TRIO STUDIO: Opportunities for Collaboration Between Researchers and Informaticians
by Tony Solomonides, PhD
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At IIT Institute of Design
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by Tony Solomonides, PhD
NorthShore University Health System

Facilitators: Santosh Basapur, IIT Institute of Design and Sherry Robison, UChicago

Research Assistants: Divya Jain and Abhignan Sai Godha (MDes Students)

Attendees:
Design Thinking Team: Majid Afshar, Loyola Medical University; Lainie Ross, UChicago; Michael Kurilla, NCATS, Gerry Stacy ITM, UChicago; Jessica Shore, Loyola Medical University; Dominique Tucker, Rush University Medical Center; Joshua Jacobs, Rush University Medical Center; Kateland Haas LaVigne, UChicago; Denise Voskuil-Marre, Rush University Medical Center; Zachary Orban, Rush University Medical Center; and Cara Joyce, Loyola Medical University.

Quality Thinking Team: Erica Rosemond, NCATS; Clare Schmitt, NCATS; Julian Solway, UChicago; Janis Sayer, IIT; Drew Simon, ITM Rush University Medical Center; Julie Johnson, UChicago; Adrian Melendez, UChicago; Riley Sticca, Rush University Medical Center; Pankaja Desai, Rush University Medical Center; Laura Magda, UChicago; Mary Harris, UChicago; Anthony Marchitti, UChicago; Nurie Dervishi, ITM UChicago.

Guests: Kathleen Ferraro, ITM Communications UChicago; and Patrick Roth, potential candidate for TRIO Communications position.

Summary
Tony Solomonides, NorthShore University Health Systems, defined informatics as the interdisciplinary field that studies and pursues the effective uses of biomedical data, information, and knowledge for scientific inquiry, problem solving and decision making, motivated by efforts to improve human health. He gave background information on informatics from all 6 ITM institions and introduced the subsequent challenges of collaboration between researchers and informatics research services which should occur early in the research question formation process to the studio.

Design Thinking approach and Quality Thinking were both used to solve the problems faced by Tony and his team at all 6 ITM. Many suggestions, based on experiences at different institutions, were made.
Top 3 Design Actions Proposed by the Studio Participants to Tony:

1. **Educate**: Educate early on about informatics.

2. **Advocacy by Informatics**: Conduct retreats to communicate informatics. Establish a committee for project review, do a case based analysis and insights, and create an information task force.

3. **Add Informatics in Application**: Gain institutional buy-in to add informatics to the application process.

Top 3 Quality Actions Proposed by the Studio Participants to Tony:

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2. **Budget**: One of the first steps in grant writing should be creating the budget. Have institutional buy-in for there to be a space on the budget template for informatics.

3. **Informatics Design or Doer**: Problem prevention. Teach informatics early on instead of waiting until there is a problem.
TRIO Studio Problem Description:

The primary goal is to improve collaboration between researchers and informatics research services early in the research question formation process.

Tony Solomonides from NorthShore University Health System Informatics introduced the problem. Researchers may not know whether the right resources are available to support their proposed study. Many researchers know to consult with a statistician in advance of embarking on research projects, informaticians are in a position to render a similar service to ensure data will be available in the right form, in the right place, at the right time. There are also opportunities to collaborate and publish with informaticians in journals not familiar to the non-informatician investigator. Tony explained that research informatics team offices are sometimes located in a separate location than where most non-informatician research offices are located. Some institutions have multiple sites and large campuses which makes it difficult to house informatics close to researchers.

Tony also explained that informatics is not a background many researchers have. Some researchers do not know, or understand the full scope of informatics resources that will be required to support their study and program. He went on to state that there are opportunities that are being missed which include administrative aspects such as the scope of informatics; hardware and software expertise for data collection; communicating the cost of these services (for example, what is supported by the organization and what will need to be supported by the researchers grant). Scientific aspects include the appropriate informatics services and techniques outlined in the methods section of a grant make for a stronger more fundable application. Study sections are taking more care to include informatics so reviewers are actively now looking for this.

Current efforts to engage researchers at the ITM institutions include:

Loyola: Grant writing course, but there is nothing specific to informatics.

NorthShore: Training efforts are focused on navigating the administrative aspects of the IRB process.

Rush: CRIO speaks with hospital and university leadership. Director of Operations speaks to scientific research committee and department chairs. Interfaences with a funded mentoring program providing support to investigators, including informatics specific needs. Faculty champion also speaks to clinicians.

UChicago: CRIO conducts a twice yearly grant-specific talk in the CRI seminar series. It describes what services are offered and notes grant consulting is available. Grant consulting works one-on-one with researchers and CRI has information on their website regarding services that are offered.
Tony went on to discuss the lessons that have been learned thus far which include communication. Rush and UChicago conduct talks aimed at a large, general audience of researchers which has led to one-on-one informatics consulting, often with researchers presenting much more mature ideas. UChicago has a website with services clearly defined. This has resulted in more productive, focused conversations with researchers who approach informatics teams.

Loyola has educational offerings which give greater visibility for informatics-specific services and methodologies that are needed. NorthShore has siloed research IT and hospital operations IT which causes disconnect between what researchers believe they may have access to and what they really should have access to, and the type of scientific work that there is an opportunity to pursue.

Tony’s call to action: How do we get researchers and their teams to think “what can informatics do for me and my project” at the beginning of the research question formation? How do we communicate what informatics resources are available to researchers and how do we determine the optimal time to communicate this? How do we better foster collaboration between researchers and informatics cores?

Do you have suggestions on how we can effectively improve collaboration between researchers and informatics research services early in the research question formation process?

Figure 1 Tony Solomonides presenting
Main problem for the studio participants to solve:
Does the TRIO studio audience have suggestions for collaborating between researchers and informaticians?

Studio Methodology
Design Thinking approach as well as Quality Science approach was used as part of the studio to solve this problem. The attendees were split into two groups. One group was assigned to Santosh and Abhignan to use Design Thinking method and Sherry and Divya lead the other group with Quality Thinking approach. Final solutions were documented from both teams and provided to Tony Solomonides.

Design Thinking Method
We used the Design thinking approach with four steps:

1. Created a free form mind map of the problem and identification of issues – Mind Mapping technique
2. Actionable insights were identified
3. Generated ideas to address issues
4. Synthesized solutions from the smaller ideas – Creative integration of smaller ideas led by Design Thinking Expert facilitator was done using white boards.

Solutions were proposed and were rated by the team on implement-ability (0-4 scale)

Quality Science Method
The Six Sigma Quality Science approach was used which consisted of four steps:

1. Problem definition and mapping of actual structure of the process
2. Identify issues and analyze causality using Fishbone analysis
3. Generated ideas to address to issues – Brainstormed using SCAMPER method
4. Merged smaller ideas and scale ideas to create bigger solutions

Actionable insights and solutions were proposed and solutions were rated by the team on implement-ability (0-4 scale)
Design Thinking Based Solutions:

Problem visualized with Insights
The group first discussed the problem and its context yielding the following context diagram as well as the stakeholder map:
Stakeholder map:

Figure 3 Stakeholders Map
Figure 4 Mind Map of Issues and Stakeholders
High level insights:
Following the context discussions, insights were generated as follows:

1. Good research should include statisticians in the preliminary stage.
2. Researchers need to look for resources in multiple mediums to support research.
3. Organizational structure in hospitals acts as a deterrent.
4. Educational training takes time, and is difficult for P.I.’s to find enough time out of their busy schedules.
5. Their is lack of knowledge about the usage of Informatics to help better research.
6. There is not enough manpower in the Informatics dept to work and co-ordinate with all research projects.
7. Medical curriculum is already very hectic but is still not up-to-date.
8. Hospital informatics dept and research informatics donot work together. (work individually in silos)
9. Informatics task force should help in advocacy of use.

Solutions Generated by Design Thinking Approach Team:
Six relatively implementable solutions were created to solve the issues of collaboration between researchers and informaticians. They are as follows:

1. **Educate**: Educate early on about informatics.
2. **Advocacy by Informatics**: Conduct retreats to communicate informatics. Establish a committee for project review, do a case based analysis and insights, and create an information task force.
3. **Add Informatics in Application**: Gain institutional buy-in to add informatics to the application process.
4. **Virtual Trial Design using Informatics**: Try to get informatics involved in clinical trial design process. Getting informatics involved to test out potential study designs early to identify issues will go a long way in proving what informatics and informaticians bring to the table as services. This will make the impact of informatics obvious to all stakeholders.
5. **Mandatory Training**: Conduct mandatory training which will be quick and elaborate that will have great content on including informatics in the application.
6. **Burst Open the Information Silos:** Seems that informatics needs are divided within an institution into particular silos. For instance, Chief Research Informatics Officer in charge of research but CIO (who needs most education) has largest resources and is in charge of operating clinical informatics needs. They both don’t usually talk so how might we enable that communication and awareness in the CIO? Also, department chairs may also inadvertently duplicate informatics for their own needs. How do we prevent that from happening so that all people use the centralized informatics groups? A suggestion is to change the organization structure for informatics in order to support resource efficiencies for all missions of an academic health center. For instance, the Figure below shows a potential new structure.

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Figure 5 Ideas and Solutions after discussion of ideas
Quality Science Based Solutions:

**Issues and Problems Defined**

The group discussed all the problems within the collaboration between researchers and informatics. Current state and goal states were elaborated as well as why, where and with whom the problems arise was also discussed.

### 1. Problem Definition

#### Current State

- Right Resources
  - Data
  - Data across many resources
  - Informatics is not top of mind for joint publications
  - Offices not visible to PI
  - Missed opportunities - “late in game”
  - Informatics gets pulled in too late (Crisis)
  - Can’t ensure that correct data is pulled
  - Current CRIO don’t know where “informatics” is going
  - Younger generation thinks about digital solutions
- Operational
  - Current Communication Methods involve:
    - Research happens twice a year
    - Website
    - Educational papers

#### Goal State

- Joint Publications and Projects - Researchers + Informatics
  - Share the research broadly
  - Educational Offerings
    - Loyola Health Sciences Course
    - Rush Master in Clinical Research
  - Shift of mindframe
  - Foster Collaboration
  - Every grant to have a panel of consultants (stats, informatics, etc.)
  - Create clear roadmap
    - Informatics should consider themselves doers - empowerment to them
    - PI considers informatics when involved

#### Who’s experiencing the problem?

- PIs
- Study Teams
- Grant Writers
- All 6 institutions
- Biostatisticians - do not like working as informaticians - with data

#### What is the scale of the problem?

- Federal level criteria are a factor
  - Not just a PI issue, institutional
  - Institutional culture makes a difference
  - PI unsure of “What is for me?”

#### Why does the problem exist?

- Geographic Location
  - Organizational Structure
    - Requires trust to break barriers and reach higher authorities
    - Issues arise between informaticians themselves
    - Costs a lot to include informaticians
  - Medical curriculum can’t include informatics
  - Lack of communication between people involved
  - Where to access right people at the right time?
  - Think of ourselves as service groups, not collaborators

*Figure 6 Problems as discussed by Quality Approach group*

**Analysis of Issues and Causes**

Causes for the issues found in step one were discussed as a group. Here is the summary of that discussion:

Investigators are not aware of informatics and what they can do for their application and project. Researchers are writing grants and not considering informatics for what they are doing in their project until right before the deadline or not at all. Several factors may impact why investigators do not collaborate with informatics early on in their process: They are not aware of the services offered from informatics, geographic location of
informatics, costs are associated with the use of informatics, and there is a lack of communication between people involved and contacting the right people at the right time.

Figure 7 Fish Bone analysis for causes
Solutions Generated by Quality Science Approach Team:
Five relatively simple solutions were created to solve the issues of collaboration between researchers and informaticians. They are as follows:

1. **Educate**: Educate the research teams about informatics and request that biostaticians refer the study teams to informatics.

2. **Budget**: One of the first steps in grant writing should be creating the budget. Have institutional buy-in for there to be a space on the budget template for informatics.

3. **Informatics Design or Doer**: Problem prevention. Teach informatics early on instead of waiting until there is a problem.

4. **Testimonials**: Get testimonials from PIs to put on websites to help education research teams as to what informatics can do for them and how it helped their grant and project.

5. **Documentation**: Reinforce documentation instead of verbal communication.

4. **Explore Solutions**

   1. **Educate the research team working with the PI**
   - Biostatistician referral of informatician
   - Clear definition of need for informatician early on
   - CRI to connect teams to leverage resources across institutions

   2. **Have Budget as one of the 1st steps**
   - Checkbox to state the need for informatics
   - Involve institutional infrastructure
   - Get informatician opinion early on in the process through collaboration

   3. **Informatics Involvement**
   - Designer vs Doer
   - Problem prevention vs treating it later

   4. **Testimonials from PI**
   - Reinforce documentation instead of verbal communication

*Figure 8 Solution set in diagram*
Appendix 1.
Slides used by Tony Solomonides, PhD, NorthShore University Health System, for the studio kick off.

Appendix 2.
Session Pictures – Design Thinking
Session Pictures – Quality Thinking Approach
Appendix 3. Actual pictures of white board from the Design studio session.
Insights:

- Cost Recent Trends - Add in the Early Stage
- What Resources → Data → Multiple Systems → Cost
  - Awareness of this Resource
  - Organizational Structure acts as a Differentiator

- Efforts
  - Grant Writing
  - Chief Medical Information Officer
  - Talks at a Stage
  - Website with clearly defined Information
  - Course at Institutions on Information

- Institution Informatics can be one way?
  - Educational training takes time out of busy Schedule of PI
  - NIH needs refined information
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- Lack of knowledge about Informatics!
- Issue of mismatch of Informatics and resources!
- Medical Curriculum is not up-to-date and already is elective!
- Hospital Informatics and Research Informatics don't work together. Both are siloed.
- Talks of a Stage 7
- Informatix Task Force Advocating for UIC Informatics School
- 3 Med Schools Combine
- Collaboration
- Physicians of the Future
- PI's
- Biostatisticians
- Expertise
- Grants
- Informatics needs to Step Up!
Appendix 4. Actual pictures of white board from the Quality studio session.
Addendum 1 – 30-Day Follow-up

Top 3 Design Actions Proposed by the Studio Participants:

1. **Educate**: Educate early on about informatics

Implementation and Results:

Informatics team is currently working with their ITM Informatics Education and Training committee to put in to place educational opportunities to educate about informatics.
2. **Advocacy by Informatics**: Conduct retreats to communicate informatics. Establish a committee for project review, do a case-based analysis and insights, and create an information task force.

Implementation and Results:

Informatics team will request the assistance of the ITM Informatics Executive Committee to help with determining next steps to assist with advocacy, this may include advancing the conversation to non-informatics groups. Dr. Tony Solomonides has drafted his response to the studio participant’s suggestions to help lead this discussion with this group.

3. **Add Informatics in Application**: Gain institutional buy-in to add informatics to the application process.

Implementation and Results:

Informatics team will request the assistance of the ITM Informatics Executive Committee to help with determining next steps to assist with advocacy. Dr. Tony Solomonides has drafted his response to the studio participant’s suggestions to help lead this discussion with this group.

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2. **Budget**: One of the first steps in grant writing should be creating the budget. Have institutional buy-in for there to be a space on the budget template for informatics.

Implementation and Results:
Informatics team will request the assistance of the ITM Informatics Executive Committee to help with determining next steps to work with leadership on to identify how informatics added to grant applications. Dr. Tony Solomonides has drafted his response to the studio participant’s suggestions to help lead this discussion with this group.

3. Informatics Design or Doer: Problem prevention. Teach informatics early on instead of waiting until there is a problem.

Implementation and Results:

Informatics team is currently working with their ITM Informatics Education and Training committee to put in to place educational opportunities to educate about informatics.