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



# Teamwork in Healthcare Management

*Mercè Mach, António C.M. Abrantes and Ceferí Soler*

## Abstract

Groups are pervasive in healthcare institutions and take on a variety of shapes. This paper uses a typology that allows us to understand the distinctive characteristics of team operations, based on interdependence and interactive dimensions. It looks at factors that influence team effectiveness in organizational settings. We review different frameworks that shed light in explaining the conditions that lead to group effectiveness. From the classical input-process-output (IPO) model to the input-mediator-output-input (IMOI) model of team effectiveness; the taxonomy of team process and emergent states, as well as the teams understood as complex adaptive systems and also studied from the multiteam system perspective. We also report the need for more robust research designs to contribute to the field's further advancement. There is consensus among scholars demanding further conceptual frameworks, as well as powerful research designs that capture process-oriented theory and research on team effectiveness. Some future directions and recommendations are suggested.

**Keywords:** teamwork, interaction, interdependence, effectiveness

## 1. Introduction

In recent decades, organizations have increasingly turned to using teams and made them a part of day-to-day routines [1, 2], and all for a variety of reasons, such as the ability to respond to emergencies, engage in continuous quality improvement efforts, and manage work projects through multidisciplinary teams. In the particular case of healthcare organizations, teamwork is essential to provide effective care, and the lack of teamwork has been identified in the literature as a key vulnerability in terms of service quality [3, 4]. In this chapter we propose revisiting the conditions that promote effective teamwork. We will first examine team work typology, using interaction and interdependence as the key dimensions characterizing and describing teams. We will then focus on teamwork effectiveness and review a few of the more influential frameworks that have driven research dedicated to teams. Finally, we will conclude with some directions for future teamwork research. But, first, we should briefly discuss what a team and teamwork are.

Kozlowski and Ilgen [5] provide a rather thorough definition of teams, describing them as “two or more individuals who socially interact (face-to-face or, increasingly, virtually); possess one or more common goals; are brought together to perform organizationally relevant tasks; exhibit interdependencies with respect to workflow, goals, and outcomes; have different roles and responsibilities; and are together embedded in an encompassing organizational

system, with boundaries and linkages to the broader system context and task environment” (p. 79) [5]. Although exhaustive, this approach defines teams in a somewhat mechanistic way in terms of their design, with an external focus. This view has been countered with a different perspective which sees teams as more dynamic and as self-constructed entities. This led Humprey and Amy [6] to define teams as “assemblies of interdependent relations and activities organizing shifting sets or subsets of participants embedded in and relevant to wider resource and institutional environments” (p. 450) [6].

On the other hand, teamwork is a process that emerges from the interactions established among team members [7] and it can be defined as “a set of interrelated thoughts, actions, and feelings of each team member that are needed to function as a team and that combine to facilitate coordinated, adaptive performance and task objectives resulting in value-added outcomes” (p. 562) [8]. Teamwork reflects the minute-by-minute behaviours and interactions that take place between team members work when executing a task [9]. As proposed by Salas et al. [9], teamwork is guided by a number of fundamental principles: it is characterized by a set of behaviours, cognitions and attitudes that should be flexible and adaptive; team members should monitor each other and feel safe to provide feedback and comfortable when receiving it; team members should also be willing and capable of providing support to other team members in their operations and activities; teamwork involves clear, precise, and concise communication; team members must be able to coordinate interdependently to take collective action; teamwork requires leadership that provides direction, planning, distribution, and activity coordination; and, finally, teamwork is subject to external influences as well as to the requirements of the task itself.

## **2. Typology of formal groups**

As in all organizations, groups are pervasive in healthcare institutions and take on a variety of shapes, ranging from different units or working groups that are permanent in nature to “ad hoc” groups (committees, meetings, etc.) which are eminently temporary. In order to manage this variety of groups, establishing a typology will allow us to understand the distinctive characteristics of their operations. In addition to varying relative to the purposes they serve, formal groups (permanent or temporary) also diverge according to the basic characteristics of how they operate. The way they function is determined by two basic dimensions: team interaction and interdependence. Team interaction relates to how team members “behav[e] together, in some recognized relation to one another” (p. 12) [10], for the purpose of performing a task. Team interdependence is the extent to which team members cooperate, depend on each other, and work interactively to complete team tasks [11]. Although related, the two concepts are independent in the sense that, although teams with high degrees of interdependence also have high degrees of interaction, the same does not always happen in the opposite sense. That is, teams with a high degree of interaction do not necessarily have a high degree of interdependence, since team members may interact but not depend on each other.

### **2.1 Team interaction**

Team interaction is central to teamwork and represents complex, temporal phenomena with multilevel manifestations [12]. It is complex because it involves a web of behavioural connections between team members; it is temporal because the very execution of team tasks has a temporal dimension unfolding over time at a specific

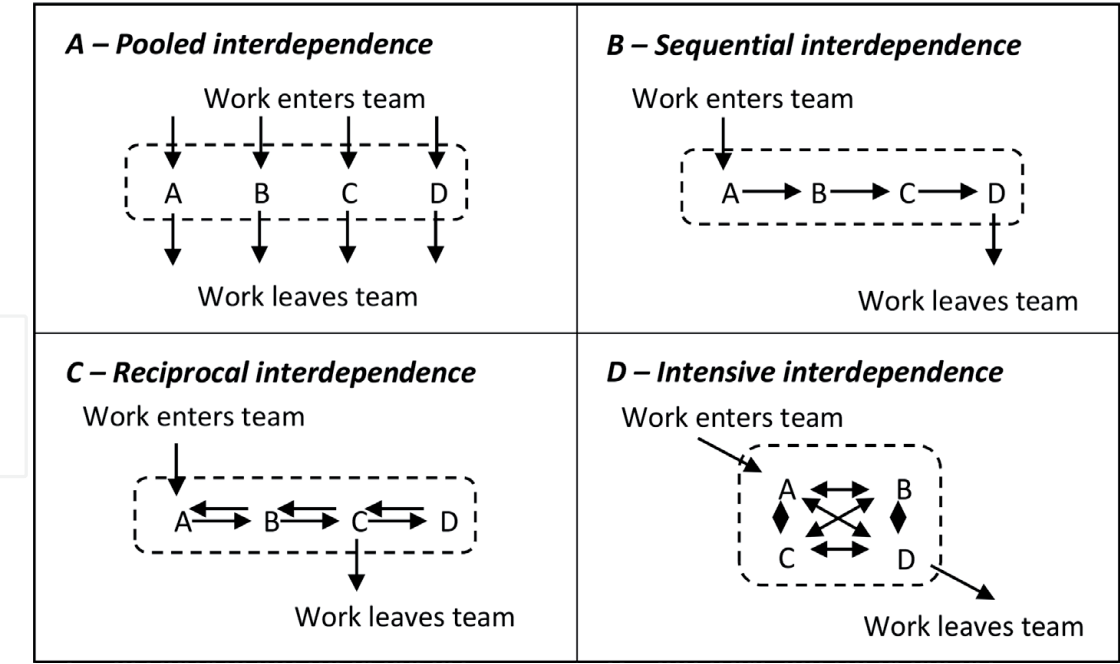
rhythm and pace; and it manifests at several levels because it is nested in individual and collective behaviours. Team interaction is thus subject to influences from elements related to individuals, from elements within the team itself, and from relational factors. Individual factors can include, for example, team members' attitudes towards work and the team. Collaborative attitudes will promote better interactions than competitive ones. Regarding team factors, for example, Lehmann-Willenbrock and Allen [13] observed that humour considered at the team level has a positive influence on the incidence of interactions within the team. From a relational point of view, differences in status and power within the team also influence the level of interaction, with that interaction increasing the smaller the differences in status and power. The team's interaction level also has significant and positive outcomes for teams. One such consequence is the development of similar team mental models, which can be defined as a common understanding among team members about key elements in the relevant team environment [14]. The similarity of team mental models has positive effects on several dimensions such as team performance [15] and adaptive capacity [16].

## 2.2 Team interdependence

Although team interdependence can be considered a single general factor, it can also be seen in three distinct dimensions: task, goal, and outcome interdependence [17]. *Task interdependence* concerns the degree of task-induced interactions between members; *goal interdependence* refers to the relationships between members arising from the type of goal (whether individual or team, for example) that drives members' performance and efforts; *outcome interdependence* refers to interdependent feedback and rewards as they relate to individual or collective performance. These types of interdependence have different consequences on team performance. For example, in a meta-analysis, Courtright et al. [18] concluded that task and outcome interdependence affect performance via different mechanisms. Task interdependence is primarily associated with team performance through its effects on team functioning in relation to the task, such as through actions or transition processes or through team-efficacy. Contrarily, outcome interdependence is mainly associated with team performance through its effects on team functioning in relation to relational aspects, such as interpersonal processes or cohesion. However, although distinct, these three types of interdependence are highly related. As Gully et al. [17] argue, when team members are performing a highly interdependent task, they tend to have interdependent goals and outcomes.

In particular, task interdependence has been widely studied [19, 20] for its implications on the way teams operate and perform. For example, to determine how to assign outcomes to individual group members, the types of tasks the team performs have to be taken into account. Thompson's [21] group task model (**Figure 1**) can help to assess the extent to which the work performed by one member affects what other group members do, as well as identifying the most effective way to distribute outcomes and/or rewards. In essence, this model reveals the form that task interdependence can take.

In the *pooled interdependence* type of task, members only depend on each other because they belong to the same organization or department. Each member of the group makes a separate and independent contribution to overall team performance. They may compete for resources but, generally, they operate relatively independently [21]. There is little interaction among members and there are few potentially dysfunctional consequences. This pooled interdependence generates additive outputs. Classic examples include a group of sales representative in a pharmaceutical company or a group of physicians in a healthcare centre.



**Figure 1.**  
*Types of task interdependence (based on Thompson model of group task [21]).*

Group tasks based on *sequential interdependence* require specific behaviours to be performed by the group’s members in a predetermined order. The level of each member’s performance, consequently, affects the performance of other members down the line. In this type of task, members’ outputs are required for the following members to perform their duties. Problems arise if the first members do not perform their jobs effectively, potentially leading to the following members having to adopt defensive strategies. When group members’ activities are sequentially interdependent, the performance level of the least capable or poorest-performing member of the group determines overall group performance [21]. Examples of sequential interdependence include any kind of assembly-line work, where the finished product is the result of all the group members’ sequential inputs.

In tasks with *reciprocal interdependence*, the activities of all the work group’s members are fully dependent on one another, so that each member’s performance influences the performance of every other group member. Work groups performing tasks characterized by this reciprocal interdependence tend to experience considerable coordination problems due to unpredictable group relations and interactions. There is no set ordering of the group’s activities when its tasks are organized reciprocally, unlike when tasks are organized in a sequential manner [21]. An example of reciprocal interdependence could be the protocols established for organ transplant surgery.

*Intensive interdependence* is one step ahead of reciprocal interdependence. This type of interdependence implies a fully connected communication network. Each group member’s activities precede and are required for all the other group members’ activities. Groups with this type of interdependence have the greatest potential for conflict, and they require the greatest number of effective communication mechanisms [21]. Examples of work groups whose tasks are intensively interdependent include operating room teams in hospitals, top management teams, emergency room teams, and R&D teams.

With increasing interdependence –pooled interdependence, sequential, reciprocal, and intensive–, the potential for conflict and dysfunctional behaviours can increase [22]. However, research provides strong evidence that the relationship between team efficacy (team perceptions regarding its ability to perform



a specific task) and performance is stronger when that interdependence is high compared to when it is low [17].

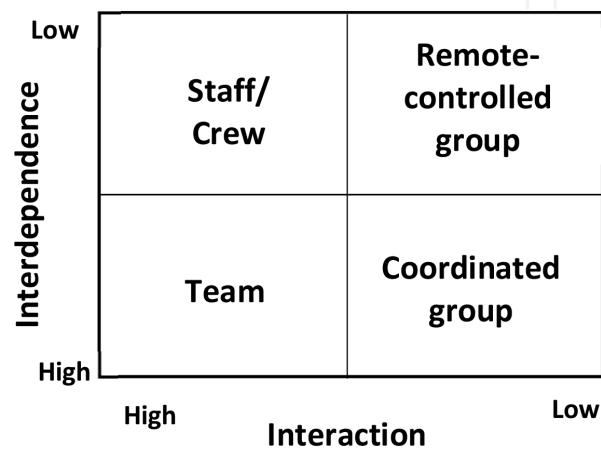
### 2.3 Types of groups

Based on the two team interaction and interdependence dimensions, we can distinguish four types of organisational groups (**Figure 2**): Staff/Crew, Remote-controlled group, Coordinated group, and Team. In the *Staff/Crew* type of group there is proximity or social contact between the people who make up the group, although their tasks are not interdependent. This group's results are generally additive, that is, they correspond to the sum of the individual members' results. Contrarily, there is no interaction or interdependence among the members in a *Remote-controlled group*. The group is merely 'nominal' and exists for the purposes of the organization, but it does not act as a group in terms of the work conducted by its members. In the *Coordinated group* there is no direct contact between its members, although they may depend on each other to carry out their work. And the *Team* group is characterised by a high degree of interaction and interdependence among its members.

### 2.4 Nature of team tasks

There are numerous dimensions by which tasks can be classified. Above we saw a classification based on interdependence, but we can look at tasks from another perspective, for example, according to the team members' contributions. From this standpoint, tasks can be additive, conjunctive or disjunctive [23]. A task is *additive* when the group's success depends on the sum of the individual group members' performance. Additive tasks are divisible, and the group's performance is a function of the average competence of the individuals within it. For additive tasks, the group's potential performance increases with the size of the group. A typical example of an additive task is a relay race, in which the final result represents the sum of each member's performance. In general, more people putting in more effort will result in a better outcome. For example, a hospital's emergency room triage team performs an additive type of task when we consider the number of triaged patients as a measure of its performance. This number represents the sum of each triage team member's performance.

*Conjunctive tasks* are those requiring all group members to contribute to complete the product or output. The group task cannot be completed successfully



**Figure 2.**  
*Types of groups based on team interaction and interdependence dimensions.*

until all the members have finalized their portion of the job. This means that the speed and quality of the group's performance are determined by the least skilled or inferior member, such as in an assembly-line which is limited by its weakest link. Both potential and actual performance of conjunctive tasks decreases as group size increases. An example of a conjunctive task could be a taskforce to develop a new protocol to resolve bottlenecks in a hospital emergency room, in which each group member has specific knowledge without which the task cannot be completed [24].

A *disjunctive task* is one in which the group's performance depends on the performance by the best member of the group, typically a task involving decision-making or problem-solving. One example is a research team looking for a single error in a complicated computer program. Disjunctive tasks require group members to define a single solution or make a decision or recommendation that will be adopted on behalf of the entire group. This means that the group's performance tends to be determined by the most skilled or logical-minded member. The potential performance of groups performing disjunctive tasks increases with group size. In the healthcare industry, an example of a disjunctive task is a weekly clinical case meeting in a hospital (or its online version). Disjunctive tasks predominate in the coordinated groups and teams seen above, although conjunctive tasks are also frequently performed by these types of groups [23].

In this section we have looked at some typologies of formal groups and discussed the interdependence of the teams' tasks and their members' interaction. In the next section we will review some of the most influential frameworks driving research on work teams.

### 3. Approaches to team dynamics

The last three decades have seen a significant increase in the number of articles published on teams or groups. A literature review of articles published in the *Journal of Applied Psychology* over the last century found that studies referring to groups or teams have more than quadrupled since the 1990s [25]. Numerous studies have been carried out to shed light on which specific set of characteristics and processes possibly lead to effective team outcomes [6]. Today, we know a lot about teams and their dynamics: we know what influences them, how to develop them, how to lead them and make them more cohesive; we also know that to be effective they have to be adaptable and flexible [26]. Teams are complex dynamic systems that develop over time as their members evolve and adapt to the different situational demands they continually face [5]. Therefore, they are strongly influenced by a wide range of factors that make teams different in a variety of ways, from their skills and level of virtuality to their culture and personality [26]. Let's look at some factors that influence team effectiveness.

#### 3.1 Fundamental frameworks

Scholars have developed different frameworks to attempt to explain the conditions that lead to group effectiveness. The classic input-process-output (IPO) model of team effectiveness [27, 28] guided developments in team research for several decades. Within the IPO model, the inputs are the antecedents, that is, the conditions that exist prior to the group activity (e.g., organizational context, task characteristics, and team composition). The processes are the interactions among group members that mediate the relationship between the team's inputs and outputs (e.g., communication and coordination processes). Lastly, the outputs are the results, the consequences of group activity (e.g., productivity/performance,

member satisfaction, and innovation). For example, the early IPO model proposed by McGrath [28] suggests that individual, group, and environmental-level factors are antecedents to group interaction processes with effects on performance outcomes such as quality, speed, number of errors, and other types of outcomes, such as member satisfaction or group cohesion.

The IPO model has been highly influential in research on teams and how members can combine their efforts and knowledge to complete a specific task. However, more recently, the model has been questioned as it has some limitations when considering the dynamic nature of teams [29, 30]. One criticism raised is that, despite involving team interactions, many researchers studying processes only assess these as static retrospective perceptions, ignoring how they emerge, their dynamics and evolution over time [29]. Furthermore, the IPO model does not take into account that all mediational factors are not necessarily processes but can also be emergent states [31] as we explore below. In addition, teamwork influences create a feedback loop in which reversal causal sequences are also possible, given that the results of a team's actions can also be an input for the following action, something not reflected in IPO models [31, 32]. To avoid some of these limitations, Ilgen, et al. [33] proposed the input-mediator-output-input (IMOI) model. In the latter, inputs are added at the end of the model to denote the system's cyclical nature, and processes are replaced by mediators to reflect a wider range of variables, namely processes and emergent states.

### 3.2 Team processes and emergent states

As seen above, not all team mediation mechanisms are processes; some are emergent states [31]. The difference between the two is fundamental, since processes imply interactions while emergent states do not. *Team processes* reflect the different types of activities and interactions that occur within a team and contribute to its end goals. They can be defined as “members’ interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed toward organizing task work to achieve collective goals” (p. 357) [31]. On the other hand, *emergent states* are an epiphenomenon (by-product) that results from the interaction between team members. Marks et al. [31] define them as “properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes” (p. 357) [31]. Thus, when implementing processes, team members operate interdependently using the various resources at their disposal to achieve the team's objectives. For example, these resources may be their own competencies or the equipment they have available. As for emergent states, they are a product of the team's experiences and reflect its cognitive, motivational, and affective states. Although they are a product of interactions and, therefore, of processes, emergent states are also inputs to subsequent processes and outcomes.

This sequential notion in which a process or emergent state is both an output and an input of subsequent processes and emergent states leads us to the recurring phase model of team processes proposed by Marks et al. [31]. In their model, team performance episodes unfold over time, signalling specific periods in which action and transition phases occur. *Action phases* are periods of time in which teams are actively involved in executing a task, trying to achieve the proposed objectives. The teams' actions depend on their nature. For example, surgical teams perform operations; emergency medical teams treat acute patients without prior appointment; firefighting teams put out fires; and research teams collect and analyse data. *Transition phases* occur between the different action phases. In these transition phases, teams focus on evaluating the previous action phase and planning the next one. These are periods of reflection where actual and projected performance levels are compared



and potential performance gaps are addressed. In each of these phases there is an IPO model, that is, a set of processes that have antecedents and that result in outputs for the next phase. For example, a given action phase's performance quality is the input for the next transition phase. Antecedents such as member diversity, task interdependence, and team size affect team processes that, in turn, have a strong impact on team effectiveness and performance.

Marks et al. [31] developed a taxonomy of team processes that considers practices that typically occur in transition phases, those that occur in action phases, and interpersonal processes that occur in both. In transition phases, team members conduct three types of processes: mission analysis, goal specification, and strategy formulation. *Mission analysis* processes refer to teams interpreting and evaluating their mission and identifying their main tasks, the operational context, and available resources; *goal specification* processes imply team members identifying and prioritising their goals and subgoals; and, lastly, *strategy formulation* processes include developing alternative courses of action to accomplish the mission, as well as defining contingency plans in case there is any change in the context. Typical processes in the action phase include progress, system and team monitoring as well as backup behaviours and coordination. *Progress monitoring* consists of overseeing the task and checking its progress; *system monitoring* implies tracking internal systems such as equipment or personnel and tracking external systems, for example, changes in the environment; *team monitoring and backup behaviours* refer to actions to help other team members perform their tasks (ranging from simple verbal feedback to replacing a colleague in performing a task); and, finally, *coordination* refers to orchestrating the sequence and synchronisation of interdependent actions. Coordination can be explicit, which implies that team members communicate with each other overtly, but it can also be implicit, consisting of the team's ability to act collectively, with members anticipating the needs of the task and other members and adjusting their behaviour accordingly, without the need to communicate overtly [34]. There are, however, other types of processes which may occur either in action or transition phases and which refer to processes that regulate interpersonal activities, that is, interpersonal processes. These comprise conflict management, motivation, and confidence building, as well as affect management. *Conflict management* can be both preventive, establishing the conditions to prevent, control, or guide conflict before it occurs, and reactive, which is a way of resolving conflicts when they do occur; *motivation and confidence building* consist of creating and maintaining a collective feeling of confidence, motivation, and cohesion, that is, creating emergent states that are positive for the mission; and *affect management* refers to regulating members' emotions when working.

Recently, Mathieu, Luciano et al. [35] have developed a team process survey tool that allows researchers to examine team processes more systematically (transition, action, and interpersonal processes). In its more extensive version, this tool includes 50 items, while its intermediate version has 30 and the reduced version only 10, one for each process. As recommended by authors [35], the use of the reduced 10-item version may be tempting, but it is not the most appropriate in all situations. The longer versions offer a more complete representation of the various dimensions. For example, Marks et al.'s taxonomy [31] includes several sub-processes that are not revealed in the 10-item version. When the aim is to get an in-depth view of the team's processes, the 30- and 50-item versions are more advisable. When only a quick look at how the team currently functions is desired or when this measure is included in a more extensive questionnaire along with other scales, using the 10-item version may be advantageous.

With regard to emergent states, an article by Grossman, Friedman and Kalra [36] summarises the emergent states emphasized the most in the literature,

dividing them into affective and cognitive mechanisms. In *affective mechanisms* we find cohesion, confidence, and trust; *cognitive mechanisms* consist of team mental models and transactive memory systems. *Team cohesion* is one of the most studied emergent states in team literature and across a wide range of disciplines, from sports psychology [37, 38], to military psychology [39]. It is “a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals and objectives” (p. 124) [40]. In the particular case of teams operating in highly stressful or very task-oriented environments, such as health-care, research has shown that team cohesion is crucial for team performance [41]. *Team confidence* includes team efficacy and team potency. These two constructs are similar but distinct. While team efficacy refers to the shared belief that the team can perform a certain task, team potency refers to the belief about the team’s ability to be successful in different tasks and contexts. Both dimensions have a positive effect on team performance, especially team efficacy, particularly when tasks are highly interdependent [17]. *Team trust* refers to the team members’ shared willingness to be vulnerable to other members’ actions [42, 43]. Without trust, team members are unlikely to be able to work effectively with each other. These three mechanisms, though independent, have some interactions. For example, Mach et al. [38] observed that team trust has an effect on performance through team cohesion. In other words, the greater the team trust, the more cohesive teams are, which contributes positively to their performance.

As far as cognitive mechanisms are concerned, *team mental models* play a major role. These are shared representations of key elements concerning the task environment, whether related to the task, to the team itself or even to temporal aspects [14, 44]. As seen above, team mental models have a positive effect on several team outcomes, from performance to adaptation. Another cognitive mechanism is the *transactive memory system*, which refers to a shared system that combines each member’s memory system with a shared understanding of what each member knows and for what kind of knowledge they are responsible, that is, who knows what [45, 46]. In addition, this emergent state contributes to teams’ successful performance [45], as it allows lightening each team member’s cognitive load and also expands the pool of expertise and knowledge available. Emergent processes and states interplay with mutual precedence relations as well as with interaction relations. For example, in dynamic contexts when performing non-routine tasks, transactive memory systems moderate the relationship between implicit coordination and adaptive behaviours [47]. This means that, when teams are fully aware of who knows what within the team, the positive effect of implicit coordination processes on performance is more pronounced.

### 3.3 Teams as complex adaptive systems (CAS)

Since Arrow, McGrath and Berdahl [48] characterised teams as complex adaptive systems (CAS), multiple theoretical frameworks have emerged to capture and explain this idea. However, relatively few empirical studies have been able to examine how long it takes teams to become effective and how these effects develop over time [49–51]. CAS are open systems that are characterised by the level of uncertainty regarding their evolution over time given the interaction of their components [52]. Ramos-Villagrasa et al. [51] carried out a systematic review through the nonlinear dynamical system theory lens, supporting the view of teams as complex adaptive systems. Teams are complex because they are integrated within organisations that exhibit complex behaviour; they are adaptive because they dynamically cope with environmental changes; and they are systems because their functioning depends on the team’s history and, therefore, on inputs, but also on the anticipated future, that is, on outputs. The continuous adaptive process that occurs within these

teams allows them to adapt to contextual discontinuities and to make decisions according to both the team's antecedents and projected results [48]. The use of this new conceptual approach can help researchers to study teams in a non-linear and more dynamic way [51], as well as to address temporal problems [53, 54] by taking measures at different stages of the team's evolution.

In the case of healthcare teams, they cannot always function as CAS [55]. For example, in clinical situations where problems are identified and described in detail and solutions standardised in specific procedures, teams operate in a planned way, and guidelines are clear and executed in a simple way. However, when there is uncertainty about how to best handle a given situation, operating as a CAS may be the most appropriate option as it promotes the development of new ideas and approaches. This is based on 7 principles: (1) team members can operate autonomously guided by ground rules; (2) team members interact in non-linear ways, i.e., they are interdependent and affect other team members in different ways; (3) the team is sensitive to initial conditions; (4) interactions between team members can produce unpredictable behaviours; (5) these interactions can generate new behaviours; (6) the team is an open system interacting with the environment; and (7) team members function as attractors modelling team behaviour [55].

### **3.4 Multiteam systems**

In the same complex adaptive system stream, teams can be studied from the multiteam system (MTS) perspective [56]. An MTS corresponds to "two or more teams that interface directly and interdependently in response to environmental contingencies toward the accomplishment of collective goals" (p. 289) [56]. These systems constitute "networks of interdependent teams that coordinate at some level to achieve proximal and distal goals" (p. 479) [57]. In a system of this nature, the processes established between the various teams, the cross-team processes, are even more important for the system's success than within-team processes [58]. In the case of the healthcare industry, the use of a multiteam system logic is very beneficial, but much remains to be studied. For example, one area where team research is needed is how best to form networks that integrate patients and their families over time [59]. Patients and their support structures are responsible for coordinating care tasks and helping interpret the information collected, extending beyond the boundaries of healthcare providers. Consequently, managing this extended multi-team system holistically will certainly have very positive results on patient care.

A literature review conducted by Shuffler and Carter [60] identified 7 important lessons for successful teamwork in an MTS: (1) MTS functioning is suited to contexts that are ambiguous, multifaceted, dynamic, and where there is a need for a sense of urgency; (2) MTS structures provide the specialisation, flexibility, and integration needed to deal with complex problems; (3) the teamwork phenomenon changes when moving from a teamwork logic within a team to a teamwork logic within an MTS, for example, cross-team processes take on sovereign relevance; (4) an MTS implies added barriers to collaboration that should be specifically addressed; (5) the incorporation of linking elements can benefit the system's performance; (6) the structure of the MTS and the design of its functioning should be carefully thought out; and (7) leadership plays a crucial role in an MTS and should be integrated and managed across the system [60].

### **3.5 Facets of team effectiveness**

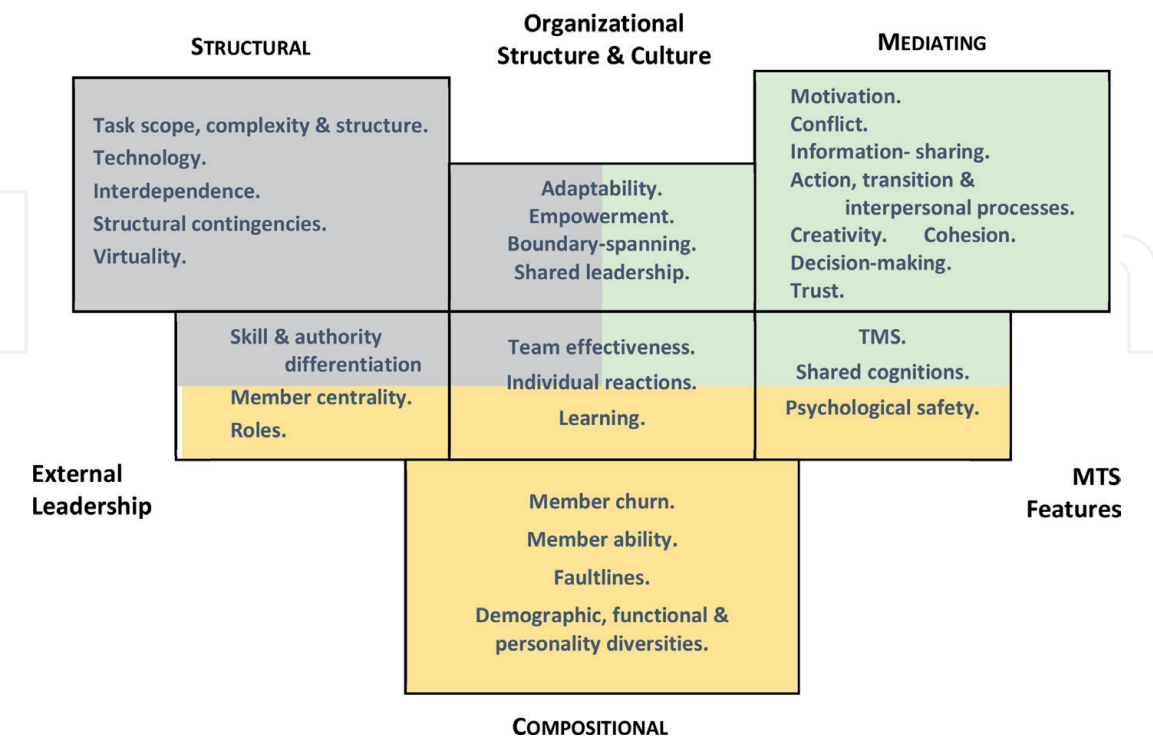
Another relevant framework used to study team effectiveness was suggested by Mathieu et al. [25] illustrating the simultaneous and interrelated relationships



among factors associated with team and individual outcomes. Based on a revision of team research published in the *Journal of Applied Psychology* (JAP) during the last century, Mathieu et al. [25] propose a summary construct domain framework with three main facets (**Figure 3**): (a) team task and structure; (b) member characteristics and team composition; and (c) team process and emergent states or mediating mechanisms. This framework captures the many overlapping facets of team effectiveness, providing an in-depth and integrative review of all the constructs that scholars have used thus far to help to advance the teamwork field.

Many of these constructs have been studied among healthcare teams. For example, O'Donovan et al. [62] recently developed a psychological safety measurement instrument designed specifically for healthcare teams. In this instrument, the authors combine the strengths of observation measures with survey measures, allowing for their application to longitudinal studies. Another tool has also been developed to measure the collective intelligence of primary healthcare teams [63]. Collective intelligence can prevent repeating past mistakes and help teams to be more efficient. Jean et al. [63] argue that intelligent teams produce high quality clinical services, so it is essential to better understand the concept and be able to measure it accurately.

Johnson [4] found that intra-team communication demonstrates recurring problems that make it difficult for healthcare teams to coordinate, proposing that teams should work within a common framework represented by formal, informal, market, and professional relationships, or a unique mix based on a mutual orientation towards patient outcomes. The formal approach is based on explicit knowledge and a shared system of codes that, for example, can be translated into written guidelines for hospitals. In addition, the formal approach considers that: personal relationships are also a source of informal information that can overcome the barriers created by formal panels; market logic relates to the creation of information and knowledge-exchange relationships that tend to be maintained through the



**Figure 3.** Facets of the team effectiveness domain based of one century of JAP publications (Source: [61]. Note. MTS = Multiteam Systems. TMS = Transactive Memory System. Some of the constructs overlap dimensions, showing all possible relations between the squares' main facets. These small squares can be seen where coloured squares intersect.)



investment that has been put into the relationship; and professional relationships relate to communication within the domain of professions by creating networks of contacts between professionals based on mutual help. Information-sharing and supportive behaviours have also been observed to have a positive impact on innovation in healthcare teams [64].

A study conducted by Jaca, et al. [65] revealed that the role of the external leader in healthcare teams is quite relevant, and his/her main function is to serve as a team performance coordinator. There is also a clear definition of roles, which facilitates decision-making and conflict management. Furthermore, internal communication and participation levels tend to be high. However, team recognition and training need to be improved, as these are the weakest points in healthcare teams. Several studies have also drawn attention to the importance of teamwork in healthcare and, in particular, the importance of interventions to promote teamwork [3, 66]. One of these types of interventions is “TeamSTEPPS” (Team Strategies and Tools to Enhance Performance and Patient Safety), developed by the Agency for Healthcare Research and Quality (AHRQ) in the USA. TeamSTEPPS is based on communication, leadership, mutual support, and situation monitoring. Another useful model is CRM (Crew Resource Management), which has a significant impact on knowledge and behaviour in acute care settings, such as healthcare [3].

#### 4. Future research avenues

Despite the remarkable advance in team work research, scholars agree on the need for more robust research designs to contribute to the field’s further advancement. In addition to the meta-analysis contributions summarizing past empirical findings [17, 18, 67–69], there is consensus among scholars demanding further conceptual frameworks, as well as powerful research designs that capture process-oriented theory and research on team effectiveness [29, 70].

Humphrey and Aime [6] call for a multilevel, multi-theoretical, and multiperiod framework to cope with the contextual dynamics and enhance the understanding of team dynamics. Likewise, Mathieu et al. [30] state that future advances on workgroup effectiveness will be linked with the ability to capture dynamic team properties (conceptually and methodologically); the complexity of team task environments; and the embeddedness in multilevel environments. In the special issue dedicated to *Creating High Performance Teamwork in Organizations*, O’Neil and Salas [2] glimpsed four themes to achieve a team’s full potential: working across boundaries; building effective team processes and states; managing team development issues; and leveraging human capital –a combination of knowledge, skills, competences, and other members’ and leaders’ characteristics. Abrantes et al. [70] highlight 3 types of challenges for research on teams: a theoretical challenge related to team dynamics and the need to identify internal and external drivers that explain these dynamics; a temporal challenge that relates to the process of emergence of team variables and how and when these variables can be assumed to be truly existing phenomena; and a methodological challenge linked to the creation of tools that enable measuring dynamic processes in a non-invasive way. Furthermore, according to Ployhart et al. [71], the agenda for future research on high performance work teams will focus on the conception of teams as adaptive and self-adjusting social entities, embedded in multi-team systems, and as social networks within and outside the team. Therefore, beyond the need to embrace the organizational nature of teams and phenomena at various levels [6], there is also consensus on the need to grasp the dynamic nature of team processes, as they have been assessed primarily as static constructs [26, 29, 70, 72].

As seen, team scholars agree regarding the need for innovative research designs and new techniques to capture team dynamics over time. In this sense, Delice et al. [73] summarize and review existing empirical studies that use novel measurements to study team dynamics over extended periods. Some of these innovative research designs are based on techniques such as role-playing simulations, videotape and software coding, videogames, video-coding, team decision tasks, and WhatsApp ICT (information and communication technology). Delice et al. [73] also propose longitudinal laboratory experiments and time-series analyses. Other alternatives include scenario-based studies, critical incident techniques, concept-mapping, cross-border e-business website analyses, and simulations (simulation tasks and longitudinal organizational, computer game-based, and dynamic decision-making simulations), as well as experiential learning approaches and performance assessments, among others. There is, therefore, a plethora of alternatives that should be used to further our understanding of teams that are dynamic and part of adaptive systems [73].

## 5. Concluding thoughts

In summary, some of the key ideas for future research attempt to overcome the limitations of traditional self-reported assessments, which suffer from problems such as low response rates, response bias, or intrusiveness [29, 74, 75]. Some research strategies that can help to overcome these effects:

- Using more than one measurement method, potentially avoiding single-source bias as well as survey respondent fatigue [26].
- Conceptualizing multiple levels, process dynamics, and the emergence of team phenomena over time [29].
- Increasing the use of measurement technology such as CM-computational modelling, ABBs, etc. [26, 73, 76].
- Addressing and reporting on the different types of work interdependence (task or outcome interdependence) [18].
- Thinking about new ways of obtaining team data such as emails, smartphones, video surveillance, etc., to replace multiple data collection points and traditional self-reported surveys [29].
- At the more conceptual level, possible strategies include:
  - Understanding the Multiteam System better as well as team network dynamics in the organizational context [26].
  - Bringing the complexity that surrounds modern team-based organizational designs to the fore of team research [70].

IntechOpen

### **Author details**

Mercè Mach<sup>1\*</sup>, António C.M. Abrantes<sup>2</sup> and Ceferí Soler<sup>3</sup>

1 Faculty of Economics and Business, University of Barcelona, Barcelona, Spain

2 ICN Business School – CEREFIGE, Nancy, France

3 ESADE Business School, Ramon Llull University, Barcelona, Spain

\*Address all correspondence to: merce.mach@ub.edu

### **IntechOpen**

© 2021 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

## References

- [1] Cross, R., Rebele, R., & Grant, A. (2016). Collaborative overload. *Harvard Business Review*, 94,74-79.
- [2] O'Neill, T. A., & Salas, E. (2018). Creating high performance teamwork in organizations. *Human Resource Management Review*, 28(4), 325-331.
- [3] Buljac-Samardzic, M., Doekhie, K. D., & van Wijngaarden, J. D. (2020). Interventions to improve team effectiveness within health care: a systematic review of the past decade. *Human Resources for Health*, 18(1), 1-42.
- [4] Johnson, J. D. (2019). Framing communication in health care action teams. *International Journal of Healthcare Management*, 12(1), 68-74.
- [5] Kozlowski, S. W., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest*, 7(3), 77-124.
- [6] Humphrey, S. E., & Aime, F. (2014). Team microdynamics: Toward an organizing approach to teamwork. *Academy of Management Annals*, 8(1), 443-503.
- [7] Carley, K. (1991). A theory of group stability. *American Sociological Review*, 56, 331-354.
- [8] Salas, E., Sims, D. E., & Burke, C. S. (2005). Is there a "big five" in teamwork?. *Small Group Research*, 36(5), 555-599.
- [9] Salas, E., Burke, C. S., & Cannon-Bowers, J. A. (2000). Teamwork: emerging principles. *International Journal of Management Reviews*, 2(4), 339-356.
- [10] McGrath, J. E. (1984). *Groups: Interaction and performance* (Vol. 14). Englewood Cliffs, NJ: Prentice-Hall.
- [11] Stewart, G. L., & Barrick, M. R. (2000). Team structure and performance: Assessing the mediating role of intrateam process and the moderating role of task type. *Academy of Management Journal*, 43(2), 135-148.
- [12] Lehmann-Willenbrock, N., & Allen, J. A. (2018). Modeling temporal interaction dynamics in organizational settings. *Journal of business and psychology*, 33(3), 325-344.
- [13] Lehmann-Willenbrock, N., & Allen, J. A. (2014). How fun are your meetings? Investigating the relationship between humor patterns in team interactions and team performance. *Journal of Applied Psychology*, 99(6), 1278-1287.
- [14] Mohammed, S., Ferzandi, L., & Hamilton, K. (2010). Metaphor no more: A 15-year review of the team mental model construct. *Journal of Management*, 36(4), 876-910.
- [15] Santos, C. M., Uitdewilligen, S., & Passos, A. M. (2015). A temporal common ground for learning: The moderating effect of shared mental models on the relation between team learning behaviours and performance improvement. *European Journal of Work and Organizational Psychology*, 24(5), 710-725.
- [16] Maynard, M. T., Kennedy, D. M., & Sommer, S. A. (2015). Team adaptation: A fifteen-year synthesis (1998 – 2013) and framework for how this literature needs to "adapt" going forward. *European Journal of Work and Organizational Psychology*, 24(5), 652-677.
- [17] Gully, S. M., Incalcaterra, K. A., Joshi, A., & Beaubien, J. M. (2002). A meta-analysis of team-efficacy, potency, and performance: Interdependence and level of analysis as moderators of



observed relationships. *Journal of Applied Psychology*, 87(5), 819-832.

[18] Courtright, S. H., Thurgood, G. R., Stewart, G. L., & Pierotti, A. J. (2015). Structural interdependence in teams: An integrative framework and meta-analysis. *Journal of Applied Psychology*, 100(6), 1825-1846.

[19] Bachrach, D. G., Powell, B. C., Collins, B. J., & Richey, R. G. (2006). Effects of task interdependence on the relationship between helping behavior and group performance. *Journal of Applied Psychology*, 91(6), 1396-1405.

[20] Kiggundu, M. N. (1981). Task interdependence and the theory of job design. *Academy of Management Review*, 6(3), 499-508.

[21] Thompson, J. D. (1967). *Organizations in Action*. New York: McGraw Hill.

[22] D'Silva, J. L., Ortega, A., & Sulaiman, A. H. (2016). Influence of personal and task interdependence on task conflict and team effectiveness. *Modern Applied Science*, 10(4), 95-100.

[23] Steiner, I. D. (1972). *Group process and productivity* (pp. 393-422). New York: Academic press.

[24] Mohammed, S. N., Mathieu, J. E., & Bartlett, A. L. (2002). Technical administrative task performance, leadership task performance, and contextual performance: Considering the influence of team- and task-related composition variables. *Journal of Organizational Behavior*, 23, 795-814

[25] Mathieu, J. E., Hollenbeck, J. R., van Knippenberg, D., & Ilgen, D. R. (2017). A century of work teams in the Journal of Applied Psychology. *Journal of Applied Psychology*, 102(3), 452-467.

[26] Salas, E., Reyes, D. L., & McDaniel, S. H. (2018). The science of teamwork:

Progress, reflections, and the road ahead. *American Psychologist*, 73(4), 593-600.

[27] Hackman, J. R., & Morris, C. G. (1975). Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. *Advances in Experimental Social Psychology*, 8, 45-99.

[28] McGrath, J. E. (1964). *A social psychological: A brief introduction*. New York. NY: Holt Rinehart and Winston.

[29] Kozlowski, S. W., & Chao, G. T. (2018). Unpacking team process dynamics and emergent phenomena: Challenges, conceptual advances, and innovative methods. *American Psychologist*, 73, 576-592.

[30] Mathieu, J. E., Wolfson, M. A., & Park, S. (2018). The evolution of work team research since Hawthorne. *American Psychologist*, 73(4), 308-321.

[31] Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*, 26(3), 356-376.

[32] Forsyth, D. R. (2010). *Group dynamics*. Belmont, CA: Wadsworth.

[33] Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in organizations: From input-process-output models to IMOI models. *Annual Review of Psychology*, 56, 517-543.

[34] Rico, R., Sánchez-Manzanares, M., Gil, F., & Gibson, C. (2008). Team implicit coordination processes: A team knowledge-based approach. *Academy of Management Review*, 33(1), 163-184.

[35] Mathieu, J. E., Luciano, M. M., D'Innocenzo, L., Klock, E. A., & LePine, J. A. (2020). The development and construct validity of a team processes survey measure.

*Organizational Research Methods*, 23(3), 399-431.

[36] Grossman, R., Friedman, S., & Kalra, S. (2017). Teamwork processes and emergent states. In E. Salas, R. Rico, & J. Passmore (Eds.), *The wiley blackwell handbook of the psychology of team working and collaborative processes* (1st ed., pp. 245-269). John Wiley & Sons.

[37] Abrantes, A. C. M., Mach, M., & Ferreira, A. I. (2020). Tenure matters for team cohesion and performance: the moderating role of trust in the coach. *European Sport Management Quarterly*, 1-22.

[38] Mach, M., Dolan, S., & Tzafrir, S. (2010). The differential effect of team members' trust on team performance: The mediation role of team cohesion. *Journal of Occupational and Organizational Psychology*, 83(3), 771-794.

[39] Ahronson, A., & Cameron, J. E. (2007). The nature and consequences of group cohesion in a military sample. *Military Psychology*, 19(1), 9-25.

[40] Carron, A. V. (1982). Cohesiveness in sport groups: Interpretations and considerations. *Journal of Sport Psychology*, 4(2), 123-138.

[41] Charbonneau, D., & Wood, V. M. (2018). Antecedents and outcomes of unit cohesion and affective commitment to the Army. *Military Psychology*, 30(1), 43-53.

[42] Fulmer, C. A., & Gelfand, M. J. (2012). At what level (and in whom) we trust: Trust across multiple organizational levels. *Journal of Management*, 38(4), 1167-1230.

[43] Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, 20(3), 709-734.

[44] Mohammed, S., Hamilton, K., Tesler, R., Mancuso, V., & McNeese, M. (2015). Time for temporal team mental models: Expanding beyond "what" and "how" to incorporate "when". *European Journal of Work and Organizational Psychology*, 24(5), 693-709.

[45] Austin, J. R. (2003). Transactive memory in organizational groups: The effects of content, consensus, specialization, and accuracy on group performance. *Journal of Applied Psychology*, 88(5), 866-878.

[46] Wegner, D. M. (1995). A computer network model of human transactive memory. *Social Cognition*, 13(3), 319-339.

[47] Marques-Quinteiro, P., Curral, L., Passos, A. M., & Lewis, K. (2013). And now what do we do? The role of transactive memory systems and task coordination in action teams. *Group Dynamics: Theory, Research, and Practice*, 17(3), 194-206.

[48] Arrow, H., McGrath, J. E., & Berdahl, J. L. (2000). *Small groups as complex systems: Formation, coordination, development, and adaptation*. Thousand Oaks, CA: SAGE.

[49] Devaraj, S., & Jiang, K. (2019). It's about time – A longitudinal adaptation model of high-performance work teams. *Journal of Applied Psychology*, 104(3), 433-447.

[50] Kozlowski, S. W. J., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology (Vol 12): Industrial and organizational psychology* (pp. 333-375). New York: Wiley

[51] Ramos-Villagrasa, P. J., Marques-Quinteiro, P., Navarro, J., & Rico, R. (2018). Teams as complex adaptive systems: Reviewing 17 years of research. *Small Group Research*, 49(2), 135-176.

- [52] Guastello, S. J., & Liebovitch, M. (2009). Introduction to nonlinear dynamics and complexity. In S. J. Guastello, M. Koopmans & D. Pincus (Eds.), *Chaos and complexity in psychology: The theory of nonlinear dynamical systems* (pp. 1-40). New York, NY: Cambridge University Press.
- [53] McGrath, J. E., Arrow, H., & Berdahl, J. L. (2000). The study of groups: Past, present, and future. *Personality and Social Psychology Review*, 4, 95-105.
- [54] Navarro, J., Roe, R. A., & Artiles, M. I. (2015). Taking time seriously: Changing practices and perspectives in work/organizational psychology. *Revista de Psicología del Trabajo y de las Organizaciones*, 31, 135-145.
- [55] Pype, P., Mertens, F., Helewaut, F., & Krystallidou, D. (2018). Healthcare teams as complex adaptive systems: understanding team behaviour through team members' perception of interpersonal interaction. *BMC Health Services Research*, 18(1), 1-13.
- [56] Mathieu, J. E., Marks, M. A., & Zaccaro, S. J. (2002). *Multiteam systems*. In N. Anderson, D. S. Ones, H. K. Sinangil, & C. Viswesvaran (Eds.), *Handbook of industrial, work and organizational psychology, Vol. 2. Organizational psychology* (p. 289-313). Sage Publications, Inc.
- [57] Zaccaro, S. J., Dubrow, S., Torres, E. M., & Campbell, L. N. (2020). Multiteam systems: An integrated review and comparison of different forms. *Annual Review of Organizational Psychology and Organizational Behavior*, 7, 479-503.
- [58] Marks, M. A., DeChurch, L. A., Mathieu, J. E., Panzer, F. J., & Alonso, A. (2005). Teamwork in Multiteam Systems. *Journal of Applied Psychology*, 90(5), 964-971.
- [59] Weaver, S. J. (2016). From teams of experts to mindful expert teams and multiteam systems. *Journal of Oncology Practice*, 12, 976-979.
- [60] Shuffler, M. L., & Carter, D. R. (2018). Teamwork situated in multiteam systems: Key lessons learned and future opportunities. *American Psychologist*, 73(4), 390-406.
- [61] Construct domain for team research. Reprinted from "A century of work teams in the Journal of Applied Psychology" by J. E. Mathieu, J. R. Hollenbeck, D. van Knippenberg, and D. R. Ilgen, 2017, *Journal of Applied Psychology*, p. 456. Copyright, 2017, by the American Psychological Association
- [62] O'Donovan, R., Van Dun, D., & McAuliffe, E. (2020). Measuring psychological safety in healthcare teams: developing an observational measure to complement survey methods. *BMC Medical Research Methodology*, 20(1), 1-17.
- [63] Jean, E., Perroux, M., Pepin, J., & Duhoux, A. (2020). How to measure the collective intelligence of primary healthcare teams?. *Learning Health Systems*, 4(3), e10213.
- [64] Moser, K. S., Dawson, J. F., & West, M. A. (2019). Antecedents of team innovation in health care teams. *Creativity and Innovation Management*, 28(1), 72-81.
- [65] Jaca, C., Viles, E., Tanco, M., Mateo, R., & Santos, J. (2013). Teamwork effectiveness factors in healthcare and manufacturing industries. *Team Performance Management: An International Journal*, 9(3/4), 222-236.
- [66] West, M. A., & Lyubovnikova, J. (2013). Illusions of team working in health care. *Journal of Health Organization and Management*, 27(1), 134-142.



- [67] LePine, J. A., Piccolo, R. F., Jackson, C. L., Mathieu, J. E., & Saul, J. R. (2008). A meta-analysis of teamwork processes: Tests of a multidimensional model and relationships with team effectiveness criteria. *Personnel Psychology*, 61(2), 273-307.
- [68] Schmutz, J. B., Meier, L. L., & Manser, T. (2019). How effective is teamwork really? The relationship between teamwork and performance in healthcare teams: A systematic review and meta-analysis. *BMJ open*, 9(9), e028280.
- [69] Stewart, G. (2000). Meta-analysis of work teams research published between 1977 and 1998. *Academy of Management Proceedings* (Vol. 2000, 1, pp. 1-1). Briarcliff Manor, NY 10510: Academy of Management.
- [70] Abrantes, A. C. M., O'Neill, T. A., & Passos, A. M. (2020). A temporal perspective on teams. In *Handbook on the Temporal Dynamics of Organizational Behavior* (pp. 274-289). Edward Elgar Publishing.
- [71] Ployhart, R.E., Nyberg, A.J., Reilly, G., & Maltarich, M.A. (2014). Human capital is dead; long live human capital resources! *Journal of Management*, 40(2), 371-398.
- [72] Mathieu, J. E., Gallagher, P. T., Domingo, M. A., & Klock, E. A. (2019). Embracing complexity: Reviewing the past decade of team effectiveness research. *Annual Review of Organizational Psychology and Organizational Behavior*, 6, 17-46.
- [73] Delice, F., Rousseau, M., & Feitosa, J. (2019). Advancing teams research: What, when, and how to measure team dynamics over time. *Frontiers in Psychology*, 10, 1324.
- [74] Feitosa, J., Grossman, R., & Salazar, M. (2018). *Debunking key assumptions about teams: The role of culture*. *American Psychologist*, 73(4), 376-389.
- [75] Golden, S. J., Chang, C. H., and Kozlowski, S. W. (2018). Teams in isolated, confined, and extreme (ICE) environments: Review and integration. *Journal of Organizational Behavior*, 39, 701-715.
- [76] Kozlowski, S. W., Chao, G. T., Grand, J. A., Braun, M. T., & Kuljanin, G. (2016). Capturing the multilevel dynamics of emergence: Computational modeling, simulation, and virtual experimentation. *Organizational Psychology Review*, 6(1), 3-33.