Best Practices for Innovation

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Portland

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National Governors Association

• NATIONAL GOVERNORS ASSOCIATION CHAIR'S INITIATIVE •

GROWING STATE ECONOMIES

National Governors Association

Best Practices in Innovation

- States creating their own R&D funds
- States using innovation as a policy framework to drive economic growth
- States pioneering new intermediary organizations—what can be called "institutes for collaboration"—to bootstrap specialized innovation ecosystems

The Elements of the Innovation Ecosystem

- Institutions that attract and support the people with the talent and foresight to create new ideas;
- Industry networks that encourage interaction, stimulate further innovation, help develop specialized services to support area companies, and encourage cross-industry partnerships;
- Facilitation of entrepreneurship to commercialize concepts so that ideas, and businesses based on them, grow in the area and
- Cultural and social amenities constituting quality of life that motivate knowledge workers and the innovation-based companies that rely on them to stay in the area

Source: Rosabeth Moss Kanter, 1995, Harvard Business School

Most Important Sources of Prosperity Can Be Created

Agricultural & Industrial Era

Inherited Assets

- Natural resources
- Geography
- Climate
- Population

Knowledge & Innovation Era

Created Assets

- Top universities
- Research centers
- Talented people
- Entrepreneurial culture
- Networks
- Amenities

State Support for R&D

- Increasing number of states are investing in research funds CA, GA,TX, NJ, NY, MI, AZ, OH, OK , VA, WA, MD

- Boom fueled partly by an understanding that states can direct their own destiny better when using their own research dollars. They can
  - Build upon priorities of local industries
  - Emphasize applied research rather than basic research
  - Seed research that helps solve local problems (better health outcomes, economic transformation)
  - Align university priorities with economic development goals

- States also recognize that federal research dollars are more likely to flow to states that have created a world-class R&D infrastructure

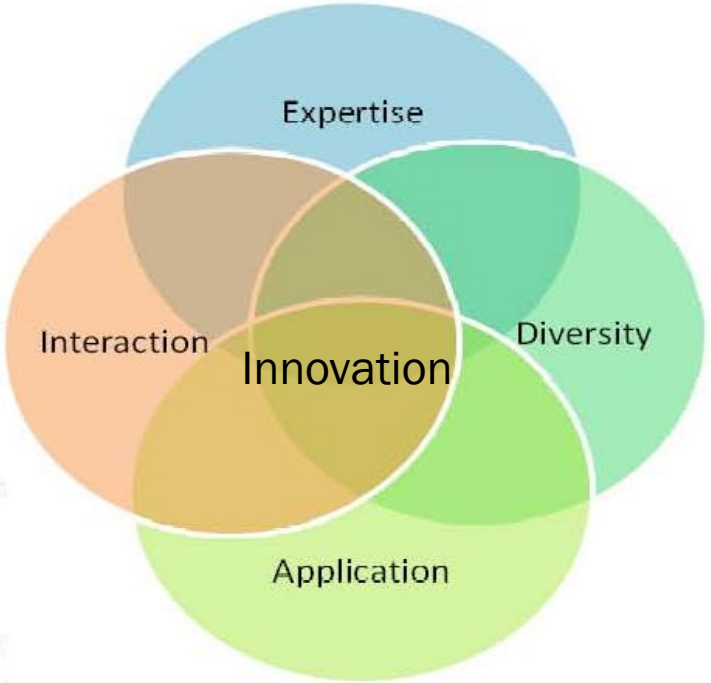
How Do States Fund R&D?

- **Earmarked taxes—Voted by the people:** AZ sales tax increase approved by citizens, $44 M / year for 20 years
- **Earmarked taxes—Voted by the legislature:** West Virginia dedicates .5% of state's racetrack lottery proceeds, $4 M/year in 2005 and 2006
- **General Fund Appropriation** —Georgia Higher Ed budget contains money for Georgia Research Alliance, $30 M/year ($400 M to date); Kentucky "Bucks for Brains" $120 M in 1998, 2000 and 2005; Virginia and Maryland in 2011
- **Tobacco Settlement Money** —Washington Life Sciences Discovery Fund, starting in 2008, $35 M/year for ten years; other states include Arkansas, Connecticut and Michigan
- **Bonds** —California voters passed Proposition 71 to fund stem cell research, $3 B over ten years; Ohio Third Frontier

Strategic Framework to Drive Innovation

People studying innovation note four components of an innovative place—whether a company, research facility or state.

- **Expertise**. New discoveries, new knowledge and new insights come from smart people who are given the resources necessary for success.
- **Interaction**. Face-to-face is still very important for the exchange of ideas and synergy that create new business models, marketing plans or products.
- **Diversity**. Ideas will only get better when they are openly discussed and considered by a mix of people with a variety of research fields, backgrounds, approaches and mind-sets.
- **Application**. Ideas are useless unless used. The true proof of their value is in commercialization.



Investing in Innovation, NGA, 2007

Strategic Framework for Policy Decisions and Investments

- **Build Expertise** by building strong research capabilities and attracting world-class talent in strategic areas.
- **Facilitate Interaction** by requiring collaboration among universities and others, cultivating strong networks, shared research facilities and compact geographical areas.
- **Link diverse knowledge fields and industry sectors together** by multidisciplinary institutions, well-designed research facilities, and mixed-use research parks to ensure that creative "sparks fly."
- **Push the application of technology and commercialization of research** by experimenting with university-industry partnerships, pioneering open IP policies and faculty tenure changes, and keeping industry engaged.

Building Expertise

- **State-sponsored Research Funds**: CA, GA,TX, NJ, NY, MI, AZ, OH, OK , VA, WA

- **Focused Excellence**: Re-enforce existing innovation clusters as well as developing new cluster--Arizona Bioscience Roadmap, CA Institutes for Science and Innovation

- **Research Talent:** Lilly Endowment's $100 M for "intellectual capital," Georgia Research Alliance's 100 Eminent Scholars, Kentucky "Bucks for Brains" $120 M in 1998, 2000 and 2005; Utah Science Technology & Research (USTAR) world-class research teams in 6 strategic areas, including nanotechnology, imaging technology, biomedical technology

Building Expertise

- **Workers and Skills:** Goals for higher education to meet STEM job needs; Industry-education partnerships Automotive Manufacturing Technical Education Collaborative (AMTECH), Commonwealth Center for Advanced Manufacturing (CCAM) to align education with industry needs/global standards; Apprenticeship Carolina (SC) $1M plus annual employer tax credits of $1,000 per apprentice has more than doubled the number

- **New Fields and Young Talent:** ASU's new master's in genomics and biotech law; State University of New York, College of Nanoscale Science and Engineering, a global first, and center of excellence in nanoelectronics; Indiana's Polytechnic Institute Applied Bachelor Degree in 3-5 years starting in 11th grade; research funds marked for young investigators

- **Entrepreneurial "Boot Camps"**: technology entrepreneur fellowship program (e.g., Pipeline systematically identifies potential high-growth CEOs/entrepreneurs and matches them with best-in-class training, resources and mentors); well-designed competitions, e.g., MassChallenge, that provide services in "real-time"

Facilitating Interaction and Collaboration

- **Networks:** dense localized networks of trust, reciprocity and cooperation associated with robust innovation clusters—UCSD CONNECT "Meet the Researcher", BIOCOM, Bay Area Science and Innovation Consortium (BASIC)

- **Shared Facilities:** MA's High Performance Computing Center—state, 5 universities and companies; ASU's supercomputer and engineering school moves to main street Tempe; test sites such as Verizon's Innovation Center in Waltham, MA offers space, troubleshooting, and certification tools to partner companies creating advanced 4GLTE network applications, such as Ericsson, Cisco and Samsung

Facilitating Interaction and Collaboration

- **Innovation Districts:** Atlanta's Technology Square, San Diego Torrey Pines, Research Triangle Park, PA's Keystone Innovation Zone, WA's Innovation Partnership Zones, Ohio Innovation Hubs; CA Institute for Quantitative Biosciences (QB3) San Francisco's Mission Bay

- **Mega-Partnerships:** Georgia Cancer Coalition, CITRIS combines 4 CA universities—Berkley, Davis, Merced, Santa Cruz; St. Louis Coalition for Plant and Life Sciences; PA Nanotechnology Institute: 12 research institutions with over 4,000 researchers and $1 B of research; more and more international partnerships;

- **New Institutions/Intermediaries**: "Institutes of Collaboration" or Smart Agents—Oregon Nanoscience and Microtechnologies Institute (ONAMI), QB3, MA's Life Sciences Center

Putting Diverse Knowledge Fields and Cultures Together

- AZ Biodesign Institute co-locates researchers from 3 fields designed for interaction, NC State Centennial Research Park, ASU SkySong-China, Georgia Tech-Korea Institute for Advancement of Technology
- Incentives (R&D funds, new colleges) to encourage cross-disciplinary research and interaction--University of Akron & P&G Bioinnovation Institute, linking materials science with biomedicine to become #1 in biomaterials and orthopedic research
- Right brain and left brain— Designers and Engineers
- Entrepreneurship across the university and particularly in S&T colleges
- Entrepreneurial "boot camps"—New England Clean Energy Council's Clean Energy Fellowship Program, UCDavis
- Charismatic, Collaborative scientists and researchers
- Silo, Solo is Passé

Pushing Commercialization

- **University-industry partnerships, Industry and Peer Review** —force an outside look (e.g., venture capitalists, out-of-state reviewers) WA Life Sciences Discovery Fund, SFAz, USTAR
- **Focus on Problem-solving**—new energy sources, traffic congestion, chronic diseases (Proof of Relevance); solving common industry technological challenges
- **Industry Cluster Focus—**North Dakota State University's Center of Excellence in Surface Protection, Delaware's Center for Translational Cancer Research
- **Update Patent, IP, Tenure Policies**—master agreements to fit open-innovation business model, reward faculty entrepreneurs
- **Regulations and Procurement**— green technologies, energy efficiencies
- **Venture Financing**—Oregon, Maryland, Connecticut, United States Treasury Department's $1.5 billion State Small Business Credit Initiative (SSBCI)

Need for a New Model

- **Solving big problems at scale**: One of the great lessons of Bell Labs – perhaps the granddaddy of all industrial research labs – was its focus on combining researchers from across disciplines to achieve innovation at scale. Indeed, the ability to be globally competitive depends on achieving a critical mass of collaboration between multiple universities and multiple companies.
- **Making the boundaries between industry and universities more porous:** When the boundaries are not porous, the opportunity for the individual actors to function as an ecosystem is lost.
- **Designing a new, nimble, lean, and collaborative entity** *devoted to supporting firms and other organizations in their innovation activities*

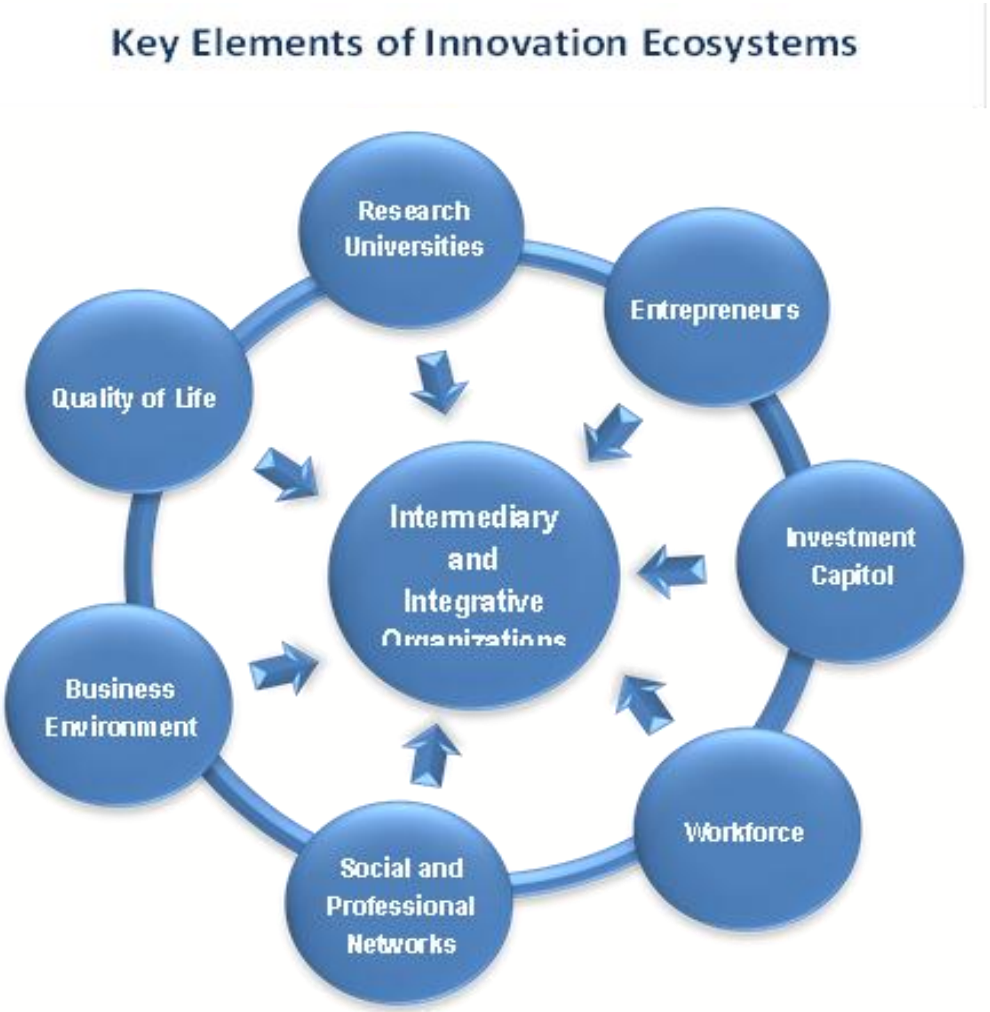
Need for a New Model

- States are finding that these efforts do not wholly constitute the systemic and comprehensive policy agenda that is needed for a well-developed ecosystem of innovation

- Turning ideas and intellectual property into jobs is not something that universities—or tech transfer offices, incubators or star scientists—can do alone;

- It is the complex interplay between academia, the private sector, public policy, and not-for-profit world that is key to turning ideas into real economic gains

Who Coordinates Key Elements of an Innovation Ecosystem?



Source: Mary Walshok, 2010

Experiments are Bubbling Up in Response to State Needs

- Silicon Valley is a "habitat" or an ecosystem in which a distinctive collection of people, firms, institutions and relationships combine in finely tuned ways to not only provide scientific advances or technological breakthroughs but to also turn ideas into products and take them rapidly to market by creating new firms

- Creating innovation ecosystems calls for a new approach and has resulted in extraordinary experiments. These experiments are bubbling up in response to specific needs in states. Moreover, they are showing results.

- The most promising model is what NGA calls institutes of collaboration, or IOC, which have emerged from the states' investments in R&D.

Bootstrapping Innovation Ecosystems

Oregon Nanoscience and Microtechnologies Institute

"ONAMI has emerged as a microcosm of a complete innovation strategy for a single technology area."

–Shelia Martin, Portland State University

Institutes for Collaboration

- **The institutes are not part of one university.** They sit at the nexus of multiple universities and aim for a "catalytic effect" that will produce results.
- **Innovation is built in from the beginning as a core mission**. Their job is to build, nurture and link the elements of "an innovative place" – a local ecosystem of people, institutions, and companies that all support the innovation process.
- **They are building an innovation ecosystem for a particular industry cluster.** Connected to a particular industry from inception, they know how to create consistency from research ideas forward through the commercialization process to feed the industrial base within the state.
- **They depart from traditional university technology transfer efforts by focusing on what is required "upstream" to bring new ventures out "downstream".** The goal is not to focus on just ideas or just markets, but to stimulate the entire innovation process in such a profound way that the state's entire innovation pipeline is transformed.

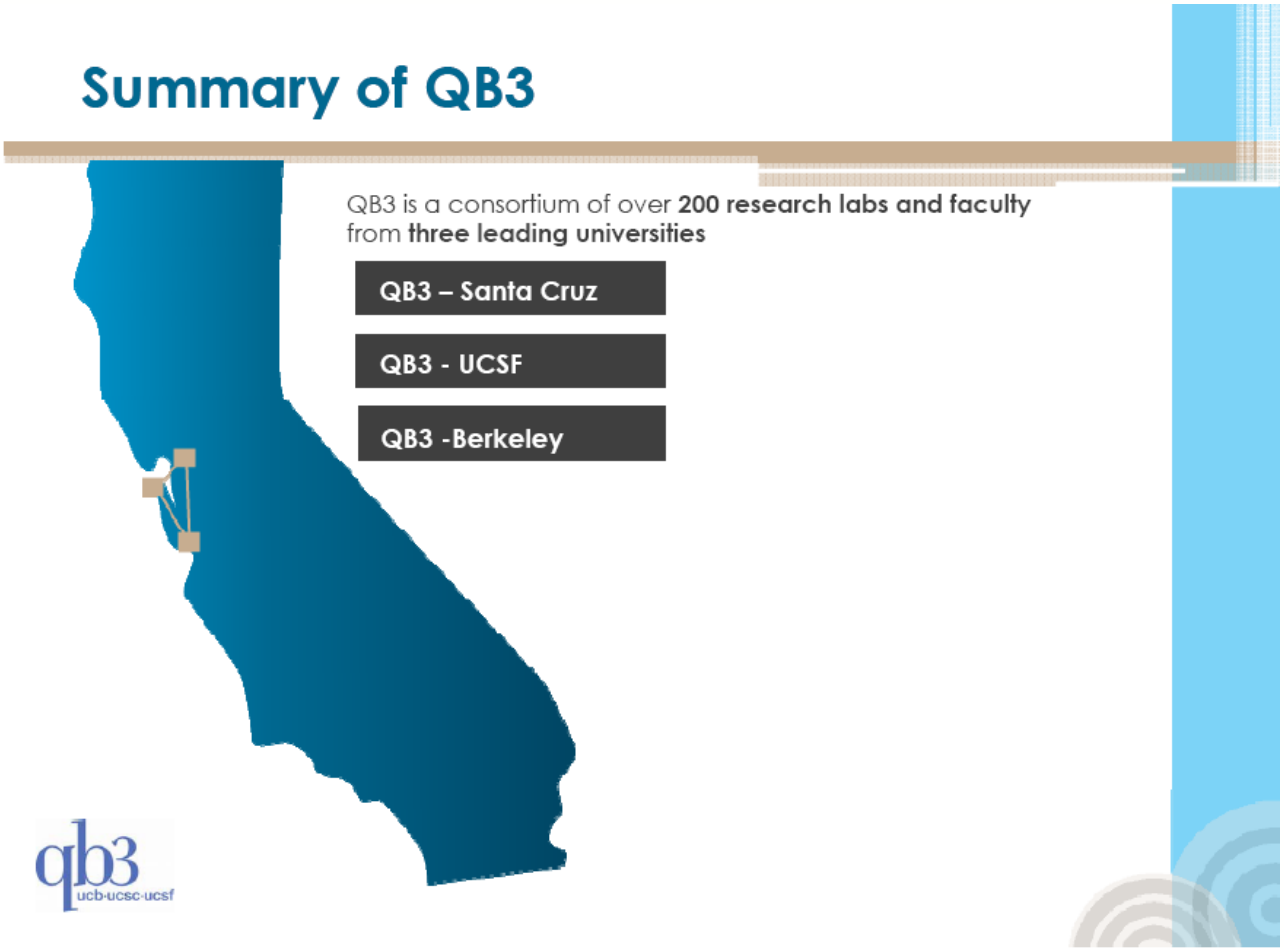
These Organizations Require

- **Leaders who proactively find and nurture connections across the boundaries** and know who to connect with whom. Companies and entrepreneurs need one point of contact that will connect them with all the diverse resources they need.
- **Speed and Flexibility in working with industry.** For this reason, non-profit organizations that operate outside of the university/government orbit may be needed, but they must excel at bringing together the resources of several universities.
- **Industry Focus that allows innovation to be strategically targeted** at sectors that are promising to the state or region. At the same time, however, there is a balancing act between being sector-focused (built up around innovation process and network for one sector) and bringing together research and companies from different disciplines and industries.
- **Space That Crosses Traditional Academic Boundaries** so that innovation results from different disciplines working together. Shared research facilities push researchers, entrepreneurs and industries beyond their specializations and allow for discoveries at the boundaries of disciplines.

California's Institutes for Collaboration

Source: Regis Kelly, QB3

Institute for Collaboration

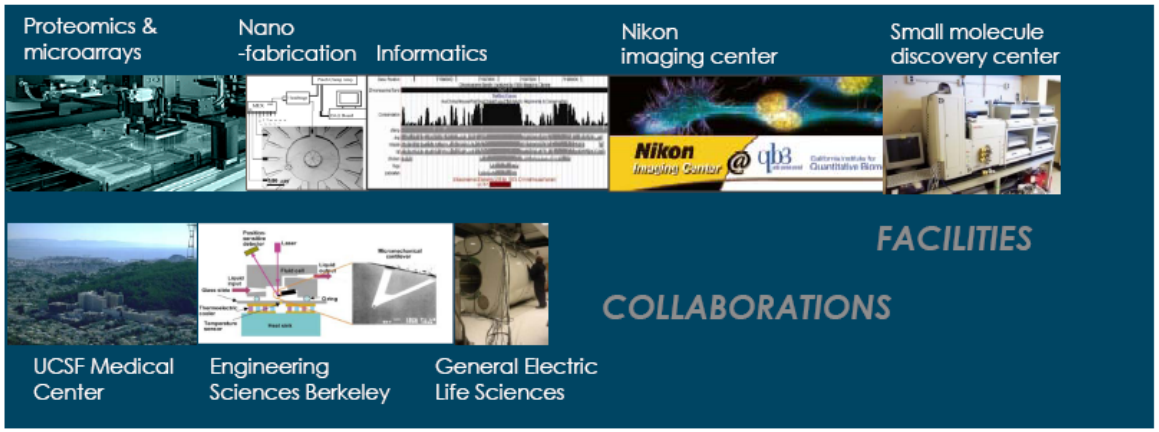


Source: Regis Kelly, QB3

Institute for Collaboration

What makes QB3 different

SCALE	QB3 is a multi-disciplinary and multi-institutional institute with more than 200 faculty
FACILITIES	Access to diverse, high-quality core research facilities
COLLABORATIONS	Affiliation with centers of Clinical, Engineering and Industry excellence



A vision of success through collaboration

Source: Regis Kelly, QB3

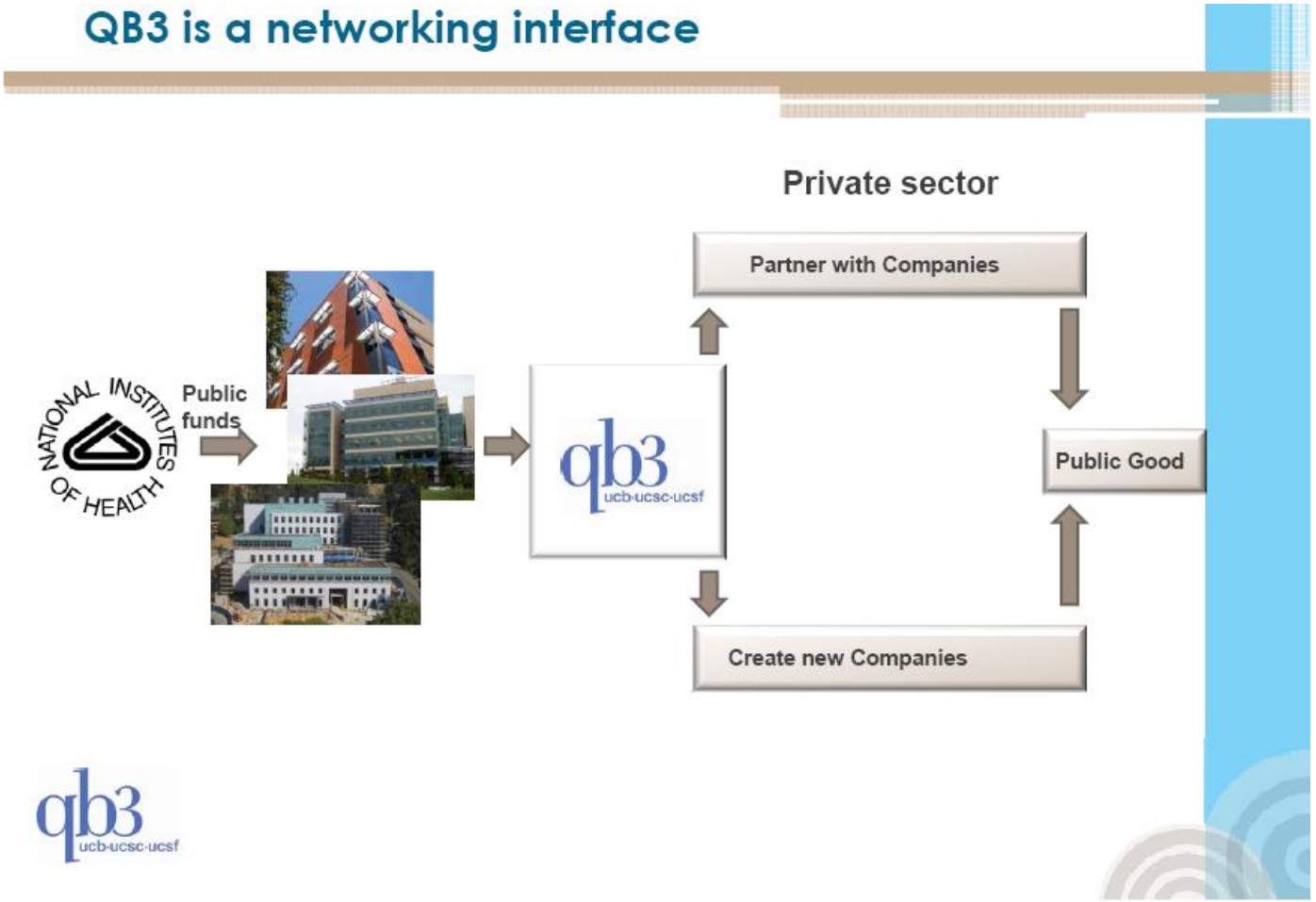
Institute for Collaboration

QB3's Mission Statement

- Scientific excellence: discoveries that can drive the creation of new industries
- Get these innovations to market and society as quickly as possible

Source: Regis Kelly, QB3

Institutes for Collaboration



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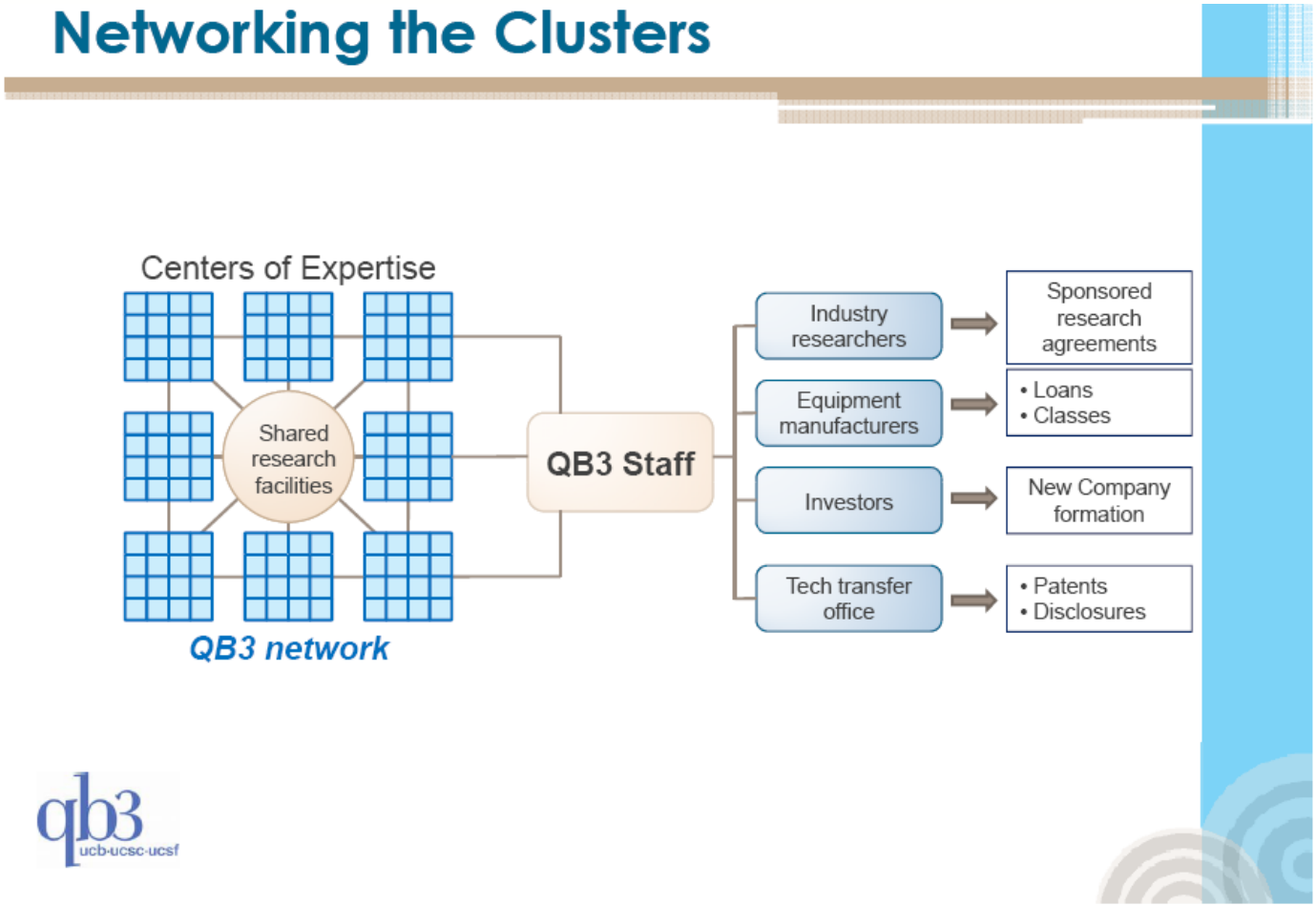


Source: Regis Kelly, QB3

Institute for Collaboration

Source: Regis Kelly, QB3

Institute for Collaboration

The dream

Measuring Results—

along the innovation continuum

USTAR Innovation Focus Areas

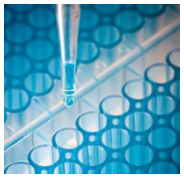
Focus areas:

- Based on existing University strengths
- Have vast commercialization opportunities
- Address large and strategic global markets
- Leverage Utah industry strengths

Strategy:

- Attract all-star research faculty from outside the state with a reputation for innovation and commercialization

Energy



BioDevice/
BioPharma

Medical Imaging
And Brain
Medicine

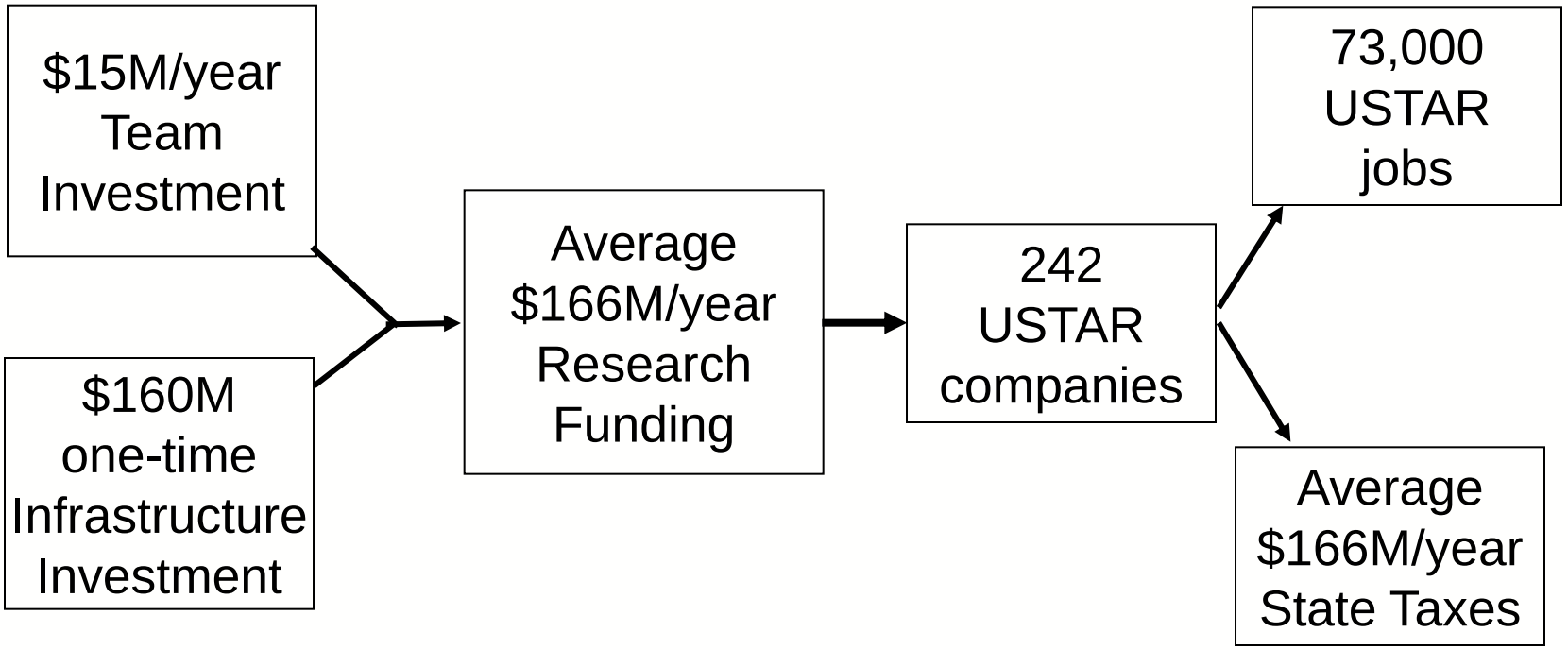
Imaging
Technologies
and Digital Media

nanoTechnology

Ted McAleer, Executive Director,
USTAR Governing Authority

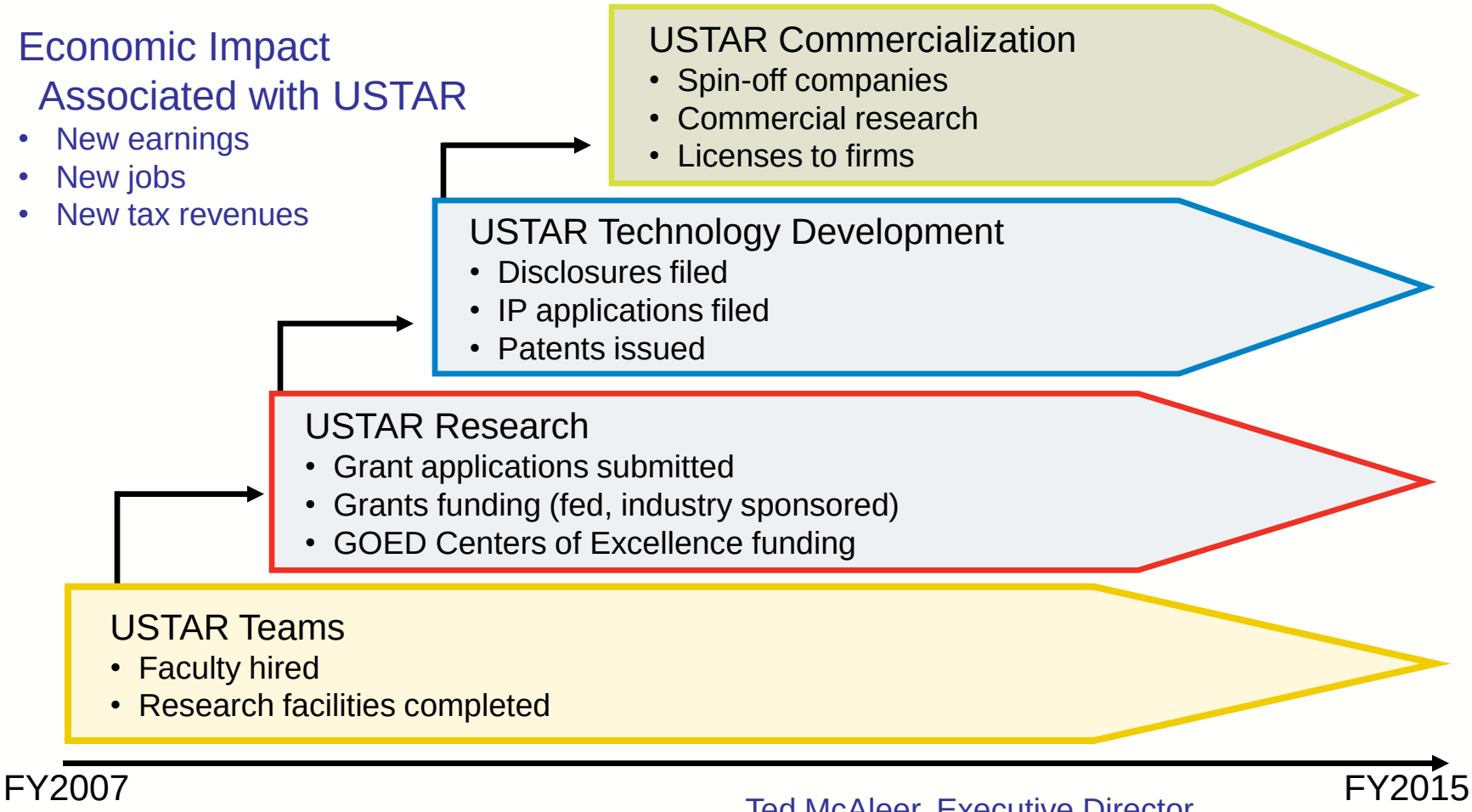
USTAR Economic Leverage

Papers . . . . . Patents . . . . . Products



Ted McAleer, Executive Director,
USTAR Governing Authority

USTAR Framework for Implementation & Measurement



Ted McAleer, Executive Director,
USTAR Governing Authority

Title

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- Bullet Point 3

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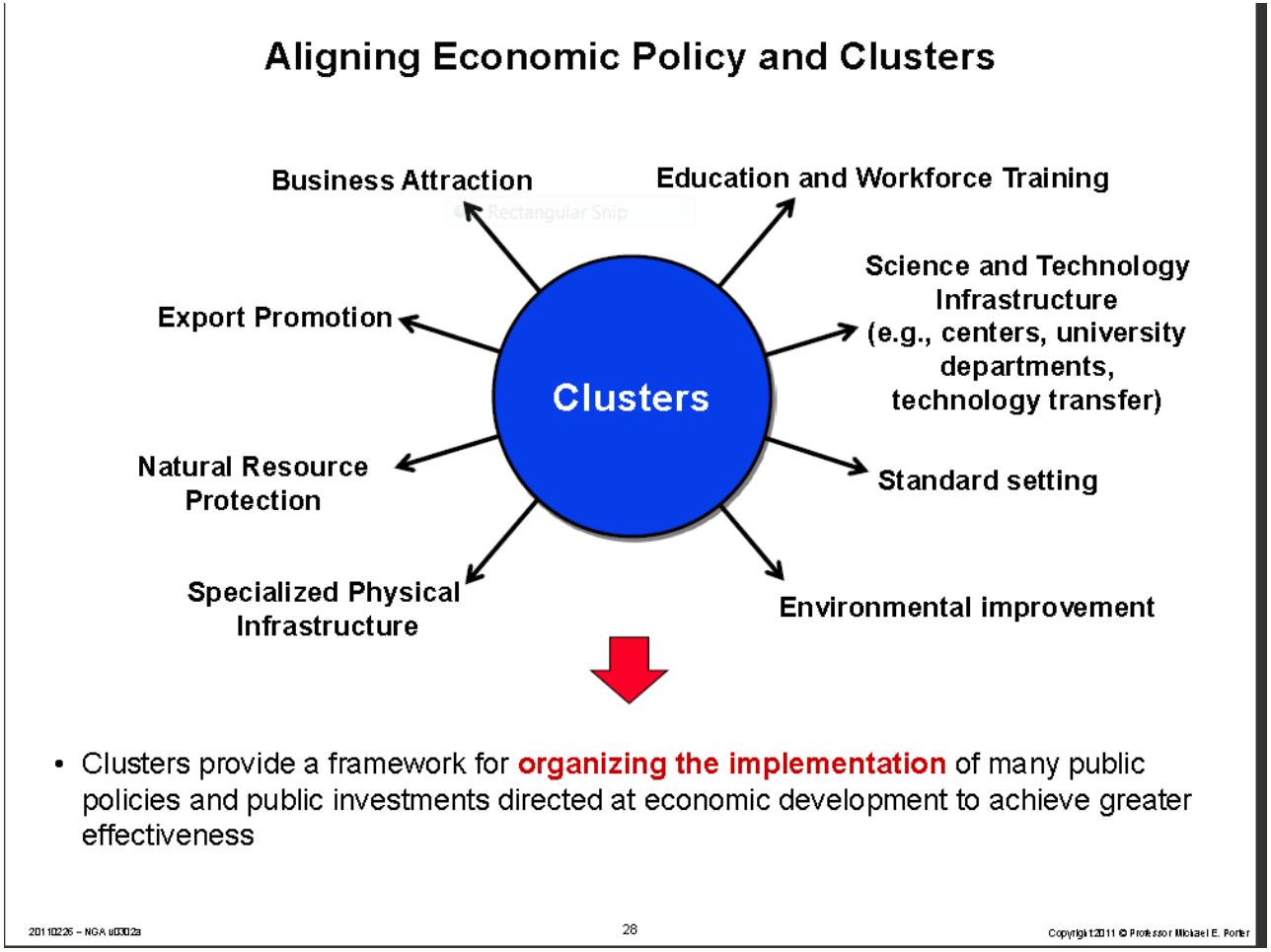
Source: Centers for Medicare and Medicaid – “Exchanges: A Proposed New Federal-State Partnership” (September 19, 2011)

Service Delivery Tool



Source: Dr. Michael Porter

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Must-Haves for Innovation

The Four Components of Innovation