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Highlights of Membership Data

FY 2011-2012

IUCRC Evaluator's Meeting

June 7, 2013

Denis Gray, Olena Leonchuk, Lindsey McGowen &

Sarah DeYoung

North Carolina State University



Membership Report Data

- 2011-12 Data
 - Type of members
 - Multiple center members
- Membership Trends Over Time
 - Overview of factors affecting Membership
 - Total membership trends
 - By type member
 - Net Gain/Loss
 - Turnover
 - Dwell time



Take Home Message

- Tracking “membership” is important because it may be the most important measure of success for centers and the IUCRC program
- But...
 - We need to be very careful in interpreting changes in membership overtime



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What about the composition of IUCRC membership?



Membership Summary

	Count	Percent
Total memberships	1093	100%
Industry: large firms (500 + employees)	569	51.97%
Industry: small firms (< 500 employees)	282	25.80%
US Government: Federal	137	12.63%
US Government: State or local	50	4.57%
Non-Profit	28	2.56%
Other	27	2.47%
Number of organizations with memberships	739	--

Membership: Organizations with the Most Memberships



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# of Memberships	Organizations
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31	Army	* = New to this list
28	Air Force	
21	Boeing	
20	DoE	
13	Lockheed Martin	
12	GE , Raytheon	
11	NASA	
10	Intel	
8	Navy, DoD	
7	GM, IBM, Northrop Grumman	
6	National Instruments, Honda, Honeywell, Cisco*, NSA, Qualcomm, Samsung*	
5	DHS*, SAIC, Texas Instruments*, Huawei*	

Membership: Organizations with the Most Memberships Over Time



1995		2000		2005		2011	
N	Name	N	Name	N	Name	N	Name
10	Dow Chem.	10	Motorola	17	DoE	31	Army
9	DuPont	9	Army	13	Army	28	Air Force
8	3M, Motorola, Ford	8	Lucent Tech., DoE	10	Boeing	21	Boeing
7	General Motors	7	Boeing, IBM, Honeywell	8	Intel, Air Force	20	DoE
6	Amoco, Boeing, Texas Inst.	6	Daimler Chrysler	7	Raytheon, HRL, DoD	13	Lockheed Martin
--	--	5	Ford	6	Honeywell, Navy	12	GE, Raytheon
--	--	--	--	5	Dow Chem., Siemens	11	NASA
--	--	--	--	--	--	10 5	Intel, Navy, DoD, GM, SAIC, Honda, IBM, Northrop Grumman, Cisco, NSA, Samsung, DHS, Texas Inst., Huawei, Honeywell, Qualcomm, Nat'l Inst.



Dropped: Dow Chem., DuPont, 3M, GM, Amoco, Texas Inst., EPA, Navy

Motorola, Lucent Tech., IBM, Daimler Chrysler, Ford

Dow Chem., HRL, Siemens

New: Lucent Tech., IBM, Honeywell, Daimler Chrysler, DoD

Intel, Air Force, Raytheon, HRL Labs, Dow Chem., Siemens, Navy

GM, Lockheed Martin, NASA, IBM, GE, NG, NSA, SAIC, Honda, Qualcomm, NI, Navy, DoD, Samsung, Huawei, Cisco, DHS, Texas Inst.

Government Members



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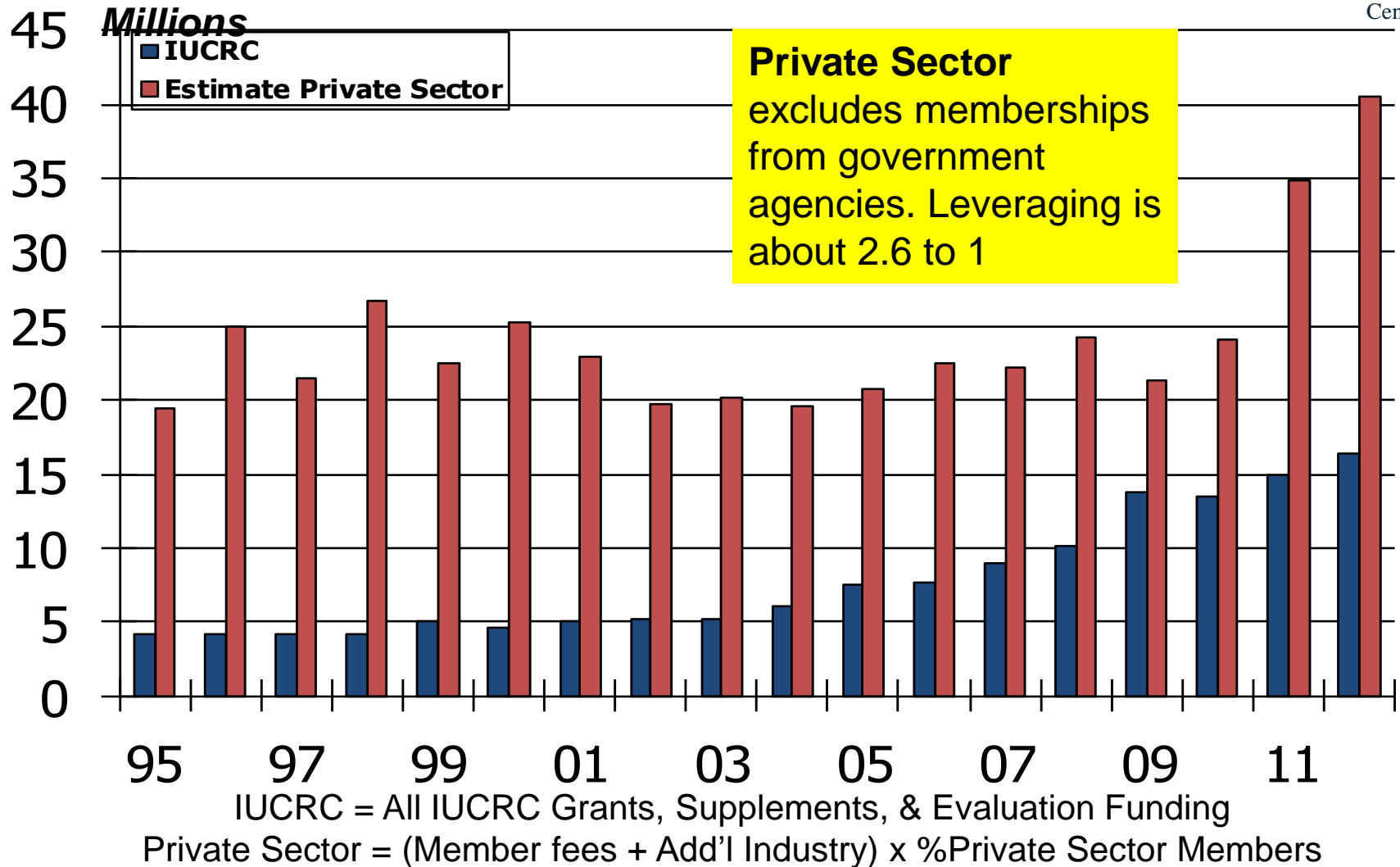
188 memberships, 73 organizations (17.2% of all memberships)

- Air Force Research Lab
- Arizona Department of Environmental Quality
- Arizona Public Service
- Arkansas Electric Cooperative Corporation
- Arkansas Power Electronics International
- Arkansas Public Service Commission
- Army
- Austin Energy
- Ben Franklin Technology Partners of Southern Pennsylvania
- Bonneville Power Administration
- Bureau of Land Management, Eugene District Office
- Bureau of Reclamation
- California Association of Sanitation Agencies
- Cameron, Texas
- Central Arizona Project
- CIA - Wideband Beamformers
- City of Austin
- City of Glendale
- City of Houston
- City of Peoria
- City of Peoria
- City of Phoenix
- City of Tucson Water
- CMRM Directorate, DoD
- County Sanitation Districts of Los Angeles
- Dept. of Homeland Security (DHS)
- DoD
- DoE
- Federal Bureau of Investigation
- Georgia Trauma Commission
- Idaho Department of Lands
- Idaho National Laboratory, Idaho
- IME A*STAR
- Industrial Technology Research Institute
- John Deere Phoenix International
- King County/Northwest Biosolids Management Assoc
- Knolls Atomic Power Laboratory
- Laurea, Ltd/Univ
- Mid Ohio Regional Planning Commission
- Milwaukee Metropolitan Sewerage District
- Montana Department of Transportation
- Montana Deptment of Natural Resources and Conservation
- NASA
- National Highway Traffic Safety Administration
- National Institute for Occupational Safety and Health (NIOSH)
- National Institute of Standards & Technology
- National Oceanographic & Atmospheric Administration
- National Renewable Energy Lab
- National Renewable Energy Lab
- National Security Agency
- Navy
- New York Power Administration
- North Central Texas Council of Governments (NCTCOG)
- NYSERDA
- Oklahoma Transportation Center
- Orange County Sanitation District
- Oregon Department of Forestry
- PA Department of Community and Economic Development (DCED)
- Pima County Regional Wastewater Reclamation Department
- Purdue Univ. Forestry & Natural Resources
- Quinault Dept. Natural Resources
- Salt River Project
- San Diego Gas and Electric
- Santa Clara Valley Water District
- SENAI-CETA
- State of Hawaii Energy Office
- Tennessee Valley Authority
- Texas Department of Transportation
- Town of Brookhaven
- TTI
- USDA
- Washington State Department of Natural Resources
- West Virginia Department of Transportation

NSF IUCRC and Estimated Private Sector Funding



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Understanding Membership Changes Over Time

Interpreting Membership Changes Over Time

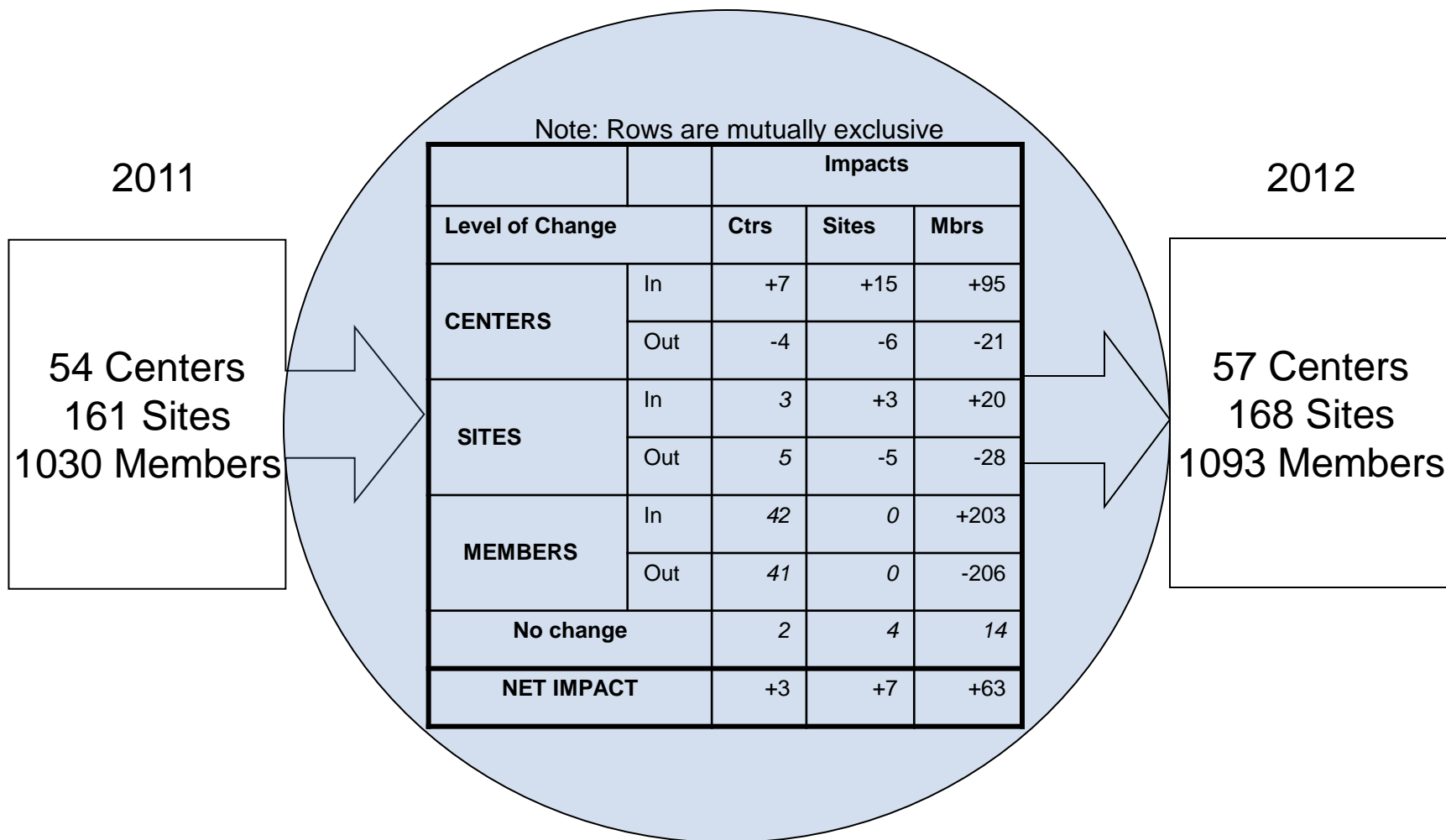


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- Changes in membership numbers over time are influenced by changes at different levels:
 - Members: Individual members will leave a center and new members will be added.
 - Centers: mature centers will graduate (and their members will be dropped) and new centers will be created (and their members added).
 - Recently, graduated centers have re-emerged as Phase 3 centers
 - Sites: Generally speaking, new sites are added to existing centers but not always
- Changes in program total and average can be due to any combination of these factors.
 - Totals are particularly unstable



2012 IUCRC System Changes

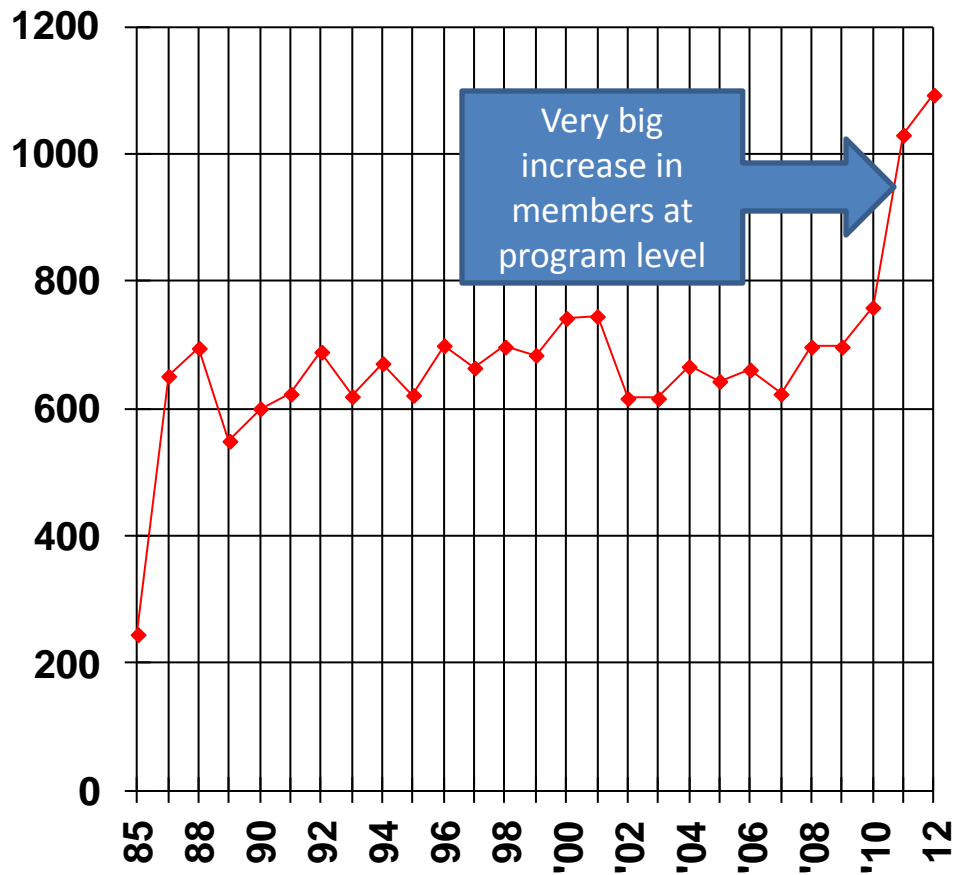


Industrial Memberships by Year

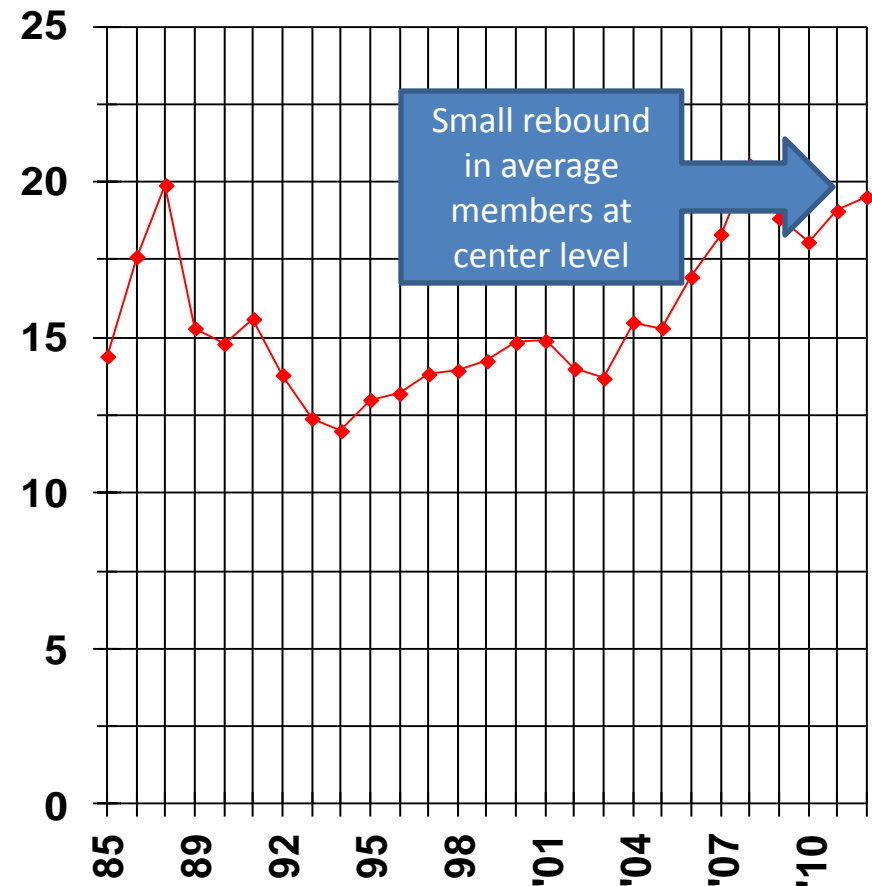


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Total Number of Members

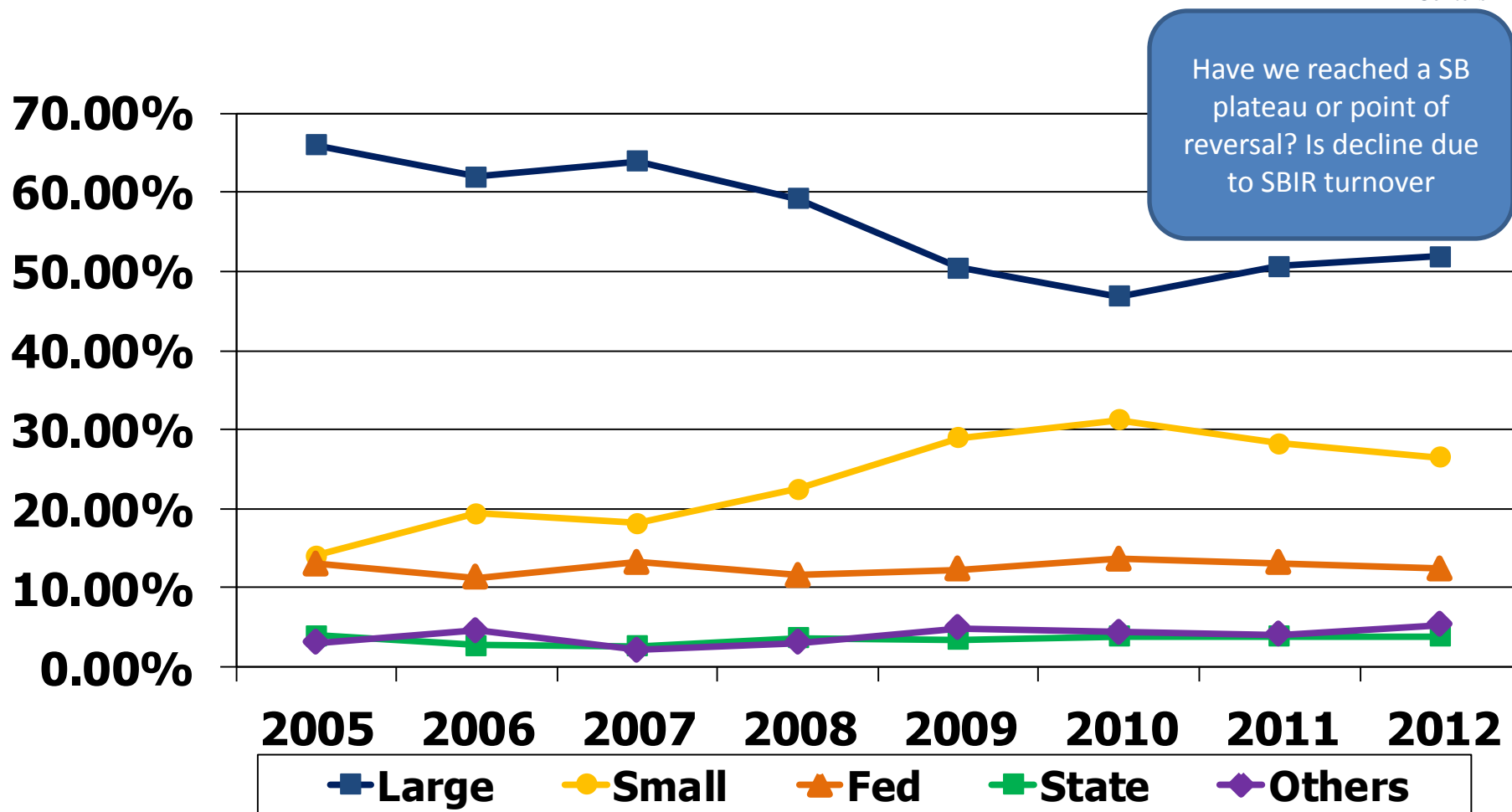


*Average Number of Members
per Center*





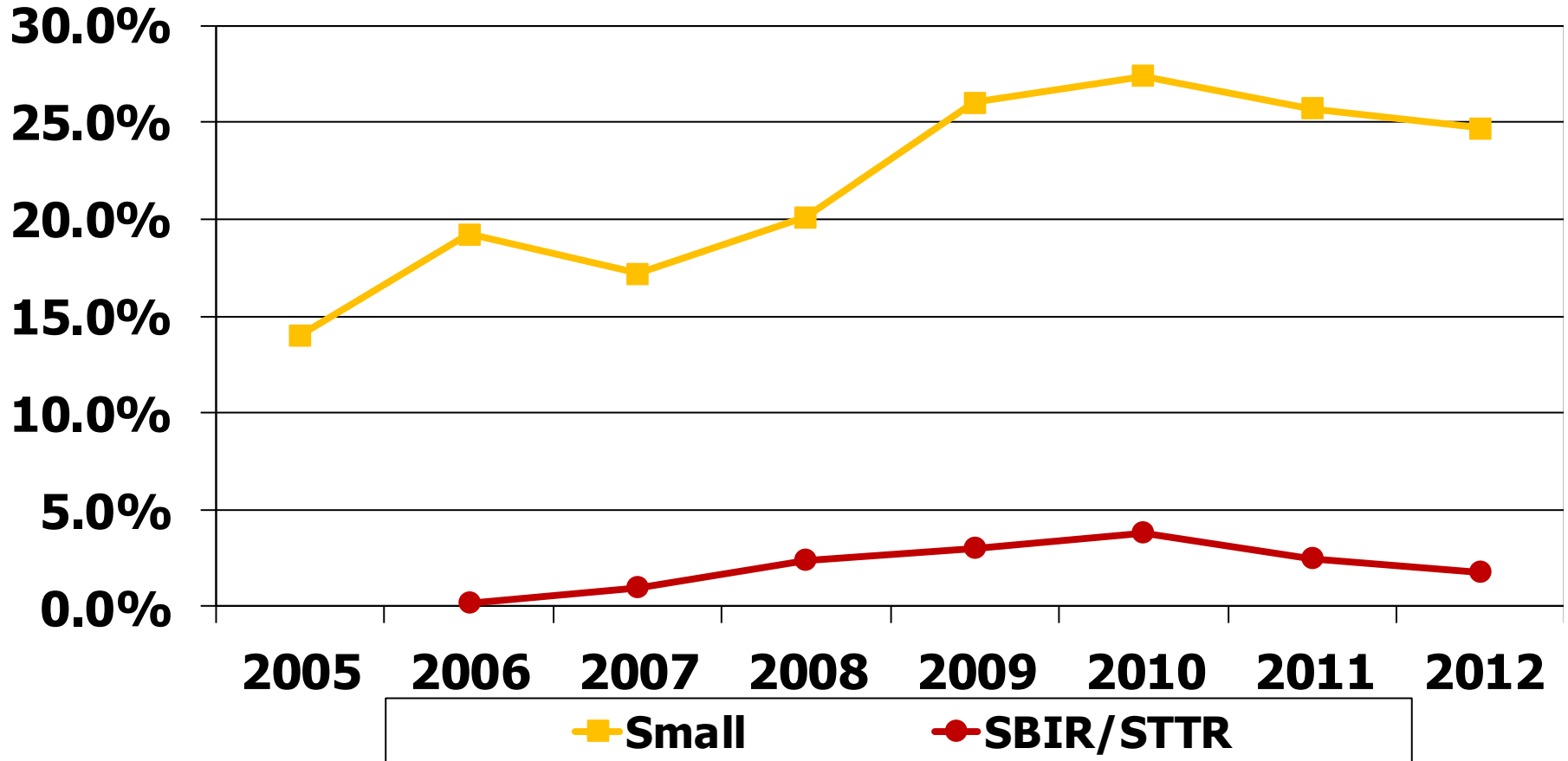
Member Composition 2005-2012



Have we reached a SB plateau or point of reversal? Is decline due to SBIR turnover

^ Categories comprising Others include: non-profit, non-US government, and other organization
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Member Composition 2005-2012: Small & SBIR/STTR Only

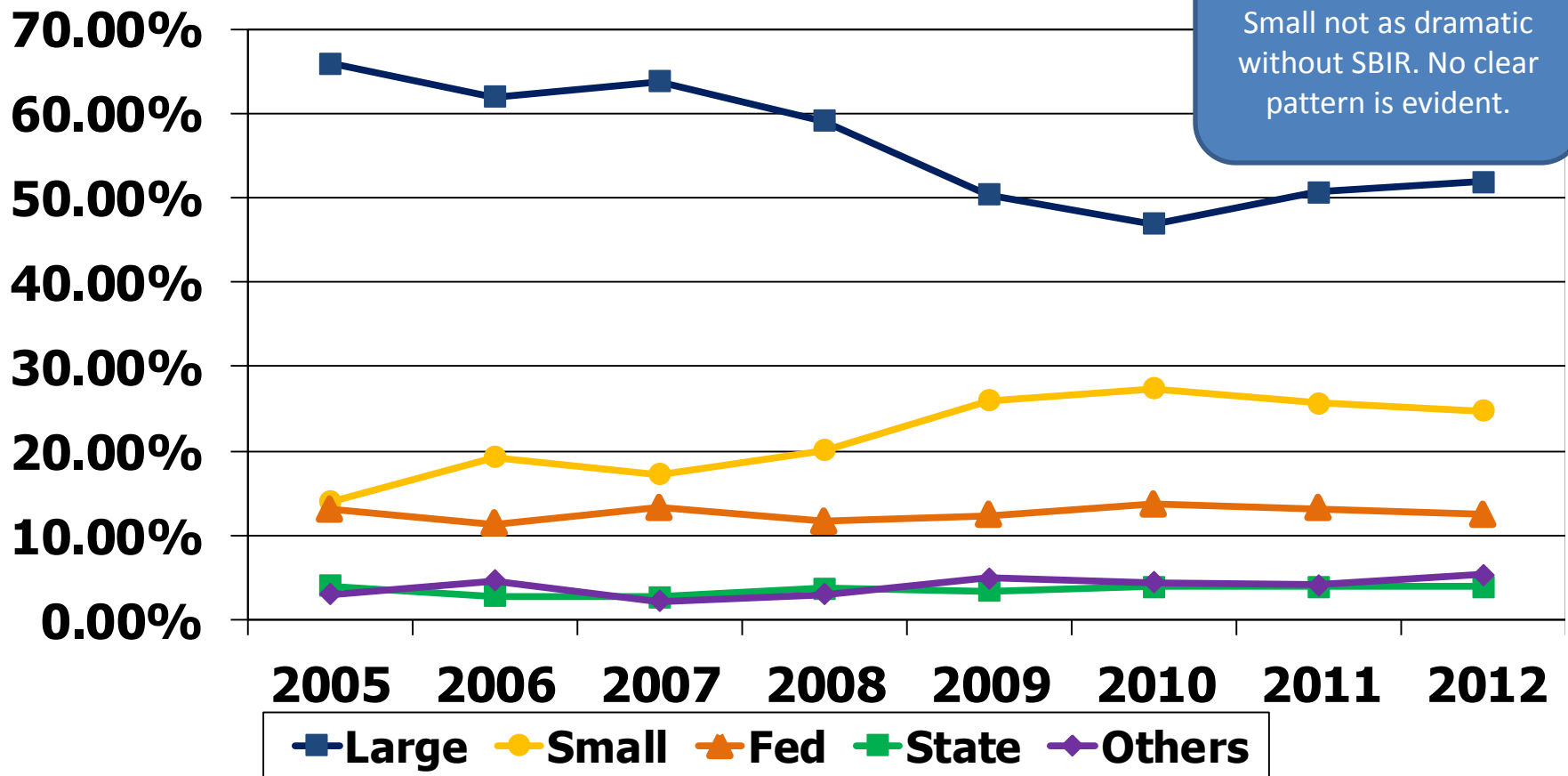


^ Categories comprising Others include: non-profit, non-US government, and other organization
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Member Composition 2005-2012: SBIR/STTR Removed



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Growth and decline of Small not as dramatic without SBIR. No clear pattern is evident.

■ Large ● Small ▲ Fed ■ State ◆ Others

^ Categories comprising Others include: non-profit, non-US government, and other organization
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Evaluating Membership Indices



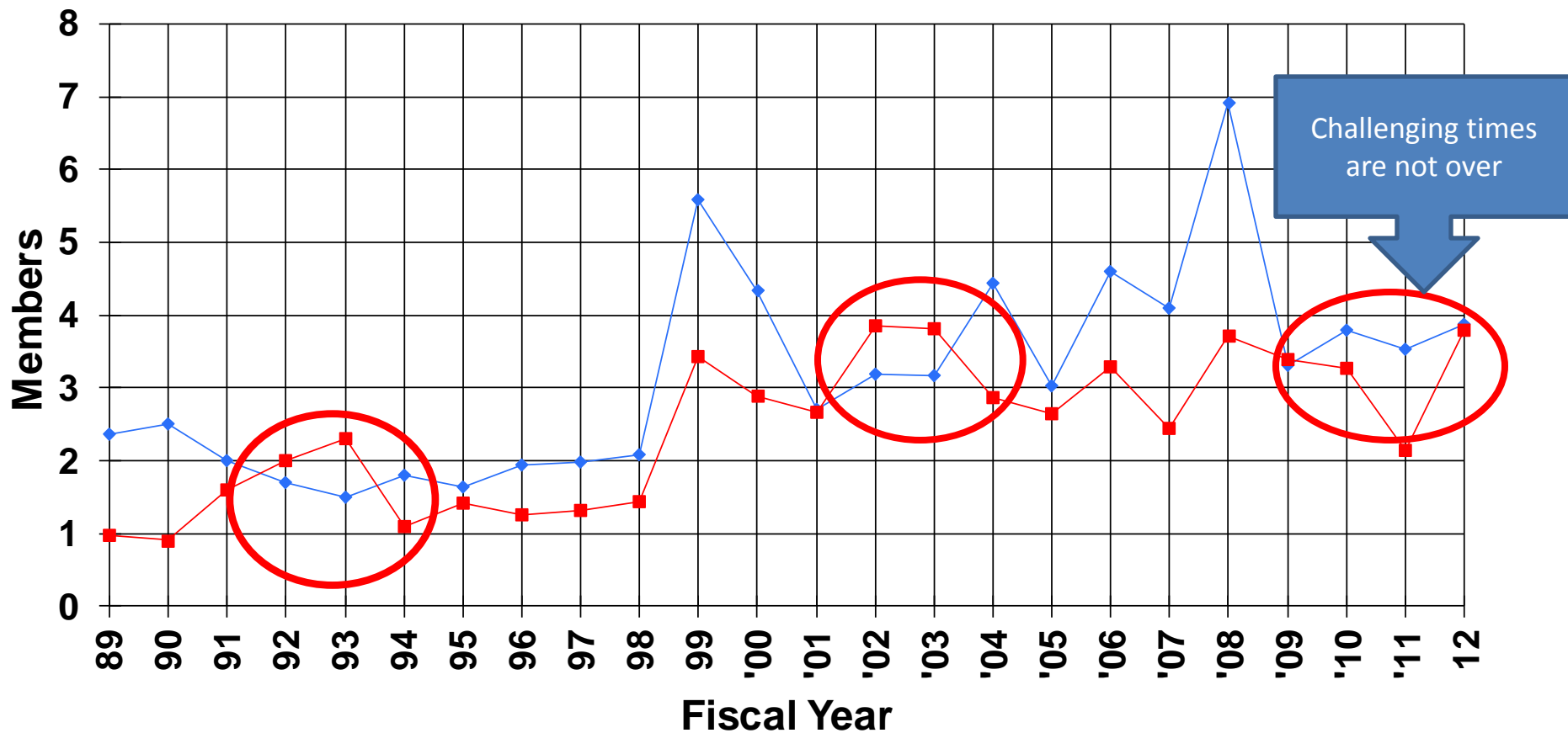
Membership Variables and Indicators

- **Members added:** number of members center reports adding during past year (may include new individual members or members from added site)
 - Does not include addition of new centers
- **Members left:** number of members a center reports leaving the center during past year (would only include site-level loss if site left center)
- **Member Net Gain/Loss:** the relative gain or loss of members (members added – members left) centers experience during each calendar year
- **Member Turnover:** percentage of a center's members from year x that leave the center the following year ($\text{year } x + 1$)
- **Member Dwell Time:** Number of continuous years an organization remains a member after joining a center



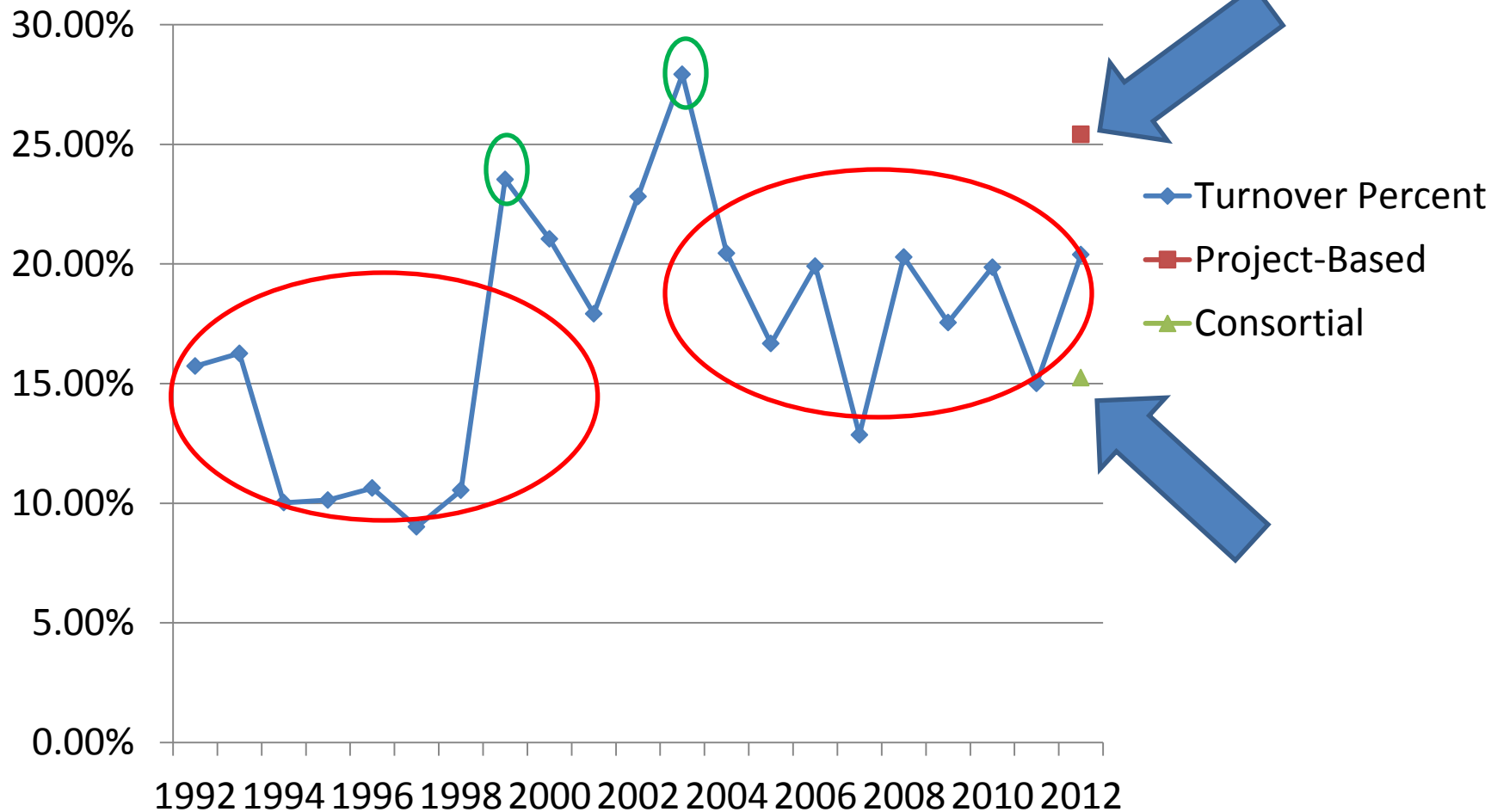
Average Center Membership Gain/Loss

◆ Members Added this FY ■ Members Left this FY





Member Turnover Rate – New Normal



Turnover % = Members terminated in year X+1 / Total members in year X

Member Turnover by N of Sites and Membership Fee

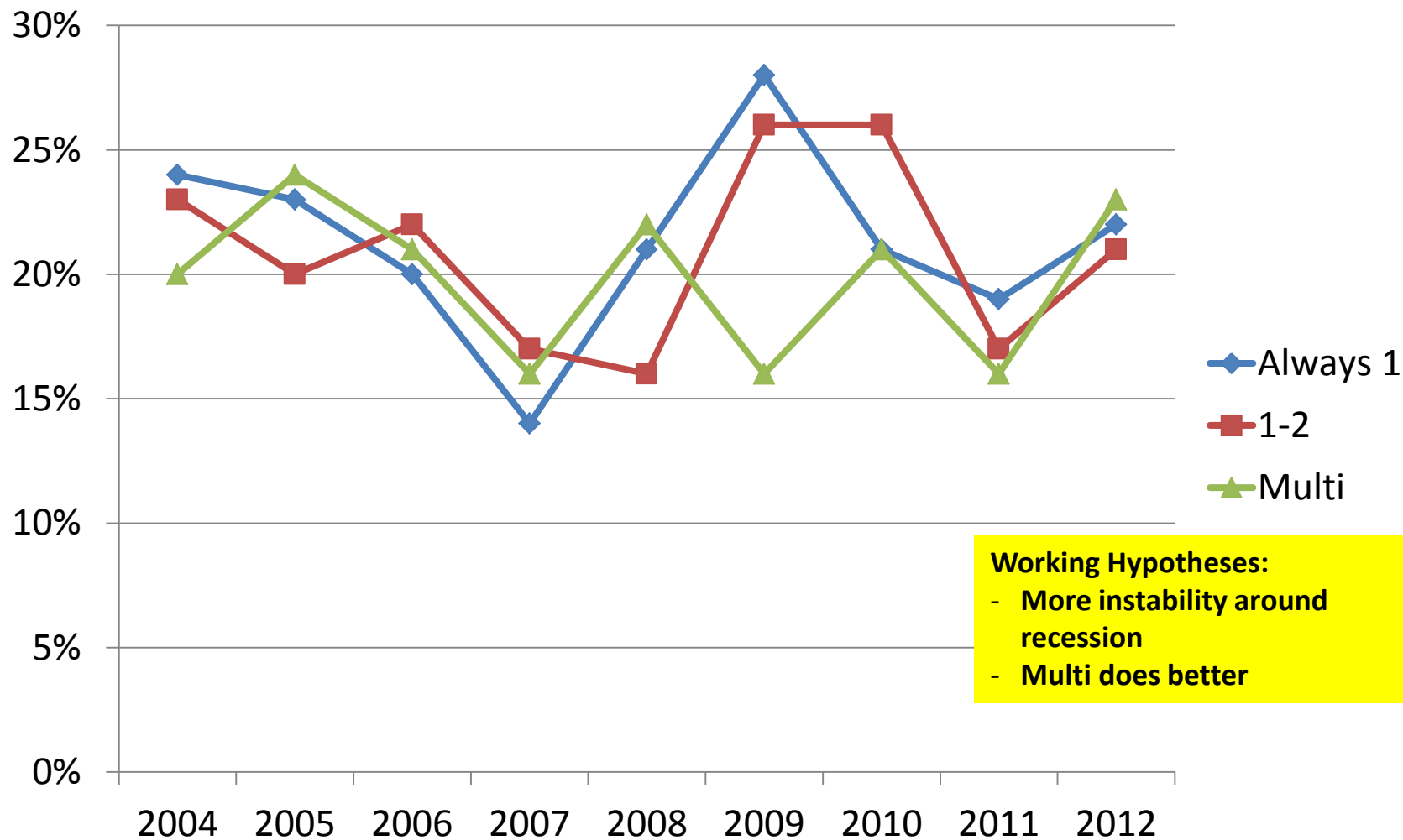


- Center Level of Analysis
 - Structural data on centers' number of sites and I/UCRC membership fees were used to classify centers into the following groups:
 - **Based on N of Sites**
 - Group 1: Always single-site (N=16)
 - Group 2: Always two-site or one-to-two-site (N=12)
 - Group 3: Multi-site (N=17)
 - **Based on Primary Fee***
 - Group 1: 30K or less (N=13)
 - Group 2: 31K - 49K (N=18)
 - Group 3: 50K or more (N=13)

*One outlier was excluded because fees ranged from 25K to 35K over the years.



Turnover Rate by N of Sites





Turnover Rate by Membership Fee





Conclusions: Turnover

- Member turnover is becoming an increasingly big challenge for IUCRCs
 - Longitudinal data on membership turnover shows increased percentage of members leaving in recent years
- Possible explanations are:
 - Internal:
 - More Centers opting for a project-based mode of operation
 - External: New Normal
 - Globalization or development of communication technologies create more alternatives for companies.
 - Periodic recessions making memberships unstable



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Dwell Time Analyses

How long do companies maintain a membership?

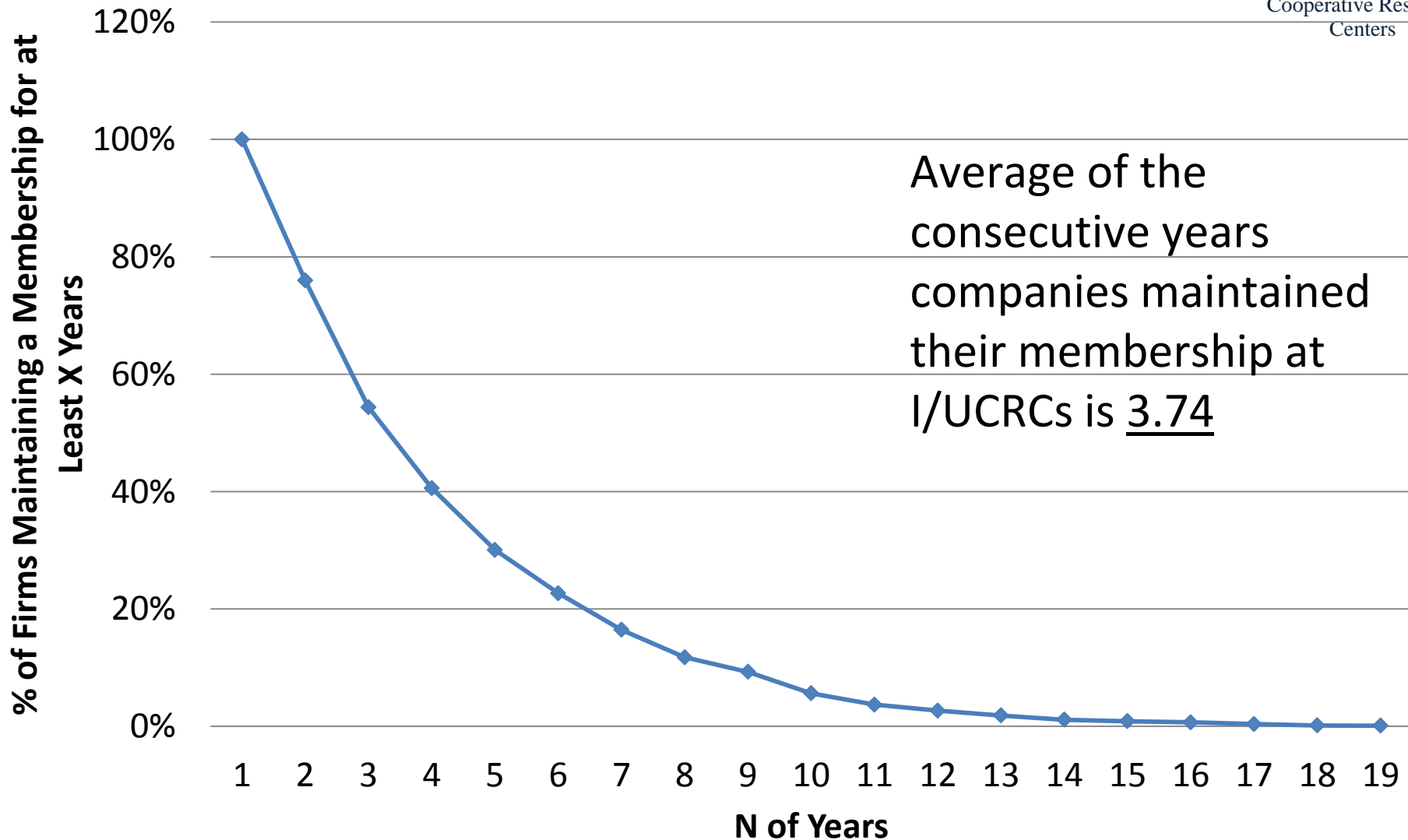


Method

- Member Level of Analysis
- Sampling & Time Period
 - Centers that started between 1992 and 2001 and that had at least 9 years of NSF support (collection of data)
 - Members of these centers between 1992 and 2011
- Procedure
 - Combine data from archival membership database (1992-2006) and the latest membership data from 2007-2011
 - Assign an individual numeric code for each member
 - Calculate years of continuous membership for each organization
 - Classify members into 7 categories:
 1. Large Industry (>500 employees)
 2. Small Industry (<500 employees)
 3. Government (non-US)
 4. Government (US Federal)
 5. Government (US State/Local)
 6. Non-Profit
 7. Other Organization [unidentified organizations]



Member dwell time



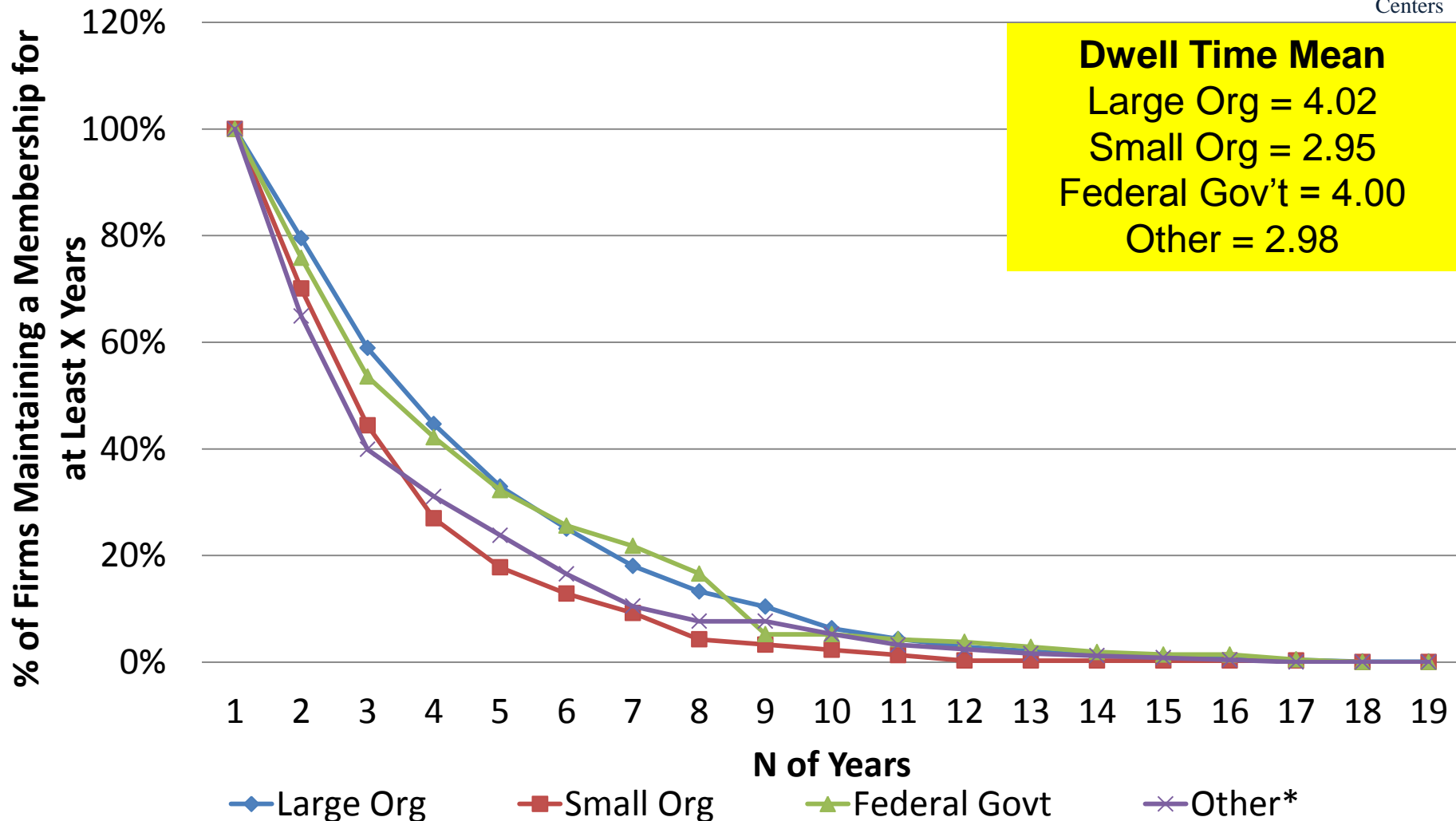
Predictor Variables: Type Organization

- Total 2121 individual memberships were identified from which:
 - Large Industry – 64% ($N=1358$)
 - Small Industry – 14% ($N=304$)
 - Gov't (U.S. Federal) – 10% ($N=201$)
- Remaining categories combined (Other) due to low N:
 - Gov't (U.S. State/Local) – 2% ($N=44$)
 - Gov't (non-US) – 1% ($N=20$)
 - Non-Profit – 5% ($N=96$)
 - Other Organization – 4% ($N=85$)

Member dwell time by Type of Organization



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Member Dwell Time by Org. Type

Results of an ANOVA indicate that Large and Federal members have significantly longer dwell times than do Small or Other members. Organization type accounts for 2% of the variance in member dwell time

	Member Type				<i>F</i>	η^2
	Large Mean(SD)	Small Mean(SD)	Federal Mean(SD)	Other Mean(SD)		
Dwell Time	4.02(.08) _a	2.95(.17) _b	4.00(.20) _a	2.98(.19) _b	17.24*	.02

*Note: * $p \leq .01$. Means with differing subscripts are significantly different at the $p \leq .01$ based on Tukey-Kramer post hoc comparisons for unequal cell sizes.*

Survival analysis coming soon...

Member Dwell Time by N of Sites and Membership Fee



- Member Level Analysis: Conducted HLM to determine if center level characteristics (Fee, N of Site) impacted member-level dwell time
- Center Level Analysis: Conducted ANOVA to determine if center level characteristics (Fee N or Site) impacted mean center dwell time for center members

All analyses were non-significant



Limitations

- Missing years in membership data – imputed data
- Maddening variations in member names to reconcile
- Sample issues: exclude centers with less than 9 years data
- Different start and end years of the NSF funding that determines data collection by the NC State evaluation team



Conclusion and a caution ...

- Membership is dynamic
 - Program level picture positive based on significant growth in new centers and lots of sites
 - Center-level picture looks stable; loss of members has rebounded again
 - Turnover continues at a higher plateau
 - Percentage of small firms has stopped growing and may have plateaued or may be ...
 - No due to SBIR effect
- Causal factors are hard to pin down
 - Turnover
 - Economic recessions: losses and instability
 - Consortial > One-on-one
 - Economy interaction effect with membership and N of sites?
 - Dwell time:
 - Large and Federal > Small businesses and Other
- Explanations probably reside with other center level variables like leadership, technology salience



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Discussion and Suggestions



Conclusions: Dwell Rate

- Multiple indicator strategy for dwell rate
 - Percentage maintaining membership steadily declines over time
 - Average Dwell Rate = 3.8 years
 - Average member stays 32% of possible years
 - No discernible pattern by year members started membership (1993-2008)
- Additional analysis at the member (by Organization Type) and center (by N of Sites and Primary Fee) levels
 - Large businesses, the U.S. Federal and State/Local government tend to have higher average dwell time than other types of members
 - Centers with higher membership fees tend to have members with lower dwell rate