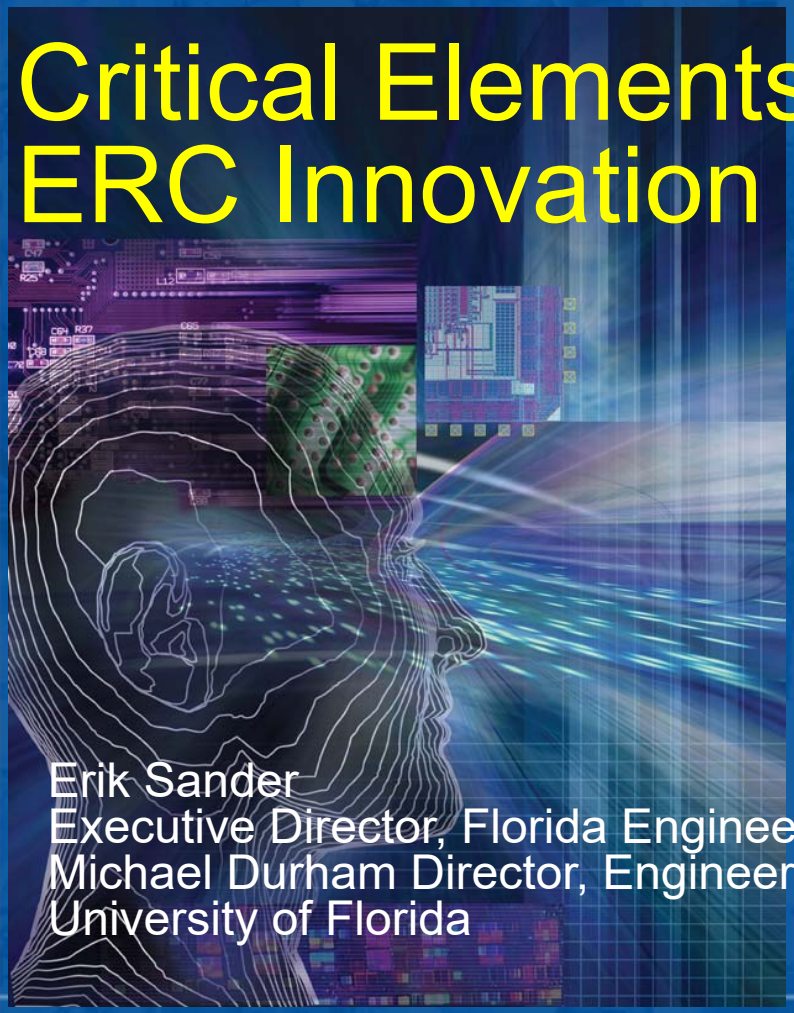
UF Herbert Wertheim College of Engineering
UNIVERSITY of FLORIDA

Critical Elements of an ERC Innovation Ecosystem



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POWERING THE NEW ENGINEER TO TRANSFORM THE FUTURE

Innovation Ecosystem Evolution

- Gen-2 (Class of 1994-2006) & Gen-3 (Class of 2008 - 2017) ERCs tasked to:
  - develop program for industrial collaboration & tech transfer through information exchange, hiring graduates, sponsored & translational research
  - develop graduates better prepared for effective practice in industry, leadership in technological development, and innovation in a global economy
  - expand program to include Innovation and Practitioner Partners devoted to stimulating entrepreneurship and innovation
- Gen-4 changes relevant to the Innovation Ecosystem
  - Greater emphasis on research leading to societal impact through convergent approaches and **engaging stakeholder communities**
  - Opportunity for **different leadership models** to address three core IE functions

Gen-4 Innovation Ecosystem Leadership

- IE Leadership is a part of the ERC Leadership Team and responsible for IE strategic and execution plans, including organization, assessment, reporting, and other functions to carry out the IE mission.
- Must integrate activities across ERC:
  - Convergent Research – E.g., Industry and other Stakeholder input to strategic research plan and project vetting and development
  - Workforce Development – E.g., Student training in innovation, technology translation, and entrepreneurship
  - Culture of Inclusion – E.g., Assuring diversity and inclusion as a core principle of student career development
- ERC is challenged to tailor IE Leadership structure to management of three IE Core Functions and integration with other ERC programs.

NSF Expectations: Gen-4 ERC Innovation Ecosystem Three Interlocking Core Functions

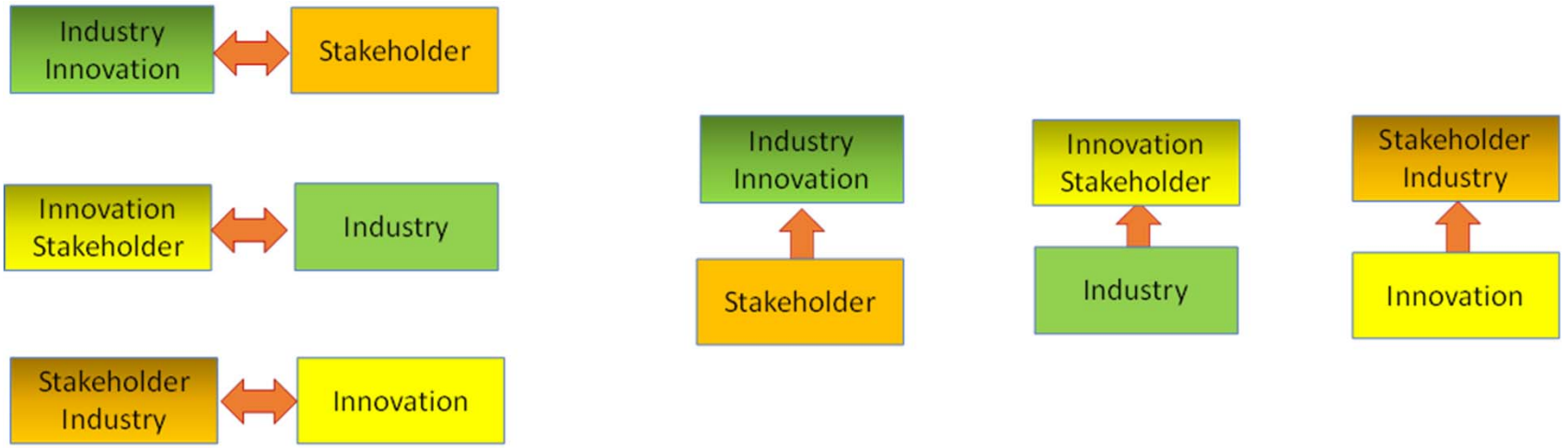
- Industry Management - Strategic partnerships with core industrial / practitioner stakeholders
- Innovation Management - Speed translation of research into new processes and products and foster an entrepreneurial culture by engaging ERC students in all phases of the innovation process
- Stakeholder Management – Define and engage myriad internal and external Stakeholders – essentially those impacted by or impacting the proposed technology

Source: Deborah Jackson (NSF ERC Program Office)

Innovation Ecosystem Core Functions Require Myriad Skill Sets and Experiences

Function	Primary Stakeholders / Partners	IE Leadership Skills/Experience
Industry Management	• Startup, SME, MNC • Practitioners • Technical and Business Leaders	• University/Industry Relations • Contracts • Research Planning
Innovation Management	• University Tech Transfer, Entrepreneurship, Economic Development • Investment/entrepreneurial community	• Technology Translation • Entrepreneurship, IP Management • Entrepreneurship and Innovation Networks
Stakeholder Management	• Ethicists, Policy Makers, Social Scientists; Advocacy Groups, Prof. Associations, End Users, Intermediaries, Regulatory Agencies, CROs, Healthcare Providers, state and local governments, etc.	• Very broad-based, industry-specific knowledge of ethical, legal and societal impacts – positive and negative

IE Leadership Structure Must be Tailored to Suit Specific ERC Needs – Two Person Examples



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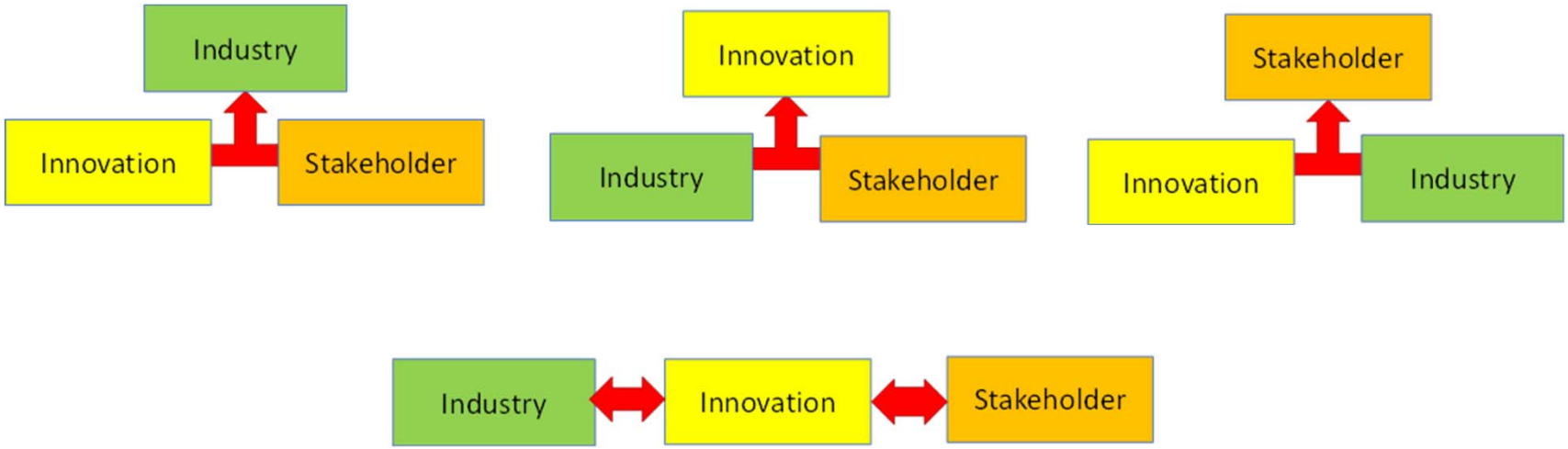


Source: Deborah Jackson (NSF ERC Program Office)

Core Function: Industry Management

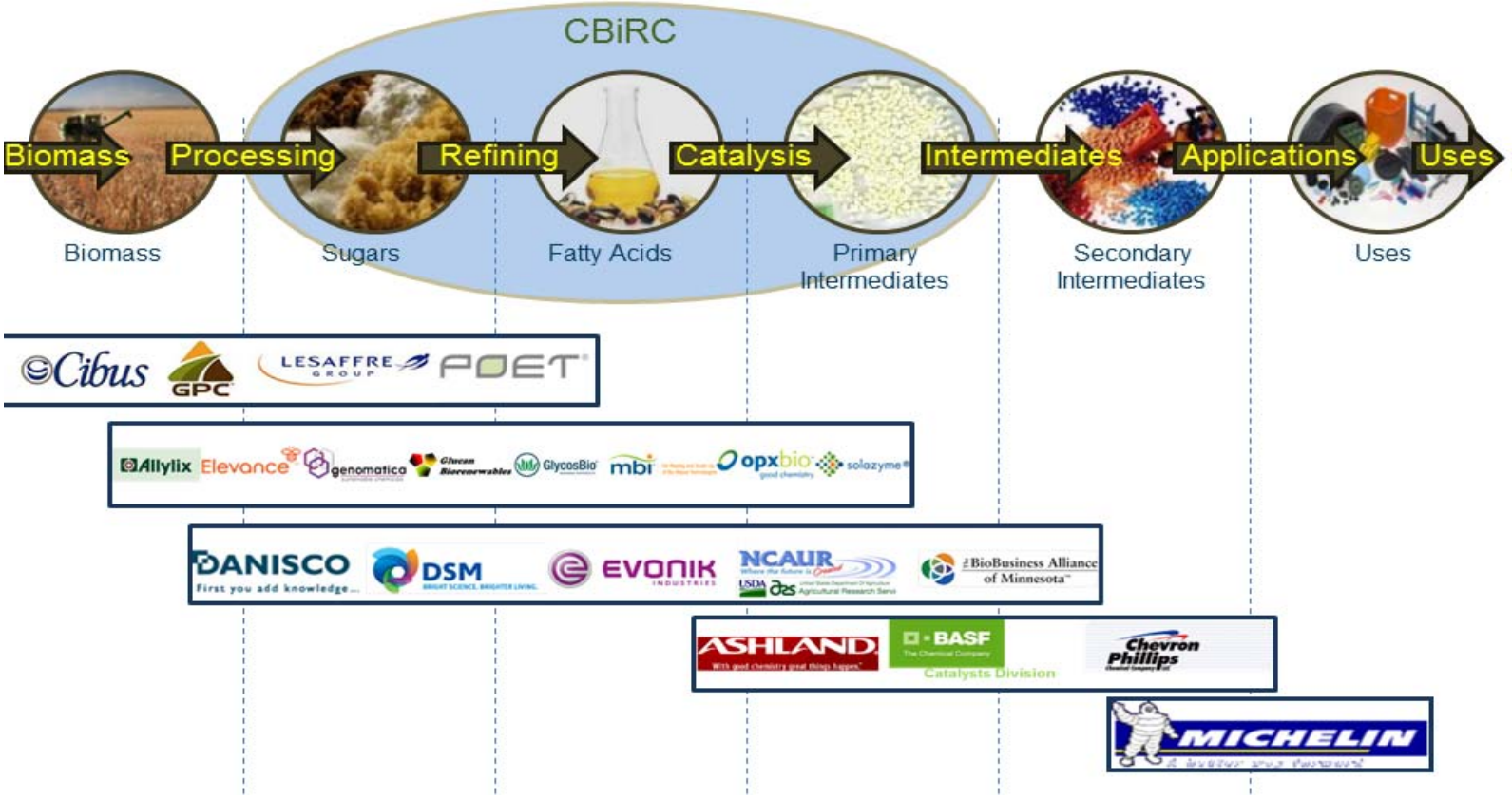
- Set vision and strategic plan for industry
- Establish Industry Advisory Board governed by a Membership Agreement and IP Policy that crosses partner universities
- Market ERC to industry across the IAB value chain
- Engage Industry and Practitioner Partners, manage payments, etc.

Start to Think about Industry Engagement Details

- Industrial Partner Agreement overall intent - establish a contract that is:
  - mutually beneficial and equitable to both parties
  - applicable to companies of all sizes
  - outlines rights & obligations of company subsidiaries/sister/parent orgs.
  - scalable to a large ERC industrial membership

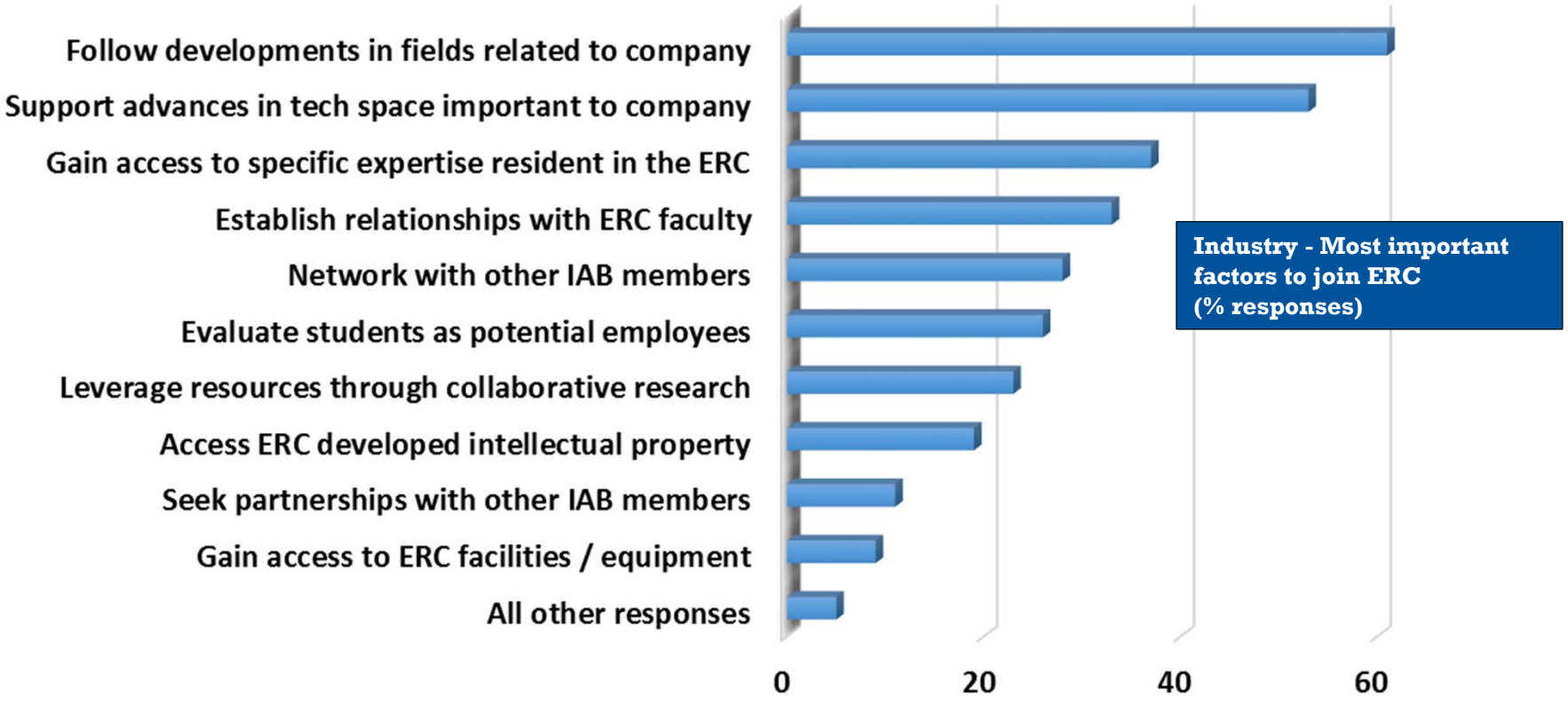
- Key Elements of the Industrial Membership Agreement
  - Expectations and Obligations of the universities and Industry Members
  - Intellectual Property Rights and Management
  - Membership Structure, Fees, Tiers, and Benefits, including in-kind contributions
  - University Publication Rights
  - The rest - Entities Eligible to Serve as Industry Members, Use of Resources, Term and Termination, Applicable Law, Confidentiality

Engage Companies Across the Value Chain



Source: Center for Bio-Renewable Chemicals ERC, Iowa State University

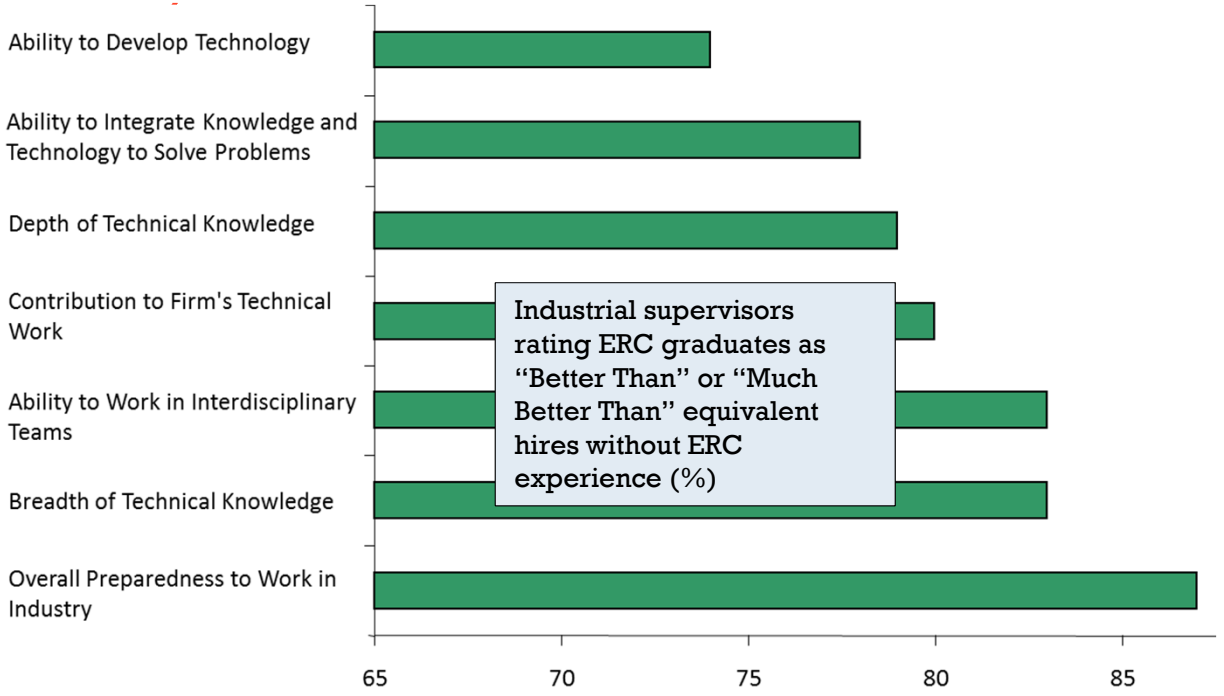
Industry Motivation to Join



Source: IAB Involvement in ERCs: Assessing and Strengthening the Role; Peter Seoane: As presented at the NSF ERC Annual Meeting, Washington, DC, November 2012.

ERC Industry Value Point – Uniquely Educated Workforce

- Prepare students to thrive in industry, academic, and fed. lab cultures
- Integrated Research, Innovation, & Workforce Dev. programs produce uniquely trained students:
  - Non-traditional coursework and modules
  - Experiential education
  - Industry engagement in training
  - Professional Practice development

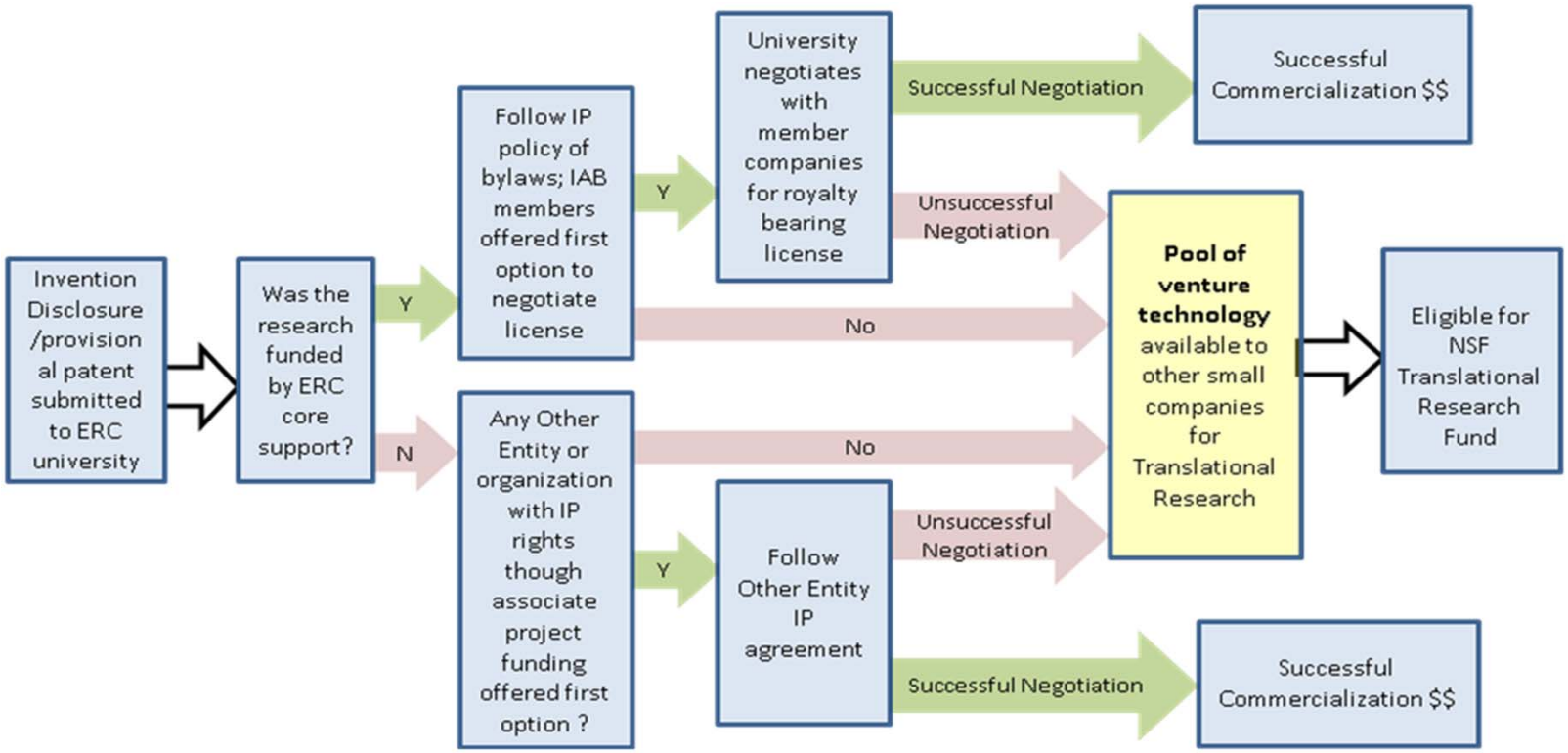


Source: Impact on Industry of Interactions with Engineering Research Centers - Repeat Study; SRI International: Arlington, VA, December 2004. Findings discussed and confirmed in NSF ERC ILO Retreat 2013.

Core Function: Innovation Management

- Manage the translational research process. For example:
  - Drive IP Management Inter-institutional Agreements
  - Create a Secure Site for IP Review & Promotion
  - ERC Best Practice based IP training, production, harvesting, management, and transfer processes
- Develop partnerships to accelerate innovation with a broad Stakeholder community
- Integrate innovation ecosystem with workforce development program and strategic vision for diversity and a culture of inclusion

NSF ERC Sample IP Flow



Core Function: Stakeholder Management

- This is mostly new territory for Gen-4 ERCs
- Advance a model to identify key stakeholders – those who are impacted by or can impact the ERC (e.g., Risk Management model)
- Understand motivations for each stakeholder
- Think through best engagement strategies. E.g.,:
  - Frequency and formality of engagement, information exchange, and reporting
  - Different Stakeholder groups rights and obligations
  - Formal or informal ERC assessment (e.g. SWOT analysis?)
  - Longer term technology ethical, Life Cycle, social, public policy, etc. impact analyses

Identifying Stakeholders – An Example Checklist

A. What entities impact available funding?

B. What entities or groups comprise the end-user community?

C. What entities or groups are impacted by the technology?

D. What factors or entities provide the governing frameworks that define the interactions among the above?

Source: Deborah Jackson (NSF ERC Program Office)

Identifying Stakeholders

A. What entities impact available funding? – Dependent on the ERC Vision.

- Federal and State Agencies (e.g., SBIR, GOALI, SECO, INTERN)
- Federal, State and Local Economic Development Initiatives (e.g., USDOC EDA, VentureWell, State workforce development programs)
- NGOs and Foundations (e.g., Gates Foundation, Lemelson Foundation)
- Academic (e.g., Tuition for training, University research translation awards)
- Private Investment Funds:
  - Angels
  - Venture Capitalists
  - Crowdfunding
  - Company Venture Arms

Identifying Stakeholders

B. What entities or groups comprise the end-user community?

- Consider all that will impact the buying and use decisions across the value chain
- End-user communities are different in mind-set and acceptance of product introductions

IT Sector User Community

- Any industry - FinTech, Transportation, Manufacturing, Consumer services, Healthcare, Defense, Agriculture, Social networks, etc.
- Executive to technical level professionals (actionable information vs. data)
- Evolutionary product improvement
- Developers of HW/SW, algorithms, & applications
- Short R&D & training life cycles; Dynamic/fast evolving end user environment

Biotech Sector User Community

- Patients, Practitioners, Healthcare systems, CRO's, Patient Advocacy Groups
- High risk – high-cost development environment / Low research to market success rate
- Product failure averse user community
- Long training and R&D life cycles; Very high development and market intro cost
- Regulators have a significant say

Identifying Stakeholders

C. What entities or groups are impacted by the technology?

- Net positive & net negative impacts across sectors, with many not well understood & evolving
- Significant social, legal and ethical concerns impact many populations and groups

IT Sector Impacts

- Advocacy Groups – Data integrity, accuracy, privacy, transparency; Disappearance of jobs; Power asymmetries; Bias and discrimination; Loss of freedom and individual autonomy; Contested ownership of data
- Security Monitoring Organizations - Misuse of personal data; Potential for military, criminal & malicious use
- Lobbyists – Online privacy; Piracy; Intellectual property; Cybersecurity; Tax issues; Labor impacts

Biotech Sector Impacts

- Advocacy Groups – Patient rights; Vulnerable & underserved populations; Responsible data sharing; Health equity and health literacy; Affordability; Harm to the environment; Religious concerns
- Institutional Review Board - Protecting human subjects in clinical trials; Patient information privacy; Informed consent
- Payer-Providers – Equitable access; Total cost of care; Healthcare performance & outcomes

Identifying Stakeholders

D. What factors or entities provide the governing frameworks that define the interactions among the A, B, and B?

- Public policy, National and regional regulatory agencies, Municipal, state and county governing bodies, Economic development target industries and zones)
- Laws reflecting social desires, Tax incentives, Established customs and norms

IT Sector Governing Framework

Fragmented industry-specific requirements:

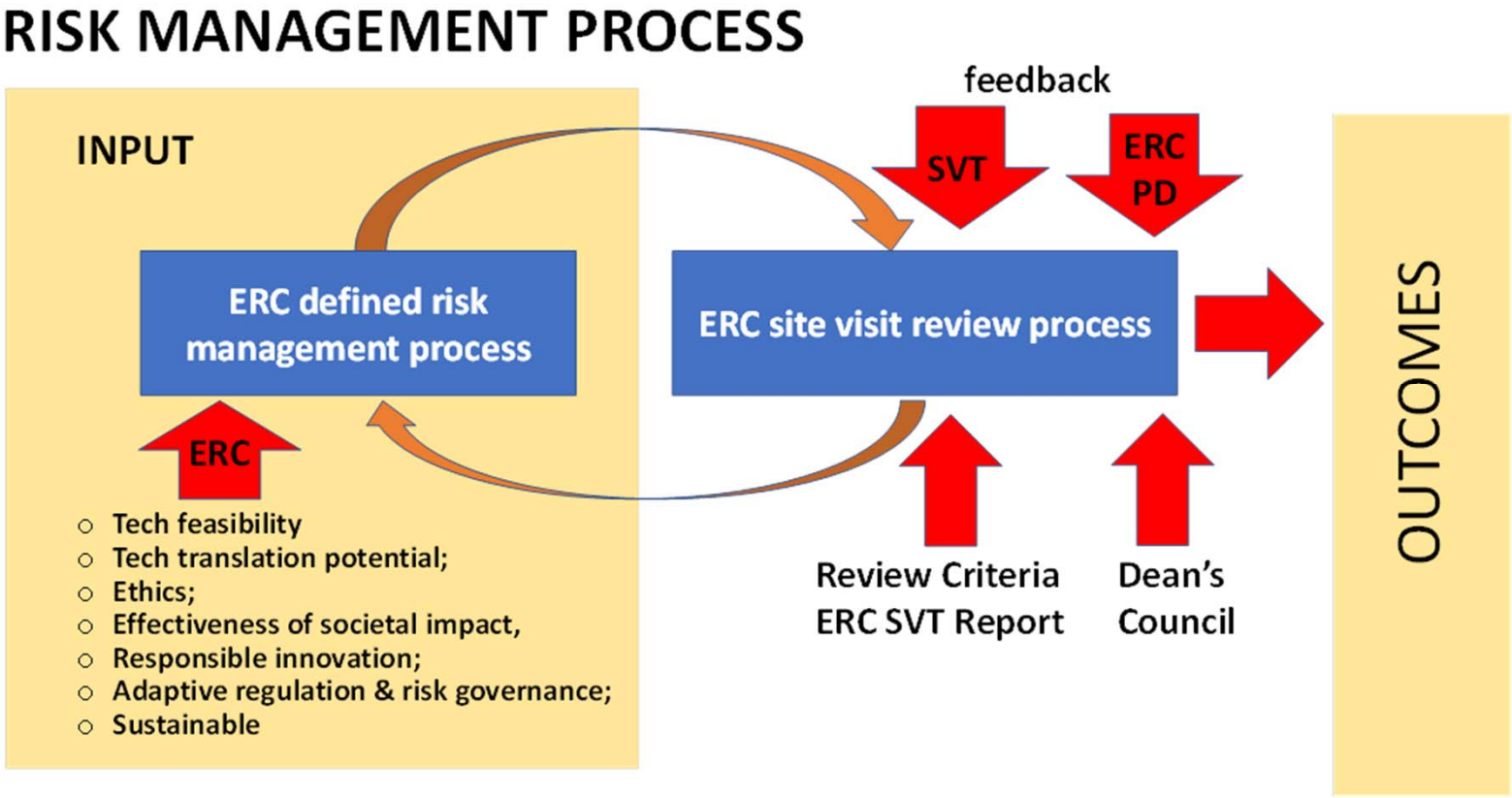
- National Institute of Standards and Technology
- Center for Internet Security Controls
- International Organization for Standardization
- Health Insurance Portability & Account. Act
- Payment Card Industry Data Security Standard
- General Data Protection Regulation
- Control Objectives for Infor and Related Techs
- International Traffic in Arms Regulations
- Children's Online Privacy Protection Rule

Biotech Sector Governing Framework

Heavily regulated environment overseen by:

- DHHS / FDA
- USDA Biotechnology Regulatory Services
- EPA

Stakeholder Identification - Risk Management Model



Source: Deborah Jackson (NSF ERC Program Office)

Innovation Ecosystem Resources

- General Resources
  - Chapter 5 of ERC Best practices Manual https://erc-assoc.org/best_practices/best-practices-manual
  - Erik Sander – esander@ufl.edu; www.eng.ufl.edu/flex/about/people/
- Innovation Ecosystem Funding Sources (Source: D. Jackson, NSF)
  - SBIR/STTR - https://seedfund.nsf.gov/
  - GOALI - https://www.nsf.gov/eng/iip/goali.jsp
  - SECO - https://www.nsf.gov/pubs/2015/nsf15043/nsf15043.jsp
  - INTERN - https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf21013

Bottom Line

- Assemble the team and clearly articulate how an ERC is different – especially a Gen-4
- Start to think and operate to the degree feasible like an ERC now
- Focus on defining Stakeholders early – not trivial – and then start to engage with them
- Evolve how you would envision managing the IE leadership role(s)
- Keep up with NSF as Gen-4 requirements evolve

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