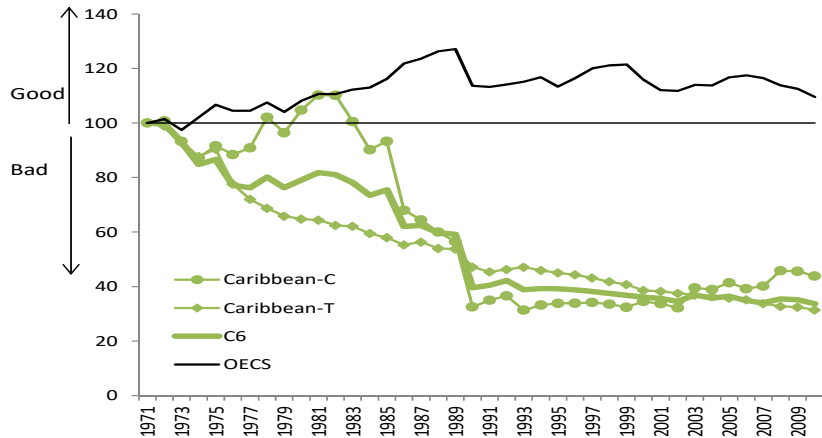# Promoting
Industry-University Collaboration

Jose Jorge Saavedra

Kingston, Jamaica
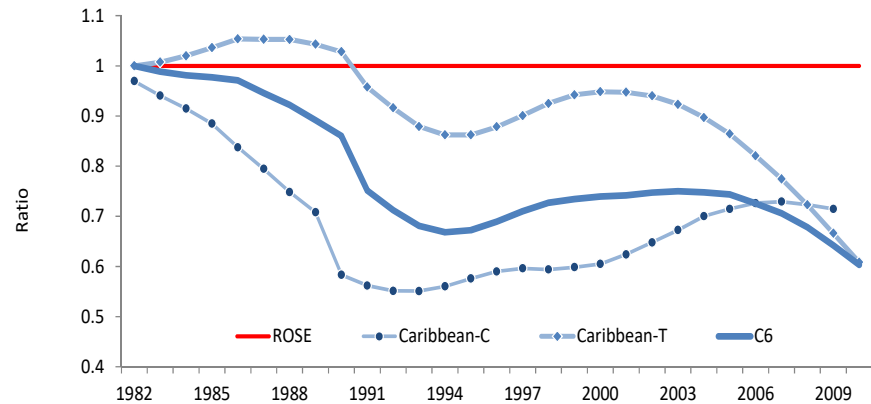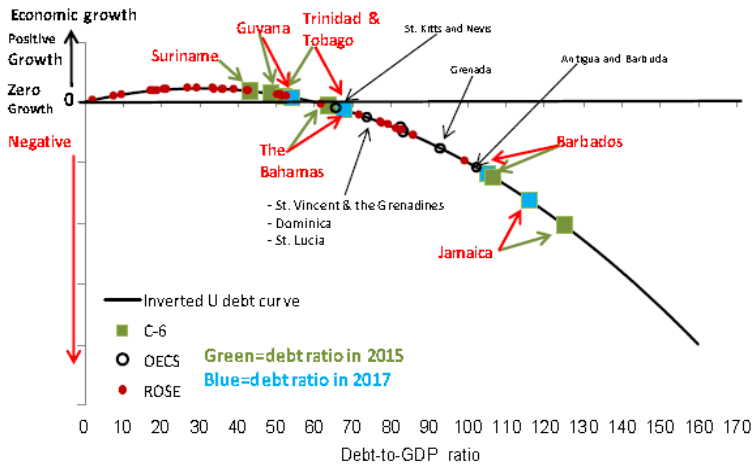
June, 2019

Caribbean: A troubling context
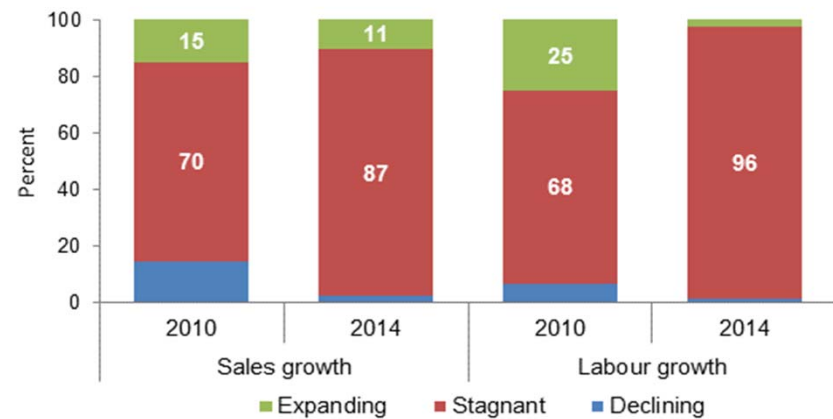
Relative GDP per capita 1971-1910

Total Factor Productivity

Debt-to-GDP ratio and Growth

Performance Classification of Caribbean Firms

Three policy implications:

- To increase productive capacity growth requires an increase in (particularly private) gross capital formation.

- To increase economic growth requires an increase in total factor productivity that requires an increased adoption rate of product and service technological innovation in businesses and government.

- To increase the employment effect of a given economic growth rate requires increasing output-employment elasticity (particularly of the youth).

Source: Inder Ruprah

Caribbean: Challenges and Vulnerabilities

Challenges

- Low growth and debt
- Crime, high and increasing
- Domestic Violence
- The "boy" problem
- High migration and brain drain
- Low productivity of firms

Challenges

- Low growth and debt
- Crime, high and increasing
- Low productivity of firms
- Domestic Violence
- High migration and brain drain
- The "boy" problem

Vulnerabilities

- Commodity Price Volatility
- Oil shocks
- Divisive political culture and partisanship
- De-Risking
- Wavering commitment to fiscal discipline
- Exposure to Natural Disaster and Climate Change: Flooding and Sea Level Rise

Caribbean: Opportunities for Higher Education Institutions
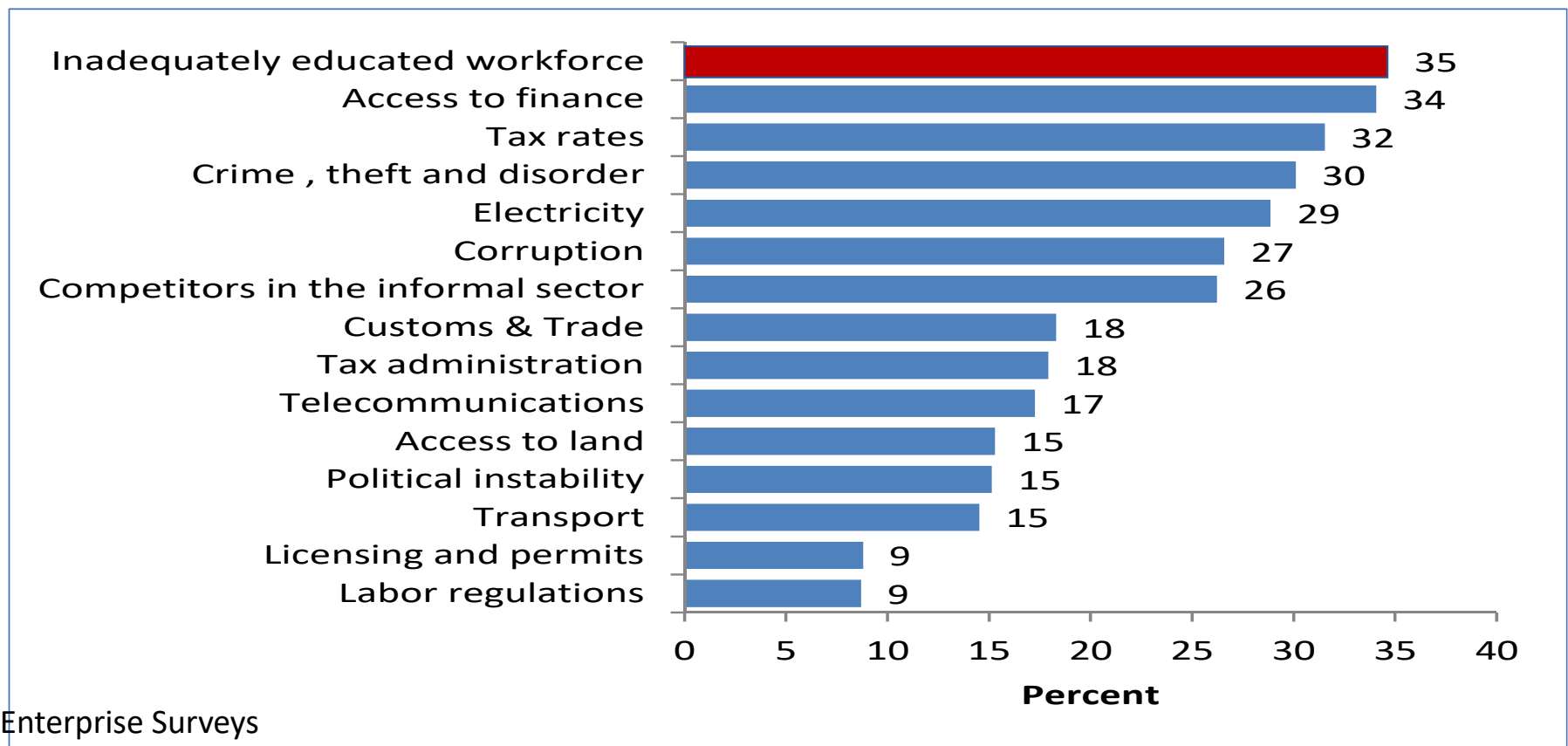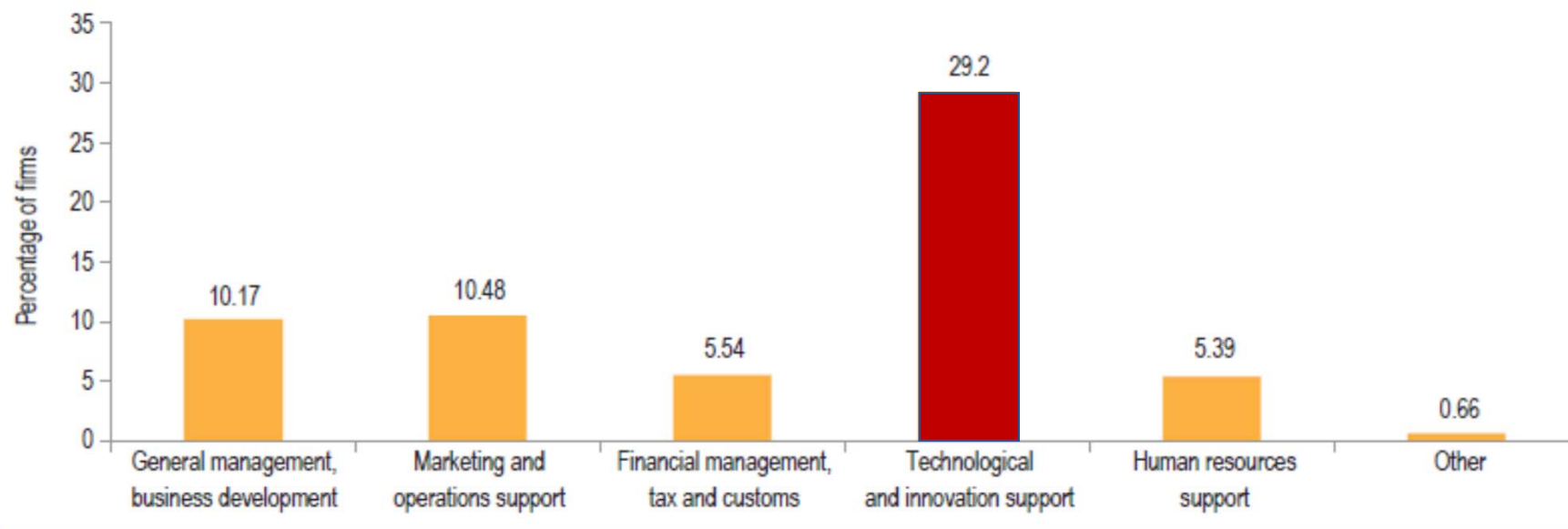
Ranking of the most problematic factors for Doing Business in Caribbean countries

Factor	Percent
Inadequately educated workforce	35
Access to finance	34
Tax rates	32
Crime , theft and disorder	30
Electricity	29
Corruption	27
Competitors in the informal sector	26
Customs & Trade	18
Tax administration	18
Telecommunications	17
Access to land	15
Political instability	15
Transport	15
Licensing and permits	9
Labor regulations	9

Percent

Caribbean Firms Expressing Demand for Business Development Services

Are we producing people with relevant skills in the Caribbean?

Skills Mismatch in the Caribbean

Educational Levels: 1=Primary; 2=Secondary; 3=Vocational Training; 4=University Degree
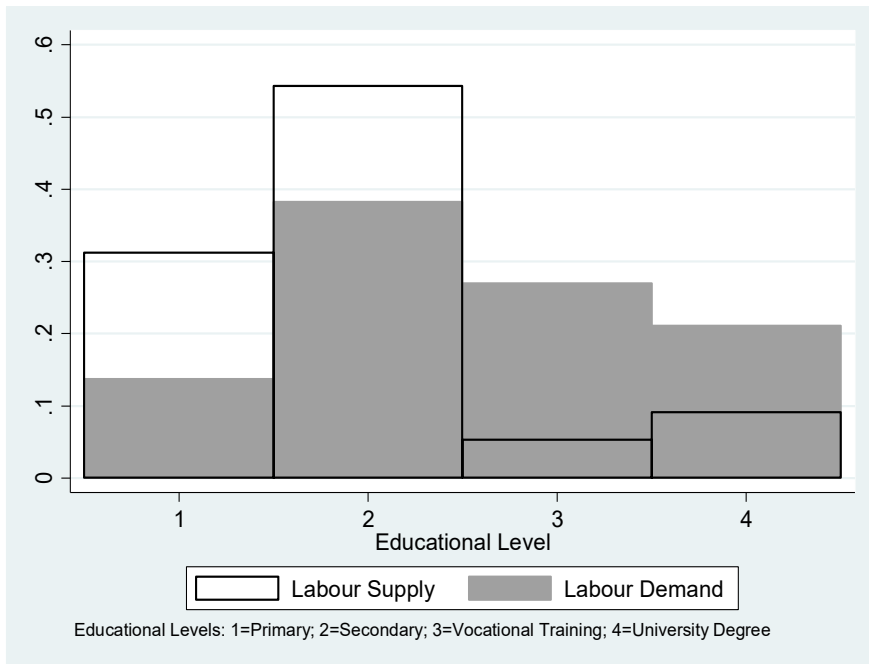
Source: IDB staff estimates from Trinidad and Tobago's Labour Force Survey (2013) and PROTEqIN Survey, 2014

How relevant are UWI degrees to current jobs?

Relevance of degree to current job (percent of respondents that agree or strongly agree)
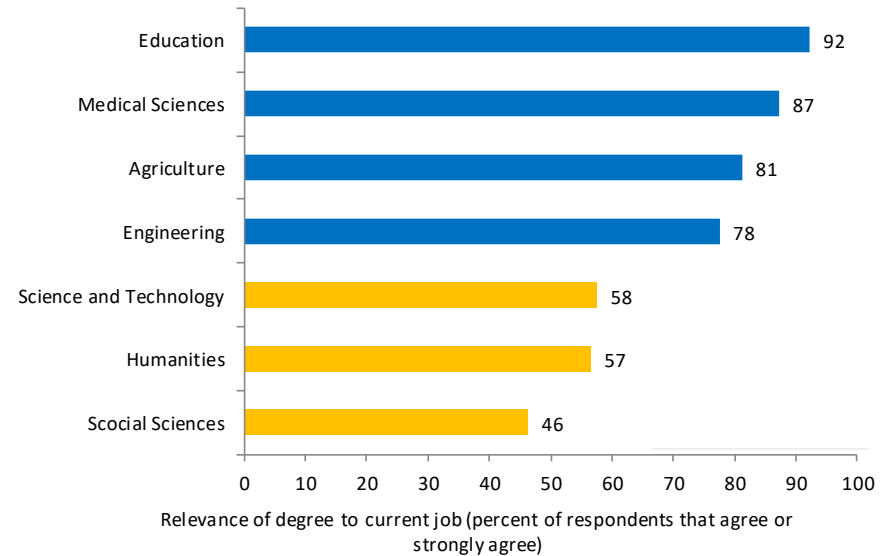
Source: IDB staff estimates using data from the University of the West Indies, 2016.

So what? Great opportunity for UWI?

High debt, low growth, low productivity, stagnation

Many challenges and vulnerabilities

High Demand for better educated workforce

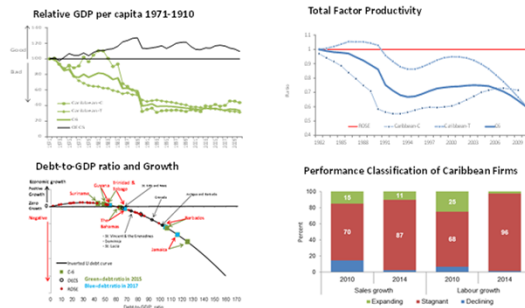Ranking of the most problematic factors for Doing Business in Caribbean countries
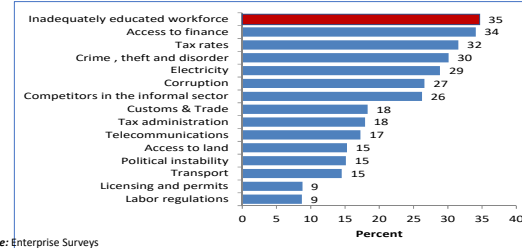
Source: Enterprise Surveys

High Demand for technology and innovation support

Caribbean Firms Expressing Demand for Business Development Services

Source: Exploring Firm-Level Innovation and Productivity in Developing Countries: The Perspective of Caribbean Small States, IDB 2017

NO! if we stay with business as usual

We do not produce the skills that the market demands

Skills Mismatch in the Caribbean

Educational Levels: 1=Primary; 2=Secondary; 3=Vocational Training; 4=University Degree

We are not relevant in some of the strategic areas of the future

How relevant are UWI degrees to current jobs?

Area	Value
Education	92
Medical Sciences	87
Agriculture	81
Engineering	78
Science and Technology	58
Humanities	57
Scocial Sciences	46

Relevance of degree to current job (percent of respondents that agree or strongly agree)

So what?

High debt, low growth, low productivity, stagnation

Many challenges and vulnerabilities

High Demand for better educated workforce

Ranking of the most problematic factors for Doing Business in Caribbean countries

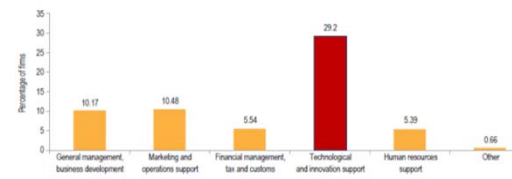**High Demand for technology and innovation support**

Caribbean Firms Expressing Demand for Business Development Services

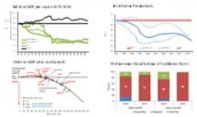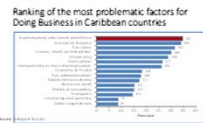**What can we do about it?**

**Developing Sustainable
Industry-University Relations
to improve our pertinence and impact**

Developing Sustainable Industry-University Relations: Trends
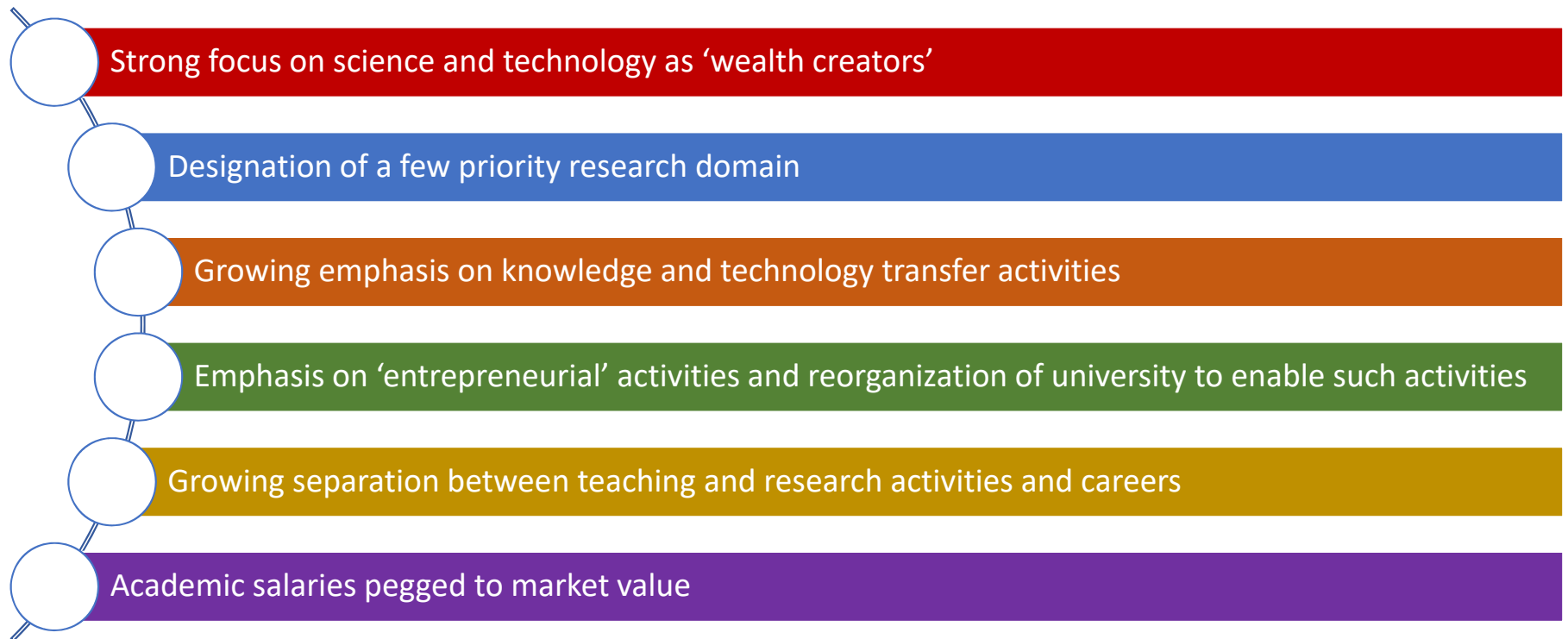
- Strong focus on science and technology as 'wealth creators'
- Designation of a few priority research domain
- Growing emphasis on knowledge and technology transfer activities
- Emphasis on 'entrepreneurial' activities and reorganization of university to enable such activities
- Growing separation between teaching and research activities and careers
- Academic salaries pegged to market value

Source: Ellen Hazelkorn, Dublin Institute of Technology, 2005

Developing Sustainable Industry-University Relations: International Experience

- **Denmark/Sweden**: tradition of research-based teaching

- **Canada**: Innovation Fund focus on innovation/return on investment in research, i.e. commercialization

- **UK and Australia**: Research Assessment Exercise provides competitive funding to 'best' research departments and institutions, and forcing developing of 'centers of excellence'

- **Ireland**: National Development Plan, Science Foundation Ireland and Enterprise Ireland developing institutional capacity in internationally competitive higher education research and collaboration with industry
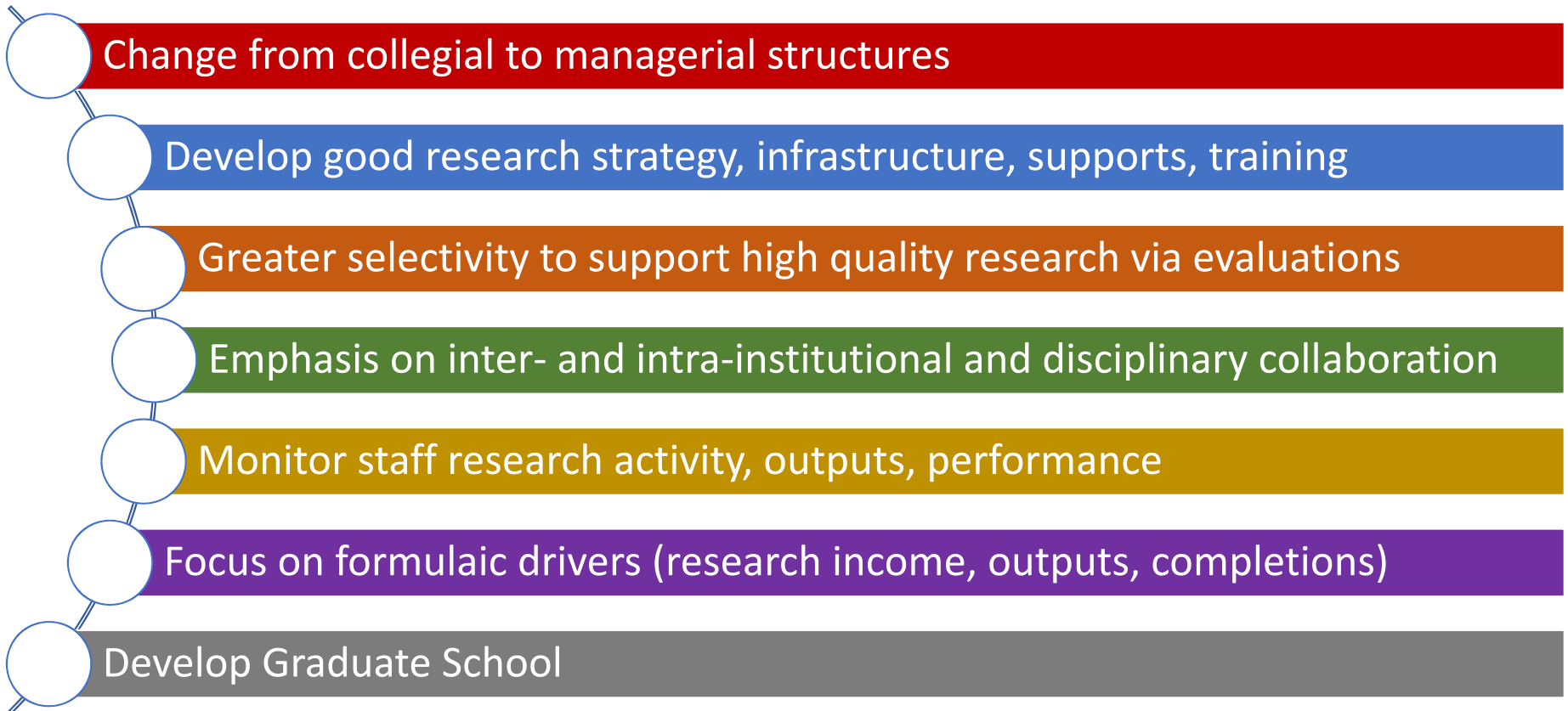
- **New Zealand**: Higher Education resource allocation driven by economy and society and no longer student choice

Source: Ellen Hazelkorn, Dublin Institute of Technology, 2005

Developing Sustainable Industry-University Relations: Institutional Best Practices

Change from collegial to managerial structures

Develop good research strategy, infrastructure, supports, training

Greater selectivity to support high quality research via evaluations

Emphasis on inter- and intra-institutional and disciplinary collaboration

Monitor staff research activity, outputs, performance

Focus on formulaic drivers (research income, outputs, completions)

Develop Graduate School

Source: Ellen Hazelkorn, Dublin Institute of Technology, 2005

Priorities for Industry-Academia Partnerships

University Orientation	Most Developed Countries
Teaching University	• Private participation in graduate programs • Joint Supervision of Ph.D. Students
Research University	• Research consortia and long term research partnerships to conduct frontier research
Entrepreneurial University	• Spin-off companies, patent licensing • Entrepreneurship education

Source: Priya Saini and Somprabh Dubey, Pacific Business Review International, April 2017

Priorities for Industry-Academia Partnerships

University Orientation	Most Developed Countries	Less Developed Countries
Teaching University	• Private participation in graduate programs • Joint Supervision of Ph.D. Students	• Curricula development to improve undergraduate and graduate studies • Student internships
Research University	• Research consortia and long term research partnerships to conduct frontier research	• Building absorptive capacity to adopt and diffuse already existing technologies • Focus on appropriate technologies to respond to local needs
Entrepreneurial University	• Spin-off companies, patent licensing • Entrepreneurship education	• Business incubation services • Entrepreneurship education

Source: Priya Saini and Somprabh Dubey, Pacific Business Review International, April 2017

Medium - High

- **The open nature of the university model for knowledge production & exchange**
  - Open Culture of Scientific Commons vs. Proprietary IP system for technology commercialization in private firms
  - High flow of talents (students but increasingly professors as well) in university model vs. moderate churn in firms
  - Spatial proximity of, & porosity of boundary between diverse disciplinary fields, facilitating cross-disciplinary research

- **Increasing adoption of "Third Mission"**
  - Adapting the traditional university model to incorporate a technology commercialization role in addition to the traditional roles of teaching & research

Source: Professor Wong Poh Kam, NUS

NUS Enterprise Incubator: A holistic ecosystem approach

NUS National University of Singapore

Generation of Pipelines
- Ideas/projects pipeline from NOC/ILO/NUS community
- Partnerships with IHLs, Polys, RIs and overseas counterparts.
- Start-Up@Singapore competitions
- *Technology Scouts*

Funding & Infrastructure
- Use university seed fund to leverage co-funding from government agencies (NRF, SPRING, MDA, IDA)
- Infrastructural support like NUS R&D labs, IP advisory, legal/accounting services

NUS Enterprise Incubation
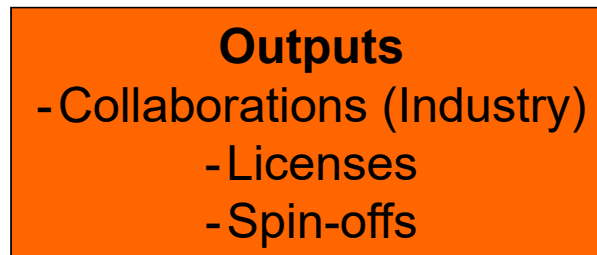
Expertise & Management
- Incubator Managers
- Mentor Network (Global & Local)
- Capability Development & Training (e.g. Marketing)
- *Entrepreneurs-in-Residence*

Physical Incubators
- University-wide
- Faculty-based
- Overseas launching pads

Outputs
- Collaborations (Industry)
- Licenses
- Spin-offs

Priority technology focus synergized with strategic sectors being promoted at the national level
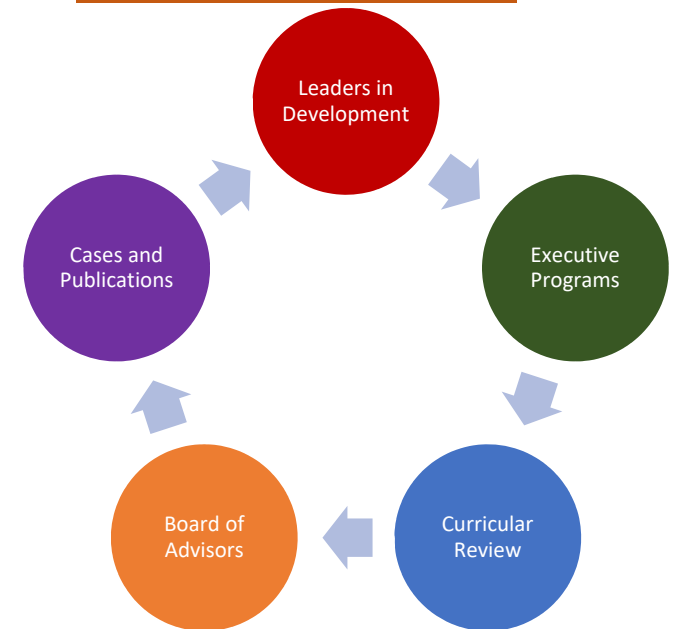
Source: Professor Wong Poh Kam, NUS

Medium-Low

Training of industry employees, internship programs, postgraduate training in industry, secondments to industry of university faculty and research staff, adjunct faculty of industry participants

Formation of social relationships (e.g, conferences, meetings, social networks)

Dialogo Nacional

- Leaders in Development
- Executive Programs
- Curricular Review
- Board of Advisors
- Cases and Publications

Types of Industry-Academia Links

|		
High	**Research Partnership**	Inter-organizational arrangements for pursuing collaborative R&D, including research consortia and joint projects
	Research Service	Research-related activities commissioned to universities by industrial clients, including contract research, consulting, quality control, testing, certification and prototype development
	Shared Infrastructure	Use of university labs and equipment by firms, business incubators and technology parks located within universities
Medium	**Academic Entrepreneurship**	Development and commercial exploitation of technologies pursued by academic inventors through a company they (partly) own (spin-off companies)
	Human Resource Training and Transfer	Training of industry employees, internship programs, postgraduate training in industry, secondments to industry of university faculty and research staff, adjunct faculty of industry participants
Low	**Commercialization of Intellectual property**	Transfer of University-generated IP (such as patents) to firms (e.g, Via licensing)
	Scientific Publications	Use of codified scientific knowledge within industry
	Informal Interactions	Formation of social relationships (e.g, conferences, meetings, social networks)

Source: Adapted by Saini and Dubey from Perkmann and Walsh, 2007

Developing Sustainable University-Industry Relations: Challenges

- Proximity matters for university-industry collaboration
- Technology foresight studies can narrow fields of investigation
- Industry and university have different missions, needs and timetables
- Managing economic/commercialization expectation
- Assuring the integrity and productivity of research

The Vision Thing: Smart & Sustainable Islands
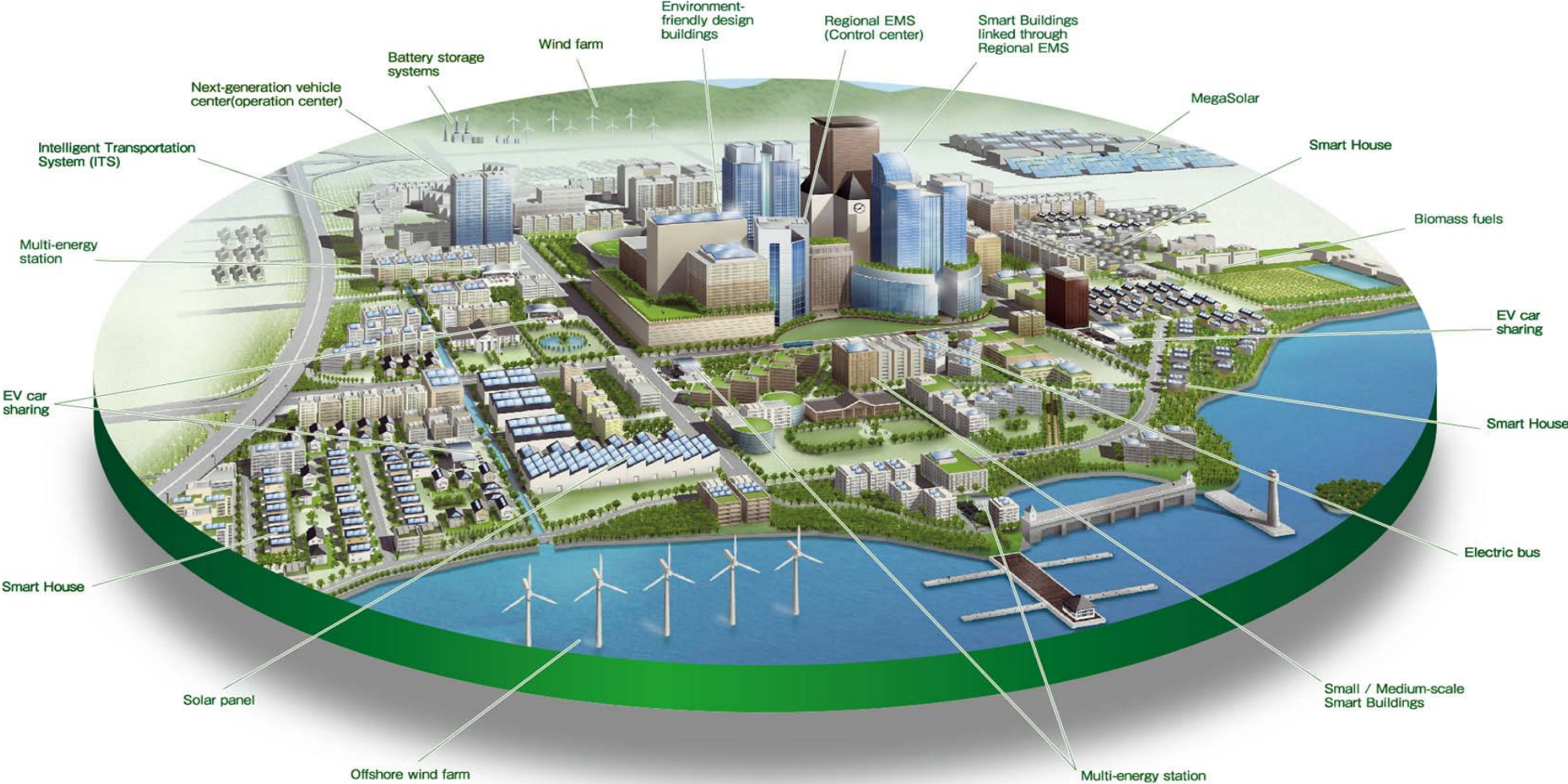
- We live in the convergence of two important phenomena in the history of humanity: the acceleration of global urbanization and the digital revolution.

- Planning, managing, and governing islands in a sustainable way, by maximizing economic opportunities and minimizing environmental damage, are major challenges that virtually all Caribbean countries will be facing in this new century.

- The transformation of traditional islands into Smart Island is not just an opportunity, it is an imperative.

- In this process, individuals, governments, the private sector, the academic world and civil society must participate.

- Despite the challenges, sustainable urban solutions have great potential to contribute to climate change mitigation an adaptation while addressing key socioeconomic concerns and building resilience.

- A smart and sustainable Island can be defined as an Island that uses Information and Communication Technologies and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, and environmental aspects.

Smart Islands

Sustainable Islands
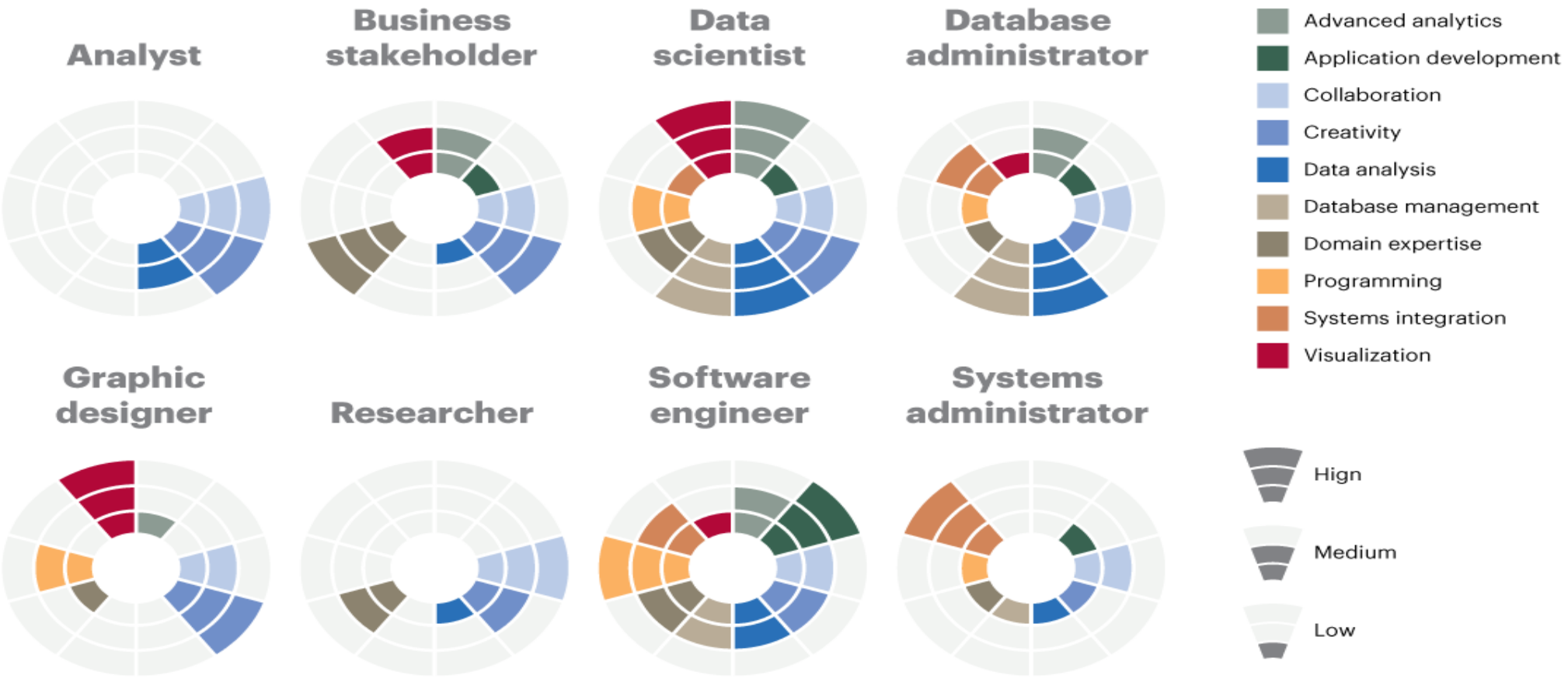
Smart Islands

Sustainable Islands

Top 10 Most In-Demand Skills

Skill	No. of Big Data Jobs Mentioning this Skill Set	% Growth In Demand For This Skill Set Over The Previous Year
Big Data	112,469	118%
Java	35,700	106%
Hadoop	31,274	118%
Python	31,100	231%
Structured query language	28,037	76%
Software development	27,990	128%
VMware	27,249	1269%
Application development	27,202	396%
Data warehousing	26,418	272%
Open source technology	23,666	387%

Source: Wanted Analytics, 2015

Needed skills by role for effective cross-functional IT and data science collaboration

Analyst

Business stakeholder

Data scientist

Database administrator

Graphic designer

Researcher

Software engineer

Systems administrator

Legend:
- Advanced analytics
- Application development
- Collaboration
- Creativity
- Data analysis
- Database management
- Domain expertise
- Programming
- Systems integration
- Visualization

- High
- Medium
- Low

Final thoughts

- Set a realistic but challenging Strategic Vision
- Strong and sustained commitment by Top Leadership (YOU)
- Introduce new organizational mechanisms to support change
- Recruit the right people to lead the change
- Widen funding mechanisms
- Invest in staff development and establish an appropriate reward system
- Build critical research and entrepreneurial infrastructure
- Build strategic international linkages
- Widen evaluation metrics
- Study global best practice, but innovate one's own approach based on own unique context; learn and adapt over time
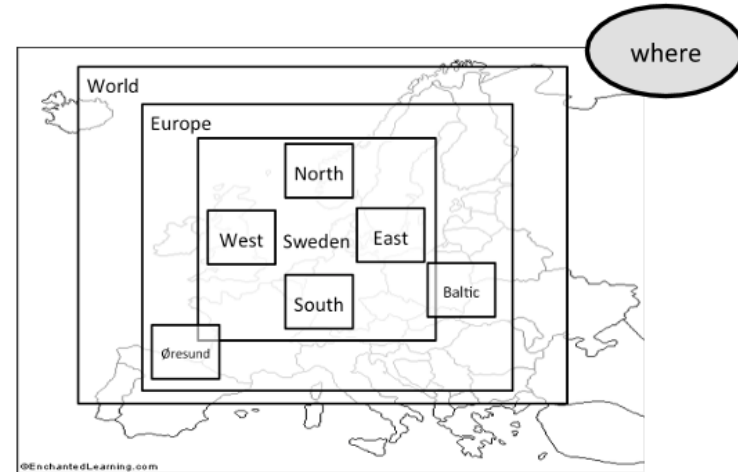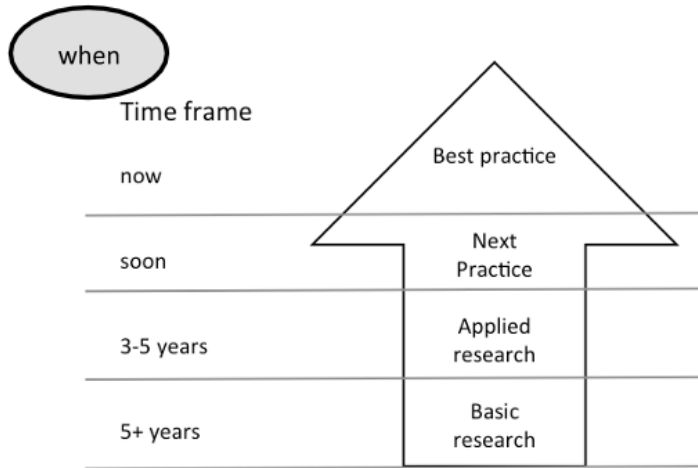
Thank You

Frameworks for action

The 4+1 model of Industry-Academia Collaboration

when — Time frame

now	Best practice
soon	Next Practice
3-5 years	Applied research
5+ years	Basic research

where — World / Europe: North, West, Sweden, East, South, Baltic, Øresund

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what

	Automotive	Industrial Automation	Telecom Mobile	Defence	Public	Medical	Other
Management							
Engineering							
Technology							

how

	Networking	Catalyzing	Executing
Society/Financing			
Knowledge provider			
Service Provider			
Product Provider			

How to Create Productive Partnerships With Universities

	IDEA LAB	GRAND CHALLENGE	EXTENDED WORKBENCH	DEEP EXPLORATION
What do you want to achieve?	• Attract new partners • Build relationships • Generate options	• Shape innovation ecosystem • Develop research agenda • Meet societal challenges • Hire talented graduates	• Solve near-term problems • Gain advice and support	• Tackle fundamental challenges • Access new areas of expertise • Access pipeline of discoveries • Hire talented graduates
How can you structure the collaboration?	• Simple and standardized contracts • Open calls • Outline research priority areas • Internal selection	• Special-purpose vehicles • High-leverage industry consortia • University endowments or centers	• Consulting agreements with individual academics • Contract research agreements with university • Student projects	• University center sponsorship • Framework agreements allocating decision rights to downstream intellectual property
Examples	• HP Labs Innovation Research Program • IBM Faculty Awards	• Structural Genomics Consortium • Shell Grand Challenge	• Nokia applied research contracts • Often practiced within larger collaborations	• Pfizer-Scripps partnership • Rolls-Royce University Technology Centers

Source: Permann and Salter, MIT Sloane Management Review, Summer 2012

Best Practices for Industry-University Collaboration

THE SEVEN KEYS TO COLLABORATION SUCCESS

1. **Define the project's strategic context as part of the selection process.**
   - Use your company research portfolio to determine collaboration opportunities.
   - Define specific collaboration outputs that can provide value to the company.
   - Identify internal users of this output at the working level; executive champions are not a substitute for this requirement.

2. **Select boundary-spanning project managers with three key attributes:**
   - In-depth knowledge of the technology needs in the field
   - The inclination to network across functional and organizational boundaries
   - The ability to make connections between research and opportunities for product applications

3. **Share with the university team the vision of how the collaboration can help the company.**
   - Select researchers who will understand company practices and technology goals.
   - Ensure that the university team appreciates the project's strategic context.

4. **Invest in long-term relationships.**
   - Plan multiyear collaboration time frames.
   - Cultivate relationships with target university researchers, even if research is not directly supported.

5. **Establish strong communication linkage with the university team.**
   - Conduct face-to-face meetings on a regular basis.
   - Develop an overall communication routine to supplement the meetings.
   - Encourage extended personnel exchange, both company to university and university to company.

6. **Build broad awareness of the project within the company.**
   - Promote university team interactions with different functional areas within the company.
   - Promote feedback to the university team on project alignment with company needs.

7. **Support the work internally both *during* the contract and *after*, until the research can be exploited.**
   - Provide appropriate internal support for technical and management oversight.
   - Include accountability for company uptake of research results as part of the project manager role.

University Researchers — Company Professionals — Project Manager

University Domain — Company Domain
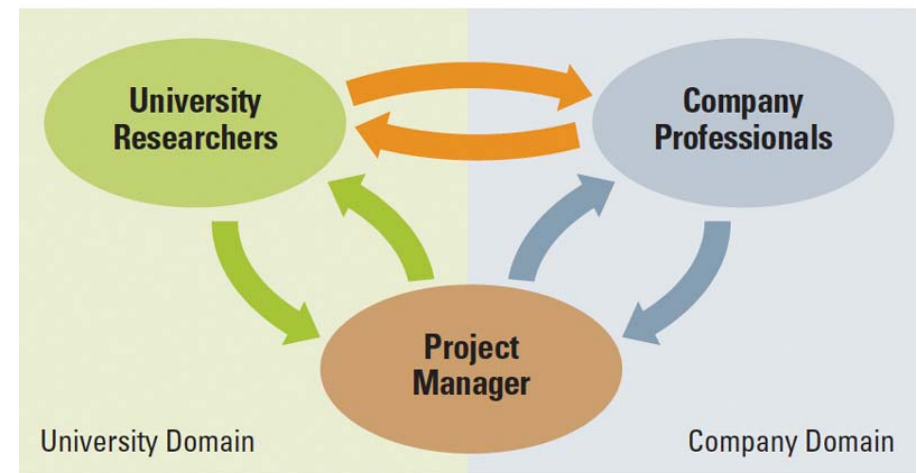
Source: Pertuze et al, MIT Sloane Management Review, Summer, 2010