

Annual Meeting
Collaborating for the Advancement of Interdisciplinary Research
in Benign Urology (CAIRIBU)

Translational Teams

impact, developmental stages and leadership

12/3/2021

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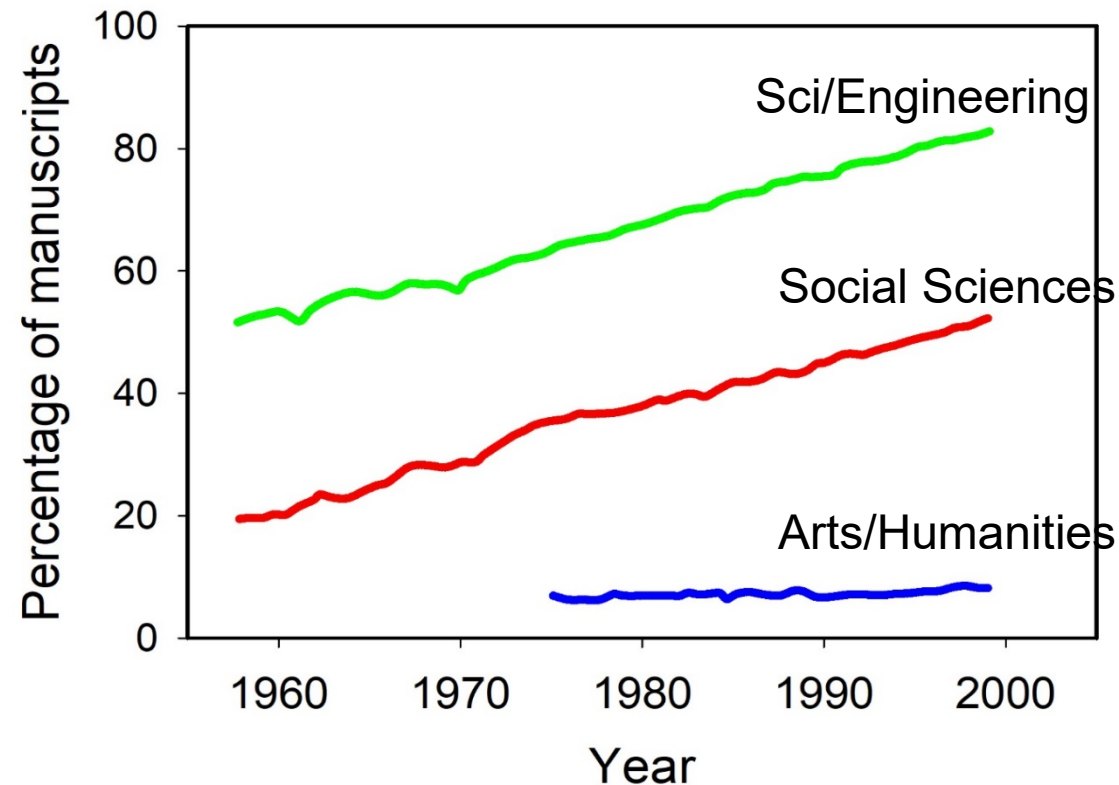
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The way we do science is dramatically changing

82% papers are interdisciplinary:
25% are inter-institutional



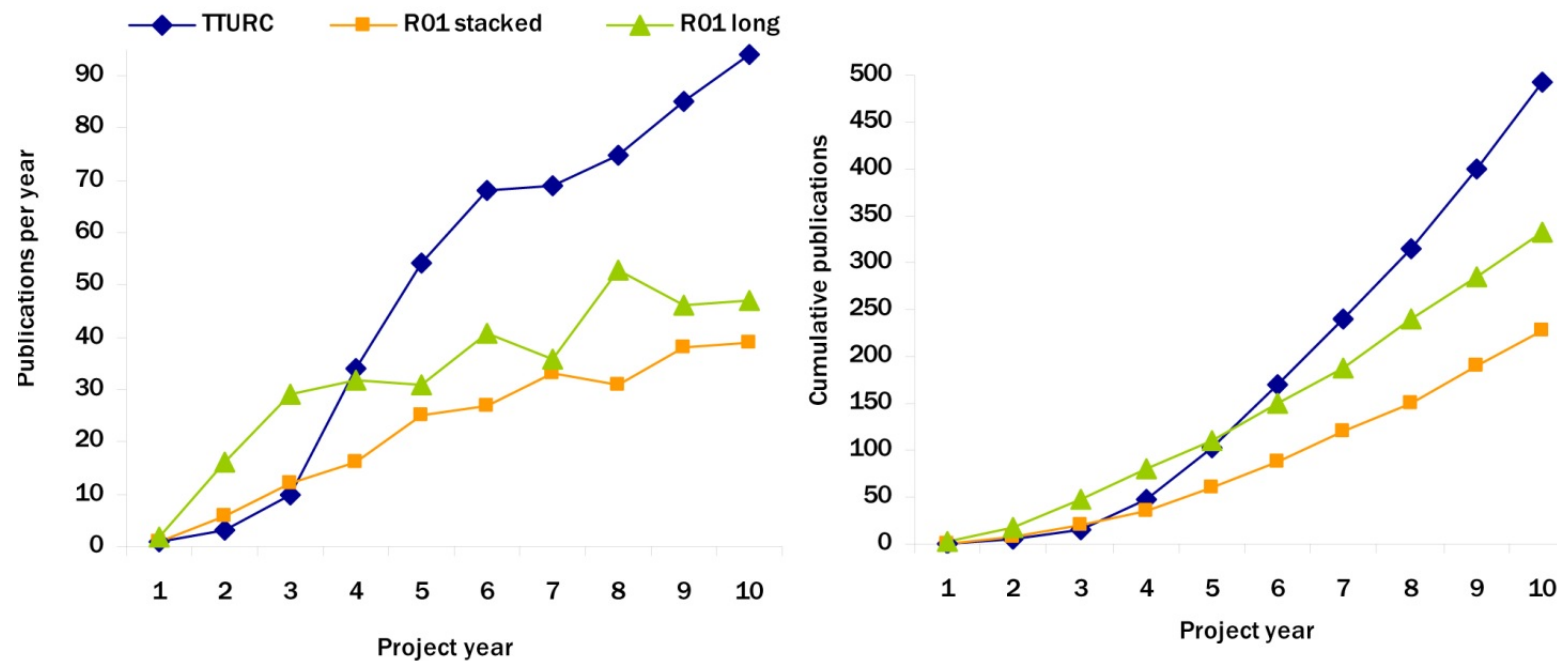
Why is interdisciplinary team research gaining popularity?

- Increases **productivity**
- Enhances **impact**- progression across the translational research spectrum
- Enables application of new technologies/expertise
- Develops culture of **reproducibility**



Productivity of Teams

Productivity of the Transdisciplinary Tobacco Use Research Centers (TTURC) program (1994-2004)

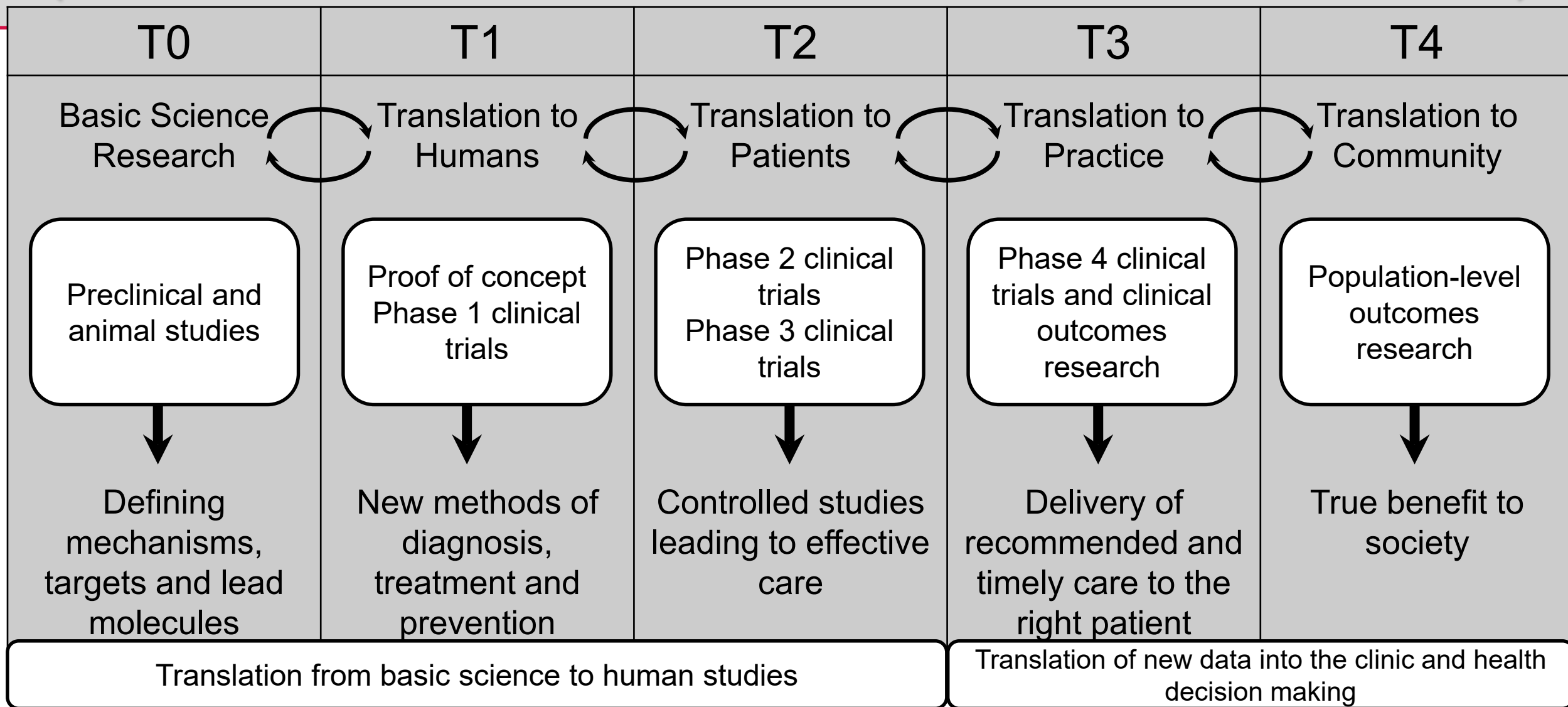


TD center publications have longer start up period compared to R01s but become more productive over time

Centers initial lag in number of publications is eliminated around Project Year 4.



Translational Research Continuum



Translational research is slow and expensive

- Of 101 promising discoveries with clear clinical potential, only five resulted in interventions with licensed clinical use 20 years later.

c&en
HEALTH
**Cost to Develop New
Pharmaceutical Drug Now
Exceeds \$2.5B**

A benchmark report estimates that the cost of bringing a drug to market has more than doubled in the past 10 years

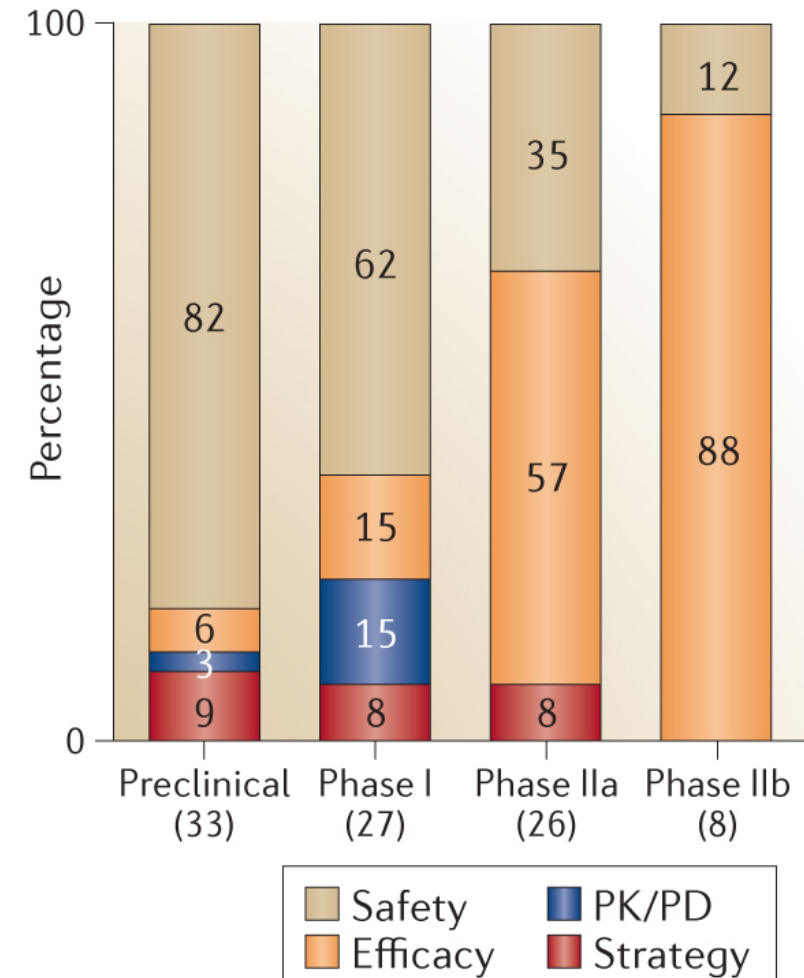
Pharmaceutical development is slow, inefficient and expensive.

- New drug development take more than a decade
- More than 95% of drugs fail in development; 50% of drugs fail in phase II
- Costs for new drugs are \$2.5B from phase I testing to licensing

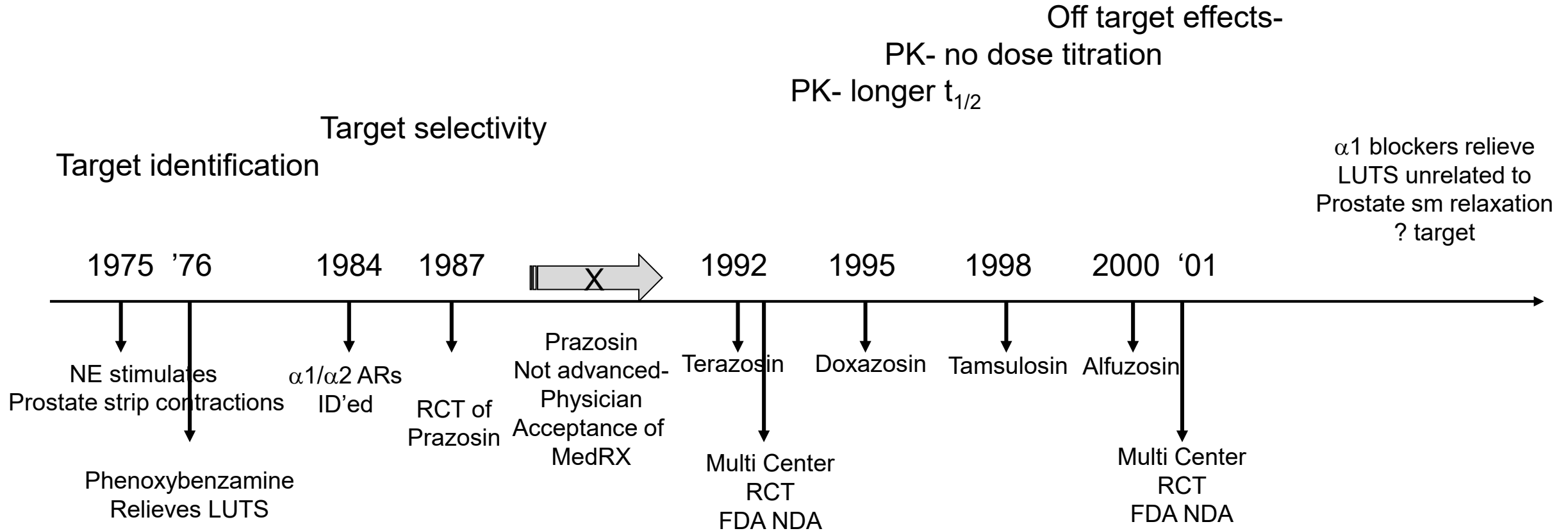
Astra Zeneca's Experience with Drug Development

Most drug development projects fail due to lack of efficacy in Phase II studies

- Insufficient understanding of the biological target
- Basic research not generalizable
- Limitations of preclinical models
- Academic discoveries not reproducible
 - BayerHealth Care can reproduce 25% of published studies
 - Amgen could reproduce 6/53 landmark studies
 - Begley, 2012 *Nature* 483:531



α blockers in treatment of LUTS



Team Best Practices Enhance Reproducibility

*Journal of Clinical and
Translational Science*

www.cambridge.org/cts

Education Special Communication

Cite this article: Rolland B, Burnside ES, Voils CI, Shah MN, and Brasier AR. Enhancing reproducibility using interprofessional team best practices. *Journal of Clinical and Translational Science*, page 1 of 8. doi: [10.1017/cts.2020.512](https://doi.org/10.1017/cts.2020.512)

Received: 5 April 2020
Revised: 2 July 2020
Accepted: 7 July 2020

Keywords:

Team science; translational teams; reproducibility; ethics; interprofessional teams

Abbreviations used:

DRP, detrimental research practices; FFPM, fabrication, falsification, plagiarism, and misrepresentation; GIP, Good Institutional (Reproducibility) Practices; RCR, responsible conduct of research; SciTS, Science of Team Science

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Enhancing reproducibility using interprofessional team best practices

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Abstract

The pervasive problem of irreproducibility of preclinical research represents a substantial threat to the translation of CTSA-generated health interventions. Key stakeholders in the research process have proposed solutions to this challenge to encourage research practices that improve reproducibility. However, these proposals have had minimal impact, because they either 1. take place too late in the research process, 2. focus exclusively on the *products* of research instead of the *processes* of research, and/or 3. fail to take into account the driving incentives in the research enterprise. Because so much clinical and translational science is team-based, CTSA hubs have a unique opportunity to leverage Science of Team Science research to implement and support innovative, evidence-based, team-focused, reproducibility-enhancing activities at a project's start, and across its evolution. Here, we describe the impact of irreproducibility on clinical and translational science, review its origins, and then describe stakeholders' efforts to impact reproducibility, and why those efforts may not have the desired effect. Based on team-science best practices and principles of scientific integrity, we then propose ways for Translational Teams to build reproducible behaviors. We end with suggestions for how CTSAs can leverage *team-based* best practices and identify observable behaviors that indicate a culture of reproducible research.

Culture of Rigor & Reproducibility

- Shared mission and goals
- Accountability and trust
- Approaches/methods/results
- Information management/replication
- Functional leadership

What do we mean by team?



One lab
Focused on specific topic
Single discipline



- ✓ Membership from different disciplines
- ✓ Interdependent activities
- ✓ Shared goal

Academic Teams vs Business Teams

Strategies for Academic team building must take these into account!

	Academic	Business
Membership	Voluntary Dynamic	Cross-functional Assigned as part of job responsibility
Goal	Knowledge Training next generation Funding Improving health	Product development Profit/ROI
Types of products	Knowledge and knowledge sharing • Manuscripts • Intellectual property Translational products-devices, behavioral interventions	Products with defined specifications • Aligned with market needs • Unique and differentiating value • Scalable/cost-effective
Rewards	Enhanced academic	Professional advancement

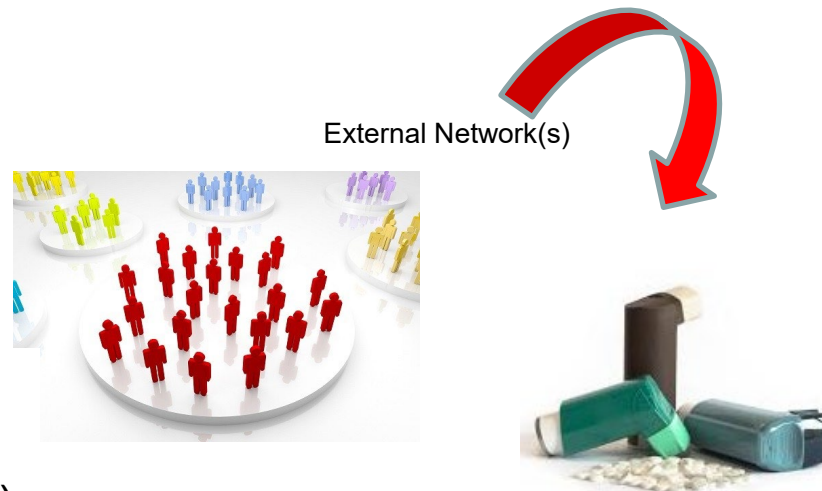
Translational Teams are a hybrid of academic and product development team

Academic characteristics

- Led by experienced scientist/scientists
- Focused on generating new knowledge
- Involved in training investigators
- Roles defined by subject expertise

Core members:

- Principal Investigator
- Trainees (KL2, TL1, etc)
- Scientists
- Health Care Providers
- Nursing
- Research Coordinators



Product development characteristics

- device, drug or intervention for application to human health

Calhoun et al, Clin Transl Sci. 2013; 6:60
Sprecher, CTSA Methods/Processes Report, 2020
Lotetracchio et al, JCTS 2020; 5:e72

Example: Therapeutics & Diagnostics of Interstitial Lung Disease

Discipline of Members

Interventional Pulmonology

Epigenetic regulation

Nanotherapeutics

Optical Imaging/Engineering

Animal models of fibrosis

Regulatory advancement

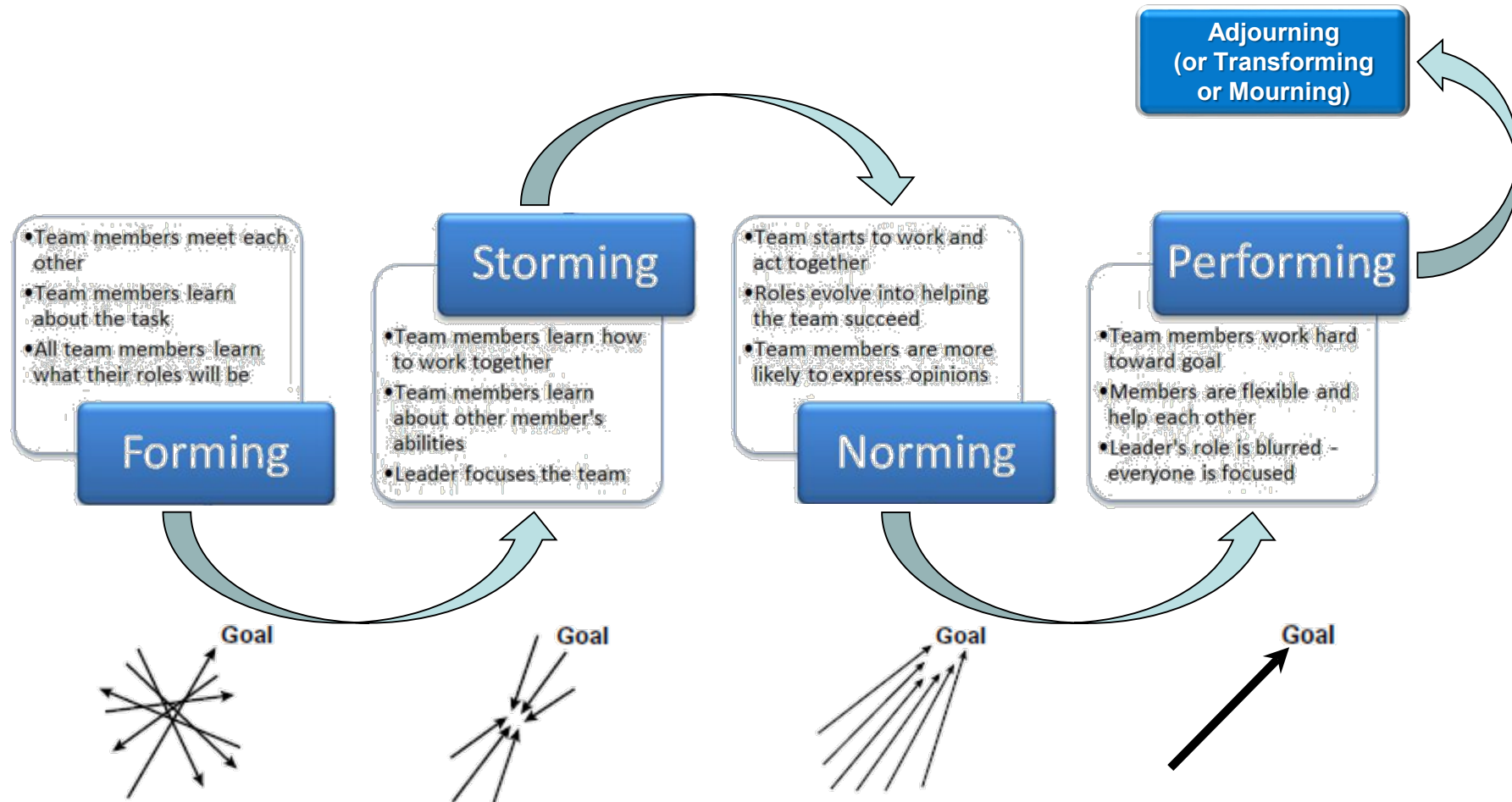
Drug delivery systems

Medicinal Chemistry

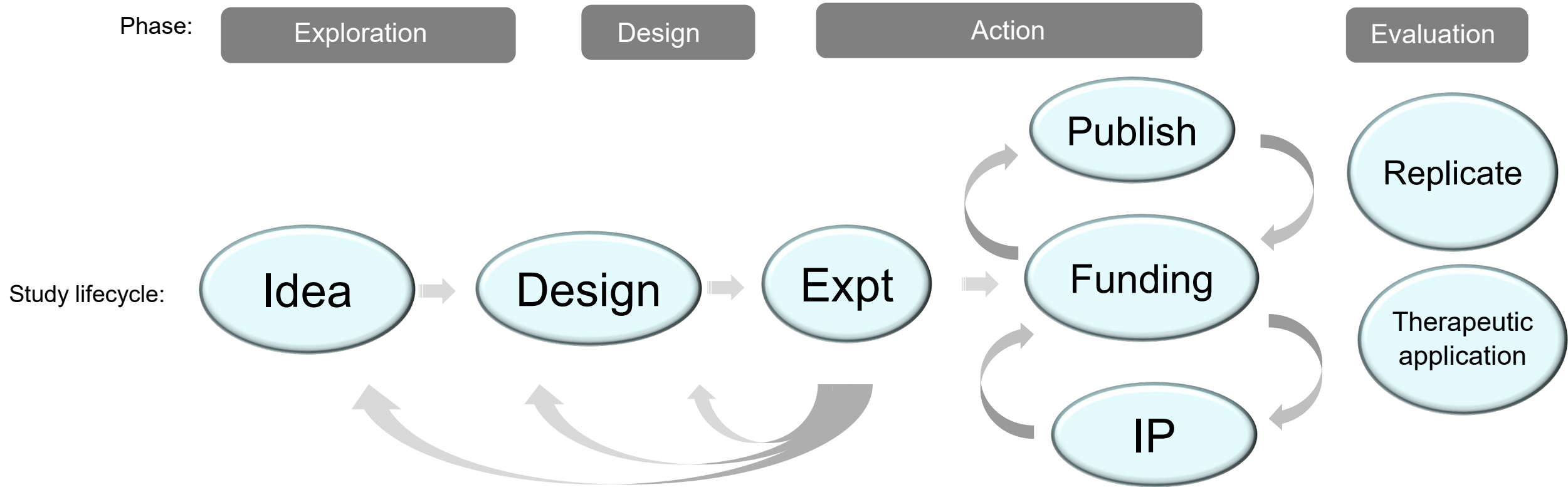
ILD affects 150,000 individuals in the US. This is a lethal disease producing death in 3-5 years from progressive respiratory scarring. No treatments exist that reverse fibrosis.

The translational objective is to develop selective therapeutics by delivering aerosolized nanoparticles to areas of active remodeling. These therapeutics will be advanced by new minimally invasive diagnostics that will detect the presence of fibrosis in humans.

Stages of Generic Team Development: Tuckman Model

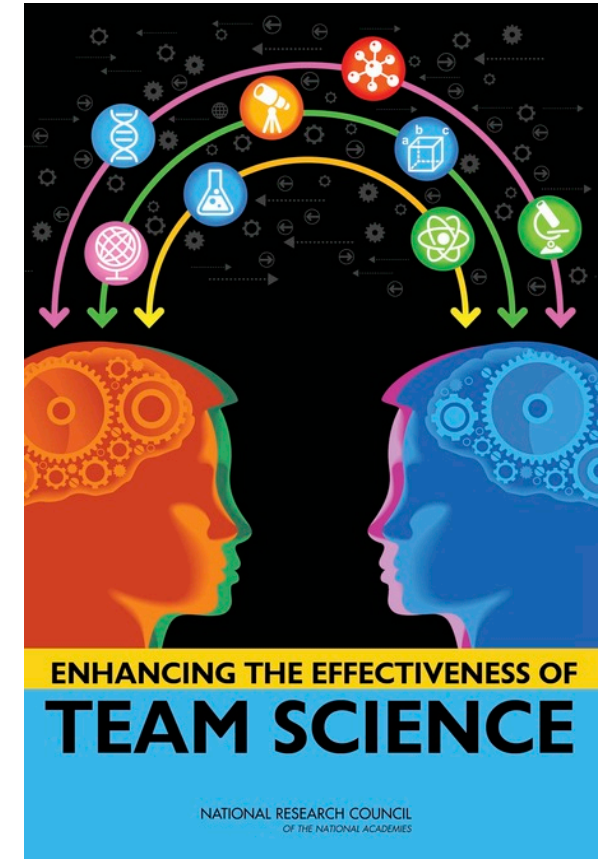


Stages in Translational Team Development



Challenges of Conducting Team Science

1. High diversity of membership
2. Deep knowledge integration
3. Large team size
4. Goal misalignment with other teams
5. Permeable boundaries
6. Geographic dispersion
7. High task interdependence



National Research Council (NRC). (2015). Enhancing the effectiveness of team science. Washington, DC: National Academies Press.

Many challenges can be impacted by effective leadership behaviors

- Leaders align team efforts towards a common purpose.
 - Kouzes, Leadership Challenge ISBN-10: 1119278961
- Leadership promotes team innovation
 - Boerner, J. Lead & Org. Structure 2007: 13:15-26
- Leadership promotes satisfaction, role clarity and productivity
 - Tafvelin J Leadership & Org Skills 2011; 18: 480
- Leadership motivates team members
 - Wang, J. Applied Psychol. 2010; 95:1134

Discussion: What characteristics do you admire in a team leader?

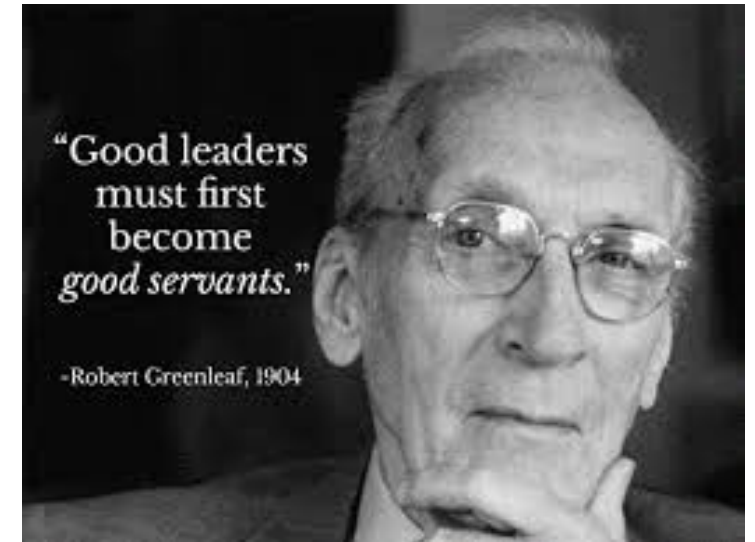
1. Acknowledges contributions of everyone on the team
 2. Follows through on commitments
 3. Makes ethical and equitable decisions
 4. Listens to input and feedback
 5. Successfully translates interventions in health
 6. Inspires confidence
 7. Articulates a compelling vision of the future
 8. Acts with the best interest of the team members at heart
 9. Articulates reasoning behind decisions
 10. Models behaviors that inspire trust
 11. Problem solves, switching directions rapidly when needed
 12. Embraces diversity of opinions and team members
 13. Commands respect as a leading scientist in the field
 14. Demonstrates commitment to training team members
 15. Generates consensus
 16. Ensures that roles and responsibilities across the project are clear
 17. Holds team members accountable for their commitments
-

Leadership Models

- Servant leadership
- Transformational leadership
- Strengths-based leadership
- Situational/Functional Leadership: ICTR
Leadership Assessment and Skills Enrichment for
Research (LASER) Practices

Servant Leadership

- Servant leaders
 - put those whom they lead first (“others-first”)
 - look for ways to make the team experience better, help them learn new skills and succeed in reaching goals, and to take on as much responsibility as able



Strengths-based leadership

- Know your strengths
- Investing in the strengths of others
- Getting people with the right strengths on your team
- Meet the needs of your team



Transformational leadership

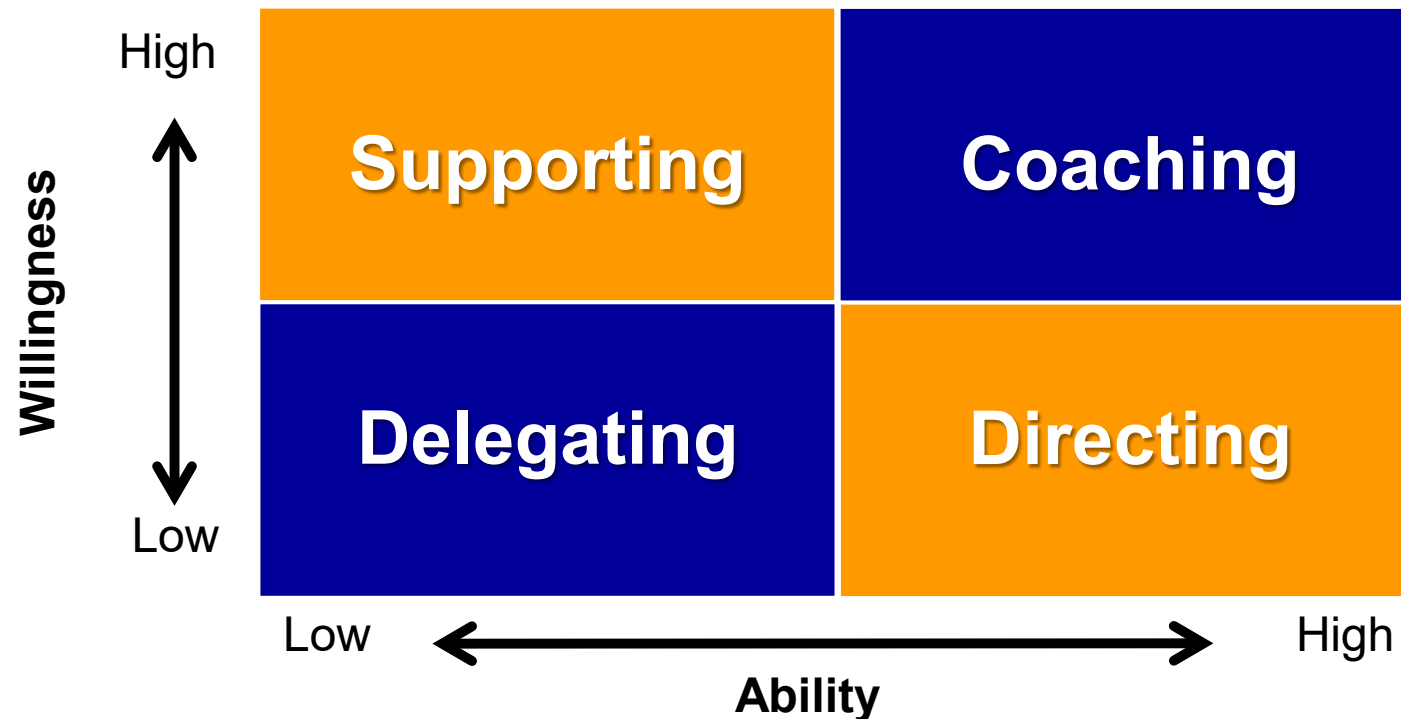
- Leaders who inspire team members to go beyond their self interests and work towards a common goal



Situational Leadership

Effective leadership is task-relevant.

Successful leaders are those who adapt their leadership style to the *performance readiness* (ability and willingness) of the team.



ICTR Leadership and Skills Enhancement for Research (LASER)

- Operating philosophies:
 - Leadership is a relationship.
 - Leadership development is an ongoing process.
 - Leadership development takes deliberate practice.
 - Leadership behaviors change with team development
 - Everyone on the team leads (at some point) and everyone follows

LASER: Dimensions and Practices

- Task-based
 - Visioning
 - Communicating
 - Facilitating
- Human/Social
 - Inspiring
 - Engaging
 - Empowering

Practices are related and self reinforcing

Leadership Practices



- **Visioning:**
 - Develop and focus an ambitious long-term team goal
 - Create a sense of importance, how team members belong, and what is expected
- **Communicating:**
 - Actively listen and facilitate dialog for including perspectives
 - Provide interpretation- sensemaking

Leadership Practices



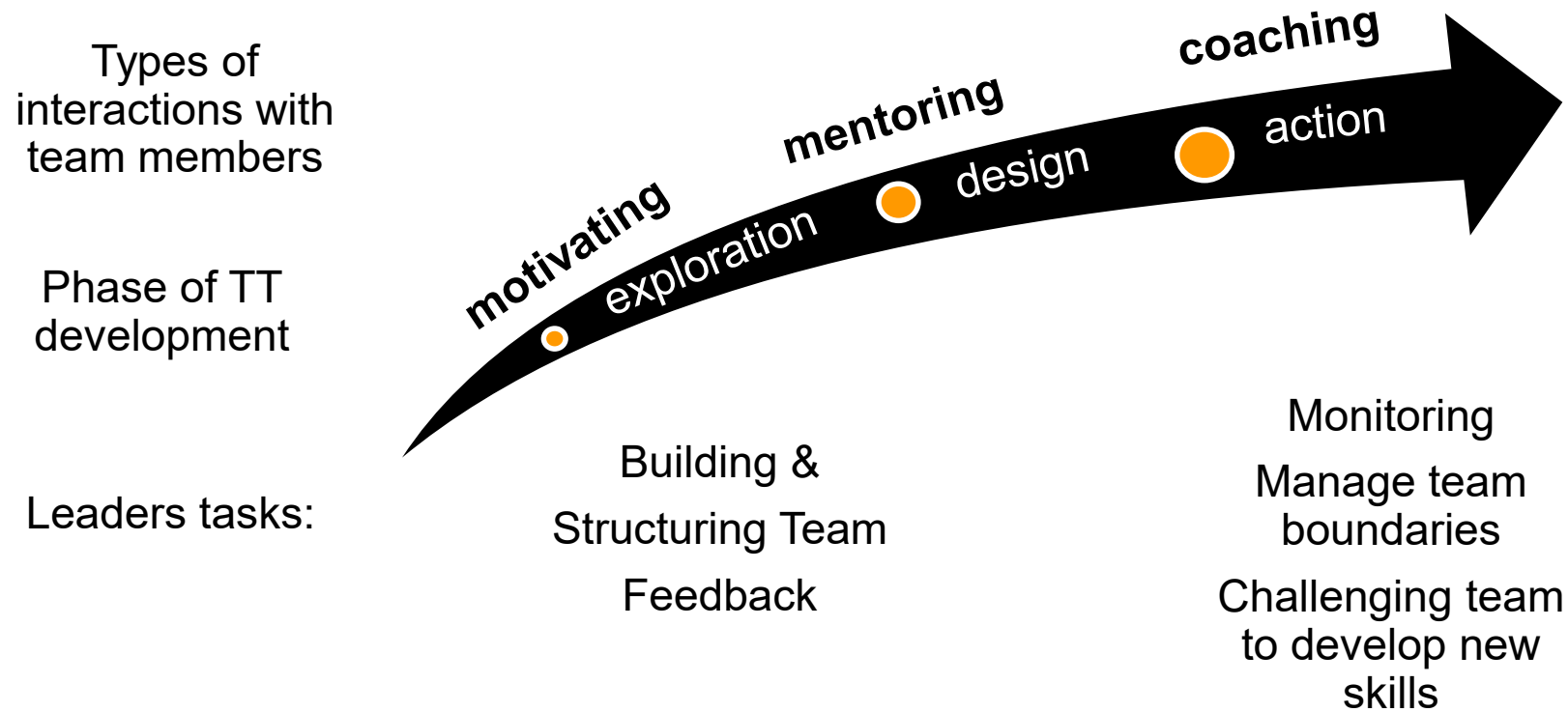
- **Facilitating**
 - Provide direction and feedback
 - Clarify roles and responsibilities
- **Inspiring**
 - Acknowledges contributions of team members
 - Celebrate “wins”

Leadership Practices



- **Engaging**
 - Foster participative and inclusive team environment
 - Ask for and receive feedback
- **Empowering**
 - Provide team members with authority and autonomy to enhance effectiveness
 - Encourage decision making aligned with the teams goals.

Practices Supporting TT development



Morgeson, *J of Manag.* 2010: 366:5
Begerowski, *JCTS* 10.1017/cts.2021.832

Leadership Practices in the “Exploration” phase

- Structuring the team
- Defining shared goal
- Establishing roles/responsibilities
- Developing trust
- Providing feedback/coaching

Structuring the team

- Get the right skills for the project's translational goal
- Develop a working relationship
- Establish trust
- Develop shared goals/mental models
- Define roles and responsibilities

Discussion

You are an assistant professor, your lab has been working in a project in aging and have made a discovery about a pathway that may be important in LUTS. You want to start a team to modify the pathway for treatment in humans.

What are the most important for team member selection:

- A colleague who works in the same department and shares similar views.
- Someone who has a lot of experience working in teams.
- An assistant professor that is funded to study this pathway.
- A senior scientist with extensive connections in urological organizations.
- A physician who treats patients with LUTS.

Structuring the Team

Team members should be selected intentionally

- Technical diversity- skills that are complementary to the goal of the study- (enhanced productivity)
- Cognitive diversity- enhanced innovation
- Past record of collaboration- curious and willing to engage
- Connectors- enhance outcomes, diffusion of results
- Team size- small vs large?



Hall et al., Am Psychol 2018; 73:532
Nature Human Behaviour 2:726; 2018

Factors That Influence Team Performance – Evidence?



An “optimal” mix

- Fraction of newcomers vs. incumbents
- Junior vs. Senior Researchers
- Gender

Early adoption of new ideas

Culture of self correction/improvement/adaptation

Hall et al., *Am Psychol* 2018; 73:532

Begerowski, *JCTS* DOI: 10.1017/cts.2021.832

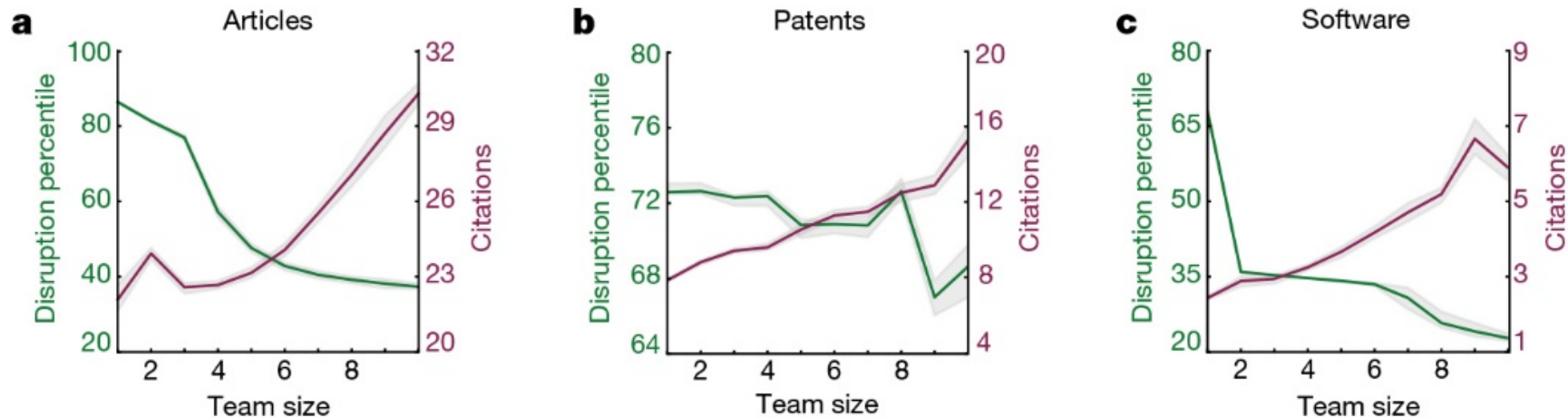
Salas et al., *Human Res. Manag* 2015; 54:599

Team Size

Teams of 1-10 account for 98% of articles from 1954-2014

Disruption in a field was related to team size for research articles, patents and software

Larger teams more productive and able to translate



Smaller teams disrupt fields, larger teams develop/translate

Team Building

Strategies:

- Celebrate early wins
- Scientific retreats to develop/refine vision and strategy
- Team debriefs after major milestones (grants, papers)

Setting Expectations for the Team



- Make sure each person understands his or her roles, responsibilities, and contributions to the team's goals.
- Establish & agree upon expectations for working together; as a participant, understand your contribution to end goals.
- Recognize that discussing team goals openly and honestly will be a dynamic process and will evolve over time.
- Be prepared for disagreements and even conflicts, especially in the early stages of team formation.
- Agree on processes for sharing data, credit, authorship.
- Regularly consider new scientific perspectives and ideas.
- Use tools for setting expectations, *e.g.*, collaboration agreements, welcome letters, institutional agreements.

Case Study-Discussion

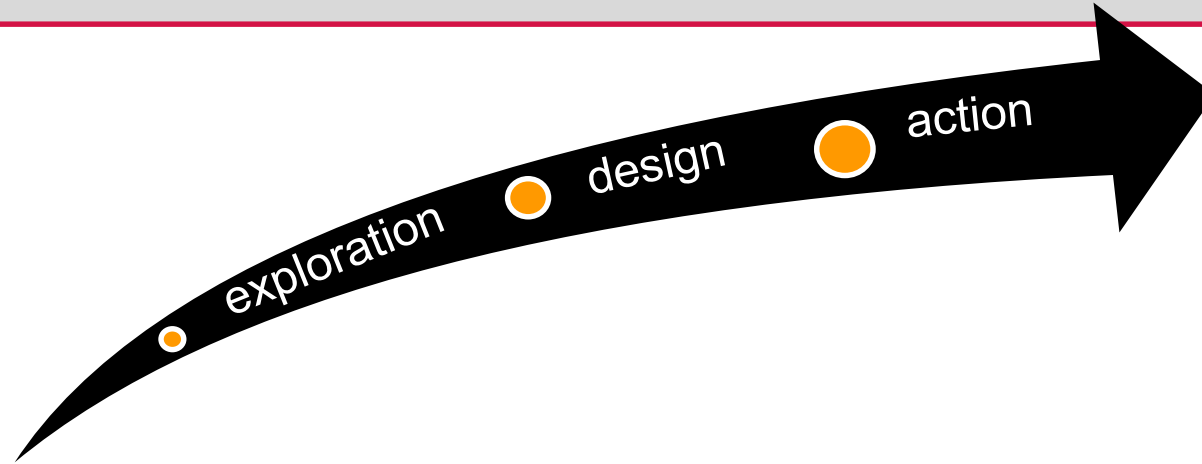


Two students worked together on a paper using separate expertise and techniques. When it was time to write a paper, both assumed they would be made the first author. A heated and emotional dispute developed.

What leadership practices could be used to prevent this situation?

What practices could remedy the situation?

Leadership practices in the “action” phase



- Enabling shared leadership
- Monitor team performance-feedback
- Challenge the team
- Provide resources
- Self management/correction

Summary

- Translational team – a special case of interdisciplinary team with health outcome goal.
- Best practices enhance reproducibility
- Leadership styles are situation- and team stage dependent
- Domains and practices of ICTR leadership model

Resources

ICTR Team Science web site

<https://ictr.wisc.edu/team-science/>

Field Guide to Team Science

<https://www.cancer.gov/about-nci/organization/crs/research-initiatives/team-science-field-guide>

NCI Team Science Toolkit

<https://cancercontrol.cancer.gov/brp/research/team-science-toolkit>

HHMI Guide scientific management for postdocs/junior faculty

<http://www.hhmi.org/programs/resources-early-career-scientist-development/making-right-moves>