

NSF I/UCRC Logic Model, as of April 11, 2014

Blue font = measure or indicator

Inputs	Activities	Outputs	Short-term Outcomes	Intermediate Outcomes	Long-term Outcomes	Impacts
<p><b>NSF</b></p> <ul style="list-style-type: none"> <li>• NSF Award: Funding &amp; Prestige</li> <li>• Best Practices: Technical Assistance, Bylaws and Membership Agreement</li> <li>• Evaluator</li> <li>• NSF Supplemental Awards</li> <li>• NSF IUCRC Program Solicitations &amp; DCLs</li> </ul> <p><b>University/Institutional</b></p> <ul style="list-style-type: none"> <li>• Leaders</li> <li>• Valuable equip. &amp; facilities</li> <li>• Talented faculty, researchers and students</li> <li>• Research accomplishments</li> <li>• Nature of research</li> <li>• More complex, “team science”</li> <li>• Reduced indirect support</li> <li>• Supplemental support for admin and student</li> <li>• University buy-in</li> <li>• Existing international</li> </ul>	<p><b>NSF</b></p> <ul style="list-style-type: none"> <li>• NSF planning meeting guidance and feedback</li> <li>• NSF I/UCRC directors meetings, boot camp</li> <li>• NSF operations guidance and feedback</li> <li>• Annual IUCRC Meeting</li> <li>• Review &amp; award of Supplemental funding proposal</li> </ul> <p><b>University/</b></p> <ul style="list-style-type: none"> <li>• Support and feedback to center leadership</li> </ul> <p><b>Faculty/Students</b></p> <ul style="list-style-type: none"> <li>• Implement IUCRC model</li> <li>• <i>Semi-annual meetings and social events</i></li> <li>• <i>Evaluator</i></li> </ul>	<p><b>University Faculty/Students</b></p> <ul style="list-style-type: none"> <li>• Technology roadmap</li> <li>• Research proposals</li> <li>• Research project results</li> <li>• <i>Proof of concept findings</i></li> <li>• <i>Annual project reports</i></li> <li>• <i>Student posters</i></li> <li>• <i>Presentations at conferences (domestic, international)</i></li> <li>• <i>Pubs in high-quality science journals</i></li> <li>• <i>Center research reports for media release</i></li> <li>• Intellectual Property</li> <li>• <i>Patent disclosures, patent apps, patents granted</i></li> <li>• Student graduates</li> <li>• <i>Degrees awarded to</i></li> </ul>	<p><b>University/Institutional</b></p> <ul style="list-style-type: none"> <li>• Increased capacity to attract \$ funding for res.</li> <li>• <i>Attraction of add'l funding</i></li> <li>• <i>Awareness of other NSF funding (for universities)</i></li> <li>• Increased prestige from hosting centers</li> </ul> <p><b>Faculty</b></p> <ul style="list-style-type: none"> <li>• Increased faculty-to-faculty interaction (# of partner scientists)</li> <li>• Enhanced understanding of industry needs</li> <li>• Enhanced trust in industry</li> <li>• Advances in knowledge</li> <li>• <i>Research procedural knowledge/testing set-up, know-how (unpub)</i></li> <li>• Enhanced scholarly reputation</li> <li>• Enhanced collaborative research management</li> <li>• Increased consulting and contract</li> </ul>	<p><b>University/Institutional</b></p> <ul style="list-style-type: none"> <li>• Attracting fac/students</li> <li>• Change in Institutional (univ.) attitude twd ind.</li> <li>• Faculty w/ diverse funding sources</li> <li>• Org learning, development (diffusion of center model)</li> <li>• Institutionalization of center operations and culture</li> <li>• Center research influences univ. courses/curriculum</li> <li>• Center growth</li> </ul> <p><b>Faculty</b></p> <ul style="list-style-type: none"> <li>• Change in faculty attitudes twd ind. research</li> <li>• New university-scientist relationships</li> </ul>	<p><b>University/Institutional</b></p> <ul style="list-style-type: none"> <li>• New innovative grad students</li> <li>• Enhanced university capacity to attract external res. \$</li> <li>• Enhanced Faculty Univ. climate for partnering</li> <li>• More entrepreneurial university culture</li> <li>• Expanded research capacity</li> </ul> <p><b>Faculty</b></p> <ul style="list-style-type: none"> <li>• Faculty scientists trained @ centers =&gt; positions of science leadership</li> </ul> <p><b>Industry</b></p> <ul style="list-style-type: none"> <li>• Knowledge &amp; technology transfer</li> <li>• Start-up co. # from I.P. (patents etc.)</li> <li>• Shorten innovation cycle</li> <li>• Patents in use</li> <li>• Technologies developed and deployed</li> <li>• Commercialization, Univ. R&amp;D =&gt; Ind. R&amp;D</li> </ul>	<p><b>Public Benefit: Enhanced research and innovation ecosystem</b></p> <ul style="list-style-type: none"> <li>• Strengthened connections among parts of research ecosystem:</li> <li>• <i>Center-inspired proposals =&gt; NSF for new project funding/centers</i></li> <li>• <i>New relationships btwn Univs and Ind.</i></li> <li>• <i>Increased participation in IUCRC by universities</i></li> <li>• <i>Philanthropy increased from Ind. to Univ.</i></li> <li>• <i>\$ private foundation philanthropy/Industry</i></li> <li>• <i>\$ support for innovative res. ideas</i></li> <li>• <i>Greater industry support of academic research</i></li> <li>• Technology meets social needs</li> <li>• <i>Technologies implemented and in use by consumers</i></li> </ul>

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<p>collaborations</p> <p><b>Industry</b></p> <ul style="list-style-type: none"> <li>• Industry financial support</li> <li>• Technical insight and direction</li> <li>• Research accomplishments</li> <li>• Time</li> </ul>	<p><i>presentations and formative feedback</i></p> <ul style="list-style-type: none"> <li>• Center &amp; Project Management</li> <li>• Indust. Relevant Research efforts by PIs and Students</li> <li>• <i>Collaborative research (teamwork)</i></li> <li>• Supplemental funding research efforts</li> <li>• Mentoring of students</li> <li>• <i>Student Training- giving presentations</i></li> <li>• Updates on collateral research proj.</li> <li>• Communication &amp; Tech. Transfer efforts</li> <li>• <i>Center poster sessions for IAB</i></li> <li>• <i>PI and student research presentations</i></li> <li>• <i>Center Newsletter/Web</i></li> </ul>	<p><i>center affiliated students/CTR YR (BA/BS, MA/MS, PHD)</i></p> <ul style="list-style-type: none"> <li>• Evaluation reports and papers</li> </ul> <p><b>Industry</b></p> <ul style="list-style-type: none"> <li>• Incorporation of Center in business plan (Industry stakeholders)</li> <li>• <i>Company Patent disclosures, patent apps, patents granted</i></li> <li>• Strong commitment to continued membership</li> <li>• New members join the center</li> </ul>	<p>opportunities</p> <ul style="list-style-type: none"> <li>• Strong commitment to ongoing participation</li> </ul> <p><b>Students</b></p> <ul style="list-style-type: none"> <li>• Students' professional development (human capital)</li> <li>• <i>Student summer internships and jobs</i></li> <li>• <i>Enhanced "soft skills" for communication, teaming, etc.</i></li> <li>• <i>Skills to bridge industry &amp; academia effectively</i></li> <li>• Thesis / dissertation research ideas and support</li> </ul> <p><b>INDUSTRY</b></p> <ul style="list-style-type: none"> <li>• Industry scientist professional development (more up-to-date)</li> <li>• R&amp;D Efficiency (research avoided or savings)</li> <li>• Student trained @ IUCRCS with shorter learning curves as industry employees</li> <li>• Awareness of proof-of-concept from center projects</li> </ul>	<p>for industry</p> <ul style="list-style-type: none"> <li>• New industry contacts/partners for universities</li> <li>• Influence of research on other scientists</li> <li>• Increase in publications</li> </ul> <p><b>Students</b></p> <ul style="list-style-type: none"> <li>• New knowledge, new scientific knowledge - industrially relevant / application lens</li> <li>• Customer orientation</li> <li>• Project management / presentations to industry standards</li> <li>• Student =&gt; Ind. job placements</li> <li>• Center-trained scientists employed @ industry sponsors' org.</li> <li>• Increased social capital</li> </ul>	<p>=&gt; Ind. Product</p> <ul style="list-style-type: none"> <li>• Private-sector/Industry Products developed/marketed</li> </ul> <p><b>SYSTEM</b></p> <ul style="list-style-type: none"> <li>• Tech. meets social needs directly/indirectly</li> <li>• Spillover effects (for indirect beneficiaries/stakeholders)</li> <li>• Technologies implemented and in use by consumers</li> <li>• Technology implemented to meet social need</li> <li>• Knowledge &amp; technology transfer</li> <li>• Long-term industry-academic partnerships (economic competitiveness, industrially relevant)</li> <li>• Enhance the intellectual capacity of the engineering workforce (through the integration of research and education)</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Centers create mechanism for intersection of business opportunity and public benefit (health, defense, environment)</i></li> <li>• Promote the progress of science</li> <li>• Economic competitiveness at multiple levels: <ul style="list-style-type: none"> <li>-National</li> <li>-Global</li> <li>-Ind. company</li> <li>-Ind @ large</li> <li>-GDP</li> </ul> </li> <li>• <i>Corporate \$ profit/share prices</i></li> <li>• Expanded innovation capacity (national)</li> <li>• <i>New fields of science</i></li> <li>• Human capital</li> <li>• <i>Next-gen STEM cohort (academically trained, professionally developed) in working with industry</i></li> <li>• Social capital</li> <li>• <i>Networked students, faculty, industry</i></li> </ul>

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	<p><i>site</i></p> <ul style="list-style-type: none"> <li>• <i>Guest Speakers</i></li> <li>• <i>Demos</i></li> <li>• <i>Best Poster Award</i></li> <li>• <i>Resume Book</i></li> <li>• Member recruitment efforts</li> <li>• Center workshops for industry</li> </ul> <p><b>INDUSTRY</b></p> <ul style="list-style-type: none"> <li>• Participation in meetings</li> <li>• <i>Member feedback and voting</i></li> <li>• Interaction and collaboration among member companies</li> <li>• Internal gatekeeping, boundary-spanning &amp; championing</li> </ul>		<ul style="list-style-type: none"> <li>• Expanded network of scientific experts</li> <li>• Access to center licenses</li> </ul> <p><b>System</b></p> <ul style="list-style-type: none"> <li>• More awareness of university/industry interdependence</li> <li>• Leveraged taxpayer research \$</li> <li>• Advances in knowledge</li> <li>• Skills in collaborative research management</li> <li>• Graduates who bridge/work industry &amp; academia effectively</li> <li>• IAB influence on research: % of proposals funded (research guided by ind.)</li> </ul>	<p><b>INDUSTRY</b></p> <ul style="list-style-type: none"> <li>• Work cited in patent applications</li> <li>• New line of research (from center project) “disruptive tech” predecessor</li> <li>• <i>Prototypes developed and tested in ind. labs</i></li> <li>• Industry, University, Scientist cooperative res. projects @ industry</li> <li>• Research efficiencies</li> <li>• <i>Lag-time to patent shortened</i></li> <li>• <i>New ideas for follow-up research from center projects</i></li> <li>• <i>New product development ideas from center research</i></li> <li>• <i>Cost avoidance</i></li> </ul>	<ul style="list-style-type: none"> <li>• Expanded research capacity</li> <li>• Shorten innovation circle</li> </ul>	

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				<p><i>(research not done)</i></p> <ul style="list-style-type: none"> <li>• Trusting relationship among industry</li> <li>• Learning from other members</li> <li>• Opportunity to identify and do research with risk-sharing, able to do work otherwise couldn't do</li> </ul> <p><u>Industry - IAB rep</u></p> <ul style="list-style-type: none"> <li>• Professional development</li> <li>• <i>Relationships with faculty</i></li> <li>• <i>Leadership development</i></li> <li>• <i>Prestige in company</i></li> <li>• <i>Career opportunities</i></li> </ul> <p><u>System</u></p> <ul style="list-style-type: none"> <li>• Industry, University, Scientist cooperative res. projects @ industry</li> </ul>		

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				<ul style="list-style-type: none"><li>• <b>New industry contacts/partners for universities</b></li><li>• <b>New university-scientist relationships for industry</b></li><li>• <b>Influence of research on other scientists</b></li><li>• <b>Center-trained scientists employed @ industry sponsors' org.</b></li></ul>		

## Feedback loops

- **Fundamental research prop. to NSF**
- **Feedback to public policy (coop research)**

## Indirect effects

- **Spillover effects (for indirect beneficiaries/stakeholders)**
- *Energy conservation from new tech*

*Center model in research policy*

**Innovation and Research Ecosystem Dynamics**

