



Industry/University
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Current and Former IUCRC Directors' Recommendations to the NSF, Social Capital, and Innovation Capacity

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Objectives for today

- Summarize recommendations to the NSF made by current/former IUCRC directors to improve experiences of new directors (*not necessarily to impact the innovation capacity of the broader system*).
- Organize recommendations into a lifecycle framework.
- Look at the IUCRC program through a ‘human and social capital’ lens.
- Organize some existing metrics around human and social capital and economic outcomes.



The larger study

Goal

To determine the professional trajectory and achievements of CRC directors and extent to which these outcomes can be attributed to their CRC experience and training.

Data sources for this deck

- Responses to open-text items from a survey with current and former IUCRC directors
 - Impact of the program on their careers
 - Recommendations to the NSF for preparing new directors
 - General comments about their experiences in the program
- Semi-structured interviews with select current and former IUCRC directors
- Responses from a focus group with IUCRC directors
- Anecdotal accounts

Refresher:

What directors do and with whom



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Knowledge, Skills, Abilities

- Leading or managing diverse teams
- Securing financial support for new ventures and activities
- Developing a broad research strategy or road map
- Championing ideas and projects with higher level administrators
- Managing budgets and allocating financial resources
- Navigating bureaucratic processes and procedures

Networks

- Researchers in US industry
- Faculty researchers in U. S. universities and in government labs
- University administrators and support offices
- Faculty researchers within and outside their department or program
- Researchers who reside in nations other than the U.S.
- Students they supervise inside/ outside their lab



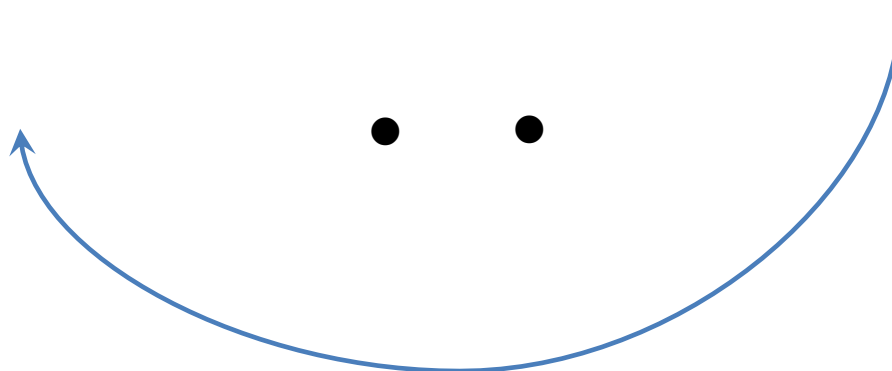
Recommendations from directors

1- Training & Mentoring

- Management
- Leadership

2- Infrastructure support

- Funding





1- Training

“It is very difficult for a tenured faculty person to understand and subsequently effectively manage an IUCRC center.” - survey respondent

“Becoming a facilitator. Becoming someone who brings faculty and industry together. Becoming a lawyer all the time. Being a tech transfer officer. Becoming a contracts and grants negotiator...”
-Focus group member

“Important to get training in inter-personal relationships within the university and outside it. Also how to work in the political arena.”
- survey respondent

“One of the things that my industry partners did for me that was the most valuable in that particular circumstance was that they engaged me in a lot of the leadership training at their organizations. They saw that the universities don't provide a lot of leadership training to their young leaders and they were appalled.”
-Interviewee



Training models

Cognitive model

- Classroom instruction
- Planned curriculum
- Transmission and absorption of ideas
- Know-what

Community of practice

- Situation-based
- Observation and participation
- Learning as a social process
- Know-what and know-how

Adapted from Cox, A. (2005). What are communities of practice? A comparative review of four seminal works. Journal of Information Sciences, 31 (6), pp 527 – 540.



Employee (or Director) Lifecycle

- ✓ Avoid 'bad' hires (and associated costs)
- ✓ Maximize engagement
- ✓ Reduce time to performance
- ✓ Reduce attrition

**Particularly for those with unique and valuable skills*

- Succession planning
- Sustainability



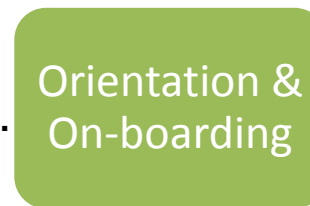
e.



a.

- Faculty
- Universities

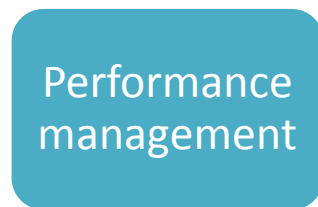
b.



- Bootcamp & other training
- Mentoring

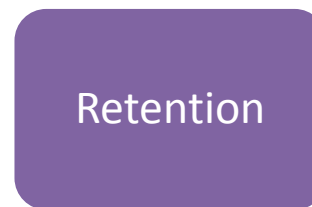
d.

- Engagement
- Continuous improvement



c.

- Infrastructure support
- Policies





a) Recruiting & selection

- Recruiting and informed self-selection
- Realistic job preview – *exactly what am I getting into?*
- Recommendation: Recognize that faculty and their universities vary in their readiness for CRCs, and may require more or less support (e.g., mentoring, guidance, interactions with university administrators) from the NSF.

“Well yeah, I’ve been trying to get out of it from day one. Because I didn’t really... I was not keen to do it because it was extra burden.”
- interviewee

“Delayed advancement to Tenure, based on Academic Elitism -- devaluing Industry-sponsored research.” -survey respondent

“We have seen many problems when untenured and/or lone faculty members try to start and lead a site.”
-survey respondent



b) Orientation & on-boarding

- Industry members have expectations about the director's capabilities
- Recommendation: Provide additional training in the management and leadership of CRCs; Consider a mentoring program to complement classroom training.

“Need excellent leadership skills to move an organization with over 50 researchers in a particular direction when you have no direct supervisory roll with those faculty.” - survey respondent

“Administrative training in general would have been helpful.”
- survey respondent

Some sort of training course on how to navigate things with University administration, how to avoid pits/falls, etc
- survey respondent

c) Retention and d) Performance Management

- Aligning center performance with the program and also with the university's strategic plans and mission
- Recommendation: Greater NSF interaction with university administrators to promote the value of CRCs to the university.

“Urge department heads and deans to reward the director for the contributions to the university's stature, relationships with industry, etc. When I retired I was the lowest paid full professor in the department because basically my university rewards only publications in archival journals. I would have earned more if I had not been a Center Director.”
- survey respondent

“Universities in general do not have a performance plan that encourages faculty to obtain deep industry project skills and thus many faculty remain unaware of the real industry challenges. (To be a good IUCRC director you have to have these skills, but they are not really well rewarded within the tenure system.) **NSF** needs to foster the development of a performance plan (for tenure and promotion) that puts much greater emphasis on practical experience, encourages individuals to move between academia and industry by recognizing contributions across the boundaries.”
-survey respondent



e) Transition

- Recommendation: consider mechanisms to support and encourage continued operations
 - Funds to support succession planning
 - Training/ mentoring for graduated centers.

“The most important thing, I think: if you’re really—if NSF is really interested in producing center that last as long as the technology, as long as the field they’re established in, then you need to get directors thinking on day one about who their successor’s going to be. And that means bringing them into the decision loop.”

- interviewee

“The NSF should have recommendations for the Center / University on how to survive after NSF support ends and how to be a successful center after graduation.”

- survey respondent



2- Infrastructure

- Can be a challenge to get infrastructure support from the university
- Administrative burdens can take away from other engagements
- Recommendation: Increase funding for infrastructure / center operations.

I think talking to [university administrators] about the I/UCRC program is very good, but I'm not sure that it carries much weight when you're telling them that you're going to give them \$50,000 to establish the center. You lose all the credibility—I think if NSF was to do anything, they are to be looking at the I/UCRC and tripling or quadrupling their budget.

- interviewee

“I've delegated major responsibilities to people within that infrastructure in the area of finance, in the area of program management, in the area of IT support, in the area of marketing and communications. You've gotta do that. You don't have the infrastructure; if a center director is looked upon as the person that has to do all work, they're not going to be able to do it.”

- interviewee



Observations & conclusions

- Industry expects strong management and leadership; its what they are used to in their own organizations.
- Many new directors are unprepared for the management and leadership challenges of a director's role.
- The employee lifecycle offers a useful framework considering faculty careers in the IUCRC program.
- IUCRC directors as a community of practice: New directors could benefit from mentoring and situation-based learning as a complement to more formal training.
- The university as a context for an IUCRC may play a moderating role in understanding directors' career satisfaction.
- Additional funding for infrastructure / support is a common recommendation from current/former directors; responding directors suggest 2x-4x current funding is necessary for center operations.



Human & social capital

Human Capital

- Researcher's tacit knowledge, craft knowledge, and know-how^[1]
- Education, training, experience, accomplishments

Social Capital

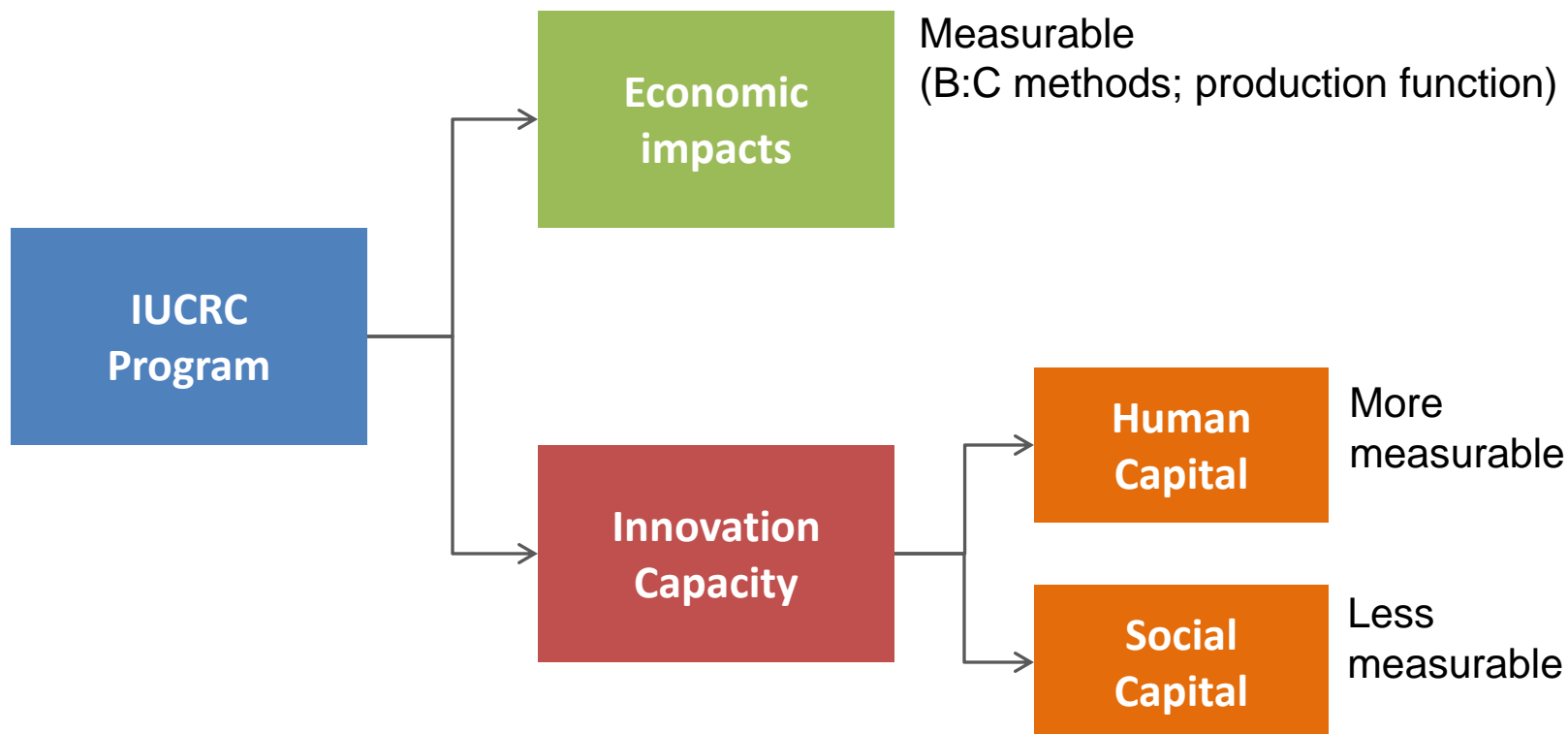
- What scientists draw on to create knowledge ^[1]
- the norms and networks that enable people to act collectively^[2]

[1] Bozeman, Dietz, & Gaughan (1999). Scientific and technical human capital: An alternative model for research evaluation. Paper prepared for presentation at the American Political Science Association, Atlanta, GA.

[2] Woolcock, M. & Narayan, D. (2000). Social capital: Implications for development theory, research, and policy. The World Bank Research Observer, 15 (2), pp 225 – 249.

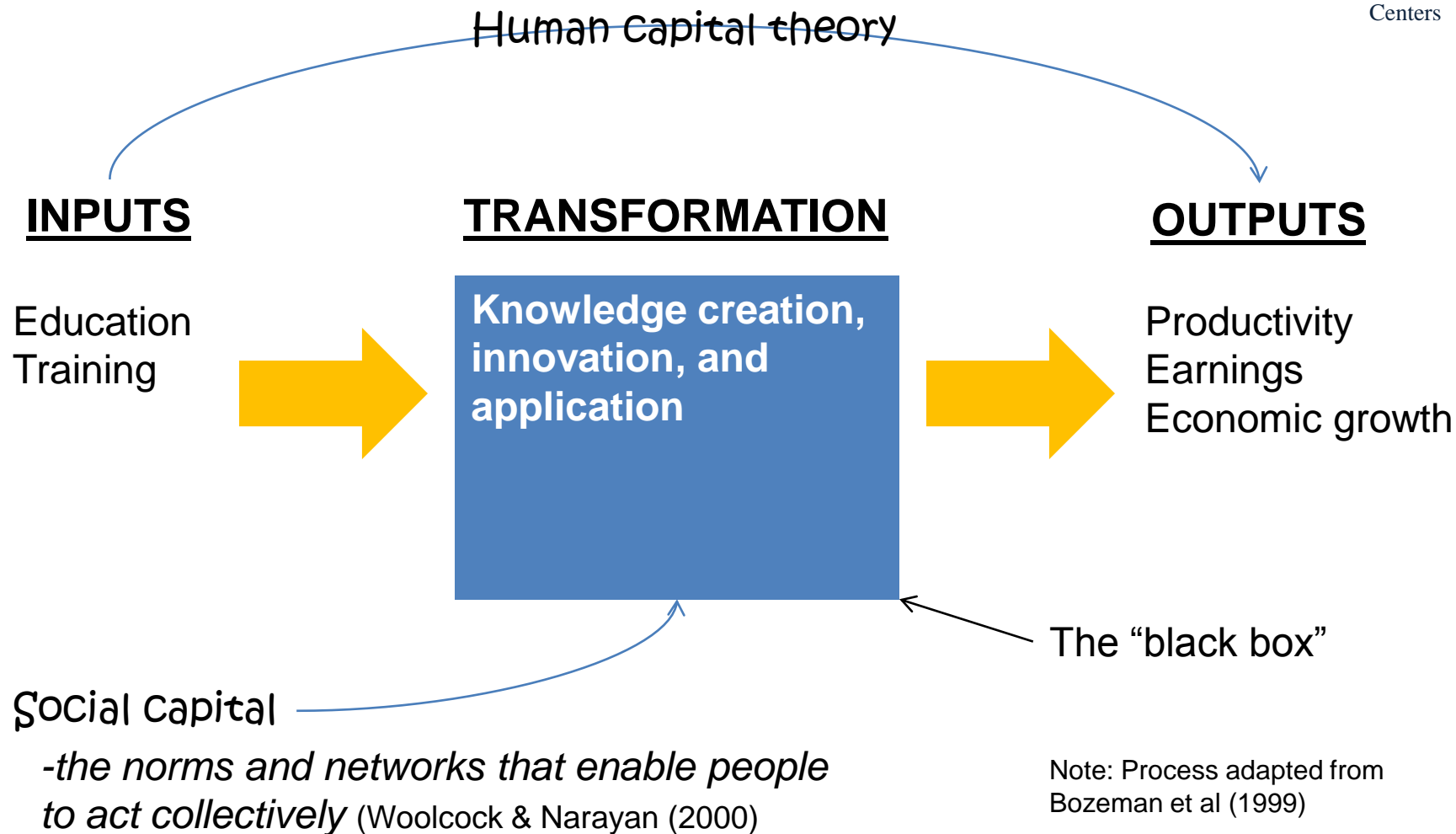


Types of impacts

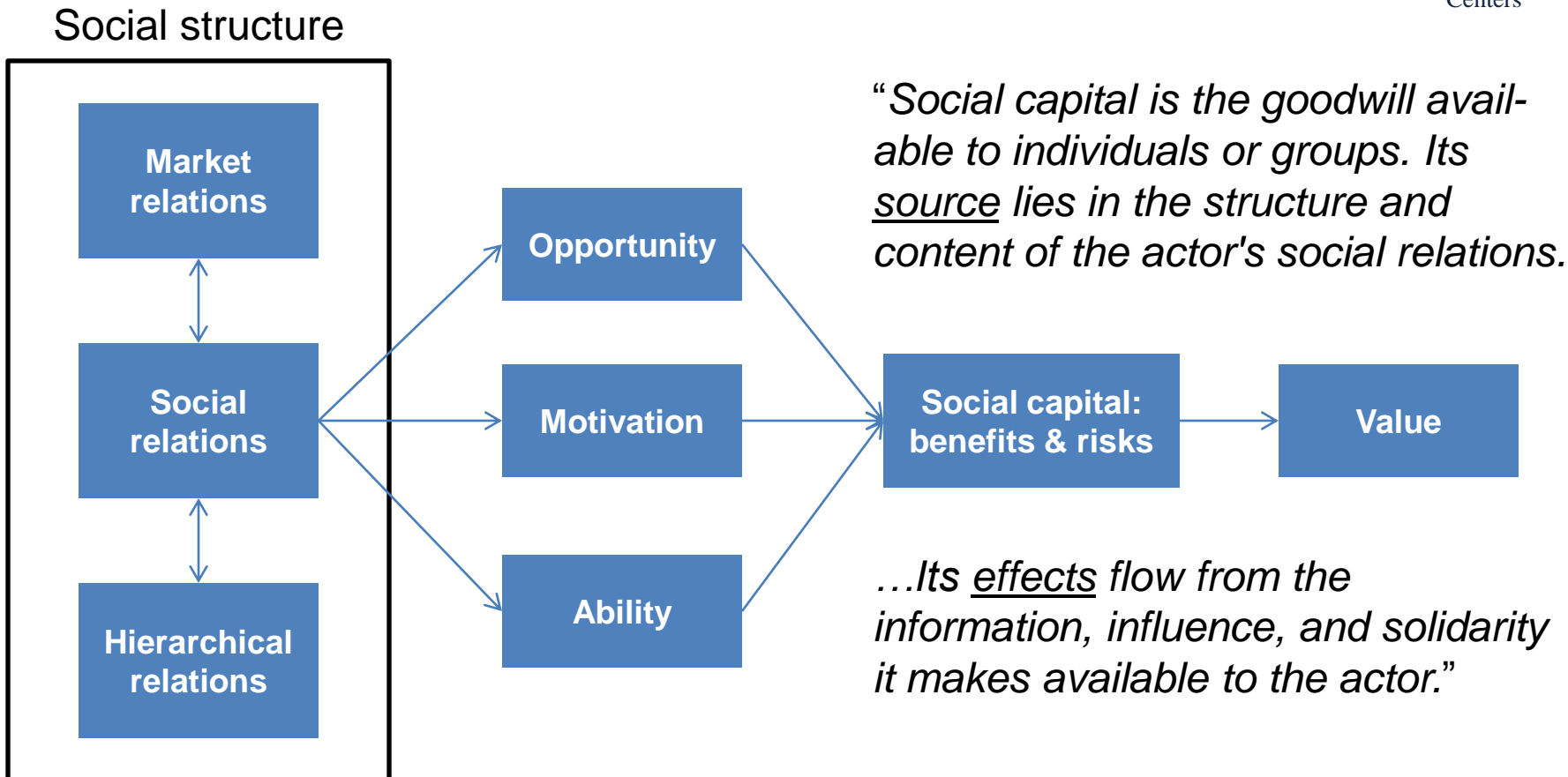




The social component



Sources and effects



Adler, P., & Kwon, S. (2002). Social capital: Prospects for a new concept. The Academy of Management Review, 27 (1), pp 17 – 40.



Human & social capital in action

“Wonderful networking across institutions. Improved visibility within my home institution to garner resources (space and funds) for valuable research and education initiatives.”

- survey respondent

“Well, I think it enabled me to do even more in terms of building industry/university partnerships. And, having been a center director enabled me to speak with authority—if you like—then, I know how to do these things. Okay, so it makes it a lot easier for me to interact with industry, to establish new centers, to work with the faculty, and having the faculty and industry working together.”

-Interviewee

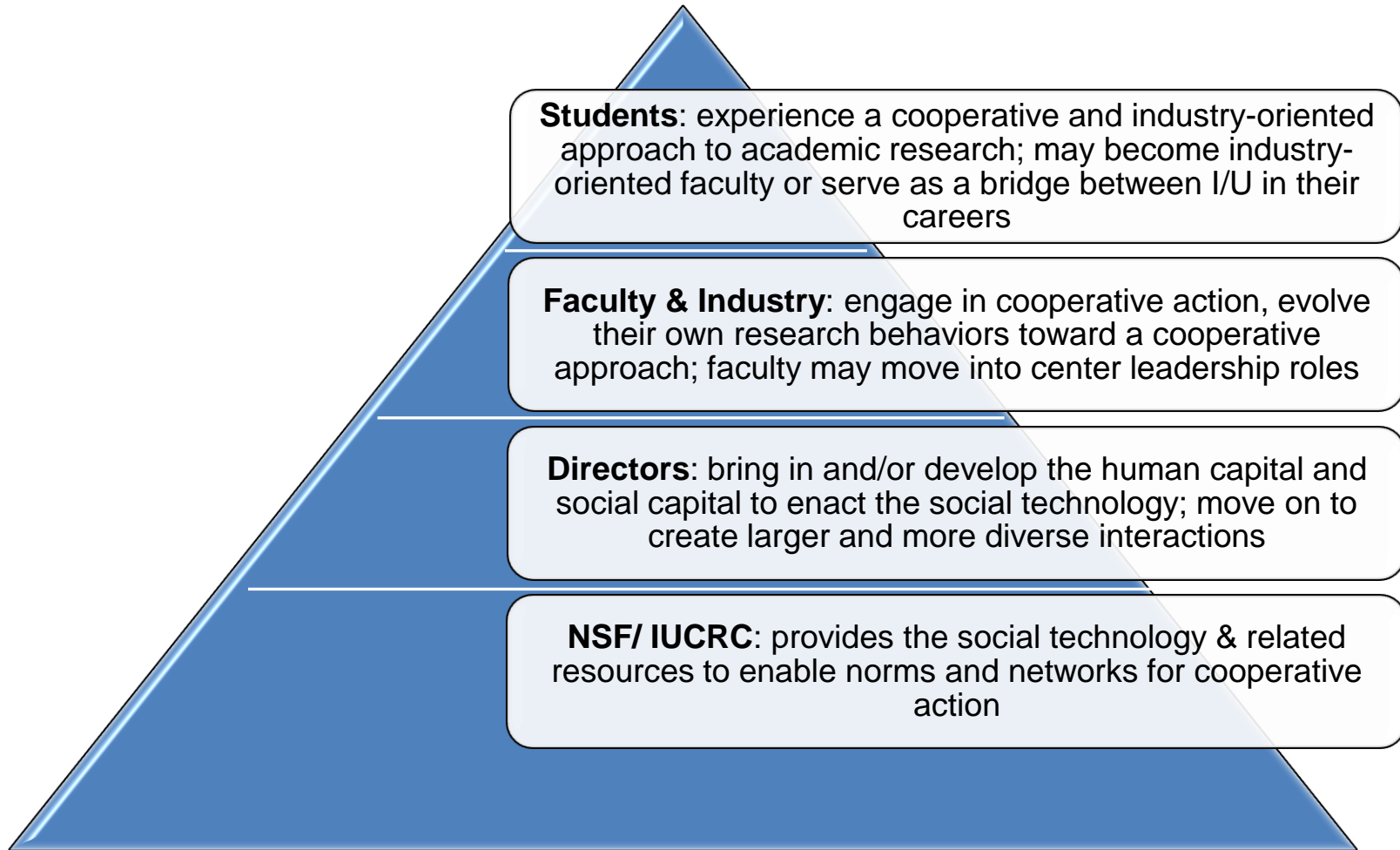
“It has provided the opportunity to develop a broader perspective of the field, to create visions for how the field should evolve, and the opportunity to strive to implement that vision .”

- survey respondent

IUCRC: A human & social capital generating system



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Social capital metrics

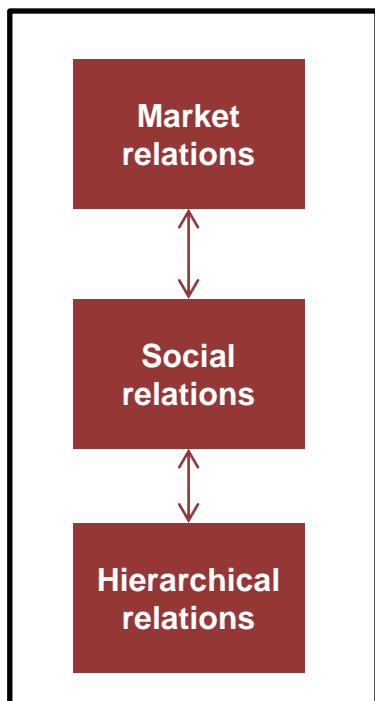
- Membership in formal and informal associations
 - * implications for increased familiarity/ trust → reduced uncertainty & risk
- Density of associations
- Heterogeneity of membership in associations
- Degree of active participation in associations
- Norms and values that facilitate exchanges
 - Lower transaction costs
 - Reduced cost of information
 - Exchange in the absence of contracts (e.g., high trust levels)
 - Sense of collectivism

Woolcock, M. & Narayan, D. (2000). Social capital: Implications for development theory, research, and policy. The World Bank Research Observer, 15 (2), pp 225 – 249.



Impact Metrics

Social structure



	2009-2010	2010-2011	Change
Human & Social Capital			
Current members	766	1030	264 ▲
New members	160	190	30 ▲
Interest in 40%+ of projects	62.4%	57.9%	-4.5 ▼
High impact on prof networks (Top2Box)	47.8%	42.9%	-4.9 ▼
Center directors	42	54	12 ▲
Faculty scientists	619	926	307 ▲
PhD Students	675	993	318 ▲
PhD Graduates	144	225	81 ▲
PhD industry hires	47	65	18 ▲
Publications w/ IAB members	97	165	68 ▲
Average member fee	\$40,429	\$40,481	\$52 ▲
Economic indicators			
Invention disclosures	30	43	13 ▲
Patent applications	34	30	-4 ▼
Software copyrights	2	9	7 ▲
Patents granted	11	15	4 ▲
Licensing agreements	8	5	-3 ▼



Conclusions

- Recommendations from directors on training and infrastructure have implications for human and social capital
 - Improved capability to enable cooperative action
 - Increased focus on expanding and strengthening networks
- Human and social capital outcomes complement economic outcomes



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QUESTIONS?