

# TEAM SCIENCE

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# Research Paradigms

- Single investigator
  - Focused problem
  - Small lab technology
  - Highly successful, still the mainstay of science and technology research
- Team
  - Complexity
  - Urgency
  - Shared need/interest

# Characteristics of scientific problems that require a team approach

Urgency and complexity of scientific problems today dictate the need for a team-based approach

- Different disciplines/expertise required to solve a problem; impetus is shared goal
  - project-oriented
  - product-oriented
- Different approaches required to solve a problem; impetus is shared system or set of problems
- Common facility/instrumentation/database required to solve different problems; impetus is shared approach
- Grand challenges for which a critical mass does not exist; impetus is intellectual challenge and potential high pay-off
- Combinations of the above

## Guiding principles for team science

- Individual creativity should be preserved while taking advantage of the synergy of team approaches
- Leadership, management structure, and communication are essential elements of team research
- Integrity, trust, and respect lay the groundwork for effective team research
- All teams need an impetus, a motivation that brings the team together and encourages collaboration

# Models or paradigms for team science

**No “one size fits all” solution**

**Variables:**

- Size: number of investigators and participants
- Location of participants: co-located or distributed
- Structure: Director(s), advisory boards, staff, budgetary allocation

*Issues vary depending on the specific set of variables*

# Models or paradigms for team science

Different from single research groups: peer-peer management

- Critical to ensure that all investigators understand and agree to abide by the guidelines for the team
- Leaders must get buy-in from the participants at the time the proposal is written or the team is set up
- Most sensitive issues
  - Resource allocation/reallocation
  - Time commitment
  - Authorship
  - IP

# Common needs

- Administrative support
  - Small teams: may be provided by unit administrative staff
  - Larger teams: need full-time, dedicated, and skilled staff
- Support structure for young faculty
  - Mechanism for individual publication
  - Seed funds
  - Access to special resources
  - Mentoring
- Administrative plan: take care of problems
- Evaluation/assessment plan: set goals, measure success
- IP management plan
- Phase-in and phase-out mechanisms: ramp-up period; finite lifetime

# Factors that make team science paradigms succeed or fail

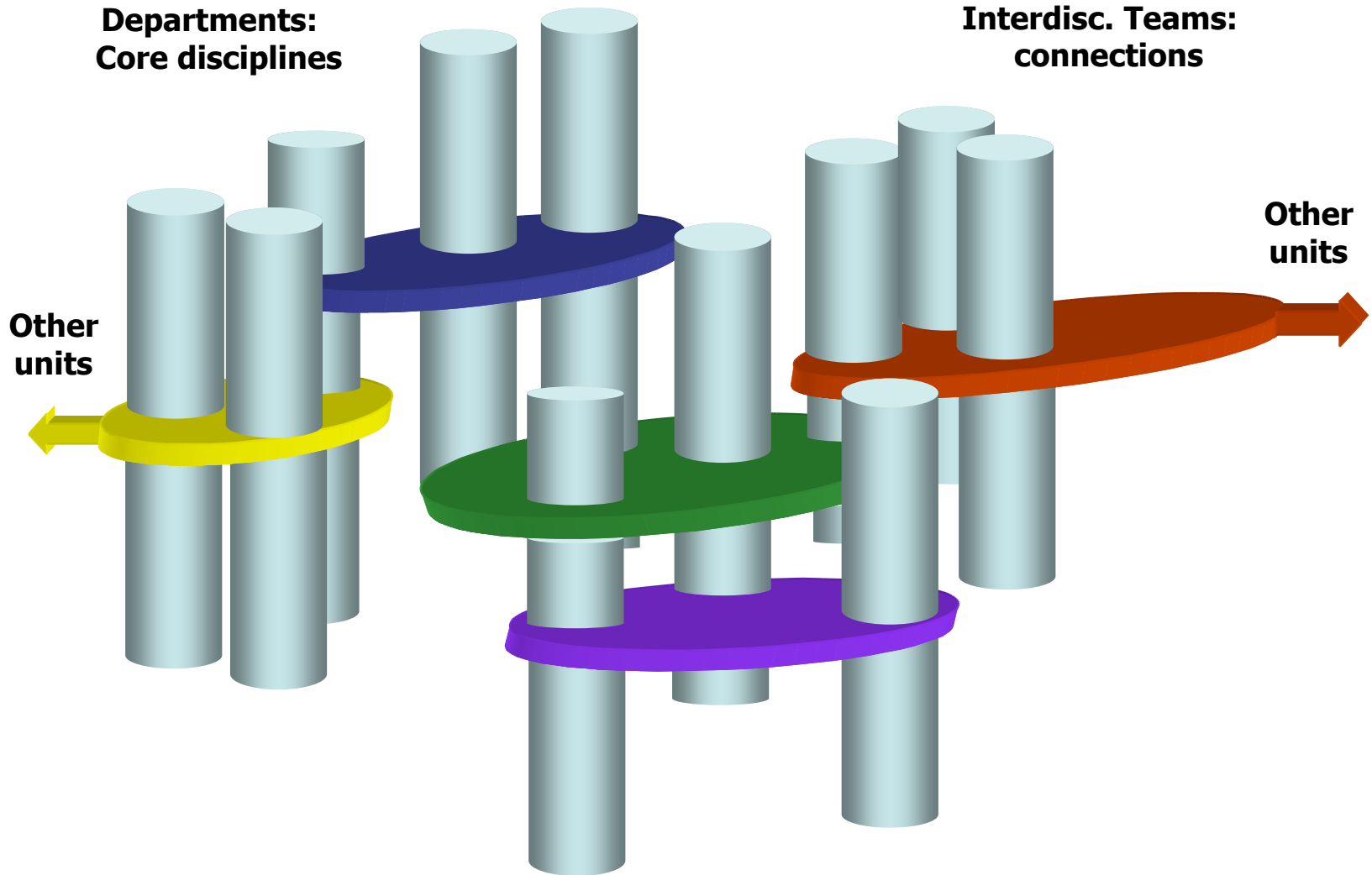
- **Leadership:** vision, enthusiasm, commitment, true team spirit
- **Communication:** time, effort, technology, training
- **Management structure:** integrate leadership and communication
- **Team-friendly environment:** integrity, trust, respect, sharing
- **Institutional commitment:** space, administrative support, faculty investment

# Issues of concern for team science

- Young investigators and career development
- Intellectual property management
- Metrics for success/failure
- Training environment
  - richness vs. negative impact on graduate student and post-doctoral training
- Phase-in and phase-out
- Longer lead time to develop team and become productive
- Cultural differences, including differences between academia and industry
- Administrative burden to highly productive faculty

# Academic Structure

Departmental towers connected by interdisciplinary initiatives



# Summary

- Team science can build bridges, connect units, add richness to training environment, solve problems not solvable any other way
- Real issues must be addressed upfront
- Involves agencies, investigators, universities