# Using Social Network Analysis to Understand User Communities

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## RESEARCH QUESTIONS

As part of the multiyear evaluation of the Center for Clinical and Translational Science (CCTS) at the University of Illinois at Chicago (UIC), we are interested in the services provided by CCTS cores and that change in service provision over time. Our questions include the following:

- 1. What are the characteristics of the user community for each core?
- 2. How have the user communities and service provision changed over time?
- 3. To what extent are user communities integrated across cores?

### METHODS

Data for this analysis come from a service utilization database developed from paper and electronic data provided by each service core. Users were defined as persons receiving services from one or more CCTS cores between January 2007 and July 2011. Since 2008 was prior to the receipt of funding, these service records may not be complete. Network analysis was conducted in UCINet software and network maps were developed with NetDraw visualization software.

## CHARACTERISTICS OF THE CCTS USER COMMUNITY

A breakdown of service utilization by user type and core can be found in Table 1. It summarizes user data from cores for the period August 1, 2007, through July 31, 2011. Overall, CCTS cores reported providing 5,072 services to 1,481 users during the five years studied.

- 1. Faculty and staff received the most services across all the cores with each group receiving about a third of services. 14% of services were provided to students primarily through the REACH, Design and Analysis (DAC), and Novel Translational and Collaborative Studies (NOVEL) cores. Community affiliates are the smallest group of users to receive services from CCTS, representing only 1% of the services delivered.
- 2. Each core serves a mixture of user types with the exception of the pilot grant program (PILOT) and Regulatory Support & Advocacy (RSAC), which primarily provide services to faculty.
- 3. Community affiliates are primarily serviced through the Community Engagement & Research Core (CERC) who reported serving 31 members of the community to date.
- 4. The only core that reported serving community affiliates is Community Engagement and Research Core (CERC), which reported serving two members of the community in 2009 and 26 in 2010.

#### TO WHAT EXTENT DO USER COMMUNITIES OVERLAP?

Table 2 shows the overlap in users by each core from 2006–2011. Overall, 321 (22%) of the 1,481 CCTS users received services from more than one core during the period studied. The number of unique users served by each core is shown on the diagonal of the upper matrix. The number of users who overlap between two cores is shown in the remaining cells. The core that served the most people is REACH (503 users) followed by DAC (463 users). The two cores that served the most like users are REACH and DAC with 112 common users. The lower matrix shows the percentage overlap of users with the upper half showing the percentage of users for the row and the lower showing the percentage of users for the column. The largest percentage overlap is between CIC and RSAC with 58% of CIC users also receiving a service from RSAC. However, this represents only 8% of RSAC's users. The second largest overlap in users is between the Administration and REACH, where 42% of the users who received services from administration also received services from REACH.

Figures 1–5 are network graphs depicting service utilization by CCTS cores over time. Each line on the graph represents service provided to a user. The color of the nodes depicts the type of user (see legend). The map was developed using a spring embedded layout algorithm, meaning that the core node is positioned nearest the core with which it has the most users in common, relative to the overlap among other cores.

- 1. The maps reinforce previous findings regarding the evolution of CCTS by illustrating the emergence of additional core services each year: TTRC and RSAC began delivering services in 2009, and Administration, BI, NOVEL, and CERC in 2010. CIC began delivering services in 2011.
- 2. The maps also illustrate the diversity in the user community at the UIC CCTS, showing that each core serves more than one type of user.

| Table 1. Services | Provided 2007—2011, by Type of User by Core | | Total | Number of Services | Delivered (August 1, 2006—July 31, 2011) | | Type of User | ADMIN | BI | CERC | CIC | DAC | NOVEL | PILOT | REACH | RSAC | TTRC | Total | Taculty | 91 | 119 | 30 | 16 | 794 | 131 | 85 | 464 | 143 | 124 | 1,997 | Postdoc | 3 | 17 | 1 | 0 | 28 | 36 | 0 | 36 | 0 | 48 | 169 | Staff | 45 | 169 | 29 | 12 | 994 | 130 | 0 | 404 | 24 | 65 | 1,872 | Student | 15 | 85 | 4 | 2 | 211 | 123 | 0 | 220 | 3 | 69 | 732 | Other/Unclassified | 2 | 23 | 4 | 0 | 57 | 101 | 2 | 64 | 0 | 6 | 259 | Total by Core | 156 | 415 | 99 | 30 | 2,092 | 521 | 89 | 1,118 | 170 | 312 | 5,072 | Type of User | ADMIN | BI | CERC | CIC | DAC | NOVEL | PILOT | REACH | RSAC | TTRC | Total | Community Affiliate | - | <1% | 31% | - | <1% | 50% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% | 36% |

						Count				
	ADMIN	BI	CERC	CIC	DAC	NOVEL	PILOT	REACH	RSAC	TTR
ADMIN	103	10	4	3	26	11	3	43	10	
BI	10	154	3	1	25	29	4	35	7	
CERC	4	3	66	1	11	1	2	12	1	
CIC	3	1	1	12	2	0	0	3	7	
DAC	26	25	11	2	463	23	15	112	29	2
NOVEL	11	29	1	0	23	233	8	55	5	2
PILOT	3	4	2	0	15	8	71	7	13	
REACH	43	35	12	3	112	55	7	<i>503</i>	22	2
RSAC	10	7	1	7	29	5	13	22	83	1
TTRC	3	7	1	1	26	24	9	24	11	25
						%				
ADMIN	100%	10%	4%	3%	25%	11%	3%	42%	10%	3
BI	6%	100%	2%	1%	16%	19%	3%	23%	5%	5
CERC	6%	5%	100%	2%	17%	2%	3%	18%	2%	2
CIC	25%	8%	8%	100%	17%	_	_	25%	58%	8
DAC	6%	5%	2%	<1%	100%	5%	3%	24%	6%	69
NOVEL	5%	12%	<1%	_	10%	100%	3%	24%	2%	10
PILOT	4%	6%	3%	_	21%	11%	100%	10%	18%	13
REACH	9%	7%	2%	1%	22%	11%	1%	100%	4%	59
RSAC	12%	8%	1%	8%	35%	6%	16%	27%	100%	13 <sup>o</sup>

Figure 1. Services, by Core, through July 31, 2007

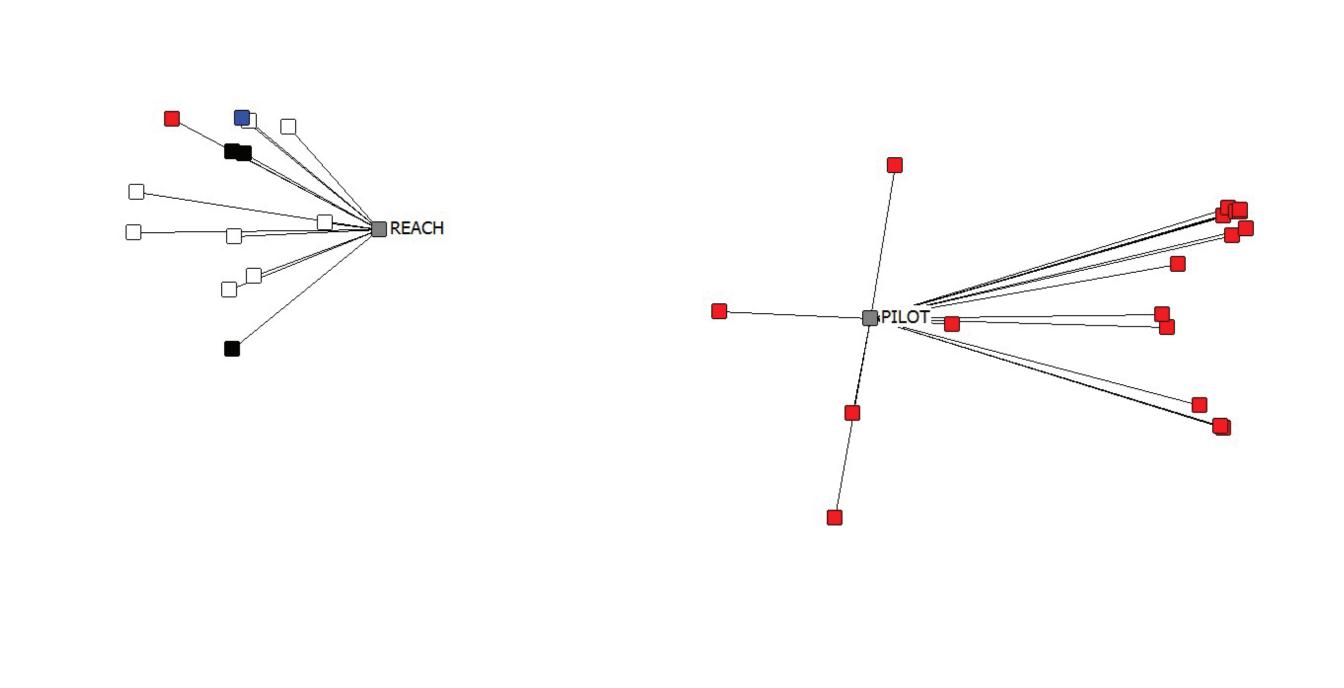


Figure 2. Services, by Core, through July 31, 2008

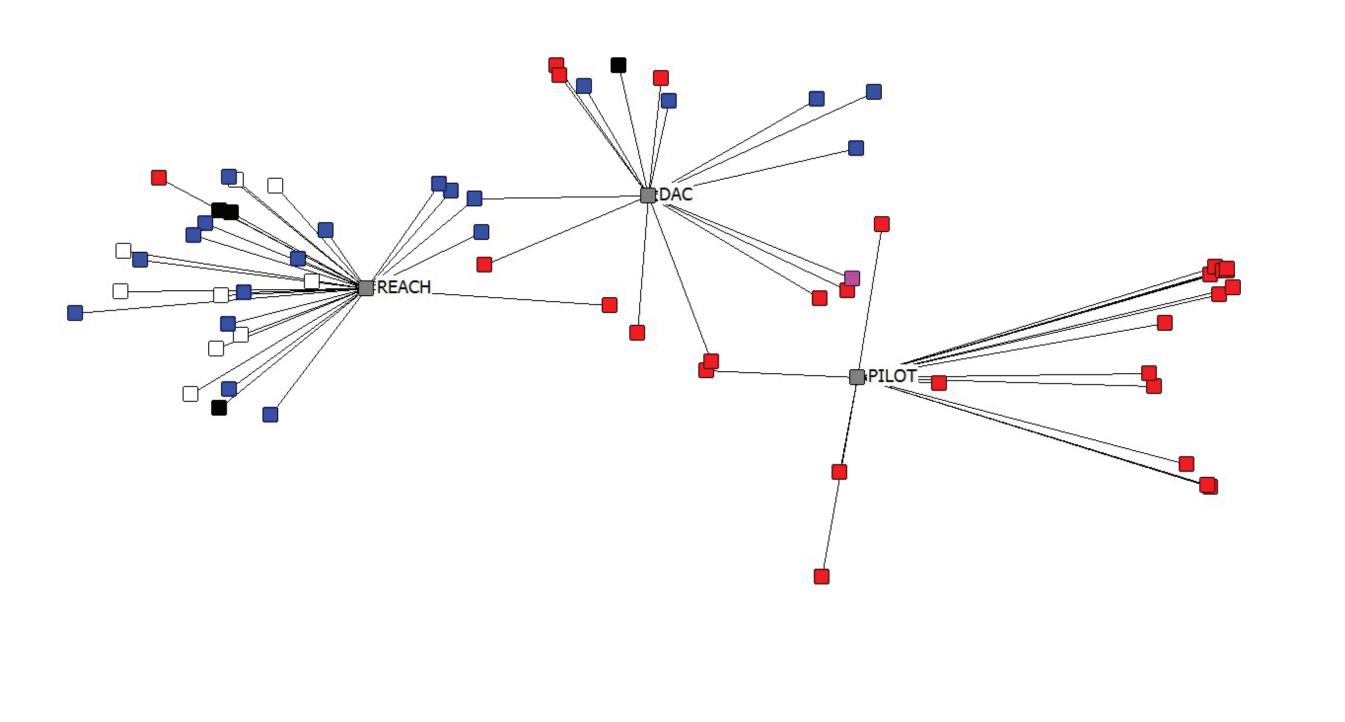


Figure 5. Services, by Core, through July 31, 2011

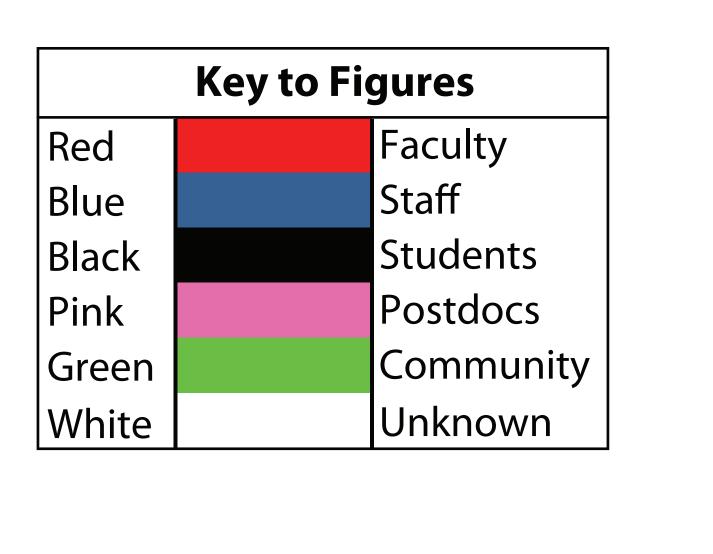


Figure 3. Services, by Core, through July 31, 2009

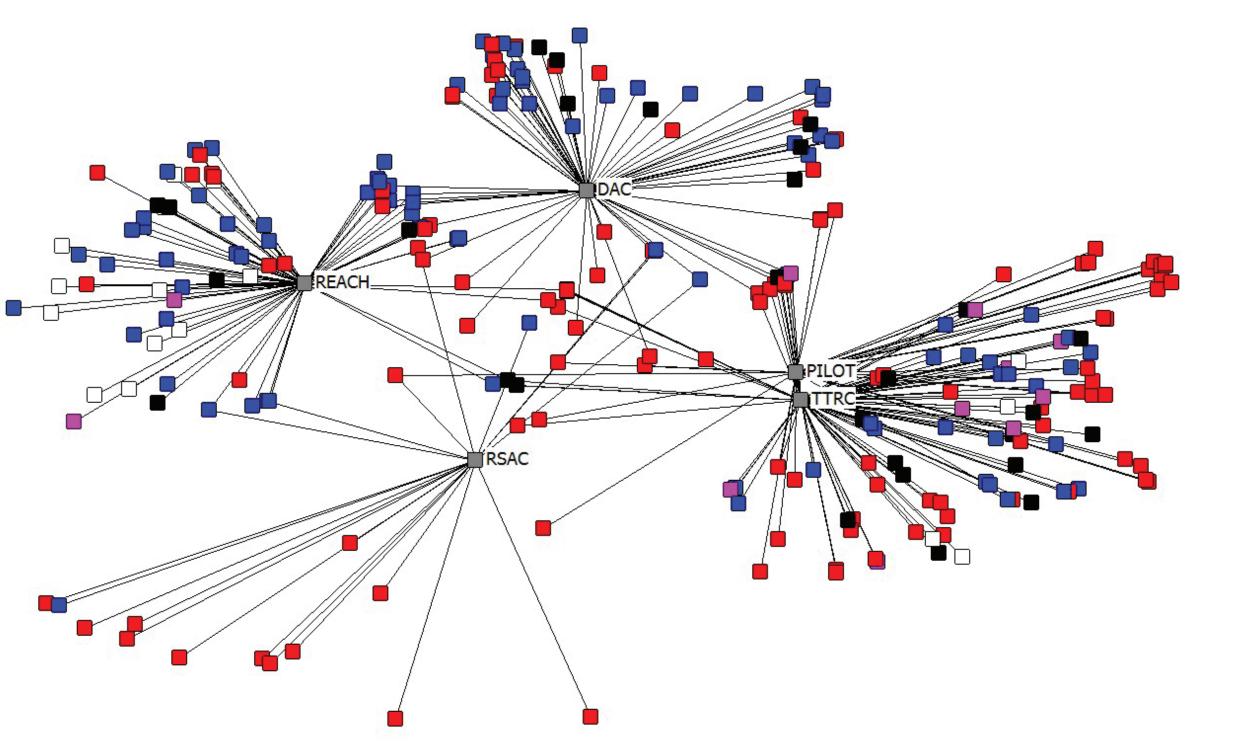
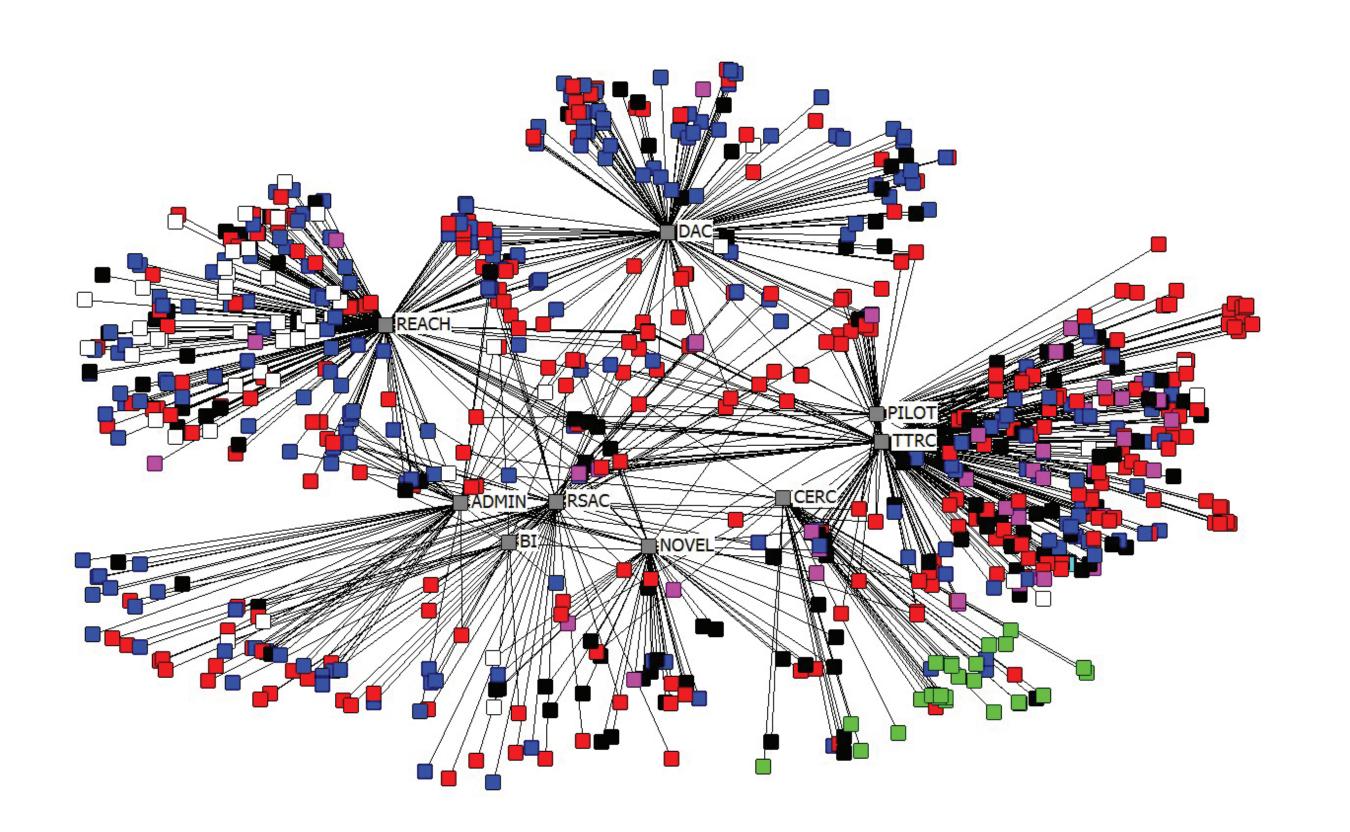


Figure 4. Services, by Core, through July 31, 2009



REACH	DAC  CCIC  ADMIN RSAC  CERC  INOVEL	OTTRC

### KEY FINDINGS FOR FUTURE EVALUATION

By tracking the type of UIC CCTS user over time, we are able to assess CCTS growth and outreach and also identify opportunities for future outreach and activities. Below we list some of the potential opportunities for CCTS cores as they seek to expand their services or reach a more diverse set of users:

- 1. Postdocs make up a relatively small proportion of users of CCTS core services and are primarily served by two cores (NOVEL and TTRC). This may point to an opportunity for the CCTS to target this user group through services or outreach to ensure that more researchers on campus are engaged in clinical and translational activities.
- 2. CERC and DAC are the only cores serving community affiliates. Other CCTS cores might consider partnering with community affiliates or providing services to community affiliates, as appropriate.
- 3. Students received more services as a portion of the overall in 2011 than in any other year but still represent only 14% of services delivered. This presents an opportunity for the other cores to develop services, courses, or lectures targeting students.

#### LIMITATIONS

Because of the lag between the initiation of service provision and the development of systems to capture service provision data for each core, there may be underreporting of service utilization. TTRC services for the year ended July 31, 2011, were not reported in time to be included in this analysis.

#### Acknowledgments

This project was supported by the University of Illinois at Chicago (UIC) Center for Clinical and Translational Science (CCTS), Award Number UL1RR029879 from the National Center for Research Resources. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Center for Research Resources or the National Institutes of Health.

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