Responding to New NCATS Requirement for D&I in CTSAs:
13 JCTS Articles that Pave the Way
This editorial provides a collection of JCTS articles that grant writers may find helpful in designing CTSA applications that are responsive to new NCATS requirements for Dissemination & Implementation (D&I) sciences. These articles are presented in brief annotated form to provide a foundation for understanding D&I from experts across the nation who are at the leading edge of D&I in CTSA.

The recently released NCATS PAR-21-293 requires that CTSA include D&I (see Box 1).

### Box 1. NCATS Requirement for Inclusion of Dissemination & Implementation Activities

**Element B: Strategic Management:** “Each CTSA hub is required to engage in Dissemination and implementation (D&I) activities to support innovative approaches to identifying, understanding, and developing strategies for overcoming barriers to the adoption, adaptation, integration, scale-up and sustainability of evidence-based interventions, tools, policies, and guidelines.”

PAR-21-293: Clinical and Translational Science Award (UM1 Clinical Trial Optional) (nih.gov)

Leveraging the expertise of the NCATS Advancing Dissemination & Implementation Working Group*, JCTS published a number of articles reflecting the collective wisdom of D&I thought leaders. Many of the articles were included in the JCTS themed issue on D&I. Other JCTS articles are also connected to D&I.

The following is an annotated mini review of selected articles that point to essentials in any D&I infrastructure and provide principles, best practices, helpful frameworks, examples, and ideas that have worked. A few key points from each article is included. Because each article is a trove of expert guidance and resources, deeper reading is urged; all articles are open access.

### Annotated Bibliography of Recent JCTS Articles by Topic
SURVEY OF IMPLEMENTATION RESEARCH IN CTSAS


This survey points to the nascence of D&I sciences in CTSA as of 2019:
• "The most significant finding is that there is a reported lack of understanding of D&I sciences across the CTSA Consortium."
• At the time of this survey, D&I science was not a formalized element of the CTSA program.
• Many PIs reported that the CTSA Consortium could play a critical role in supporting D&I science efforts in training and workforce development, provision of D&I science resources and tools, and mentorship.

D&I ACROSS THE TRANSLATIONAL SPECTRUM


Dissemination & implementation (D&I) sciences have rapidly matured over the last 15 years; The authors make these key points:
• Translation, Dissemination, and Implementation are 3 overlapping sciences
• The integrated framework and real-world examples for articulating the role of D&I sciences within and across each of the stages of the translational research spectrum

TEACHING AND WORKFORCE TRAINING IN IMPLEMENTATION


The authors describe the following:
• Implementation Competencies
• What and how to teach and co-learning opportunities
• Competencies for implementation researchers
• Competencies for Implementation practitioners
• Critical Workforce Skills: Stakeholder engagement; pragmatic studies; team science
• Educational infrastructure and resources to further this approach
• Presents Teaching for Implementation (TFI) Framework


Authors describe an Implementation Research training program that can be replicated in CTSAs, including:
· Reports on how to create IR capacity by leveraging external resources in a novel 2-day training for faculty-scientists across the four Texas CTSAs
· Links are provided to workshop resources such as videos and project design checklists

DESIGNS AND DEFINITIONS IN IMPLEMENTATION RESEARCH


"Much in the same way that inclusion criteria for patients are often relaxed in an effectiveness study of an EBI to better represent real-world populations, implementation research includes delivery systems and clinicians or stakeholders that are representative of typical practices or communities that will ultimately implement an EBI." Key concepts include:
· Definition of key terms in Implementation Research
· Overview of major research designs such as Hybrid Types 1, 2, 3, stepped wedge

RECOMMENDATIONS TO CTSA LEADERS


"We propose a set of recommendations for NCATS national and local leaders that are intended to move D&I sciences out of a position of unfamiliarity and ancillary value and into the core identity of who CTSAs are, how they think, and what they do, to advance translation and health."
· Published prior to new NCATS FOA (7-31-21)
· With 4 years of collaboration, this NCATS working group recommended methods and processes, workforce development, and evaluation components.

HEALTH EQUITY

“Implementation science is an area of research with high potential to accelerate progress toward achieving health equity goals in both public health and healthcare.”

- Highlights interaction and opportunities between health equity and D&I sciences
- Shows how CTSAs can support and facilitate sharper focus on equitable D&I in translational research

LEARNING HEALTH SYSTEMS


Learning Health Systems (LHS)—use health IT and data from real-world care-delivery to promote improvement, innovation, and health system change (E.g., Using Epic (EHR) data to improve assessment of Frailty, Bokov et al 2021)

- D&I sciences are rarely fully integrated with LHS efforts.
- Research integration in LHS is an emerging opportunity for CTSAs to grow
- data-driven quality improvement culture and clinical partnership
- informatics capacity and analytic resources

TECHNOLOGY TRANSFER INFRASTRUCTURE


The authors describe how one CTSA created a technology transfer model suitable to Implementation Science, describing key elements:

- The Wisconsin D&I Launchpad
- Facilitates D&I of research results between investigators and their community partners
- Business strategies identified (marketing, pricing, and sales forecasting)
- Creating a sustainable business model for scaling programs to new adopters
- Pilot funding

STAKEHOLDER ENGAGEMENT: COMMUNITY, AND PRACTICE BASED RESEARCH NETWORKS (PBRNs)


Partnering with CTSA clinical and community entities is critical in successful D&I efforts; these authors identify the science underlying successful stakeholder engagement:

- Stakeholder engagement is acknowledged as central to dissemination and implementation (D&I) of research that generates and answers new clinical and health service research questions.
- There is a recognized science of stakeholder engagement

The Practice-Based Research Networks (PBRNs) paradigm is well-established; these authors point to ways to leverage PBRNs in CTSA:
- Clinicians as CTSA stakeholders and community partners
- PBRNs to organize clinicians as community stakeholders

**TEAM SCIENCE**


These authors lay the groundwork for the rationale behind team science:
- D&I research necessitates the use of team science.
- Top strategies are in line with those found to be effective for teams in other fields.


The science of team science provides guidance on keeping a wide range of members focused on mutual gain; authors describe a program to implement:
- Presents a competency model and implementation plan for a team training program specific to science teams
- TeamMAPPS (Team Methods to Advance Processes and Performance in Science), an evidence-based teaming program, is described

*FOOTNOTE:
* NCATS Working Group on Advancing D&I in CTSAs
- D&I subgroup 2017-2019
  - Led by Laura-Mae Baldwin, Rowena Dolor, and Paul Meissner
  - Major Deliverable: Multiple articles in themed issue of JCTS: D&I Landscape
  - D&I subgroup reauthorized 2020-2022
  - Led by Andrew Quanbeck, Aaron Leppin, Tara Mehta, Jane Mahoney
  - Continuing to publish consensus guidance manuscripts