



Boeing's Benchmarking Process for R&D Collaboration with Universities

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What do we do?

Boeing Research & Technology

Lead Boeing Into a New Era of Innovation

We **deliver** aerospace technology capabilities that **transform** markets, **capture** business opportunity, and **benefit** humanity



Digital Engineering



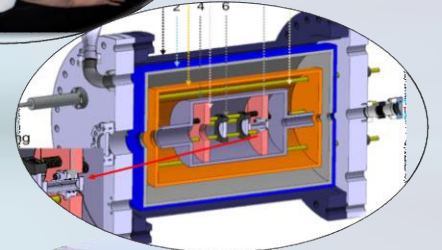
Autonomy



AI / ML

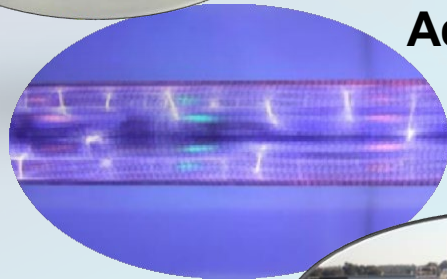


Quantum Technologies



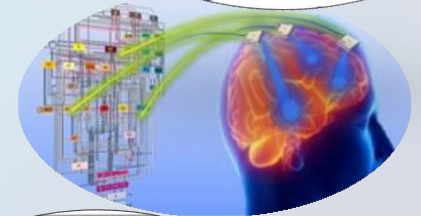
Hypersonics

Sustainability & Future Mobility



Advance Power & Thermal

Advanced Microelectronics



ATS

Additive Manufacturing



High Rate Composites



Robust, widespread, and integrated



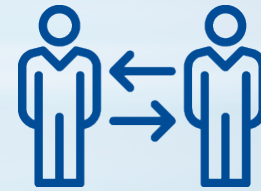
University-Industry Benchmarking



Case Studies



Internet Research



1-on-1 Conversations



Benefits

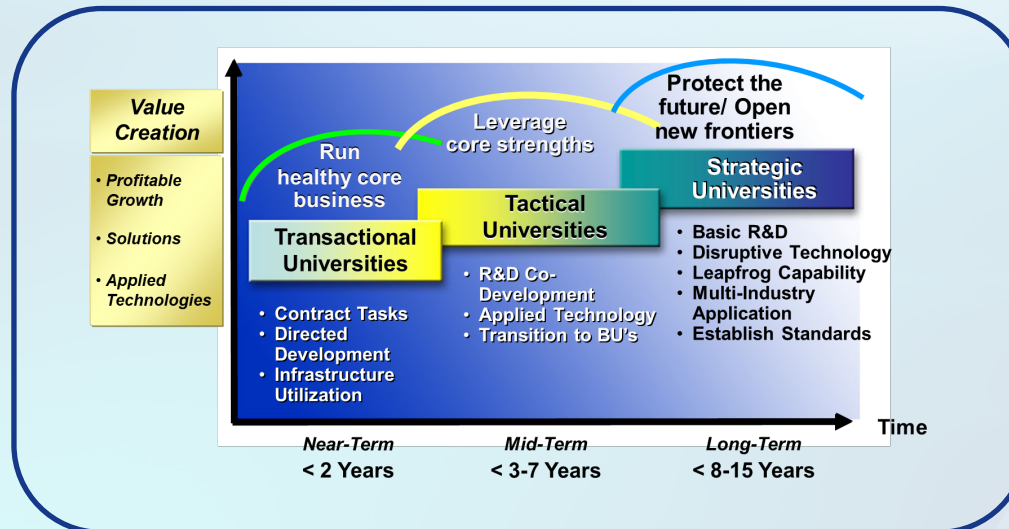
- Human Capital
- Educational
- Financial
- Operational
- Reputational
- Intellectual Property



Industry STU Objectives

- Collaborative Research
- Talent Pipeline
- Leverage

Types of Interactions



Industries use a variety of the models to reach desired outcomes



Strategic Master Research Agreements (Multi-Year Contract)

Negotiated terms and conditions between company and university to allow easy on-boarding of new projects



Work Experience

Companies globally utilize Industrial PhDs / Fellowships / Internships to provide organizational exposure to PhD students



Co-Location

Company physically has space on-site at a university for collaboration on projects



Request for Proposals

Company openly solicits ideas for research collaboration



Industry-University 10 Year Partnerships

Significant investment for unrestricted use, sponsored & blue sky research, undergrads, PhD students, lab/chair funding

There is no one size fits all

Ad Hoc

No Defined Structure

Ultimate flexibility,
one-off engagements

Standardized

Requires Less Program Management

Same approach across all university
relationships, equal engagement

Customized

Increased Flexibility

Customizable but limited
approach, varied engagement

Tiered

Ultimate Flexibility

Tiered partner system utilizing
multiple engagement models

Alliances

Long-term formalized
partnerships

Consortiums

Requires More Program Management

Collaboration and engagement
across all involved universities

How does our company compare with others?

What are alternative engagement approach strategies to consider?

Company	Partner Reference	# of Partners	Oversight of All University Engagement	Focus	Funding	# of Countries	Engagement							
							Relationship Mgt	Projects	Gifts	Interns & Fellowships	Curriculum	Facilities	IP	Length
A	Strategic Partners	4	Centralized	Open & targeted	Internal	Global	Yes	MRA		Fellowship		Shared	Joint	10 yr
B	Ambassador Universities	12	Decentralized	Company Needs	Internal & External	13	Yes	MRA & call for proposals	Grants		Yes	Shared	Joint	Annual
C	Strategic University Partners	32	Centralized	Company Needs	Internal	Global	Yes	MRA		Univ Employees, work onsite		Company Site	Own	Multi-year
D	Academic Partners	9	Decentralized	Company Needs	Internal	4	Yes	MRA	No	Interns		Univ Centered	Joint	5 yr

Not Real Data

GRADUATE WORK EXPERIENCE BENCHMARKING

Across industries a variety of approaches are utilized

How does our company compare with others?

What are alternative work experiences to consider?

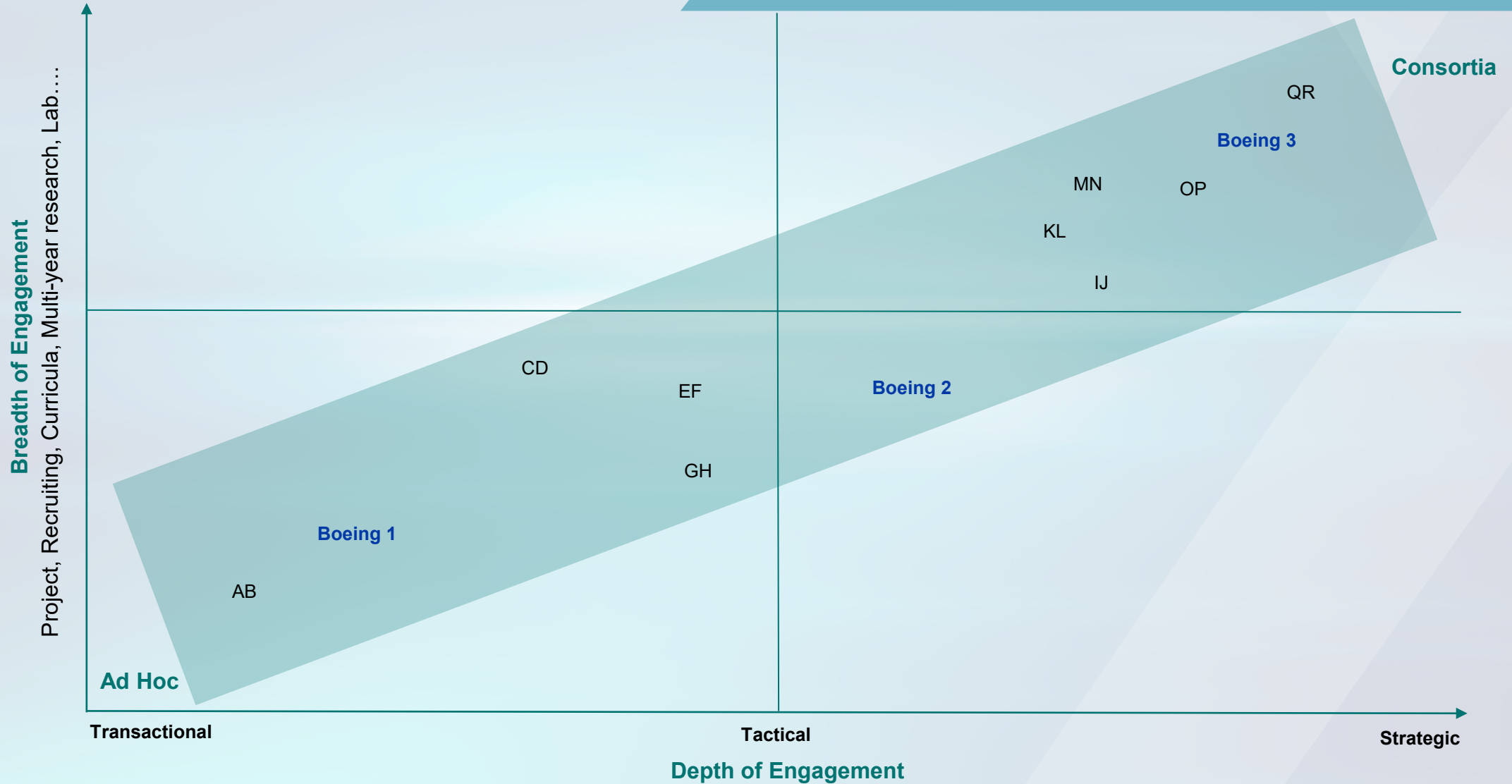
U.S. Industry Sponsored Internships

Externally Funded Fellowships

Industrial PhDs (Europe

Industry-Government Funded Fellowships

Unrestricted Fellowships (Global)



What is the purpose of our program?

What do we need from the university relationships?

Is our program formed around the right objectives?

Do we have the right model?

Does the current model fit our current business environment?

What is the right number of universities to include?

Should we consider growing future potential partnerships?



Identifying University Partners

INDUSTRY USED UNIVERSITY SELECTION CRITERIA

What are they good at?

Rankings
Leverage

Published papers (in aligned capabilities)

What do we need?

Capabilities Aligned to Company's Technical Priorities
Capabilities Aligned to Company's Talent Pipeline Needs
Capabilities Supportive of International Research Centers

Can we work together?

Existing or to be developed relationships
Ability to agree to MRA or IP terms

Flexible Criteria

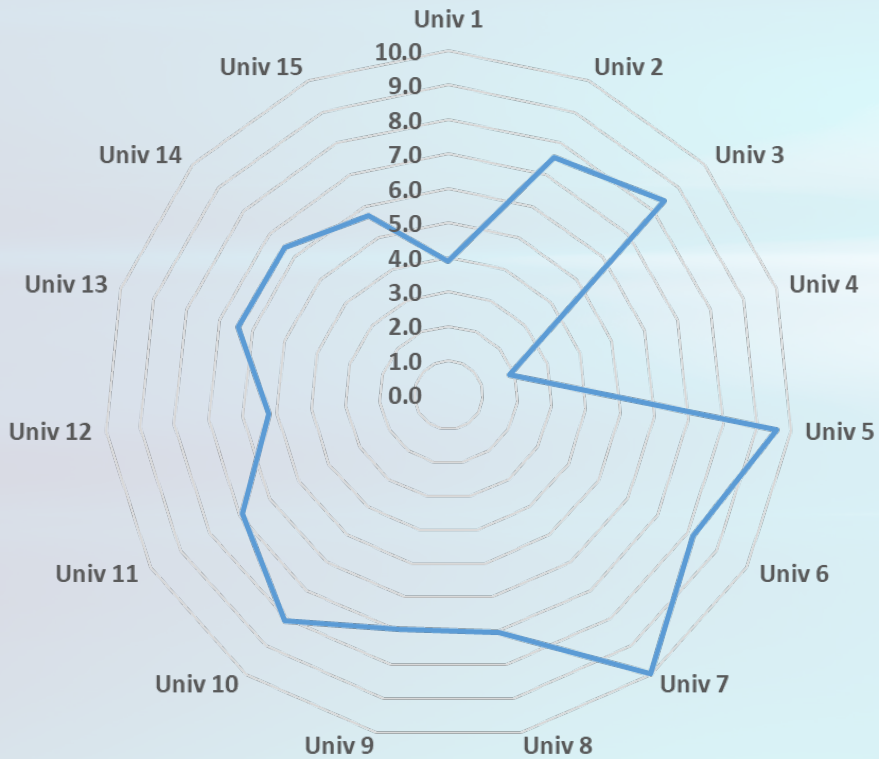
Do facilities / location aid meeting engagement objectives?

Availability of facilities / machines / labs
Co-location option

Other considerations?

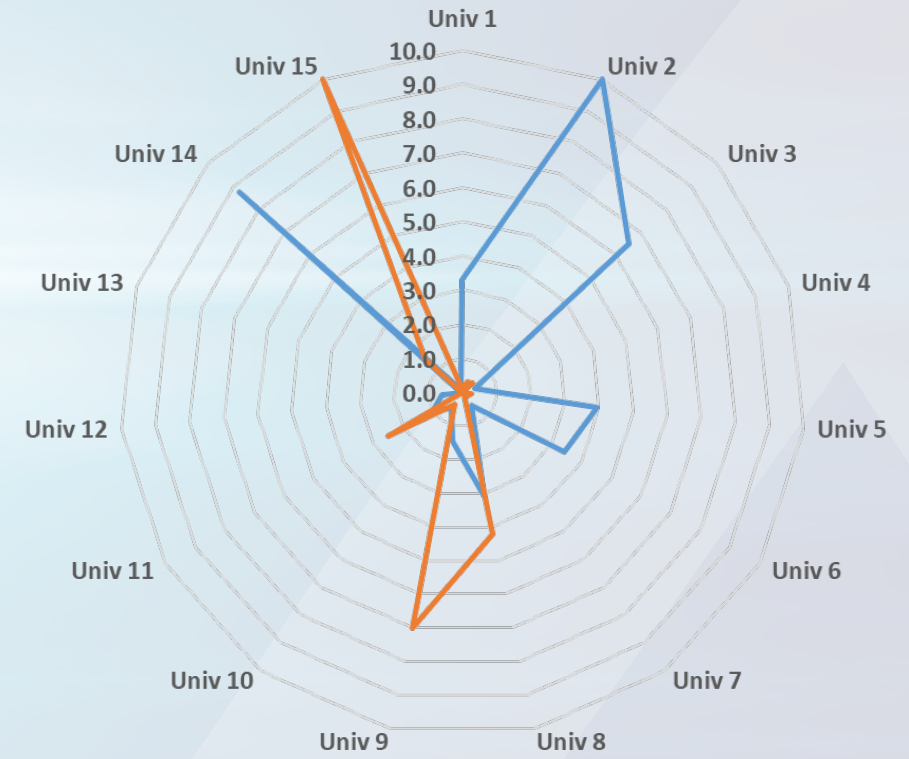
Company's Market Access Needs
Recruitment alignment

Overall Alignment to Tech Needs



- Technical Needs Alignment
- Relationship Intensity
- Engagement Frequency
- Spend Intensity
- Tech Fellow Alumni

Spend / Grants



R&D UNIVERSITY ENGAGEMENT TIERED MATURITY MODEL



Current Engagement		+ Future Engagement			Sniff Test					
Graduate Work Experience	Capability Alignment	Co-Location / Funded Lab	Engagement (guest speakers, capstone)	Curriculum Dev	Proposed # Univ	Example Universities	% of R&D Funding (last 5 years)	Avg Spend per University (last 5 years)	Executive Alumni #	Tech Fellow Alumni #

Should we work with a select number of universities and do more in depth with each one?

Should we add more partnership tiers with varied engagement?

Adoption Considerations

Sponsor research aligned to R&D capabilities at universities

Recruit PhD talent from top tier universities through sponsored research and work experiences

Increase engagement at universities: guest lecturers, capstone projects etc.

Integrate and provide insight into Enterprise University R&D Engagement

Integrate sponsored research results into R&D roadmaps

Organization / RAAs

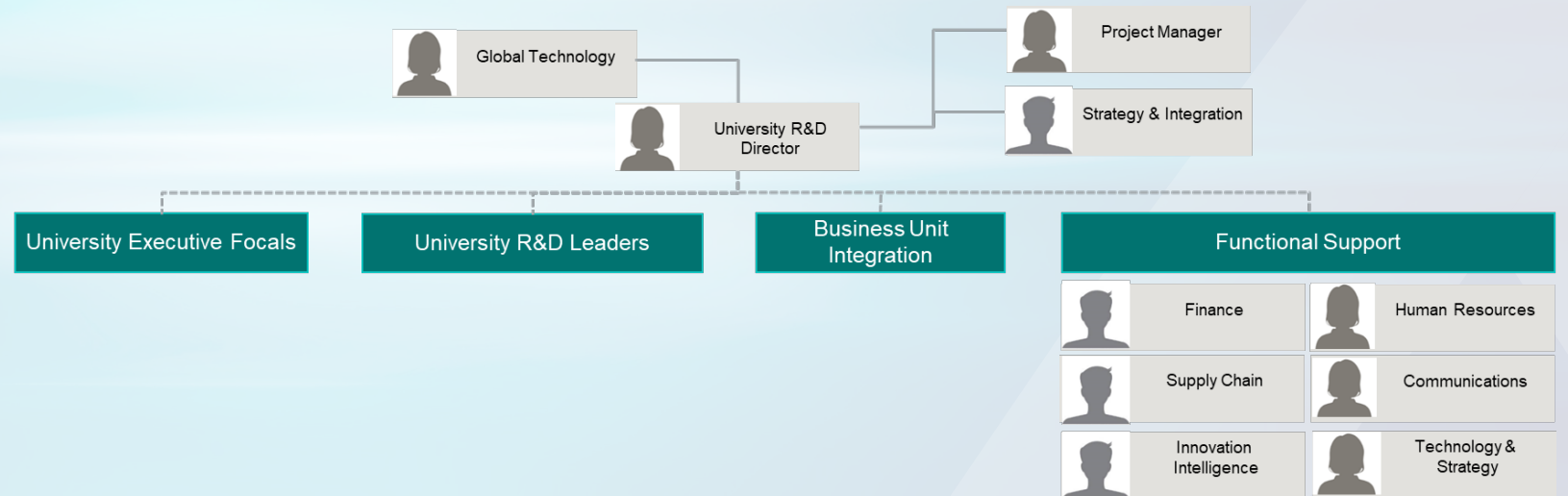
Matrix Organization
Communication / Engagement

Operations

Operating Rhythm
Operating Products
Budget / Finance
Data Management

Strategy & Integration

Annual Assessment
Portfolio Benchmark (every 3 years)



■ Outcome / Performance (linked to program goals)

Talent Pipeline Hiring

- Number of students hired
- Hiring cycle time
- Average length of time new-hires stay with the company
- Number of Executives and Tech Fellows currently employed
- Percentage of hiring in critical skill areas

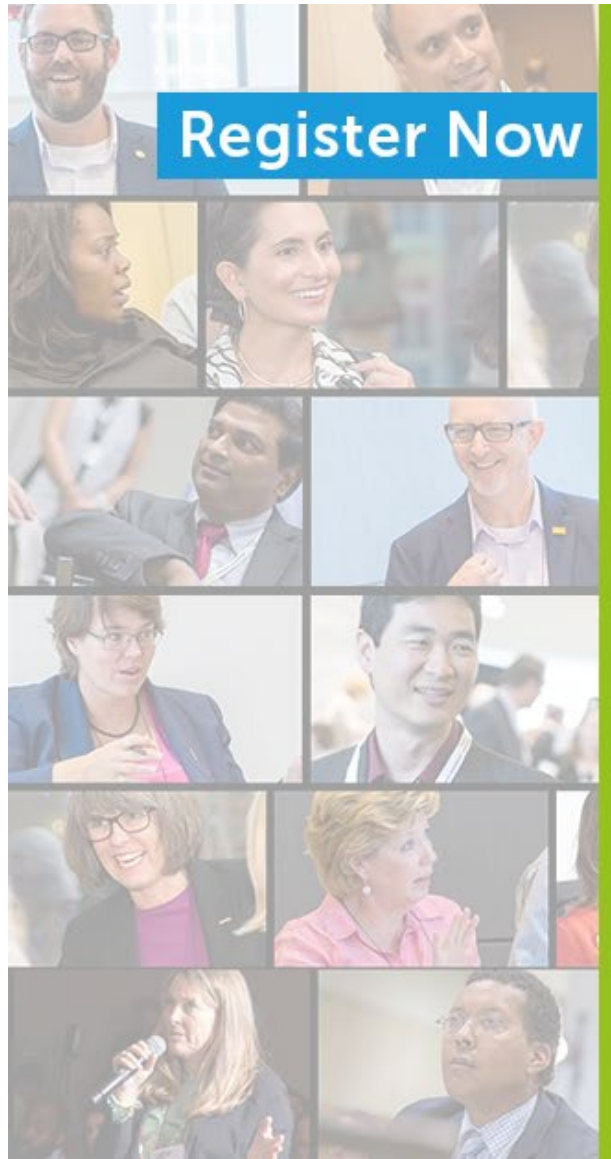
Business Impact

- Percentage of R&D funds (last 5 years)
- University 3-5 year investment average
- Number of licenses, publications, and patents
- Number of project technologies from early stage funding transitioned to Boeing
- CRAD bids / awards correlated to university R&D partners

■ Operations

- Engagement cycle time
- Total investment in the universities across entire partnership portfolio
 - \$s spent on grants and contracts
- \$s and number of research projects
- Number of students engaged per \$
- Are \$s spent as intended

Discussion & Feedback



Improving Health Through Technology, Huge Cohorts & Precision Medicine

September 15, 2021 | 11 - 11:45 AM ET



Moderator:
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University of Alabama at
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Josh Denny
NIH

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Strengthening
University-Industry
Partnerships