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### ICTS Research Collaboration Survey Results: Demonstrations of Stability

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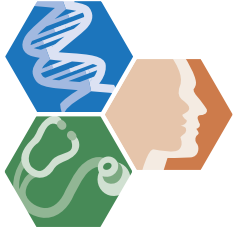
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WASHINGTON UNIVERSITY IN ST. LOUIS

Institute of **C**linical and **T**ranslational **S**ciences

# 2013 ICTS Research Collaboration Survey Results: Demonstrations of Stability

## Acknowledgments

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## Executive Summary

The ICTS Research Collaboration Survey was developed to better understand the collaborative research partnerships of ICTS members. This report provides the results from the ICTS Research Collaboration Survey administered in 2011 and 2013.

### Results

- The response rate dropped from 71% in 2011 to 46% in 2013. This pattern is consistent with dropping response rates observed in other ICTS Tracking & Evaluation surveys. The low response rate precluded a network analysis for the 2013 administration. The network analysis for the 2011 administration is available here: <http://icts.wustl.edu/mm/files/desktop/2011CollabRpt.pdf>.
- Otherwise, results from this survey tell the same story as the 2011 administration.
- More than 80% of respondents agreed that collaboration improved their research productivity and quality.
- Respondents were generally positive about their current collaborations, with at least half indicating all aspects of collaboration as “Good” or “Excellent.” For example, 66% of respondents rated their ability to capitalize on the strengths of different researchers as “Excellent.”

- Views of transdisciplinary research were favorable, with 91% of respondents indicating they at least somewhat agreed that transdisciplinary research improved how they conducted research.
- Most researchers generally agreed that they were more aware of collaborative opportunities, were better able to engage in collaborative opportunities, and were more engaged with collaborators from other disciplines than they were two years ago.
- About 40% of respondents indicated participating in research translating clinical results to humans (T1) and to patients (T2). Only 12% of respondents indicated participating in community-based research.
- Lack of time and funding were identified as the most frequent barriers to collaboration, both by about 60% of respondents.

### Recommendations for ICTS

- Increase the time interval between collaboration survey administrations from two years to five years.
- Promote the ICTS membership directory to facilitate greater collaboration among investigators seeking out new research partners.
- Promote the Clinical Research Training Center as well as other training activities whose goal it is to facilitate cross-disciplinary collaboration.

## Introduction

In September 2007, Washington University in St. Louis (WUSTL) was awarded a Clinical and Translational Science Award (CTSA). To ensure the intent of the CTSA, WUSTL created the Institute of Clinical and Translational Sciences (ICTS). The overall goal of the ICTS is to serve as the intellectual and physical home for clinical and translational research, clinical research training, and career development to help overcome the traditional boundaries between disciplines, departments, and institutions.

The Tracking & Evaluation (T&E) Program was established to conduct the evaluation of the overall goals of the ICTS. The vision of the T&E Program is to utilize evidence-based and innovative evaluation methods to 1) inform ICTS strategic planning and program improvement activities, and 2) assess the impact of ICTS on clinical and translational science that results in clinical applications and meaningful community health outcomes.

## Report Purpose

This report provides the results from the ICTS Research Collaboration Survey administered in 2011 and 2013. The ICTS Research Collaboration Survey was developed to better understand the collaborative research partnerships of ICTS members. The survey included demographic, collaboration network, and general attitude and satisfaction questions. Established scales (Mâsse et al., *Measuring Collaboration and Transdisciplinary Integration in Team Science*, 2008) were used to assess the impact of collaboration, satisfaction with collaboration, and attitudes about transdisciplinary research. Additional items were developed to assess change over time, types of research engaged in, and barriers encountered.

## Methods

The first administration of the ICTS Research Collaboration Survey occurred between March-April 2011 and the second administration occurred between August – December 2013. The survey was administered in an online web-based format to all ICTS members. For the 2011 administration, 71% of the 1041 members responded (n=737). The participation rate for the 2013 administration was greatly reduced, with 46% of the 1553 members responding (n = 719). Network analysis with response rates lower than 70% can be difficult to impossible to interpret. Consequently, a network analysis similar to that performed for the 2011 administration was not possible for the 2013 administration. (An examination of participation rates and respondent characteristics can be found in the Appendix.) All other data collected in 2011 could be compared to 2013 data.

# Results

## Characteristics of Respondents

### Affiliation

Most respondents indicated their primary institution as WUSTL for both 2011 and 2013, with fewer than 10 people each from the St. Louis College of Pharmacy, the University of Missouri at St. Louis, and Southern Illinois University Edwardsville. The distribution of institution affiliation appears stable over two years as shown in Table 1, with the exception of relatively noticeable gains from Saint Louis University and St. Louis College of Pharmacy.

Table 1. Primary Institutional Affiliation

	2011		2013	
	Frequency	Percent (%)	Frequency	Percent (%)
Washington University in St. Louis	662	89.8	599	83.3
Saint Louis University	40	5.4	72	10.0
BJC HealthCare	11	1.5	12	1.7
St. Louis College of Pharmacy	0	0.0	9	1.3
University of Missouri St. Louis	9	1.2	9	1.3
Southern Illinois University Edwardsville	3	0.4	3	0.4
Community Health Organization	1	0.1	0	0.0
Other	11	1.5	0	0.0
Missing	0	0	15	2.1
<b>Total</b>	<b>737</b>		<b>719</b>	

### Academic Rank

Assistant Professors made up the greatest percentage of respondents in both 2011 and 2013, followed by Professors and Associate professors. As shown in Table 2, the distribution of rank is fairly stable over two years, with the possible exception of an increase in “Other” from 1.5% to 3.8%.

Table 2. Academic Rank

	2011		2013	
	Frequency	Percent (%)	Frequency	Percent (%)
Assistant Professor	228	30.9	220	30.6
Professor	213	28.9	198	27.5
Associate Professor	130	17.6	129	17.9
Instructor	66	9.0	49	6.8
Student	39	5.3	36	5.0
Fellow	26	3.5	24	3.3
Staff	14	1.9	22	3.1
Resident	10	1.4	5	0.7
Other	11	1.5	27	3.8
Missing	0	0.0	9	1.3
<b>Total</b>	<b>737</b>		<b>719</b>	

## Involvement in Translational and Community-Based Research

Questions asking about the type of research that members engaged in were added for the 2013 administration. Of particular interest was involvement in translational research, the varying levels of which (T1 through T4) are described in Table 3.

**Table 3. Translational Research Definitions**

<b>Research Type</b>	<b>Translating To</b>	<b>Description</b>
T1	Humans	The translation of new understandings of disease mechanisms gained in the laboratory into the development of new methods for diagnosis, therapy, and prevention, and their initial testing in proof-of-concept studies in humans.
T2	Patients	Translation of initial research findings to test initial hypotheses and/or approaches in clinical applications. Encompasses early stage clinical trials through larger scale, multi-center trials.
T3	Practice	Effectiveness, cost effectiveness, and comparative effectiveness studies conducted in practice sites, ensuring the translation of results from clinical studies into clinical practice settings.
T4	Population	Dissemination and implementation research, which identifies and resolves barriers to implementation of evidence-based guidelines into community practice.

Respondents were asked to indicate all of the kinds of research they were engaged in. Translation to patients (T2) was the most common at 41%, closely followed by T1 at 40%. Only 12% of respondents were involved in Community-based (T4) research, and only 3% of respondents indicated not currently conducting or being involved in research as shown in Table 4.

**Table 4. Translational, Pre-Clinical, and Community-Based Research Participation**

	<b>Frequency</b>	<b>Percent (N = 719)</b>
T1	290	40.3
T2	295	41.0
T3	199	27.7
T4	88	12.2
Pre-clinical (experimental models: e.g., cells, animals, biomedical engineering)	247	34.4
Community-based research	89	12.4
Not currently conducting/involved in research	22	3.1

Lastly, the average number of years since obtaining their terminal degree for the 2011 administration was 15.8, with a standard deviation of 10.8. The average number of years for 2013 was 15.7, with a standard deviation of 11.



# Attitudes and Satisfaction with Current Research Collaborations

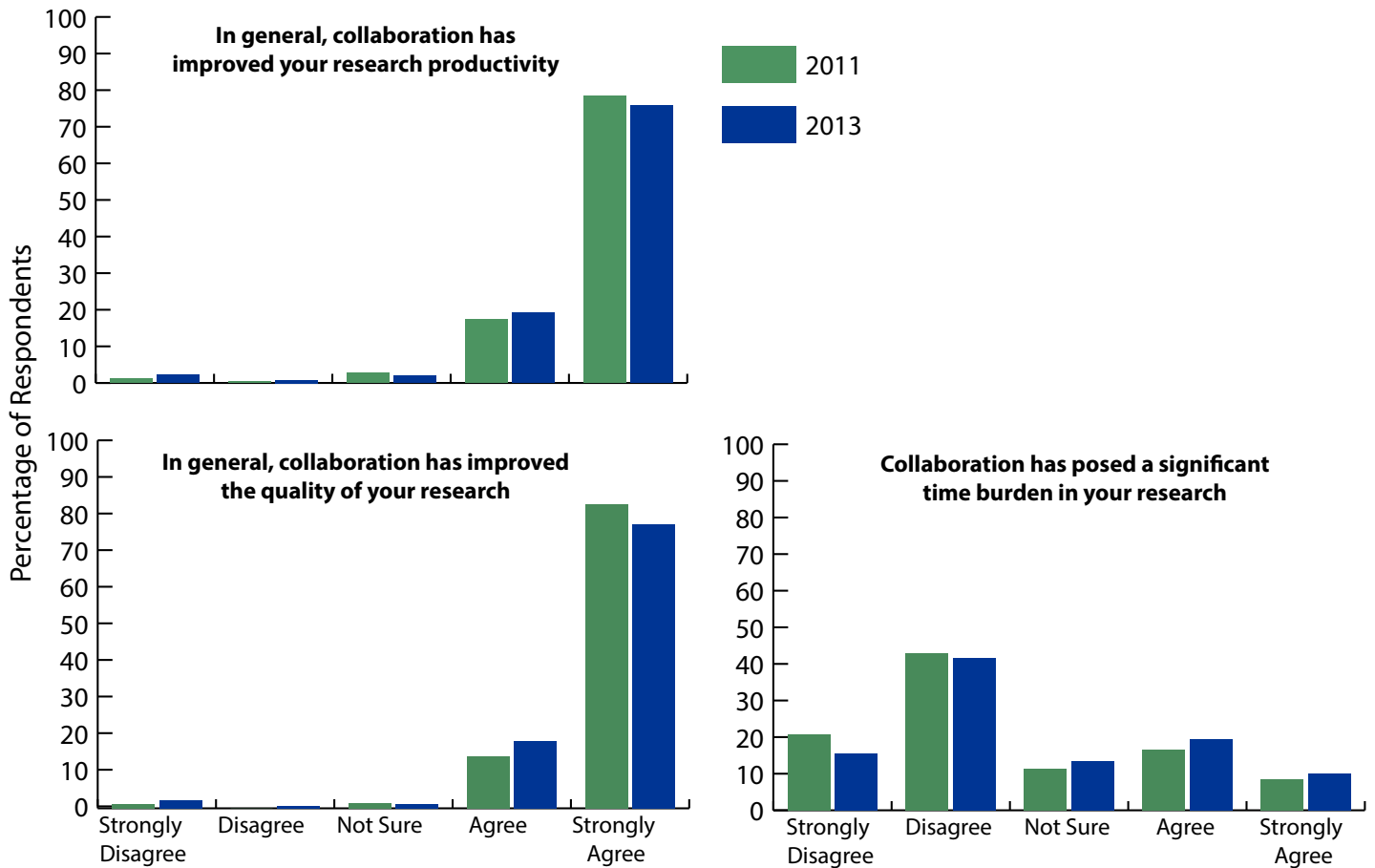
## Views About Impact of Collaborations on Research

Respondents were asked three questions about how collaboration impacts their research, rating each item on a 1 (Strongly Disagree) to 5 (Strongly Agree) scale. Respondents indicated that collaboration generally improved their research productivity and the quality of their research, and did not pose a significant time burden in their research. As shown in Table 5 and Figure 1, this pattern was stable over two years.

**Table 5. Views About Impact of Collaborations on Research Items**

	2011		2013	
	Frequency	Average Rating	Frequency	Average Rating
In general, collaboration has improved your research productivity.	711	4.71	652	4.65
In general, collaboration has improved the quality of your research.	712	4.78	652	4.69
Collaboration has posed a significant time burden in your research.	701	2.49	648	2.67

**Figure 1. Impact of collaboration on research was stable.**



## Quality of Current Research Collaborations

Respondents were asked 11 questions about the overall quality of their current research collaborations, rating each item on a 1 (Inadequate) to 5 (Excellent) scale. As shown in Table 6 and Figure 2, respondents were highly satisfied with their research collaborations, and this pattern was stable over two years.

**Table 6. Quality of Current Research Collaboration Items**

	2011		2013	
	Frequency	Average Rating	Frequency	Average Rating
Acceptance of new ideas among collaborators	707	4.60	649	4.57
Communication among collaborators	710	4.37	649	4.34
Ability to capitalize on the strengths of different researchers	707	4.58	650	4.59
Organization or structure of collaborative teams	689	4.20	635	4.20
Resolution of conflicts among collaborators	554	4.27	536	4.22
Ability to accommodate different working styles of collaborators	683	4.24	623	4.27
Involvement of collaborators from outside Washington University	542	4.26	512	4.24
Involvement of collaborators from diverse disciplines	670	4.39	607	4.39
Productivity of collaboration meetings	692	4.25	628	4.24
Productivity in developing new products (e.g., papers, proposals, courses)	659	4.17	612	4.20
Overall productivity of collaboration	709	4.41	649	4.42

## Views About Transdisciplinary Research

In 2011, participants were asked 15 items assessing their attitudes about transdisciplinary research. In the interest of reducing participant burden for the 2013 administration, this scale was paired down to the four items that best represented four subscales according to the reliabilities from the 2011 responses. These four items can be compared over the two administrations. As shown in Table 7 and Figure 3, participants indicated a strong value for transdisciplinary research.

**Table 7. Views About Transdisciplinary Research Items**

	2011		2013	
	Frequency	Average Rating	Frequency	Average Rating
I tend to be more productive working on my own rather than working as a member of a transdisciplinary research team.	710	2.19	661	2.26
Transdisciplinary research has improved how I conduct research.	696	4.44	646	4.51
I am optimistic that transdisciplinary research among ICTS collaborators will lead to valuable scientific outcomes that could not have occurred without that kind of collaboration.	708	4.55	652	4.58
I believe that the benefits of transdisciplinary scientific research outweigh the inconveniences and costs of such work.	714	4.62	656	4.65

Figure 2. Quality of current research was stable.

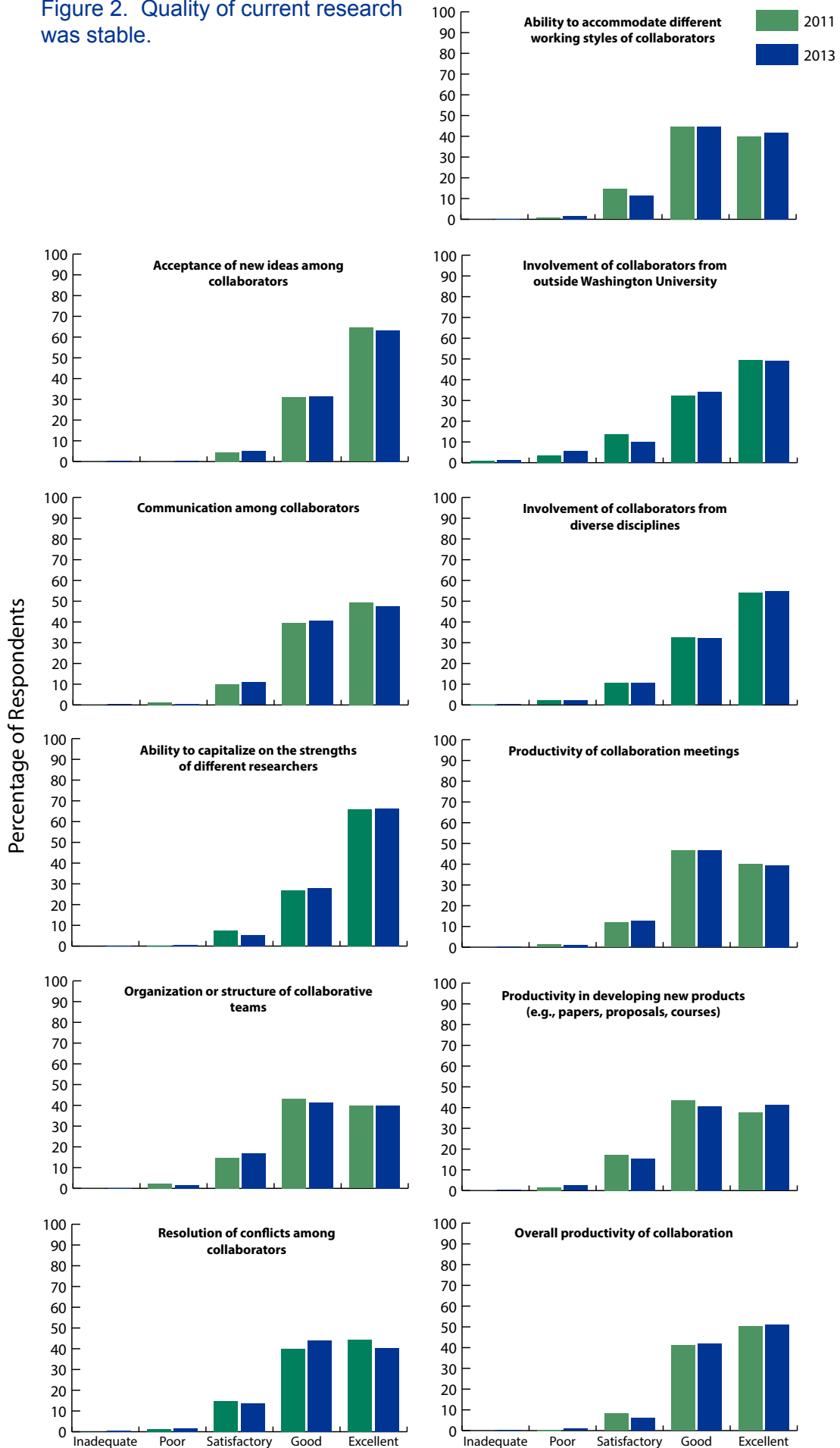
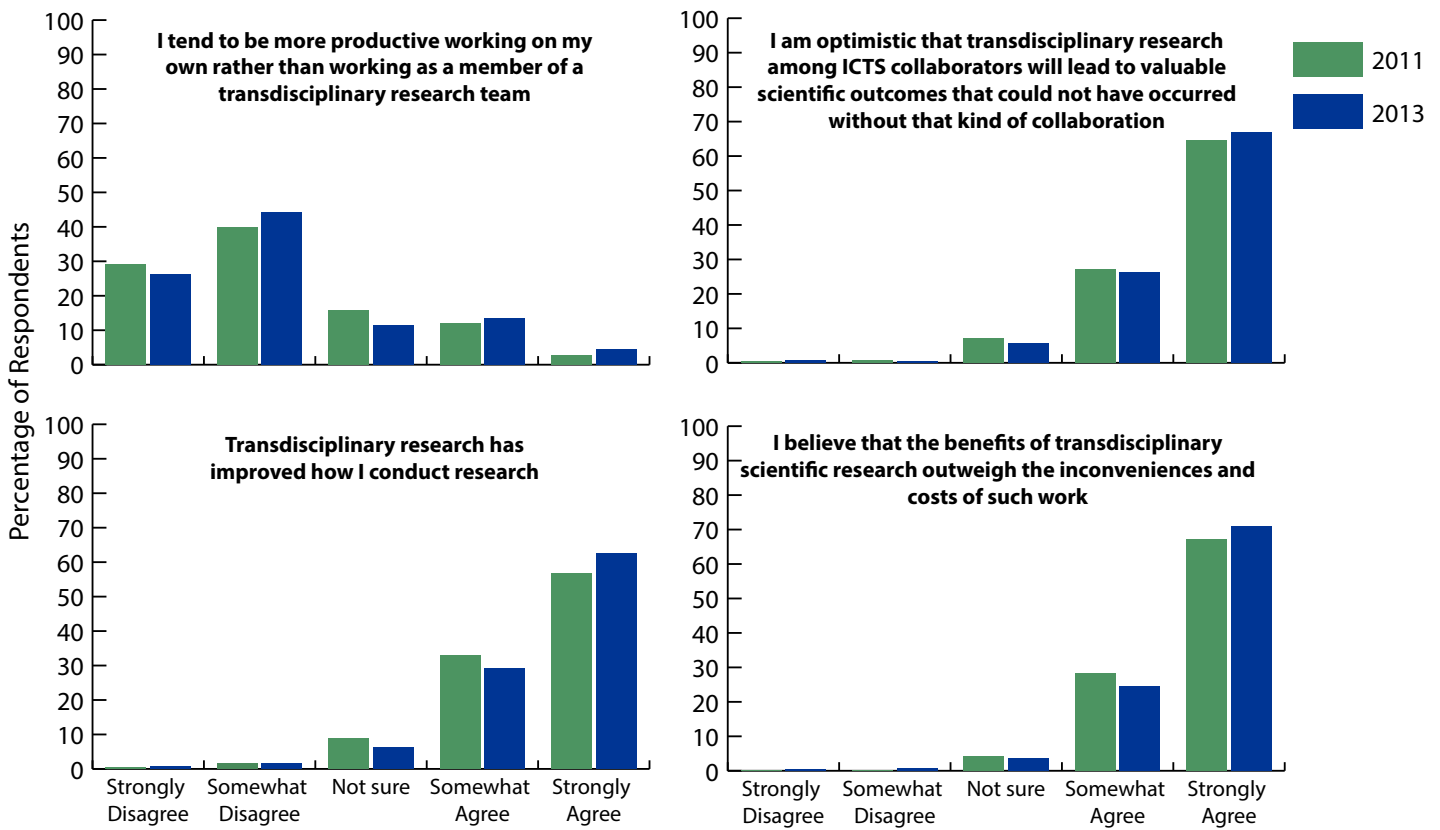


Figure 3. Views about transdisciplinary research.



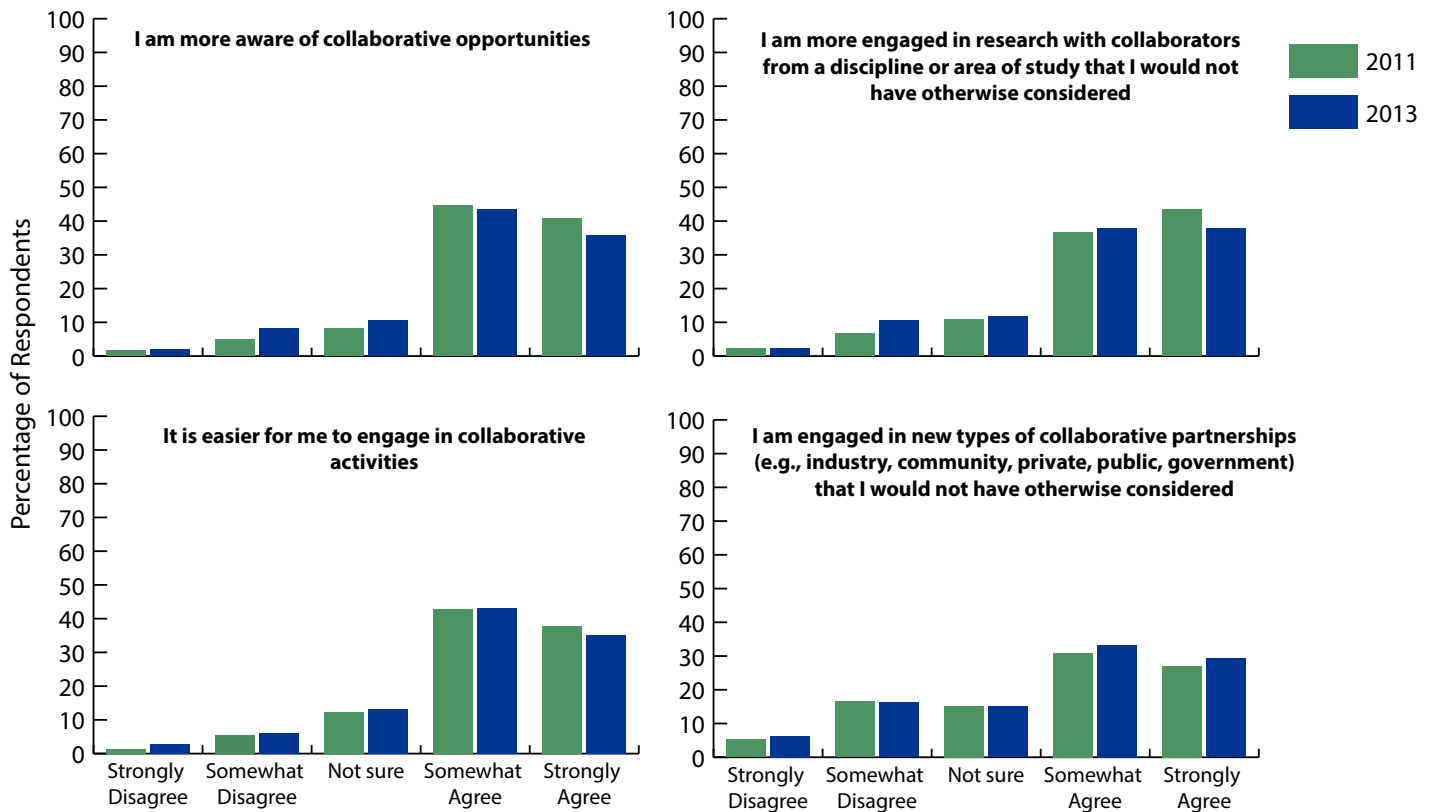
### Change Over Time

In the 2011 administration, participants were asked to evaluate how their collaborative efforts had changed over the past three years, since the beginning of the ICTS grant. In the 2013 administration, they were asked how their efforts had changed over the past two years, since the previous administration. Table 8 and Figure 4 indicate a stable rate of change over the two administrations.

Table 8. Change Over Time Items

	2011		2013	
	Frequency	Average Rating	Frequency	Average Rating
I am more aware of collaborative opportunities.	706	4.19	649	4.03
It is easier for me to engage in collaborative activities.	701	4.10	647	4.02
I am more engaged in research with collaborators from a discipline or area of study that I would not have otherwise considered.	688	4.12	629	3.99
I am engaged in new types of collaborative partnerships (e.g., industry, community, private, public, government) that I would not have otherwise considered.	624	3.68	588	3.63

Figure 4. Change over time.



### Views According to Translational Research Level

Ratings regarding the impact of collaboration on research, quality of current research collaborations, and views about transdisciplinary research from the 2013 administration were compared between researchers at varying levels of translational research. Respondents were classified as Primarily T1 & T2; Primarily T3, T4, Community; or Mixed in the following way:

- Primarily T1 & T2: Indicated participating in T1 or T2 research, and not in T3, T4, or Community-based research
- Primarily T3, T4, Community: Indicated participating in T3, T4, or Community-based research, and not in T1 or T2
- Mixed: Indicated participating in either T1 or T2 research; and in either T3, T3, or Community-based research

Table 9 demonstrates that the means for all of the ratings are consistent by research type.

A summary of views according to whether or not investigators participated in the 2011 assessment is presented in the Appendix.

Table 9. Views Regarding Collaboration by Research Level

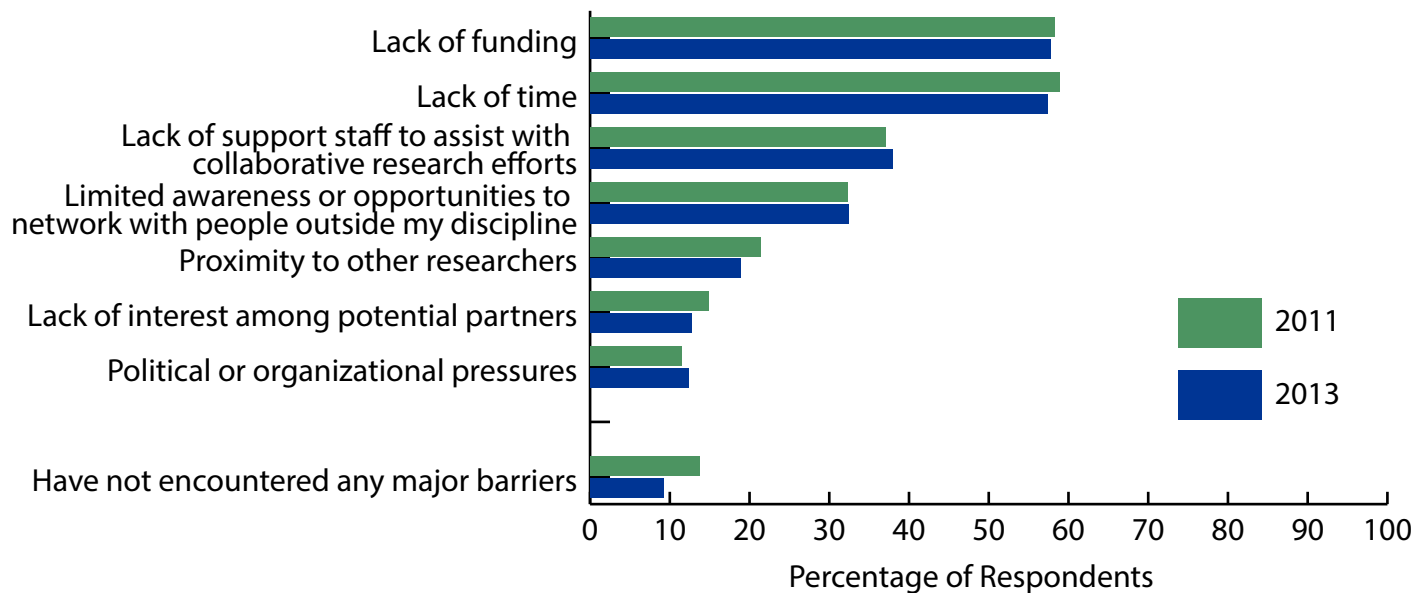
	Primarily T1 & T2		Primarily T3, T4, Community		Mixed	
	Mean	N	Mean	N	Mean	N
<i>Impact of collaboration on research</i>						
In general, collaboration has improved your research productivity.	4.7	312	4.5	127	4.7	128
In general, collaboration has improved the quality of your research.	4.7	311	4.6	128	4.7	128
Collaboration has posed a significant time burden in your research.	2.6	310	2.8	129	2.8	126
<i>Quality of current research collaborations</i>						
Acceptance of new ideas among collaborators	4.6	309	4.5	128	4.6	128
Communication among collaborators	4.3	309	4.4	128	4.4	128
Ability to capitalize on the strengths of different researchers	4.6	309	4.6	127	4.7	129
Organization or structure of collaborative teams	4.1	302	4.2	124	4.4	128
Resolution of conflicts among collaborators	4.2	261	4.2	102	4.3	113
Ability to accommodate different working styles of collaborators	4.2	295	4.3	124	4.4	125
Involvement of collaborators from outside Washington University	4.1	237	4.3	102	4.4	110
Involvement of collaborators from diverse disciplines	4.4	293	4.4	111	4.5	123
Productivity of collaboration meetings	4.2	302	4.2	122	4.3	124
Productivity in developing new products (e.g., papers, proposals, courses)	4.2	299	4.1	112	4.3	122
Overall productivity of collaboration	4.4	309	4.4	128	4.5	128
<i>Views about transdisciplinary research</i>						
I tend to be more productive working on my own rather than working as a member of a transdisciplinary research team.	2.3	313	2.3	129	2.1	129
Transdisciplinary research has improved how I conduct research.	4.5	308	4.5	123	4.6	129
I am optimistic that transdisciplinary research among ICTS collaborators leads to valuable scientific outcomes that would not occur without that kind of collaboration.	4.7	308	4.5	126	4.7	129
I believe that the benefits of transdisciplinary scientific research outweigh the inconveniences and costs of such work.	4.7	310	4.5	129	4.8	128
<i>How collaborative efforts have changed past 2 years</i>						
I am more aware of collaborative opportunities.	4.1	306	4.0	129	4.0	125
It is easier for me to engage in collaborative activities.	4.1	307	4.0	128	4.1	125
I am engaged in new types of collaborative partnerships (e.g., industry, community, private, public, government) that I would not have otherwise considered.	3.7	275	3.6	118	3.8	123
I am more engaged in research with collaborators from a discipline or area of study that I would not have otherwise considered.	4.1	297	3.8	122	4.1	125

## Barriers

The survey also asked respondents what barriers they have encountered when trying to establish

research collaborations with investigators from other departments, institutions, and organizations. Lack of time and lack of funding were the most frequently cited barriers for both years as shown in Figure 5.

Figure 5. Barriers encountered when trying to establish research collaborations.



## Additional Feedback

Respondents were asked to provide any additional feedback that could be helpful for program planning. Major themes included a desire for 1) help finding appropriate collaborators and 2) training in collaborative skills.

Respondents expressed a desire for a formal mechanism to identify potential collaborators within the ICTS. Many respondents suggested a directory of all ICTS members and his or her ongoing research interests and willingness to collaborate. Respondents also presented the possibility for a matching database that would pair researchers based on shared interests and introduce them. Researchers believed being introduced through ICTS would decrease the time needed to find potential collaborators and increase the potential for collaborations. These issues are at least partially addressed by the public availability of the ICTS member directory found on the ICTS web site: <http://icts.wustl.edu/icts-researchers/about/member-directory>. This directory is searchable by name and

research interest, which are collected from investigators themselves when signing up for membership. If investigators are thorough when completing this information, the directory will be useful in facilitating collaboration. A relatively new feature that members may not be aware of is the ability to update their membership information; updating their research interests on a regular basis will facilitate collaboration as their careers evolve. Since facilitating collaboration is one of the primary goals of ICTS, this directory should be more widely promoted.

In addition, respondents recommended further training in how to work in teams comprised of researchers with various backgrounds. Researchers found collaboration to require increased interpersonal communication skills that had not been included in formal training. Greater promotion of Clinical Research Training Center (CRTC) programs and plain-language resources that facilitate cross-discipline communication would address this issue.

## Recommendations

- Increase the time interval between collaboration survey administrations from two years to five years, given the low response rate and consistency of responses.
- Promote the ICTS membership directory to facilitate greater collaboration among investigators seeking out new research partners.
- Promote the Clinical Research Training Center as well as other training activities whose goal it is to facilitate cross-disciplinary collaboration.

## Summary

Responses from the collaboration survey indicate consistency regarding the value of collaboration to research, quality of their current collaborations, and the importance of transdisciplinary research.

- Results from this survey tell the same story as the 2011 administration.
- More than 80% of respondents agreed that collaboration improved their research productivity and quality.
- Respondents were generally positive about their current collaborations, with at least half indicating all aspects of collaboration as “Good” or “Excellent.” For example, 66% of respondents rated their ability to capitalize on the strengths of different researchers as “Excellent.”
- Views of transdisciplinary research were favorable, with 91% of respondents indicating they at least somewhat agreed that transdisciplinary research improved how they conducted research.
- Most researchers generally agreed that they were more aware of collaborative opportunities, were better able to engage in collaborative opportunities, and were more engaged with collaborators from other disciplines than they were two years ago.
- About 40% of respondents indicated participating in research translating clinical results to humans (T1) and to patients (T2). Only 12% of respondents indicated participating in community-based research.
- Lack of time and funding were identified as the most frequent barriers to collaboration, both by about 60% of respondents.



## Appendix

### Participation Rates

The participation rate was much lower for the 2013 administration than for the 2011 administration, despite the offer of similar material incentives. A similar drop in rates has also been observed in other ICTS Tracking & Evaluation surveys. In order to determine if this was the result of changes in participation by a particular group of membership, rates for 2011 and 2013 were compared by institution, position, and academic rank as indicated by the membership database. Indications of who participated in 2011 are approximate due to member identification numbers not being recorded for the 2011 administration, and are based on network data that were separated from the rating results. Only investigators who were ICTS members for both

administrations were included in the participation rate analyses (e.g. those who left ICTS by the 2013 were no longer considered members, and were not included in the calculations). Percentages for all tables indicate the percent of eligible respondents within each membership group.

Table A1 demonstrates rates by institution, with the percent within the institution that participated in 2011 but not 2013 highlighted in yellow. Although the highest percentages are from BJC HealthCare and SLU, these institutions have a small number of ICTS members, so even small fluctuations in participation result in what appear to be large percentage changes. Given that WUSTL is the physical home of ICTS, it is notable that less than half of the eligible membership (42%) participated in both administrations of the survey, and more than a third (34%) participated in the first administration but not the second.

Table A1. Participation Rates Over Time by Institution

	Participated in 2011 and 2013		Participated in 2011 but not 2013		Participated in 2013 but not in 2011		Never participated, is a current member	
	N	%	N	%	N	%	N	%
Washington University in St. Louis	327	42.0%	265	34.1%	37	4.8%	149	19.2%
Southern Illinois University Edwardsville	2	33.3%	1	16.7%	0	0.0%	3	50.0%
Saint Louis University	16	24.6%	25	38.5%	5	7.7%	19	29.2%
University of Missouri St. Louis	3	21.4%	5	35.7%	0	0.0%	6	42.9%
St. Louis College of Pharmacy	2	9.5%	8	38.1%	0	0.0%	11	52.4%
BJC HealthCare	1	6.7%	6	40.0%	1	6.7%	7	46.7%
Other	0	0.0%	1	25.0%	1	25.0%	2	50.0%
Missing	0	0.0%	0	0.0%	1	100.0%	0	0.0%
<b>Total</b>	<b>351</b>	<b>38.8%</b>	<b>311</b>	<b>34.4%</b>	<b>45</b>	<b>5.0%</b>	<b>197</b>	<b>21.8%</b>

Table A2 demonstrates rates by position, illustrating that just over a third of faculty members (33.4%) participated in 2011 but not in 2013.

Table A3 demonstrates rates by rank, which shows a relatively even attrition rate among Assistant Professors, Associate Professors, and Professors near 30%.

Table A2. Participation Rates Over Time by Position

	Participated in 2011 and 2013		Participated in 2011 but not 2013		Participated in 2013 but not in 2011		Never participated, is a current member	
	N	%	N	%	N	%	N	%
Faculty Member	328	40.9%	268	33.4%	41	5.1%	165	20.6%
Post-Doctoral Student/ Trainee	15	32.6%	19	41.3%	1	2.2%	11	23.9%
Other	3	15.0%	6	30.0%	2	10.0%	9	45.0%
Pre-Doctoral Student/ Trainee	5	14.7%	17	50.0%	0	0.0%	12	35.3%
Community Physician	0	0.0%	1	100.0%	0	0.0%	0	0.0%
Missing	0	0.0%	0	0.0%	1	100.0%	0	0.0%
<b>Total</b>	<b>351</b>	<b>38.8%</b>	<b>311</b>	<b>34.4%</b>	<b>45</b>	<b>5.0%</b>	<b>197</b>	<b>21.8%</b>

Table A3. Participation Rates Over Time by Academic Rank

	Participated in 2011 and 2013		Participated in 2011 but not 2013		Participated in 2013 but not in 2011		Never participated, is a current member	
	N	%	N	%	N	%	N	%
Assistant Professor	121	45.8%	85	32.2%	12	4.5%	46	17.4%
Instructor	38	44.2%	38	44.2%	0	0.0%	10	11.6%
Associate Professor	78	39.8%	59	30.1%	13	6.6%	46	23.5%
Professor	89	36.3%	80	32.7%	15	6.1%	61	24.9%
Missing	23	22.8%	42	41.6%	4	4.0%	32	31.7%
Other	2	16.7%	7	58.3%	1	8.3%	2	16.7%
<b>Total</b>	<b>351</b>	<b>38.8%</b>	<b>311</b>	<b>34.4%</b>	<b>45</b>	<b>5.0%</b>	<b>197</b>	<b>21.8%</b>

## Views According to Participation in 2011

Ratings for the 2013 administration were compared between those who participated in 2011 and those who did not participate in 2011. (Comparing the 2011 and 2013 scores for those who participated in both was not possible due to member identification numbers not being recorded for the 2011 administration.) Table A4 demonstrates the consistency of ratings between those who did and did not participate in 2011.

**Table A4. Views Regarding Collaboration by 2011 Participation**

	Participated in 2011		Did not Participate in 2011	
	Mean	N	Mean	N
<i>Impact of collaboration on research</i>				
In general, collaboration has improved your research productivity.	4.7	342	4.6	307
In general, collaboration has improved the quality of your research.	4.7	343	4.6	306
Collaboration has posed a significant time burden in your research.	2.8	341	2.6	305
<i>Quality of current research collaborations</i>				
Acceptance of new ideas among collaborators	4.6	343	4.5	303
Communication among collaborators	4.4	342	4.3	304
Ability to capitalize on the strengths of different researchers	4.7	344	4.5	303
Organization or structure of collaborative teams	4.3	338	4.1	294
Resolution of conflicts among collaborators	4.3	286	4.2	247
Ability to accommodate different working styles of collaborators	4.3	331	4.2	289
Involvement of collaborators from outside Washington University	4.3	270	4.2	239
Involvement of collaborators from diverse disciplines	4.4	330	4.4	274
Productivity of collaboration meetings	4.3	333	4.2	292
Productivity in developing new products (e.g., papers, proposals, courses)	4.2	333	4.2	276
Overall productivity of collaboration	4.5	343	4.4	303
<i>Views about transdisciplinary research</i>				
I tend to be more productive working on my own rather than working as a member of a transdisciplinary research team.	2.2	344	2.4	314
Transdisciplinary research has improved how I conduct research.	4.5	339	4.5	304
I am optimistic that transdisciplinary research among ICTS collaborators leads to valuable scientific outcomes that would not occur without that kind of collaboration.	4.6	340	4.6	309
I believe that the benefits of transdisciplinary scientific research outweigh the inconveniences and costs of such work.	4.7	344	4.6	309
<i>How collaborative efforts have changed past 2 years</i>				
I am more aware of collaborative opportunities.	4.0	343	4.1	303
It is easier for me to engage in collaborative activities.	4.0	343	4.0	301
I am engaged in new types of collaborative partnerships (e.g., industry, community, private, public, government) that I would not have otherwise considered.	3.6	321	3.7	264
I am more engaged in research with collaborators from a discipline or area of study that I would not have otherwise considered.	4.0	339	4.0	287