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INNOVATION PROMOTION AND TECHNOLOGY TRANSFER

Topic 3

# Requirements for Creating an Innovation Culture and the Supporting Infrastructure

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## Background of Thomas Bereuter

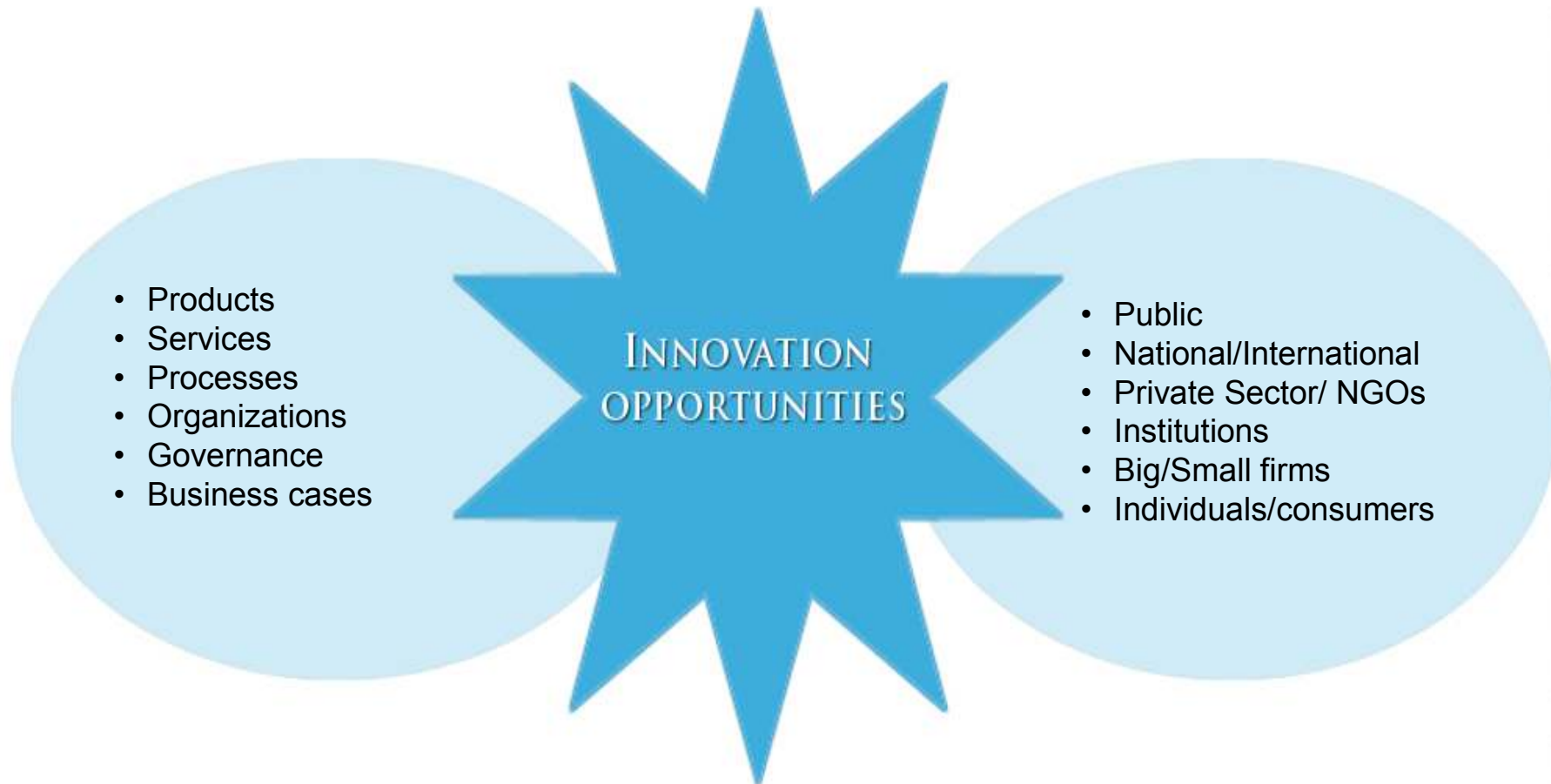
- Fundamental research at university and R&D in private research labs
- Exploitation of own patents ⇒  
Licensing, VC financed start-up and trade sale
- Set up of incubator at universities for the promotion of start-ups and spin-offs
- Experience as consultant and as manager in the high-tech sector
- Set up of technology exploitation management at R&D organisations

What are the Preconditions for Creating a Favorable  
Innovation Environment?  
Where to Start? Steps to be taken

## Innovation Defined

- » Involves lateral, creative and customer focused thinking
- » Fulfills unmet needs, not met by conventional products/processes/ services
- » Moving beyond R&D by collaboration to achieve new applications of old technologies, new processes & services, business cases, designs & more...
- » Enables solutions/inventions that have an impact on social and economic value!

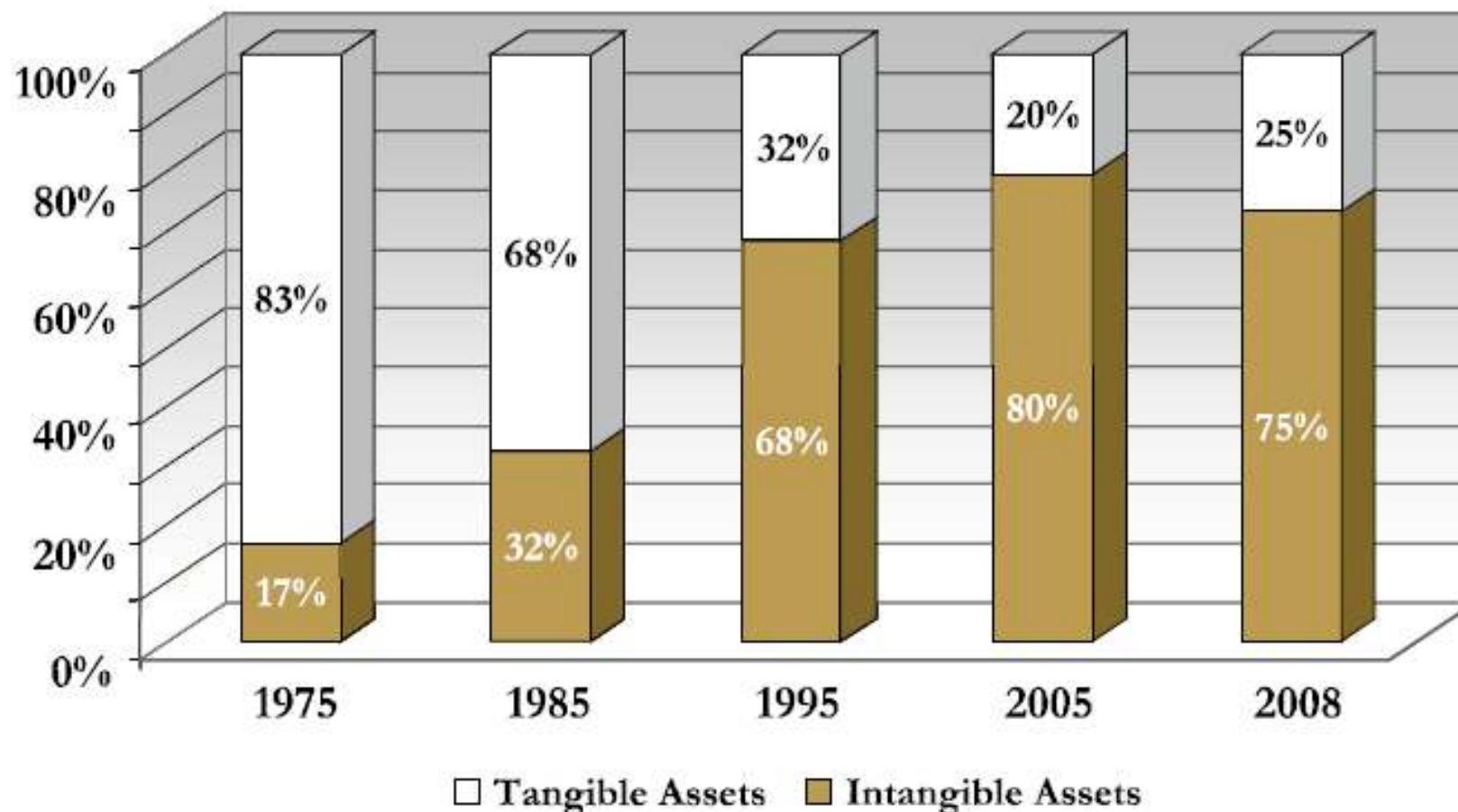
## *Innovations redefine everything*



# Innovations

- » Development of new products, services, markets,...
  - ⇒ reduce costs, improve efficiency, productivity, performance, quality, experience etc.
- » People, culture, technology, ecosystem & business cases drive Innovations
- » Major aspects are:
  - » Everyone can innovate, but no one can innovate alone.
  - » Innovators are motivated by recognition and reward.
  - » Failure goes along with innovation and needs to be allowed.
- » Innovations are the key to growth, prosperity & problem solving
- » IPRs are crucial rewards & usually a precondition for financing of product development and marketing.

## Components of S&P 500 Market Value



Source: Ocean Tomo

## Examples of valuable intellectual property



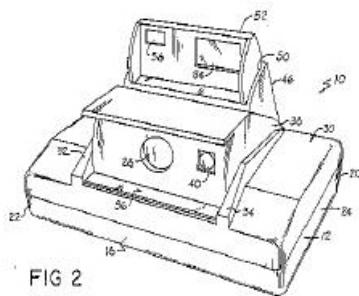
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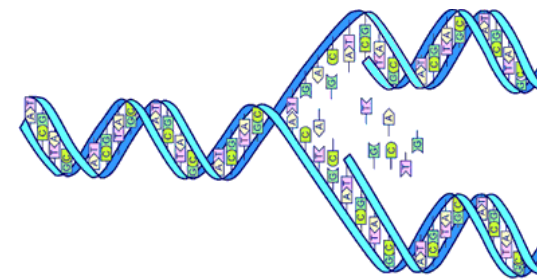
Apple® iPod®



Harry Potter



Instant camera



DNA copying process



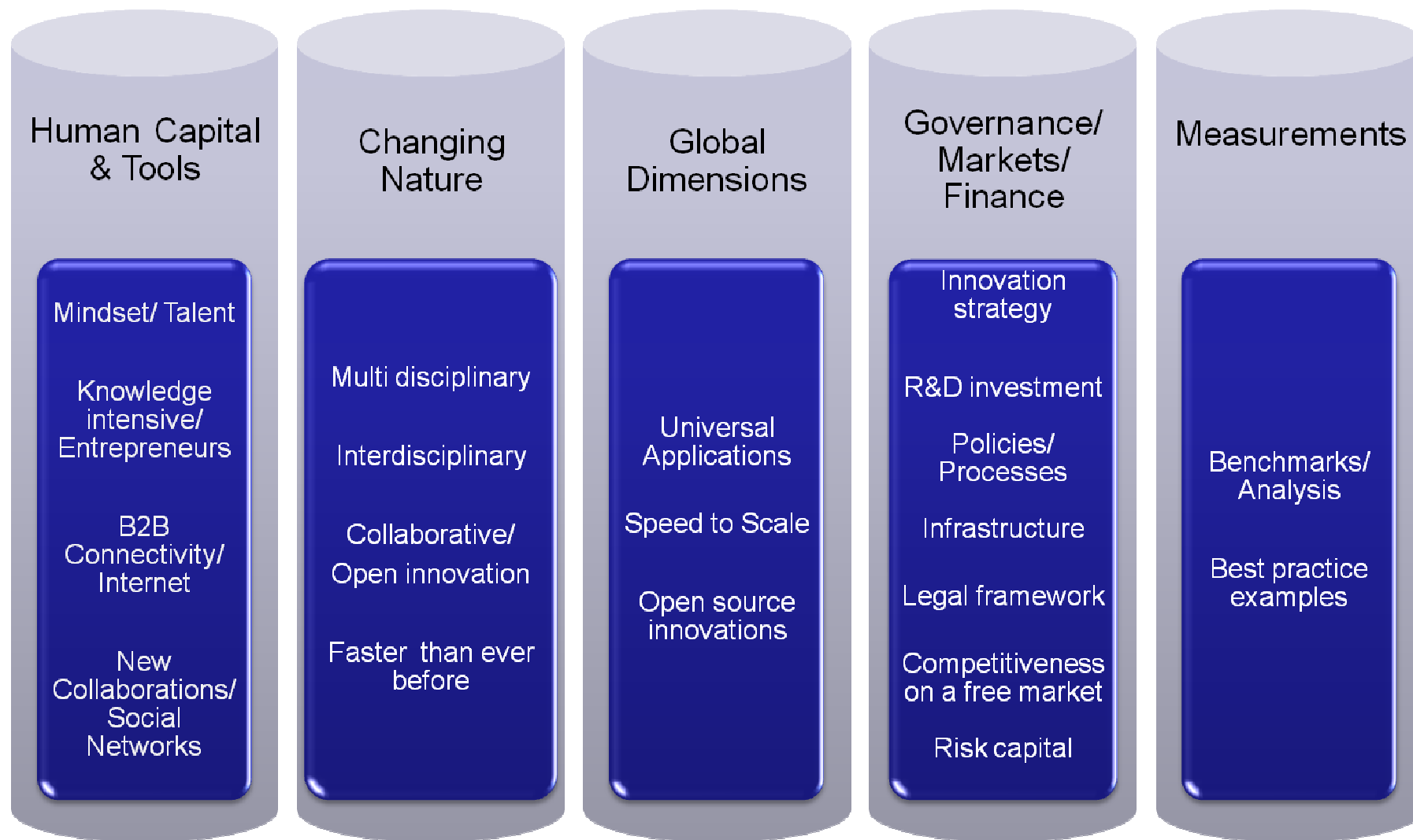
## Last 50 Years of Innovations

- » In the last 50 years Innovations have played a significant role in improving:  
Health, Education, Transport, Communication,  
Infrastructure, Energy, Governance, Wealth..
- » At the same time there are serious global challenges related to: Poverty, Hunger, Environment, Violence/War/Terrorism etc.

## The US Innovations Paradigm

- » In the last 50 years several major scalable innovations originated in the US:
  - Transistor, Laser, Fiber optics, Micro Processor, Windows, DNA/Genetics...
- » US provided the ecosystem to breed ideas:
  - **Large talent pool (immigration!)**
  - **Risk capital, government funding**
  - **Free and open markets (early adopters)**
  - **Autonomy, flexibility**
  - **Rule of law, IP framework etc.**
- » Silicon Valley & MIT/Boston/Massachusetts have been the source of many innovations creating role models for other nations

# INNOVATION PILLARS



## Supporting Infrastructure – Legal and Organizational

## Different Regulation Levels

- » **International and European regulations**
  - » Competition rules,...
  
- » **National Level**
  - » Patent/copyright law
  - » Code of obligations
  - » Research/University law
  
- » **Local & Institutional Level**
  - » Regional/local development funds
  - » University statute and regulations

## Public TT Expectations

- » Research results at public research institution are very often regarded as **common property**, not only by politicians but also from industry. If so IPRs are lost for innovation as investments are not rewarded!
- » ***TT is a public topic with different players and lobbyists!***
- » Politicians, representatives from industry and organization try to and will influence the TT for their benefit but often without having the big picture in mind.

## Bayh-Dole Act in the US

Small businesses and non-profit organizations can retain the title in a federally funded "subject invention." In exchange, the organization is required to:

- » Report each disclosed invention to the funding agency
- » Elect to retain title in writing within a statutorily prescribed timeframe
- » File for patent protection
- » Grant the federal government a non-exclusive, non-transferable, irrevocable, paid-up license to practice or have practiced on its behalf throughout the world

## Bayh-Dole Act

- » Actively promote and attempt to commercialize the invention
- » Not assign the rights to the technology, with a few exceptions
- » Share royalties with the inventor
- » Use any remaining income for education and research
- » Give preference to US industry and small business

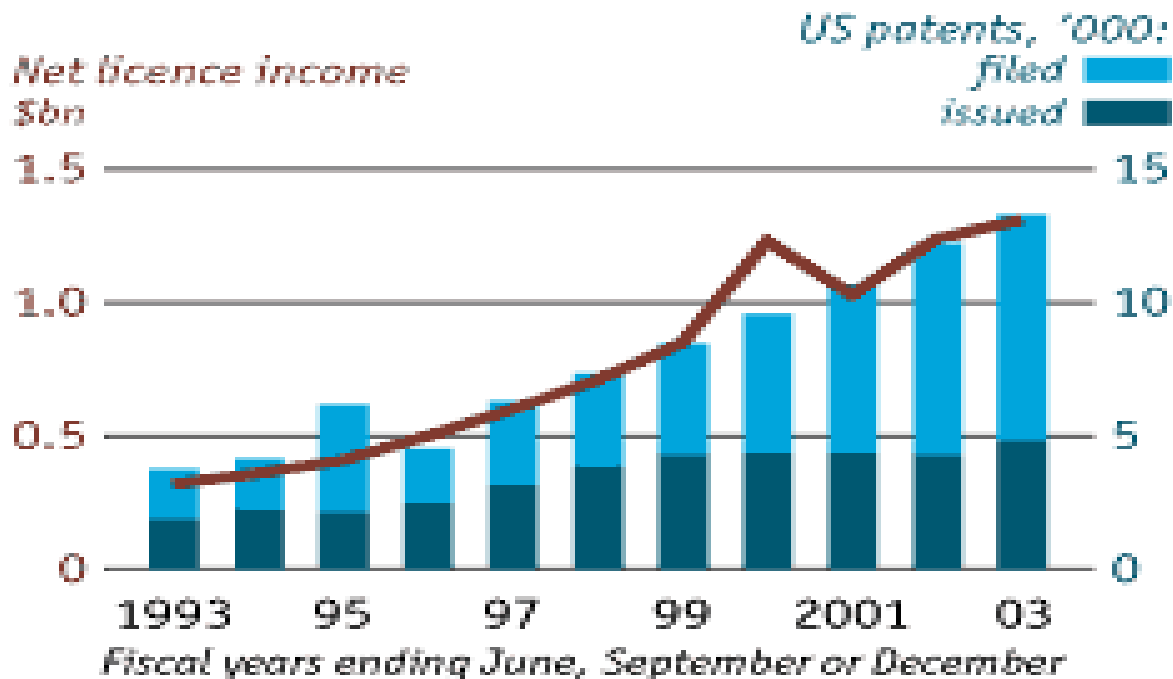


## Universities as a Source for Innovation – US Universities:

Patents filed/issued since Bayh-Dole Act 1980

### Publish or profit

American university patents and licensing



Source: Association of University Technology Managers

## European Commission

### **Commission Recommendation** on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organizations

[http://ec.europa.eu/invest-in-research/pdf/ip\\_recommendation\\_en.pdf](http://ec.europa.eu/invest-in-research/pdf/ip_recommendation_en.pdf)

## EC Framework for Aid in R&D and Innovation

### **“3.2.1. *Research on behalf of undertakings (Contract research or research services)*“**

If IPR shall be owned by the Company the following conditions have to be fulfilled:

- 1. the research organization provides its service at market price; or*
- 2. if there is no market price, the research organization provides its service at a price which reflects its **full costs** [Overhead eg. of 83,15%] plus a reasonable margin.*

## Who is the IP Owner?

- » Employee: Inventor, creator, scientist, PhD / post Doc student
- » Is there a professor's privilege?
- » Employer: Institution, department, institute
- » Non-employees: students, consultants
- » Collaboration partner according:
  - » National, local rulings
  - » Concluded agreements
- » Money provider: Sponsor, research grants,
- » Material provider:

## Institutional Ownership Systems

- » **Pre-emption rights:** the first owner is the employed inventor but the institution is entitled to claim the invention (e.g. Austria)
- » **Automatic ownership:** the first owner is automatically the employer (e.g. Switzerland)
- » **Non-employed students:** free inventors
- » **Grant systems:** rules of funding schemes
- » **University policies:** esp. for copyrights/ software

## Researcher's Remuneration

- » **Austria:** fair compensation in relation to value of invention (limitation period of 3 years)
- » **Germany:** detailed calculation guidelines for compensation depending on profits generated for employer (limitation period of 30 years)
- » **Switzerland:** no right by law
- » **UK:** “additional compensation” if “outstanding benefit” to employer -> frequently litigated

## Researcher's Obligations

- » **Austria:** inventor has to disclose and if claimed has to keep its invention secret; thesis can be locked for up to 5 years
- » **Germany:** inventor has the right to publish
- » **Switzerland:** No obligations

# Institutional IP Policies

## What has to be Regulated?

- » IP ownership
- » Patenting process
- » Commercialization process (inventor's role)
- » Financial regulation in case of IP commercialization
  
- » Handling of IP rights in different types of agreements
- » Service versus collaboration
- » Contract handling with third parties
- » Overhead and VAT



## What has to be Regulated?

- » TT office: Services and competences
- » Handling of start-up companies
- » Conflict of interest

# Patenting Process

- » **Obligation to report inventions**
  - » Who, where, when, how (formalities)
- » **Time lines**
  - » Invention evaluation, possible IP clearance, filing
- » **Allover responsibility of patent prosecution**
  - » TTO, dean's office, TT committee, inventor?
- » **Obligation of inventors**
  - » Assistance in writing/formulating, exploitation?
- » **Patent costs**
  - » TTO, department, research group, cost sharing

## Financial Regulation

### **Distribution of financial income from IP commercialization**

- » Minus external costs?
- » Minus internal costs, e.g. TTO?
- » Who will receive what type of compensation: inventor(s), faculty, department, institute, research group, administration, TTO

# IP Handling in Agreements

- » Definition / distinction between:
  - » Service / contract research agreement
  - » Collaboration agreement
  - » License / IP contract
- » Background / foreground technology
- » IP ownership
- » In case of patent prosecution
  - » Process and costs
- » IP exploitation
- » Compensation for IP exploitation

## Contract Handling

- » Form and type of agreement
- » Who is the legal entity to conclude agreements:
  - » University, department, single person?
- » Who is going to crosscheck which type of agreement and which type will not be checked?
- » Signature empowerment:
  - » Single signature, signature with two
  - » Dependent on type or value

## Overhead and VAT

- » Overhead/VAT definition and its application
  - » Amount and when applicable
- » Overhead/VAT controlling during contract negotiation
- » Overhead/VAT controlling post signature
  - » Collection of overhead/VAT
- » Overhead utilization
  - » Who will benefit from overheads and how: administration, research group,...

## TTO: Services & Competences

- » Organizational model and implementation within the R&D institution
- » Type and extend of services provided by the TTO
- » Responsibility and competence of the TTO
- » Financial aspects and financing model of the TTO

## Start-up/Spin-off Policies

- » Definition of start-up/spin-off companies
  - » Single/group of person, legal entity
- » Special programs/support modules for start-up/Spin-off companies
  - » Use of internal infrastructure: space renting (incubator), devices
  - » Personal time or other human resources to be allocated to start-up
  - » Financial support: seed fund?
  - » Coaching support



## Start-up/Spin-off Policies

- » TT conditions when start-up needs IP from Institution:
  - » License versus assignment
  - » Financial terms and conditions
  - » Equity participation
- » Conflict of interest of involved member of the institution

## Conflict of Interest

- » Definition of Conflict of Interest as e.g.:
  - » Collaborating with companies researchers are mainly involved in
  - » Involvement in start-up/spin-off companies
  
- » Responsibility and proceedings in case of infringement

## Aligned Policies – Clustering, Funding, Research and Development (R&D), Immigration and Tax

## UK Innovations

- » Central organization to coordinate innovation strategy
- » **Higher Education Innovation Fund** for knowledge transfer from HE to business and public sector
- » National Skills Academy in crucial sectors of the economy
- » Regional Development Agencies (RDAs) to deliver tailored business support products at a regional level
- » UK Government's Venture Capital Fund of 150 million pounds (\$246 million) to kick start British technology investment and the ailing business sector
- » The Public Service Innovation Laboratory - NESTA to form the centre of an open and collaborative approach to develop the radical innovations that will transform public services

## Lessons from UK

- » Strategy driven by the **Department of Innovation, Universities and Skills (DIUS)**
- » Other strategic organisations driving innovation and coordinating government effort
  - » Technology Strategy Board (TSB)
  - » Regional Development Agencies (RDA)
  - » Devolved Administrations (DAs)
  - » UK Intellectual Property Office (UK-IPO)
  - » Energy Technologies Institute (ETI)
  - » National Endowment for Science, Technology and the Arts (NESTA)

## US Innovations

- » Bayh Dole Act 1980 allowed universities to patent innovations that grew out of government-funded basic research
- » Small Business Innovation Development Act in 1982-established the rule for federal agencies to commit 2.5 percent of their extramural research budgets to the Small Business Innovation Research program
- » Defense Advanced Research Projects Agency (DARPA) is tasked with maintaining U.S. technological superiority, and has a history of creating new industries in information technology and advanced manufacturing
- » Three key science agencies coordinate S&T and innovation: the National Science Foundation, the Department of Energy's Office of Science, and the National Institutes of Standards and Technology
- » New Innovation Strategy underlined in the American Recovery and Reinvestment Act (ARRA)
- » In the Recovery Act the President has committed over \$100 billion to support groundbreaking innovation with investments in energy, basic research, education and training, infrastructure, advanced vehicle technology, innovative programs, health IT and health research, high speed rail, smart grid, and information technology .

## Lessons from US

- » Patent Reform and Legal Framework
- » R&D Funding: Government aims to invest 18.3 billion in research funding, the largest annual increase in research and development in America's history
- » Education and Skills:
  - » Investment of \$200 billion over the next decade for scholarships and tax credits to help students complete college
  - » Using the \$4 billion Race to the Top in America's Schools fund to encourage states to put STEM at the center of their reform efforts
  - » Proposed investment of up to \$500 million over the next 10 years to create world-class online courses available at community colleges
- » Creation of Regional innovation Clusters
- » White House Office of Social Innovation and Civic Participation to grow the marketplace for community innovations
- » First Social Innovation Fund to identify results-oriented non-profit programs and provide the capital needed to replicate their success in communities
- » The Recovery Act provides over \$19 billion in investments to modernize health information technology
- » Support for SMEs & Defense innovations

# China Innovations

- » China's **National Medium- and Long-Term Science and Development Plan (MLP) 2006-2020** aims to make it an innovation nation and create a **National Innovation System**
- » The Plan aims to raise the ratio of R&D to GDP to 2% by 2010 and to 2.5% or more by 2020
- » The plan calls for China's overall reliance on foreign technology to "decline below 30 percent" from an estimated 60 percent in 2006.
- » The MLP also directs that the number of patents and leading academic papers from Chinese nationals will rank among the top five in the world by 2020
- » Innovation Drivers: Ministry of Science and Technology, Ministry of Education, State Council and NDRC (National Development and Reform Commission) departments, National Natural Science Foundation of China (NSFC), Chinese Academy of Sciences
- » Key Players:
  - » Government Research Institutes
  - » Higher Education
  - » Business Sector



## Lessons from China

- » **R&D spending has increased** at a stunning **annual rate of almost 19% since 1995** and reached USD 30 billion in 2005, the sixth largest worldwide
- » Government funding for **government research institutes** and the **higher education sector** to support basic and applied research has driven innovation
- » Role of Higher Education sector in establishing academia-industry linkages
- » Role of Business sector as largest R&D performer in terms of inputs, outputs and patent applications
- » Government to focus on building up innovation capability and creating more IPR on the basis of extensive utilization of resources worldwide
- » Technological support and tax incentives to small and medium-sized enterprises (SMEs)
- » Move towards indigenous Innovation
- » Technology Markets to facilitate Industry-Science relationship. These are physical entities set up to facilitate technology transactions between sellers and buyers of technology and technological services

# China Indigenous Innovation

- » MLP defined indigenous innovation as ‘enhancing original innovation through co-innovation and re-innovation based on the assimilation of imported technologies’
- » Focus on replacing foreign technology in such “core infrastructure” as banking and telecommunications systems. That means products like integrated circuits, operating software, switches and routers, database management and encryption systems.
- » Patent rules now make it easier for domestic retaliation by Chinese companies which face overseas Intellectual Property Rights (IPR) lawsuits from foreign competitors; incentivize filing of patents by Chinese companies
- » Product testing and approval regimes are geared to delay the introduction of foreign imports into China, and to study foreign designs and production processes before the products cross the border
- » A refocus on state-industry monopolies and controlled competition privileges accompanied the enactment of an anti-monopoly law that aims to protect domestic companies
- » Preferential Government procurement policies and industrial and technology standards serve to promote products designed and produced in China

## China Indigenous Innovation

- » MLP detailed preferences for domestic goods and service providers.
- » A September 2006 tax bureau “Circular on Preferential Tax Policies for Innovation Enterprises” offered two year exemption of enterprise income tax.
- » The December 2006 “Administrative Measures on the Accreditation of National Indigenous Innovation Products” outlined the plans for creating national indigenous innovation product catalogues
- » The May 2007 “Measures for Administration of Government Procurement Budgets for Indigenous Innovation Products” warned government at all levels to develop specific indigenous innovation procurement plans or they would lose procurement funds.
- » In May 2007, “Measures for Assessment of Government Procurement of Indigenous Innovation Products” lowered government procurement supplier qualification standards for companies doing indigenous innovation.

## China Indigenous Innovation

- » In December 2007, Ministry of Finance (MoF) issued “Measures for the Administration of Government Procurement of Imported Products” which directed that approval by a board of experts is necessary for government entities to purchase imported goods. It called for favouring foreign suppliers that provide the domestic industry with technology transfers and training services.
- » A January 2008 “Enterprise Income Tax Law” offered a preferential rate of 15 % to high-tech enterprises designated by the government as indigenous innovation companies because they developed and owned their intellectual property.
- » On November 15, 2009 with the release of the public draft of the “Circular on Carrying Out the Work on Accreditation of National Indigenous Innovation Products,” known as Circular 618, MOST, the NDRC and MoF issued the joint circular announcing the creation of a new national-level catalogue of products that will receive preferential treatment in government procurement.

## Lessons from Israel

- » Eco-system for innovation created through government policies, private initiative & start up culture
- » Government push for developing the domestic venture capital industry through schemes such as *Yozma*
- » High level of investment in R&D
- » Focus on keeping the innovation center in Israel but acceptance of having a larger part of the value chain in the US (the dominant market)
- » Room for failure

## Other countries

Korea	Move from imitation to innovation while leapfrogging in strategic areas
Finland, Ireland, US	Use ICTs as a springboard for innovation-led growth
Canada, Ireland	Embed knowledge intensive foreign investment in the national innovation system
Japan, Korea	Give more depth to the research system by expanding fundamental research
EU, Spain	Promote an innovation-led growth while reducing regional imbalances
Switzerland, UK	Promote innovation in services
Denmark, US	Foster innovation-oriented entrepreneurship

What is the Role of the Government, Academia and the  
Private Sector in Innovation Promotion?

How do we Create an Innovation Culture in Society,  
Businesses and Schools?

# Innovation Eco-system

- » Innovation is the result of a complex interplay of dynamics among various players such as
  - » Government
  - » Firms
  - » Education and Research Institutions
  - » Finance
  - » Individual Innovators
  - » Customers/users
  - » NGOs / Civil Society/ Grassroots organizations
  - » Media
- » Policies and activities in these domains, as well as the interaction among these players influence the innovation eco-system



## Collaboration, Training & Research

- » Fostering a culture of innovation requires mechanisms for (international) collaboration and (national) resources for training and R&D
- » Bring together key stakeholders to analyse challenges and recommend solutions
- » Create clusters – physical and virtual – as a support system and provide infrastructure for innovators without killing the free market
- » An Innovation Fund has to provide the right resources and incentives
- » An Innovation Portal has to provide a platform for collaboration, sharing and support by creating right synergies
- » Create linkages, knowledge exchanges and support mechanisms which enable ideas to be transformed into innovative outputs

## Who are National Intellectual Property Creators?

### Individuals at

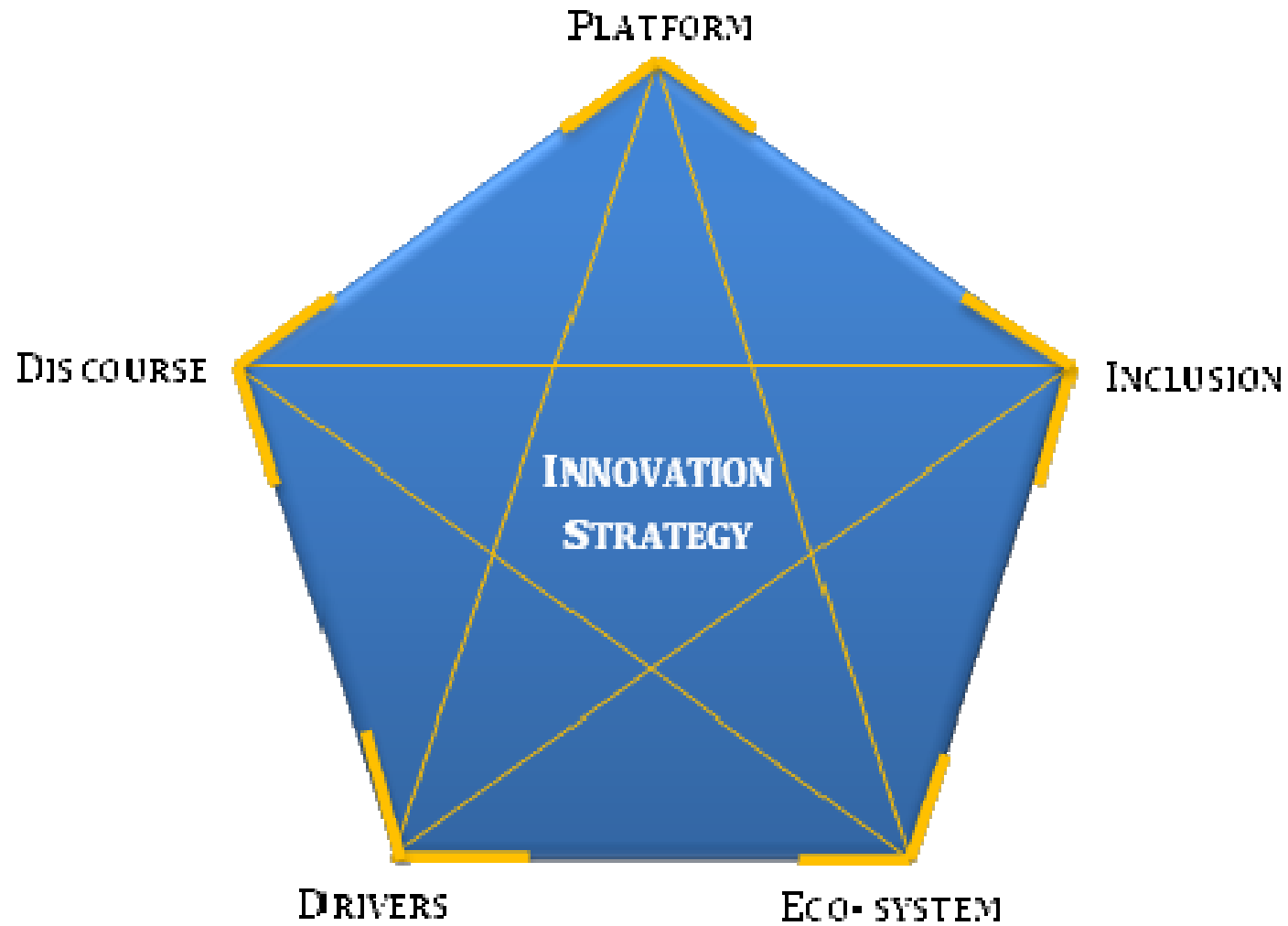
- » Their own: pioneers, entrepreneurs, fools,...
- » Higher education like universities etc.
- » R&D institutions
- » Small and medium enterprises
- » Industry

# Q&A

## Questions & Answers

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# Strategy

Provide broader **PLATFORM** for Innovations everywhere to include:

1. **Products**
2. **Services**
3. **Organisations & Institutions**
4. **Processes**
5. **Research and Development**
6. **Science & Technology**
7. **Governance**
8. **Social and Cultural**
9. **Mindset**
10. **National/ State/ Sectoral Councils**

# Strategy

Encourage Innovations for **INCLUSION** aimed at the bottom of the Pyramid:

1. **Awareness**
2. **Access**
3. **Affordability**
4. **Availability**
5. **Scalability**
6. **Sustainability**
7. **Quality**
8. **Pervasive Growth**
9. **Innovations for/by the people**
10. **Innovations for the BOP**

# Strategy

## Foster necessary **ECO SYSTEM**

1. **Incentives & Awards**
2. **Innovation clusters at universities**
3. **Innovative business clusters**
4. **Innovation in MSMEs**
5. **Organisational Autonomy & Flexibility**
6. **Policies & Programmes**
7. **New Institutions**
8. **Risk/ Venture Capital**
9. **IPR/ Patents**
10. **Web & ICT as tools**



# Strategy

## Focus on **DRIVERS**

1. **Multidisciplinary**
2. **Collaborative**
3. **Disruptive**
4. **Generational Change vs. Incremental Change**
5. **Durable vs. Disposable**
6. **Need vs. Demand**
7. **Nature as Nurture**
8. **Locally Relevant**
9. **Globally Connected and Competitive**
10. **Focus at the Edge**

# Strategy

Expand **Space for Discourse** on Innovation in the country by:

1. **Discussions**
2. **Debates**
3. **Seminars**
4. **Conferences**
5. **Best Practices**
6. **Subversive Dialogue**
7. **Irreverent Dialogue**
8. **New Ideas**
9. **Media**
10. **Innovation Portal**