

Team Science In Multi- Team Systems

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Multi-Team Systems

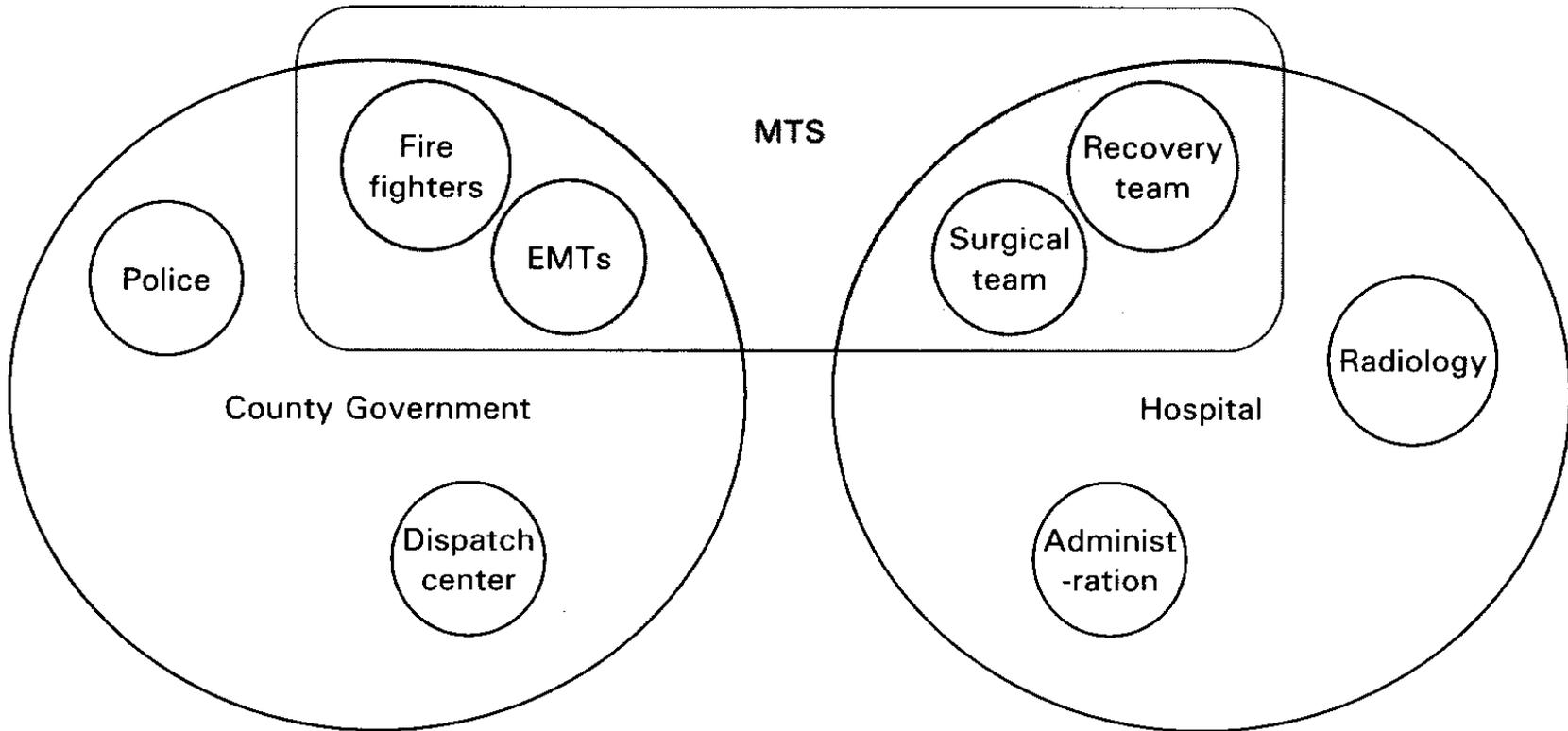
- Concept articulated by Mathieu, Marks, & Zaccaro
- Networks of Teams

Definition:

- Two or more teams that interface directly and interdependently in response to environmental contingencies toward the accomplishment of collective goals
- All teams in the MTS, while pursuing different proximal goals share at least one common distal goal
- Each team exhibits input, process, and outcome interdependencies with at least one other team in the system

Mathieu, J. E., Marks, M. A. Marks, and J. S. Zaccaro (2001). Multiteam systems. In N. Anderson, D. S. Onez, H. K. Sinangil, & C. Viswesvaran (Eds.) *Handbook of industrial, work, and organizational psychology* (Vol. 2, pp. 289-313). London: Sage

**Multiteam System
for handling severely injured accident victims**



Interdependence in MTSs

- **Functional Interdependence:** Entities have mutual reliance, determination, influence, and shared vested interests in processes they use to accomplish work activities
 - **Input interdependence:** Extent to which teams share inputs such as people, facilities, equipment, and information; used in the attainment of more proximal goals
 - **Outcome interdependence:** Extent to which outcomes depend on the performance of other teams
 - **Process interdependence:** The amount of interteam interaction required for goal accomplishment
 - **pooled, sequential, reciprocal, intensive interdependence**

Goal Hierarchies in MTSs

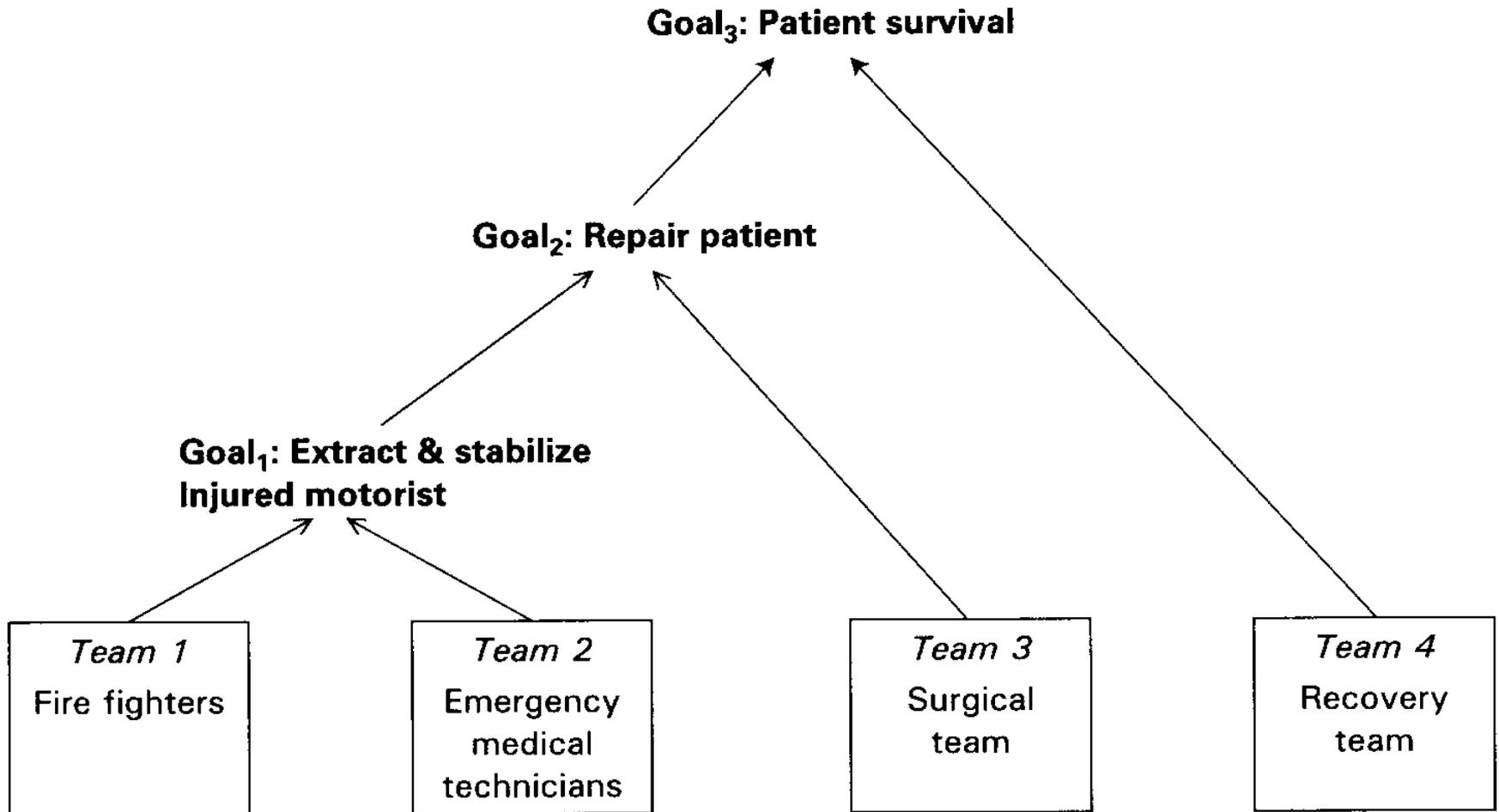
Hierarchies of goals:

- Collective goals
- Sub-system of teams goals
- Team goals

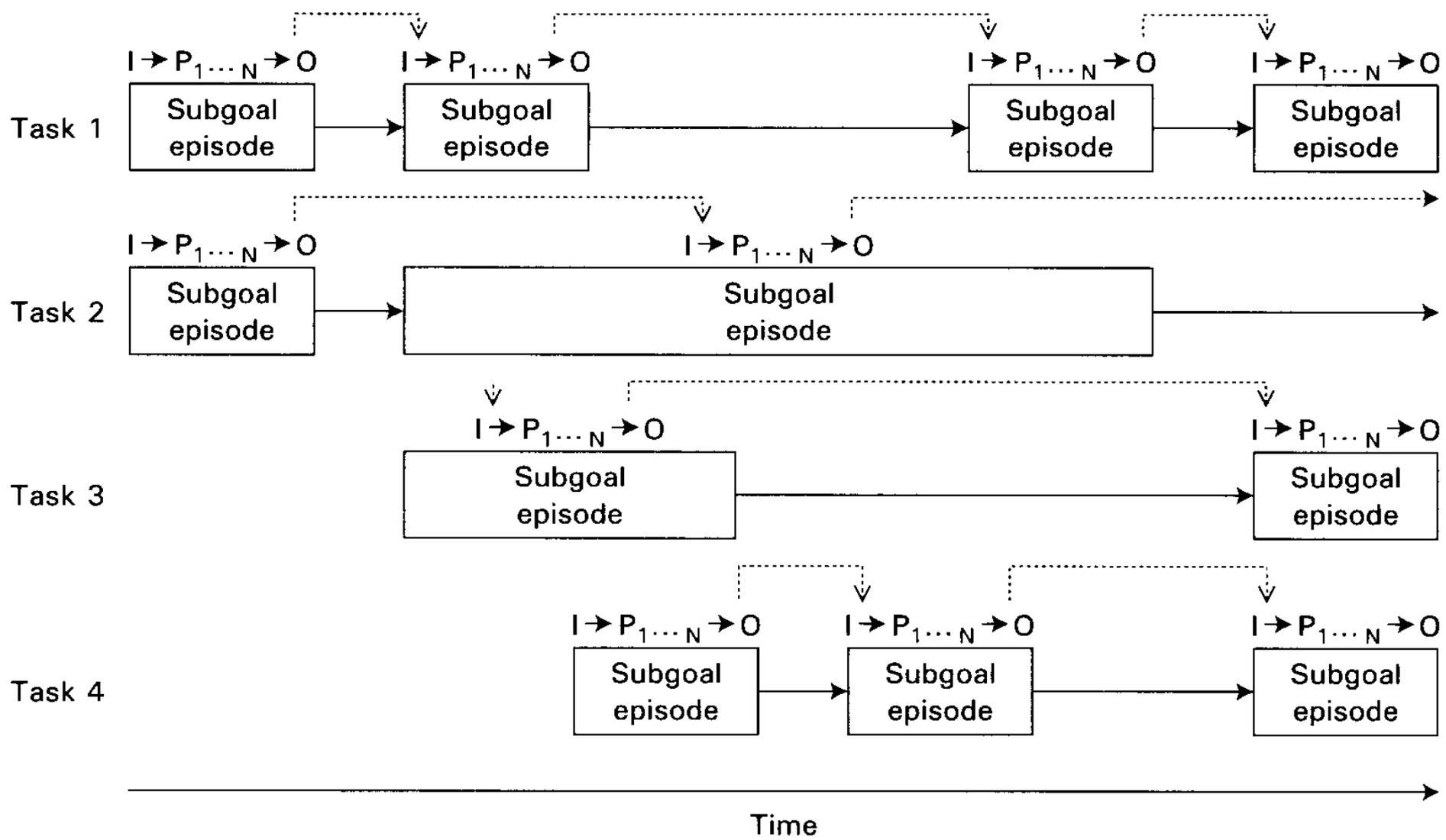
Performance episodes

- Multitasking

MTS Goal Hierarchy



MULTIPLE TASK Episode



To What Extent Does the MTS Model Extend to Scientific Teams?

- MTS Articulated Primarily for “Action Teams”
 - High Role Differentiation
 - High Integration Needs
 - Brief Performance Events
 - Recognition Primed Decision-Making
 - Clear Goals
- Scientific Teams are “Project/Development Teams”
 - High Role Differentiation
 - Lower Integration Needs
 - Extended Performance
 - Reflective Decision-Making and Problem-Solving
 - Goals More Ambiguous

Sundstrom, R., DeMeuse, K. P., & Futrell, D. (1990). Work teams: Applications and effectiveness. *American Psychologist*, 45, 120-133.

To What Extent Does the MTS Model Extend to Scientific Teams?

Similarities:

- Goal Hierarchies
- Multi-Tasking
- Interdependencies

Other Differences:

- Fluid Team Arrangements
- Less Clear Boundaries
- Dynamic Goals

An Example: The Virtual Worlds Observatory Project

- Objective is to study behavior in virtual worlds
- Data downloads from EverQuest II and Second Life + Surveys + Experiments
- PIs at 4 Institutions:
 - Northwestern (Contractor)
 - USC (Williams)
 - Minnesota (Srivastava)
 - UIUC (Poole)
- Teams of graduate students and postdocs at each institution plus connections to scholars at U of Michigan, U of Chicago, and Indiana University

An Example: The Virtual Worlds Observatory Project

- Four Funded Projects:
 - NSF: General Studies of Virtual Worlds
 - ARI: Studies of Networks and Teamwork
 - AFRL: Studies of how RW characteristics can be predicted using VW characteristics/behavior
 - BBN: Experiments in VW to test how dynamics in configurations of communication, information, and social networks affect performance and outcomes for teams
- In practice: One big project to explore and understand VWs where each of the four projects specifies subgoals and individual investigator and grad student interests specifies sub-sub-goals

An Example: The Virtual Worlds Observatory Project

- Teams form around individual projects, e.g.:
 - Economics of VWs
 - Trust in VWs
 - Gold Farming
 - Gender
 - Teamwork
- Project Teams typically include members from several of the universities
- Project Teams work virtually and the entire project comes together 2-3 times a year at "All Hands" meetings
- PI Team Provides Coordination/ General Strategic Direction

An Example: The Virtual Worlds Observatory Project

- Project Teams have overlapping memberships, which leads to knowledge transfer and new ideas
- Logical interdependencies are not realized in practice
- Turnover will start to affect teams in one-two years
- Individual and Team/MTS goal alignment issues

Factors Shaping Effectiveness of MTSs

- Shared Mental Models
 - Task
 - Team
 - Team Interaction
- Leadership
 - Links MTS with other units and environment
 - Links Teams within the MTS to each other
 - Establishes Strategic and Operational Directions for Teams and MTS
 - Facilitates within and between team operations to foster goal accomplishment

Factors Shaping Effectiveness of MTSs

- Information Technology
 - Within Teams
 - Between/Among Teams
 - Applications and Tools
 - Feedback (on Team Effectiveness)
- Reward Systems: Should include components for:
 - Individual performance
 - Team performance
 - MTS performance

Additional Factors Shaping Scientific MTSs?