

Humans, Robots, and Teams

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Plan

1. What is a team?
2. What is an effective team?
3. Four levels of team autonomy
4. Four research issues for human-robot teams
5. What makes for a great roboteer team?
6. Resources for strengthening teams

1. What is a team?

A *bounded* set of actors who are *interdependent* for achieving some *shared purpose*.

2. What is an effective team?

- The team's purpose is achieved, and is (at least) acceptable to those who receive, review, or use it.
- The team becomes increasingly competent as a performing unit over time.
- The team experience contributes positively to individual members' learning and well-being.

3. Four Levels of Team Autonomy

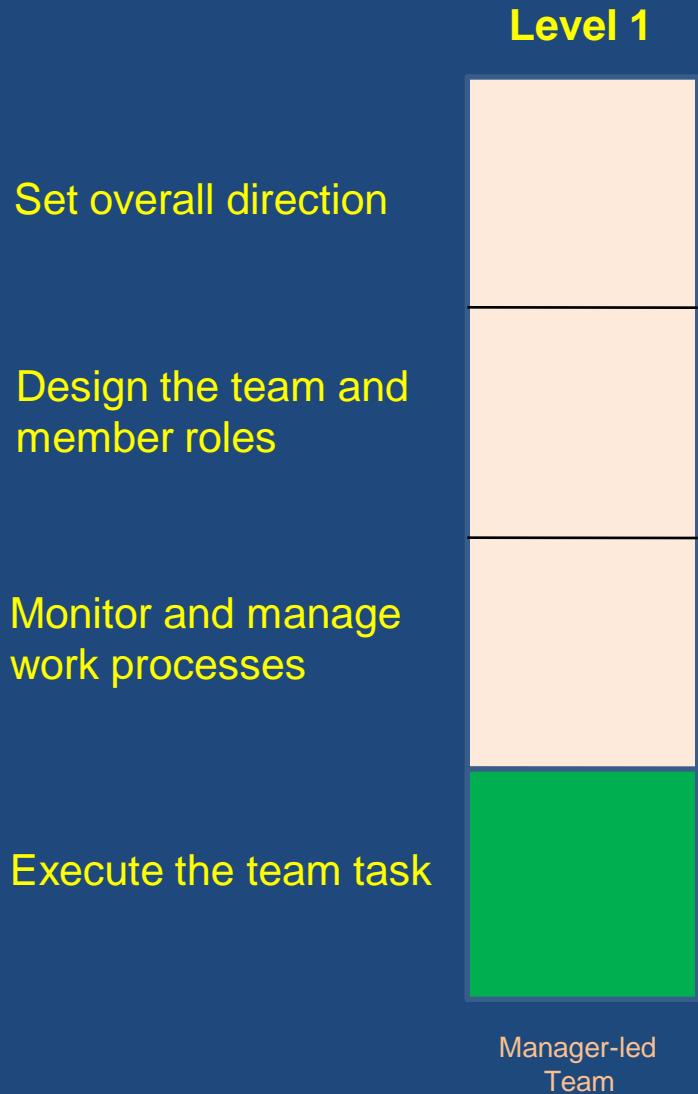
Set overall direction

Design the team and
member roles

Monitor and manage
work processes

Execute the team task

Four Levels of Team Autonomy



Four Levels of Team Autonomy

	Level 1	Level 2
Set overall direction		
Design the team and member roles		
Monitor and manage work processes		
Execute the team task		
	Manager-led Team	Self-managing Team

The diagram illustrates the four levels of team autonomy for two team types: Manager-led Team and Self-managing Team. The levels are: Set overall direction, Design the team and member roles, Monitor and manage work processes, and Execute the team task. The Manager-led Team (Level 1) has autonomy in the top three levels, while the Self-managing Team (Level 2) has autonomy in all four levels. The bottom row and the 'Monitor and manage work processes' row for Level 2 are highlighted in green.

Four Levels of Team Autonomy

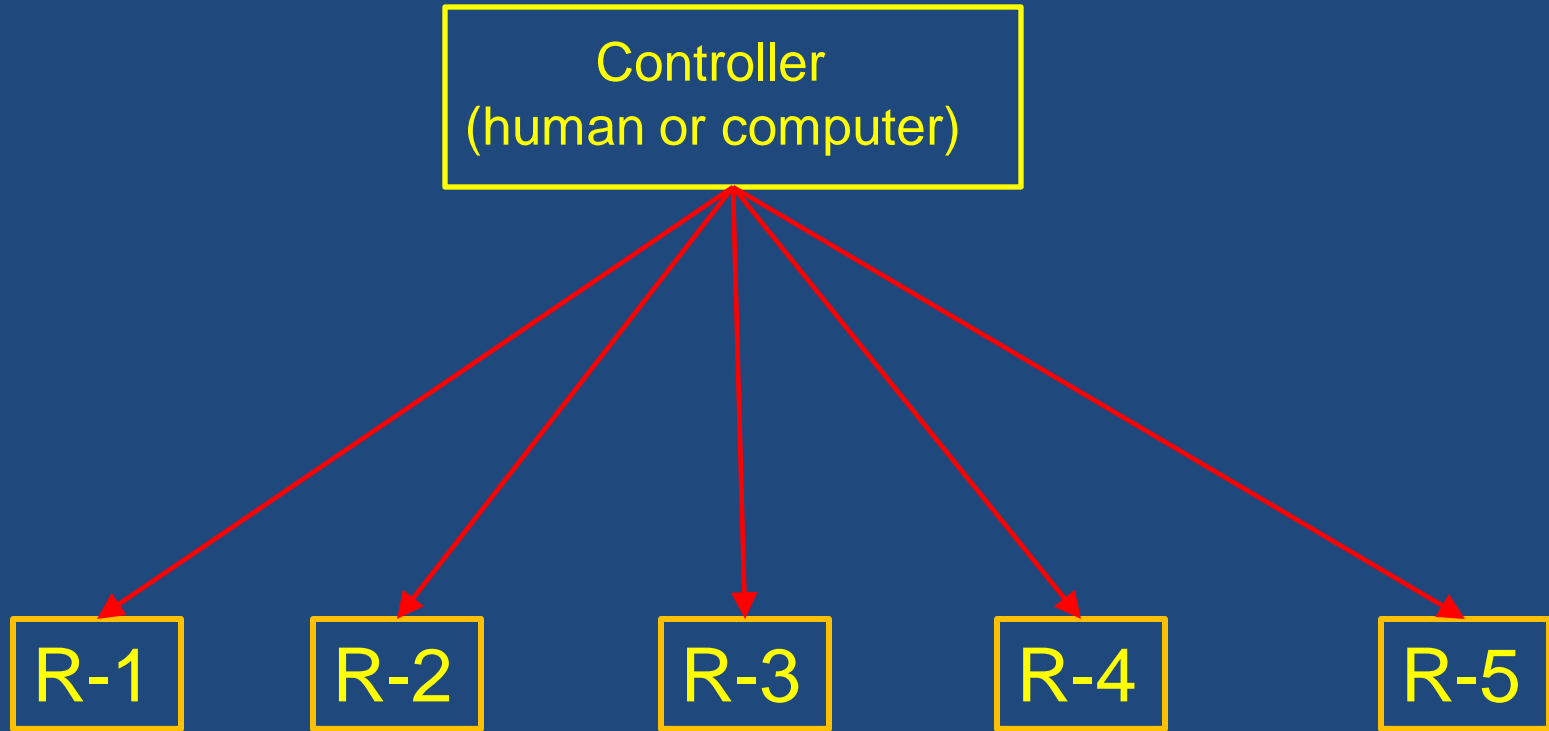
	Level 1	Level 2	Level 3
Set overall direction			
Design the team and member roles			
Monitor and manage work processes			
Execute the team task			
	Manager-led Team	Self-managing Team	Self-designing Team

Four Levels of Team Autonomy

	Level 1	Level 2	Level 3	Level 4
Set overall direction				
Design the team and member roles				
Monitor and manage work processes				
Execute the team task				
	Manager-led Team	Self-managing Team	Self-designing Team	Self-governing Team

Team's Responsibility

Level 1 Robot Team



Note: Rs may or may not have different capabilities.

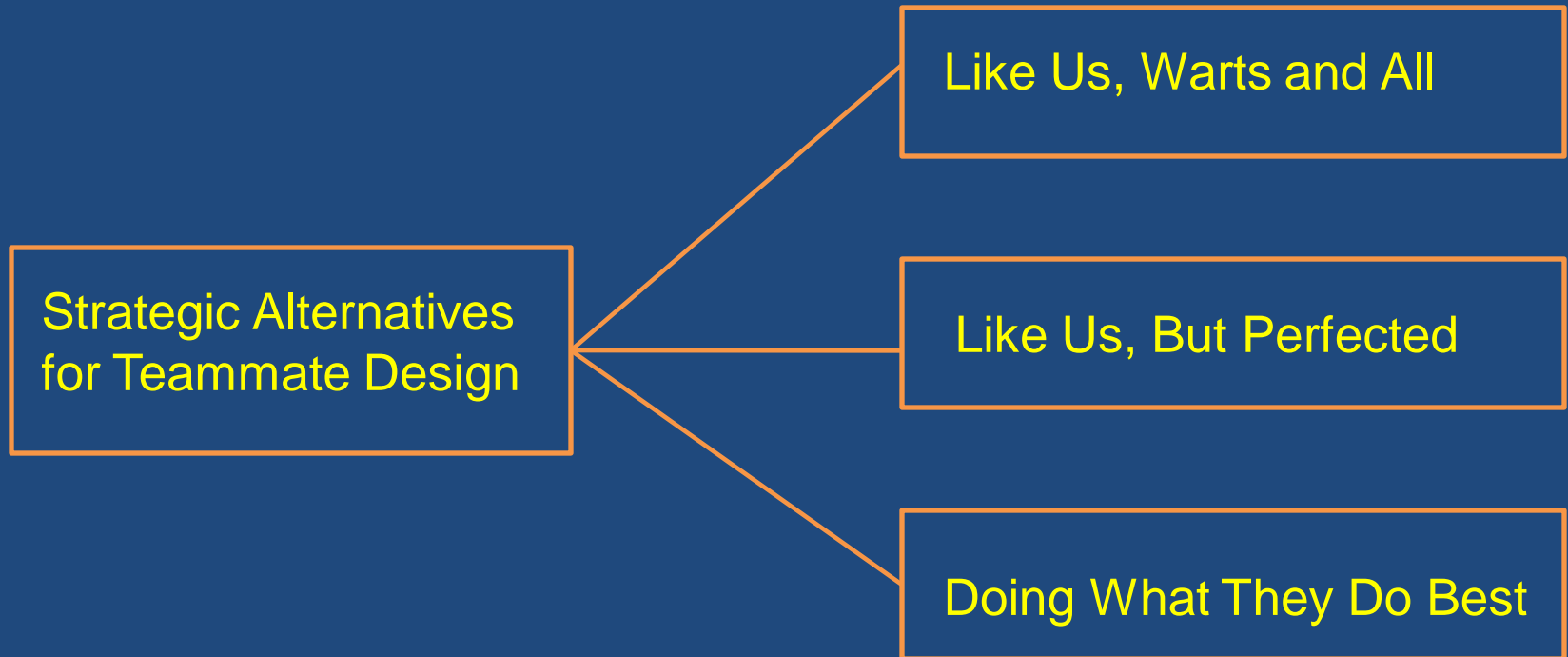
Four Levels of Team Autonomy

	Level 1	Level 2	Level 3	Level 4
Set overall direction				
Design the team and member roles				
Monitor and manage work processes				
Execute the team task				
	Manager-led Team	Self-managing Team	Self-designing Team	Self-governing Team

Team's Responsibility

The diagram illustrates the four levels of team autonomy across four task categories. The grid is colored as follows: Level 1 (Manager-led Team) has yellow cells for 'Set overall direction', 'Design the team and member roles', and 'Monitor and manage work processes', and a green cell for 'Execute the team task'. Level 2 (Self-managing Team) has yellow cells for 'Set overall direction' and 'Design the team and member roles', and green cells for 'Monitor and manage work processes' and 'Execute the team task'. Level 3 (Self-designing Team) has a yellow cell for 'Set overall direction', and green cells for 'Design the team and member roles', 'Monitor and manage work processes', and 'Execute the team task'. Level 4 (Self-governing Team) has green cells for all four task categories.

What Kind of Teammates Do We Want/Need?



4. Four research issues for human-robot teams

- Weighting
- Sharing
- Timing
- Learning

Weighting

Counterterrorism Study

Fifty-one four-person teams analyzed and integrated several kinds of evidence to crack a terrorist plot.

Four different types of evidence:

- Intercepted e-mails using codewords
- Security camera photos
- Surveillance videos
- Building photos and blueprints

Evidence 1: Cryptic email

From: glr1967@msn.com
Date: Wed, 7 Jul 2004 22:48:56
To: jesuswept@yahoo.com
Subject: Sand Crabs

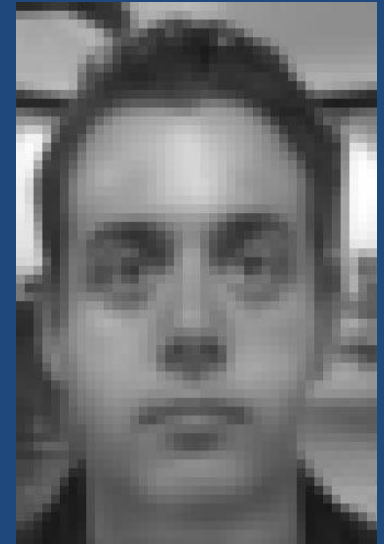
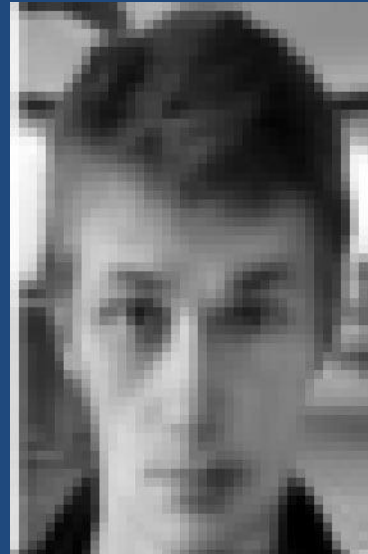
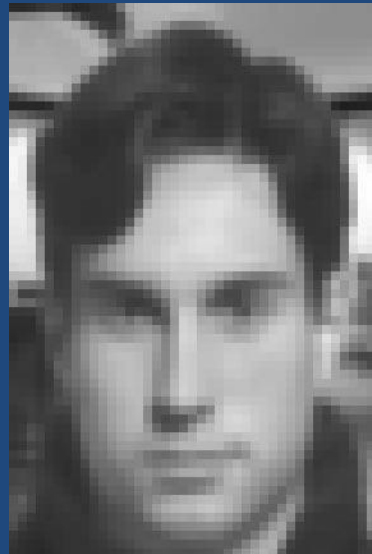
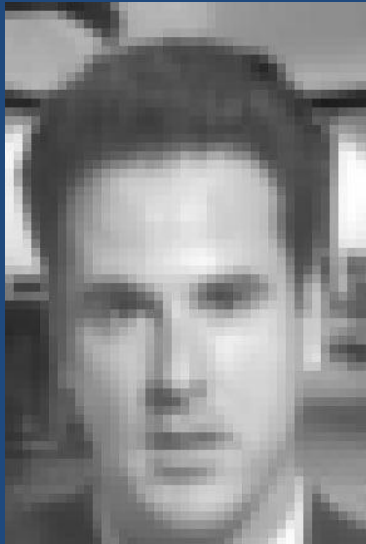
Hey:

The environmental guy is going to take you to an artist in southie, a Bug Dust specialist make you blend right in with the people. I will lay the crabs in their bedding myself right across from Hassal's. Earthy can take annexia while we all work Islam Incorporated together - capiche?

Codes

- Bug Dust = diversions
- People = Boston police
- Sand Crabs = explosives
- Hassal's = Federal Reserve Bank
- Annexia = hazmat lab
- Islam Incorporated = MIT

Evidence 2: Degraded Facial Pictures



Evidence 3: Security Camera Footage



Evidence 4: Building Photos and Blueprints



Experimental Design

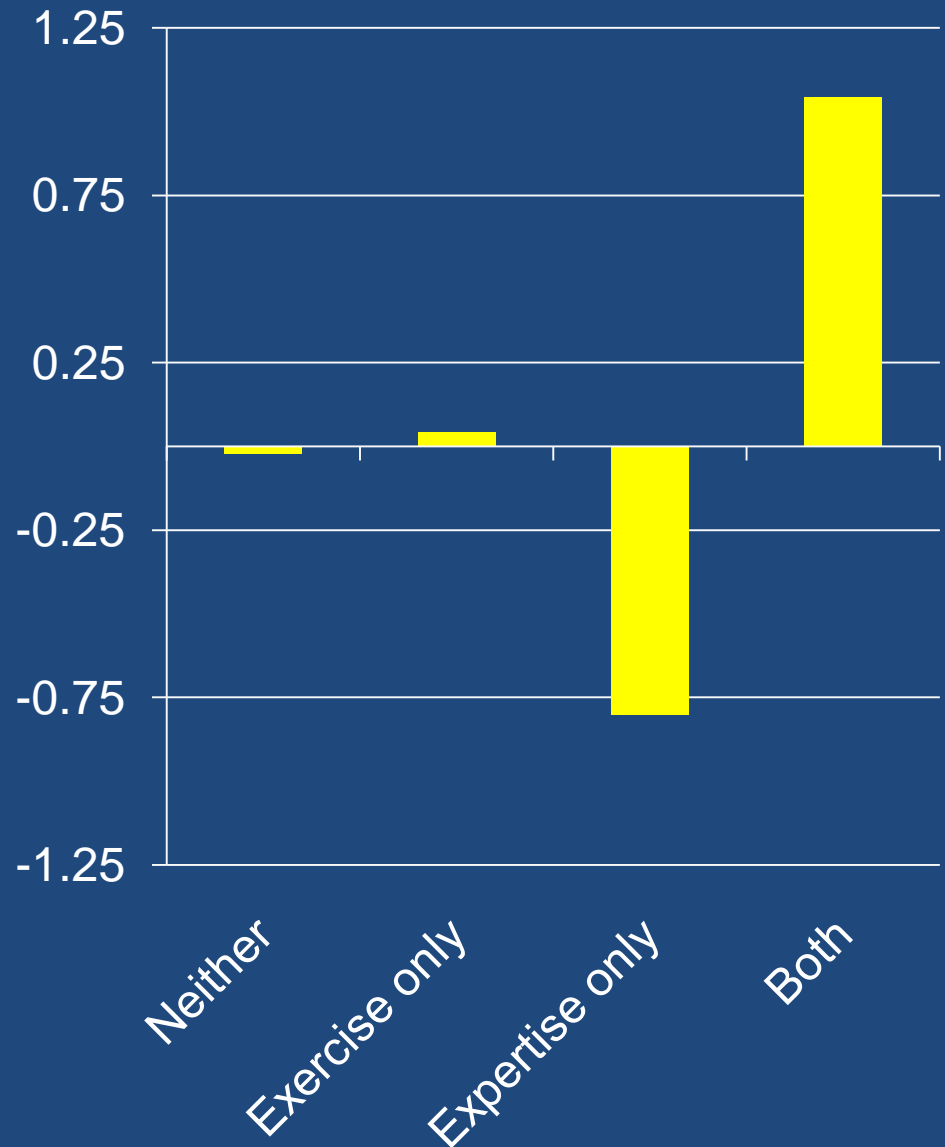
All subjects were pre-screened for capabilities in face recognition (degraded photos) and word pair memory (coded e-mails).

Expertise: Some teams were composed to include both a face recognition and a word pair memory expert. Other teams had no special expertise.

Exercise: Some teams were given an intervention intended to help them use members' expertise well. Other teams received no intervention.

Findings

- Best performance: Teams that had both expertise and an intervention to help them use it well.
- The intervention alone did not help average-ability groups perform well.
- Expertise with no intervention actually impaired performance.



Sharing

Links Among Members as Team Size Increases



Timing

The Team Life Cycle

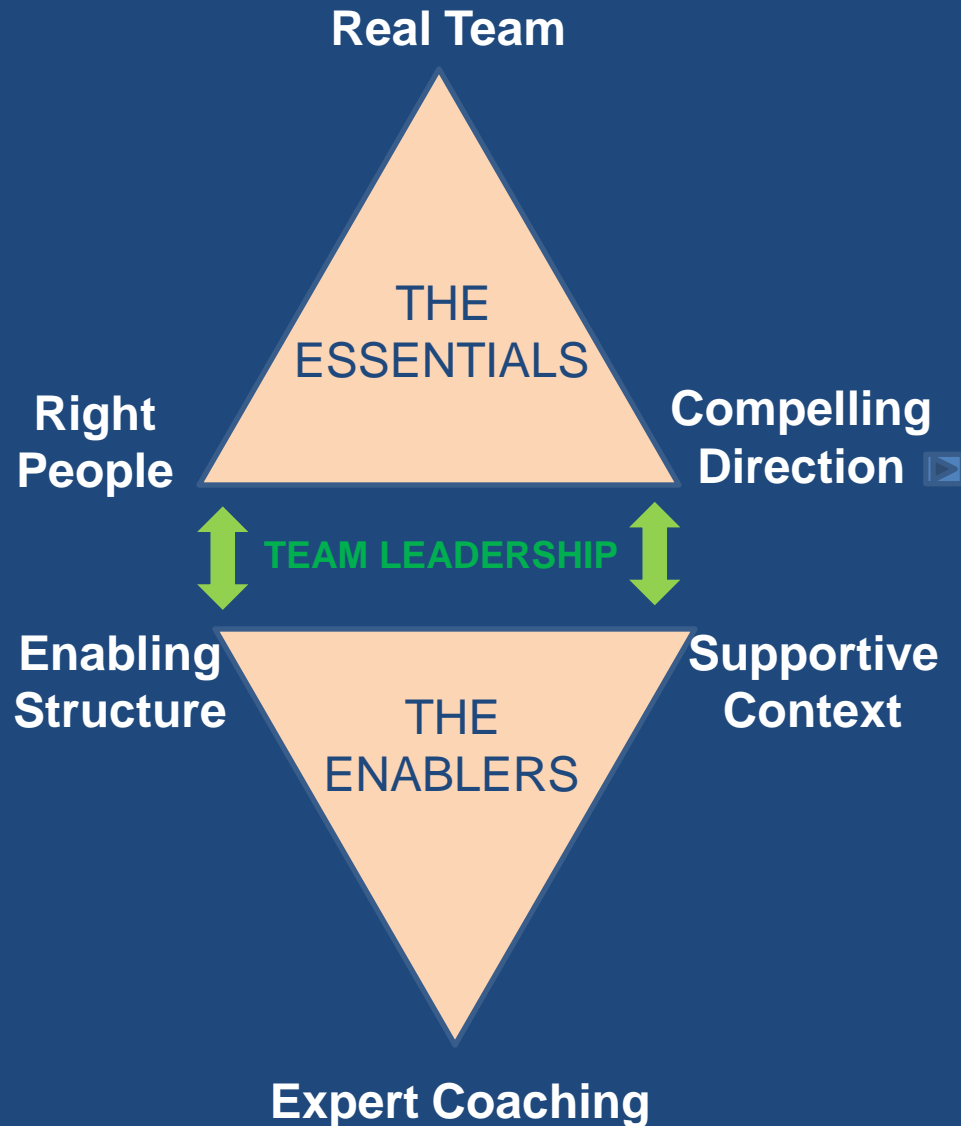


Adapted from Gersick (1988)

Learning

5. What makes for a great robonoteer team?

What Makes for a Great Team?

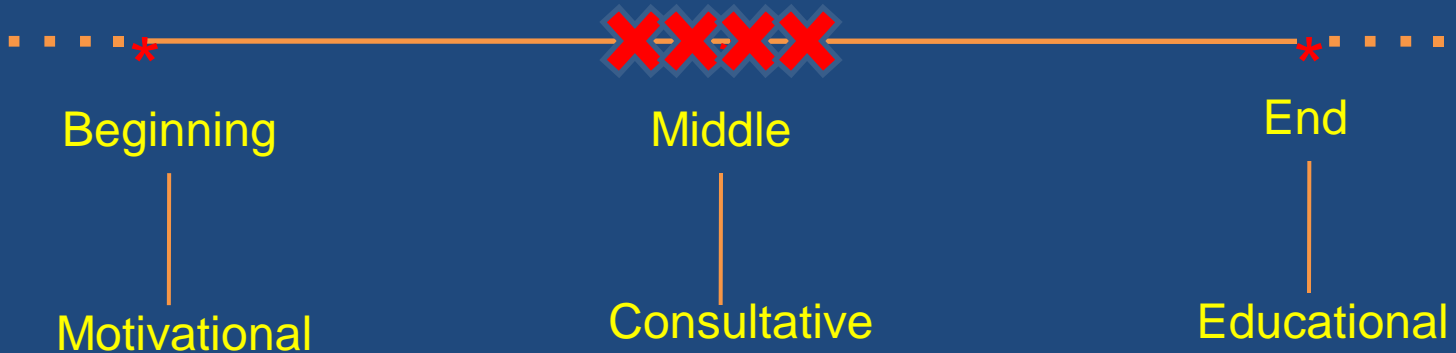


Specifying Means vs. Ends

		<u>Ends Specified?</u>	
		No	Yes
<u>Means Specified?</u>	No	Risk of anarchy	Self-managing, goal-directed team work
	Yes	Turn off (worst cell of all)	Wasted human resources



The Team Life Cycle

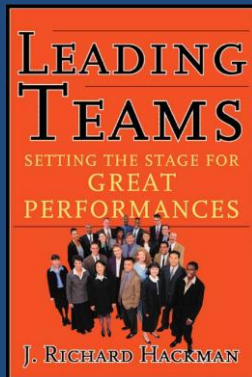


Type of Coaching Intervention

6. Resources for strengthening teams

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For more about designing and leading effective teams, see the book, *Leading Teams* . . .



. . . or visit our web site:

<http://www.leadingteams.org>

The *Team Diagnostic Survey* assesses the standing of a team on the conditions that foster team effectiveness, and provides a diagnostic profile of the team's strengths and weaknesses.

For (free) online access, go to:

<https://research.wjh.harvard.edu/TDS>