

Flight Tracker Consortium Meeting

November 4, 2020

Visualizing & Simplifying Your Data

Scott J. Pearson



Meeting Agenda



Simplifying & Visualizing Your Data

What's New & What's Next?

Next Month's Agenda

Office Hours with Rebecca and Scott

Central Problem



Flight Tracker collects a lot of data from a lot of sources. This can become overwhelming. **How can you see what's important through the noise?**

Generally, this is a problem we're all facing due to the success of the Internet. Data collection has become much easier/cheaper; sifting through all those data now becomes the challenge.

Flight Tracker's Approach



- The **Summary** form in REDCap is always a good place to start. Computer algorithm selects its best guess as to the truth.
 - Demographics
 - Latest 15 grants
- Scholar Profiles - Demographics Summary & Timeline
- Publications – Lists, Average Scores
- Grants – Stylized CDA Table
- **Visualizations and Analysis**

Measurements of Success



- Grants
 - Trainee: Getting a grant after graduation
 - Early Career: K-to-R conversion ratio
- Publications
 - Quantity: Number of Grants (Scholar Profiles)
 - Quality: Relative Citation Ratio, Altmetric Scores, H-Index (Scholar Profiles)
 - Publications Brag Page – put in other webpages
 - Co-Authorship Social Network Graph (new)
- Resources
 - Return on Investment (coming this weekend)

Social Network Graph Impetus



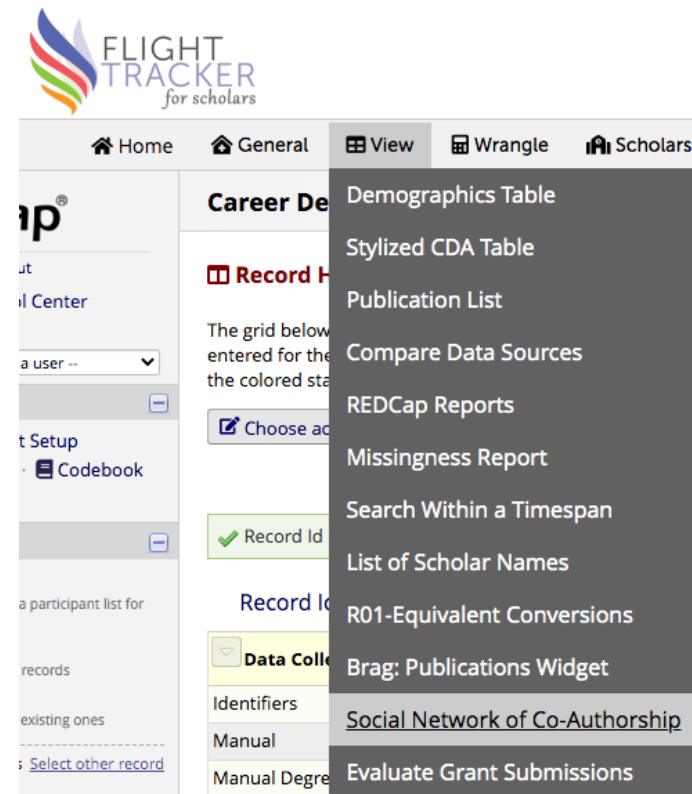
- Translational Science is about breaking down barriers between groups
 - ➔ Quicker knowledge transfer
 - *E.g.*, MDs and PhDs, Departments
- **Collaboration** is a central aim of the CTSA program (and a central method of research generally)
 - ➔ **How can we demonstrate this to NIH and to ourselves?**



Social Network Graph



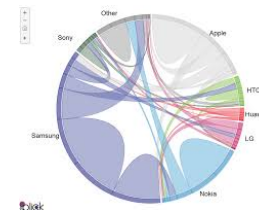
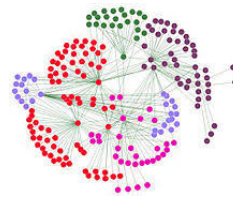
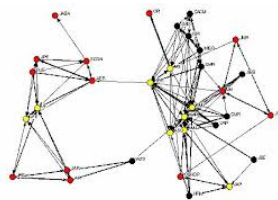
- Network → Who in the project is writing with other authors in the project?
- Where to find in menu (versions on-or-after 2.23.0):



Social Network Graph Terms



- **Social Network Diagram/Graph** – A graph that analyzes social structures through networks and graph theory.
- **Social Network Analysis** – Statistics about a social network diagram.
- **Nodes** – The individuals/groups under analysis. For us, a scholar or a given outcome.
- **Edges/Connections** – A link between 2 nodes. For us, co-authorship.
- **Chord Diagram** – A Social Network Graph with nodes presented in a circle and edges linking the nodes in the middle of the circle.



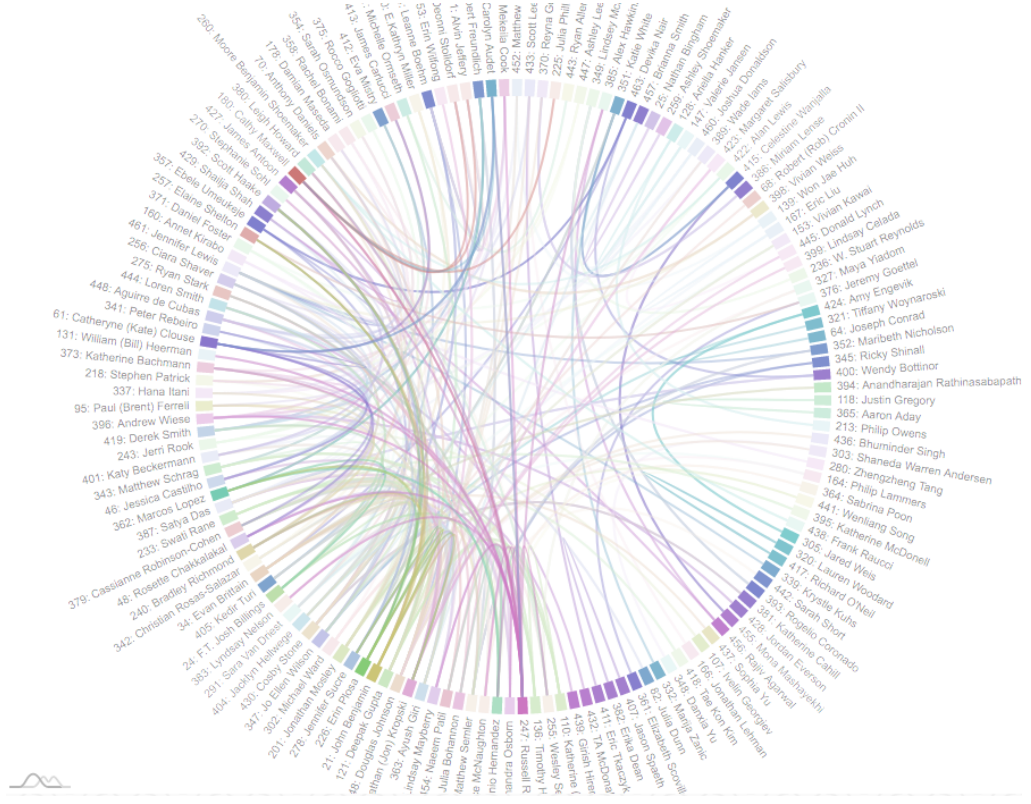
Social Network Graph Terms



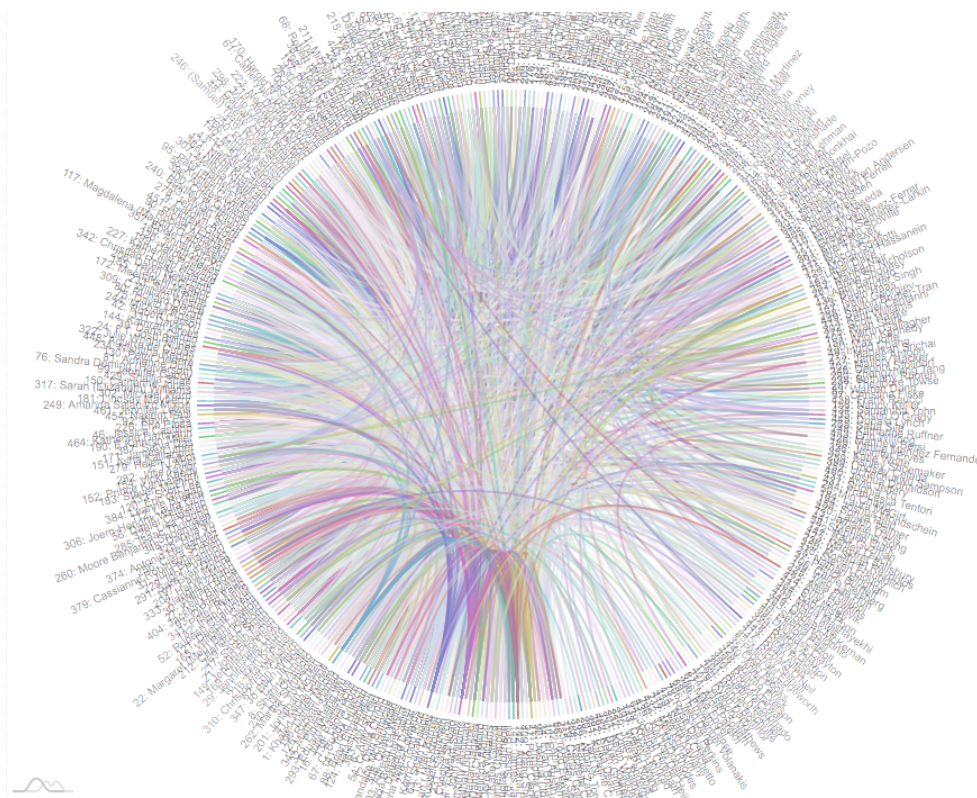
- **Scholar** - The person whose publication is being examined.
- **Collaborator** - A different person who has co-authored a paper with the Scholar.
- **Connection** - A paper published with a Scholar and one-or-more Collaborators.



Social Network Graph



Can Get Busy (Hairball)



Interface



- Cohorts/Sub-Groups – Good to simplify (*e.g.*, K awards before 2010, from 2010-2015, and after 2015)
- Index by Field

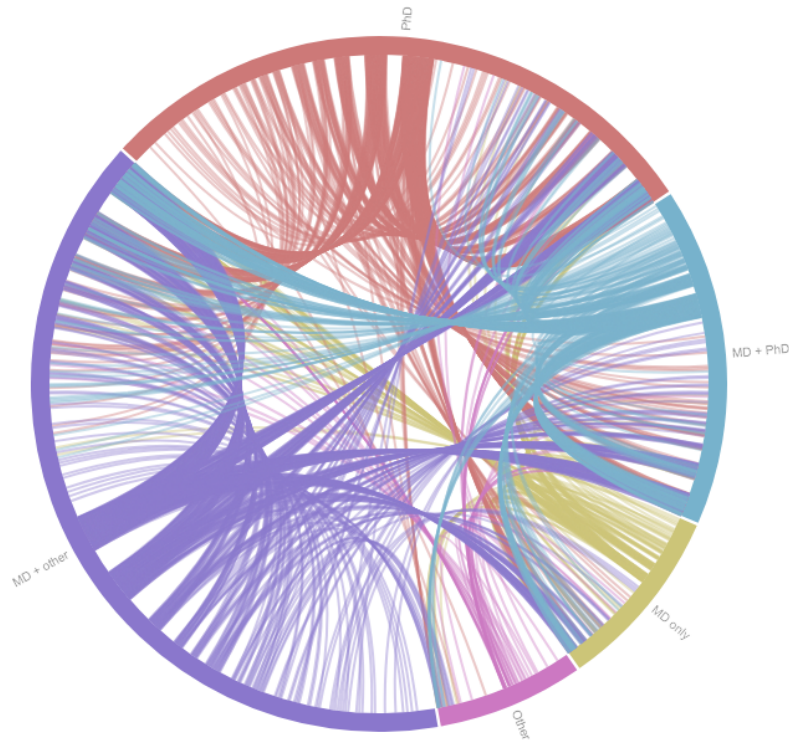
A screenshot of the FLIGHT TRACKER web interface. At the top left is the logo. At the top right is the text "VANDERBILT UNIVERSITY MEDICAL CENTER". Below this is a horizontal navigation menu with icons and labels for Home, General, View, Wrangle, Scholars, REDCap, Dashboards, Cohorts / Filters, Mentors, Resources, and Help. The main content area has a light gray background with a wavy pattern. It features the title "Publishing Collaborations Among Scholars" in large black text. Below the title is a form with the heading "Make a Cohort to View a Sub-Group". The form contains two dropdown menus: "Select Cohort:" with the value "---SELECT---" and "Index by Field:" with the value "Record Id". A "Go!" button is positioned below the second dropdown menu.

Interface: Possible Fields for Index



- Record ID – Individual Scholars
- Primary Department
- Gender
- Under-Represented Minority status
- Graduate Degrees

Collaboration by Degrees



Social Network Algorithm



→ Go through all names in Flight Tracker and match names to all citation authors in Flight Tracker records

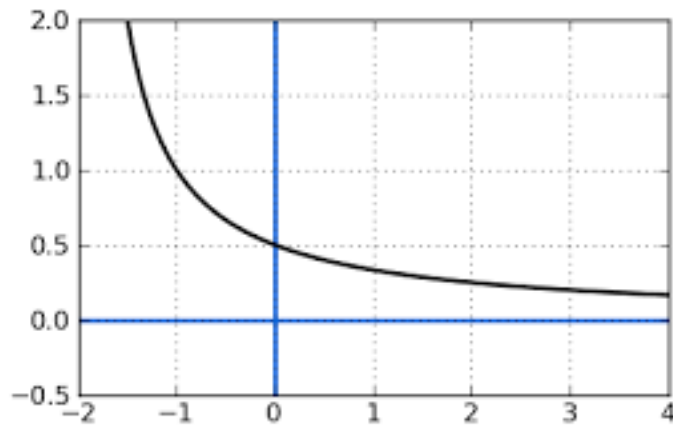
- Inexact: Relies on name matching
- Matches name in Flight Tracker to author line and skips middle names
 - *E.g.*, Scott J. Pearson matches **Scott Pearson** to **Pearson SJ**
- As always, maiden names and nicknames are attempted to match



Social Network Graph Limitations



- Common names are over-matched (*e.g.*, Smith, Williams, Xu).
- Only wrangled publications are analyzed for edges.



$$\lim_{x \rightarrow c} f(x) = L$$

The diagram illustrates the limit notation. An arrow points from the text 'lim' to the expression $x \rightarrow c$, which is enclosed in an oval. Another arrow points from the text '=' to the letter 'L', which is enclosed in a circle.

Social Network Graph Statistics



Given	
Citations to others in network	
Total Connections	
Number of Scholars with Connections	
Average Number of Collaborators with at least one Connection	
Mean of Connections	
Average Connections with a Collaborator	
Median of Connections	
Mode of Connections	
Standard Deviation	
Maximum Connections	
Maximum Number of Collaborators	
Received	
Citations by others in network	
Total Connections	
Number of Scholars with Connections	
Average Number of Collaborators with at least one Connection	
Mean of Connections	
Average Connections with a Collaborator	
Median of Connections	
Mode of Connections	
Standard Deviation	
Maximum Connections	
Maximum Number of Collaborators	

- Further social-network-specific measures (e.g., degree centrality) will likely be coming in future

Thanks!



Special thanks to **Chad Lightner**, Senior Application Developer at Vanderbilt, for the design of the chord diagram!

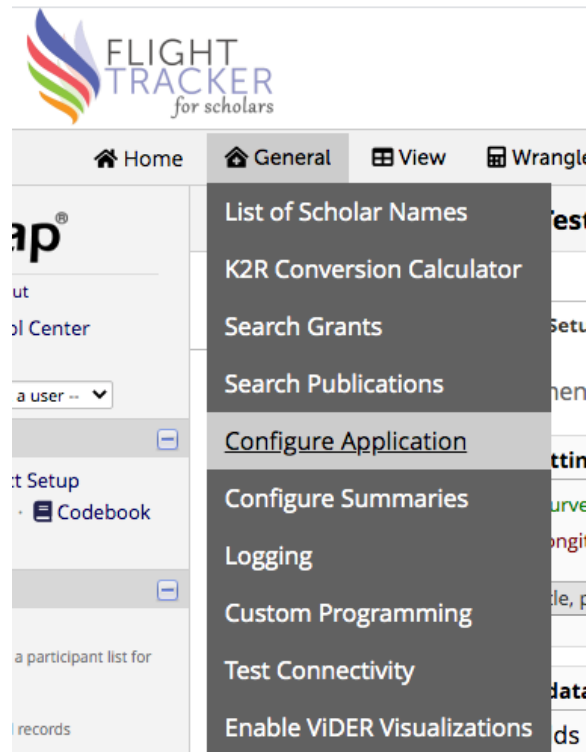
Resource ROI Sneak Preview



Results for Grant Pacing		
Result	Did <u>Not</u> Use Resource	Used Resource
Effect of Grant Pacing on Average RCR		
Mean (μ) for Average RCR	$\mu = 1.9$	$\mu = 2.1$
Cases (n) for Average RCR	n = 276	n = 162
Standard Deviation (σ) for Average RCR	$\sigma = 1.6$	$\sigma = 2.5$
Probability (p) of H_0	p = 0.383 t = -0.87420021203266 df = 436	
95% Confidence Interval (CI)	CI = [1.76, 2.54]	
Effect of Grant Pacing on Number of Publications		
Mean (μ) for Number of Publications	$\mu = 30.1$	$\mu = 36.0$
Cases (n) for Number of Publications	n = 285	n = 163
Standard Deviation (σ) for Number of Publications	$\sigma = 32.8$	$\sigma = 28.9$
Probability (p) of H_0	p = 0.48 t = -1.9777994841521 df = 446	
95% Confidence Interval (CI)	CI = [31.57, 40.48]	
Effect of Grant Pacing on Conversion Rate		
Mean (μ) for Conversion Rate	$\mu = 40.7\%$	$\mu = 54.7\%$
Cases (n) for Conversion Rate	n = 201	n = 126
Odds Ratio	OR =	
Effect of Grant Pacing on Years to Convert		
Mean (μ) for Years to Convert	$\mu = 4.8$	$\mu = 4.2$
Cases (n) for Years to Convert	n = 80	n = 67
Standard Deviation (σ) for Years to Convert	$\sigma = 2.7$	$\sigma = 2.3$
Probability (p) of H_0	p = 0.170 t = 1.3877589525459 df = 145	
95% Confidence Interval (CI)	CI = [3.71, 4.85]	

Update: The Odds Ratio has been completed. Will release this weekend.

Adding Resources



Adding Resources



Project Name

Timezone

City or Cities

Grant Class Training Grant (T) Career

Grant Number

Department Names

Resources

Adding Resources



Project Name

Timezone

City or Cities

Grant Class Training Grant (T) Career

Grant Number

Department Names

Resources

Adding Resources



Project Name

Timezone

City or Cities

Grant Class Training Grant (T) Career Development (C)

Grant Number

Department Names

Resources

Errors to Development Team? No Yes

ing the Following Resources? Position Change Resources Hor

as? (No waits until overnight.) No Yes

Tracking Resources



VANDERBILT UNIVERSITY
MEDICAL CENTER

- Home
- General
- View
- Wrangle
- Scholars
- REDCap
- Dashboards
- Cohorts / Filters
- Mentors
- Resources
- Help

Resource Participation Roster

Date:

Select a resource:

Select a Resource to Receive a Participation Roster

Tracking Resources



Resource Participation Roster

Date:

Select a resource:

Attendance Roster

(One per line.)

Sign in First and Last Names

Names Matched with Database

Already Signed In

Tracking Resources



Resource Participation Roster

Date: 11/02/2020

Select a resource:
Grant Pacing

Attendance Roster

(One per line.)

Sign in First and Last Names

Eric Austin

Names Matched with Database

Eric Austin

Already Signed In

Add Names

What's New & What's Next?



What's New?

- Conversion “Rate” → Conversion “Ratio”
- Automatic download of citation information if you just insert in the PMID in the REDCap form or in a CSV upload
- Stay on same record when move across FT pages or in and out of REDCap

What's Next?

- xTRACT integration and NIH Tables still ongoing – CTSA renewal due for Vanderbilt in December; will wrap up projects to share

Next Month's Agenda



To be Determined...
(Feel free to suggest a topic if you want!)

Office Hours with Rebecca & Scott

