



THE THREE FRAMES OF INNOVATION

THREE FRAMES: A COMPARISON

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This table allows you to grasp easily the distinctiveness of each frame.

<p>FRAME 1: R&D</p> 	<p>FRAME 2: SYSTEMS (A) AND ENTREPRENEURSHIP (B)</p> 	<p>FRAME 3: TRANSFORMATIVE CHANGE</p> 
<p>TIME OF DOMINANCE</p>		
<p>1960s-1980s</p>	<p>1980s to today</p>	<p>Emerging</p>
<p>MAIN GEOGRAPHICAL FOCUS</p>		
<p>National</p>	<p>National and regional systems of innovation intersecting with sectoral and technological innovation systems (a)/ National with particular attention to "centres of excellence" or "clusters" of innovative activity (b)</p>	<p>Multi-scalar: focus on grand challenges that extend to multiple scales exceeding geographical, sectoral, technological and disciplinary boundaries</p>
<p>FOCAL ACTORS</p>		
<p>Government, scientists and industry actors with a tendency to prioritise large firms</p>	<p>Interlinked configurations of government, science and industry actors with particular attention to the role and missions of universities (a)/ enterprises, markets and the government with a particular focus on New Technology-Based Firms and start-up culture (b)</p>	<p>Government, science, industry, civil society, end-users and non-users (as potentially affected parties and contributors to the innovation processes)</p>

THE THREE FRAMES OF INNOVATION

FRAME 1: R&D



FRAME 2: SYSTEMS (A) AND ENTREPRENEURSHIP (B)



FRAME 3: TRANSFORMATIVE CHANGE



JUSTIFICATION FOR POLICY INTERVENTION

Fixing market failures: industries fail to conduct basic scientific research that is not fully appropriable or conduct less of this research than socially desirable

Fixing structural system failures: increase in R&D spending does not automatically lead to high performance in terms of innovative activities

Fixing transformational system failures: R&D, innovation systems and commercialisation do not necessarily lead to solving important social and environmental problems

MAIN STRATEGY

Knowledge generation: provide support for basic and applied science

Knowledge utilisation: boost absorptive capacity; increase system performance by creating of links between actors and facilitating mutual learning (a)/ promote entrepreneurship and facilitate the creation of markets for innovative goods and services (b)

Solving social and environmental challenges: tilt the regulative playing field on the global level and provide more space for experimentation with niche solutions on the local level, enabling socio-technical systems change

NATURE OF CRITICAL KNOWLEDGE

Appropriate and transferable: easy to adopt, apply and utilise without protective measures

Sticky and situated: utilisation requires proximity, absorptive capacity and interactive learning

Emergent and co-produced: generated through dialogue between multiple actors as part of a collective search process


FOCAL AREAS

High technology: stress on the creation of radical novelty


Radical and incremental product and process innovations: stress on significant price/performance improvements through successive incremental innovations

Socio-technical systems: stress on fundamental transformation of system architecture, changing both its components and its directionality of development

FRAME 1:
R&D



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FRAME 3:
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TYPICAL POLICY ACTIVITIES

- R&D stimulation (subsidies, tax credits, procurement, mission-oriented programmes)
- Building the Intellectual Property Rights regime
- Education policy with emphasis on Science, Technology, Engineering and Math (STEM) subjects
- Science communication to explain the importance of STEM to wider public
- Foresight to select focus areas, regulation and technology assessment to manage negative impacts

- Constructing links between actors (building platforms, networks, databases) and organising technology transfer
- Stimulation of learning-by-doing, learning-by-using, learning-by-interacting
- Use of demand stimuli (e.g. procurement) to enhance and accelerate market development
- Building regional and national systems of innovation by assessing capabilities gaps and technological opportunities, implementing policies to address them
- Enhancing skill development based on proactive analysis of skill gaps and shortfalls
- Programs to stimulate entrepreneurship and incubators (including indoctrination in the social value of entrepreneurship)
- Improving business conditions for Small and Medium-Sized Enterprises and start-ups
- Addressing the nature of equity markets (mezzanine level finance, IPO, inclusion in exchanges), especially angel and venture capital markets

- Stimulation of experimentation with niche technologies, scale-up and acceleration of socio-technical transitions (e.g. Strategic Niche Management, innovation intermediaries, Transition Management)
- New institutional solutions for changing the directionality of existing R&D and innovation activities (e.g. technology forcing, Responsible Research and Innovation, policy mixes for stimulating niches and destabilizing existing systems)
- Promoting social, inclusive, frugal and pro-poor innovation
- Bridging science/engineering, social sciences and humanities in the education system


UNDERLYING MODEL OF INNOVATION

Linear model: invention (discovery) leads to innovation (commercialisation) leads to diffusion (adoption)


Interactive and system-bound: chain-linked model stressing feedback loops between invention, innovation and use; evolutionary model, stressing ongoing interactions between actors, networks and institutions (a)/demand-pull model – needs of organisations and individual consumers largely drive innovative activities (b)

Systemic and experimental: quasi-evolutionary model including non-random (purposeful) variation, selection and retention, stress on feedback loops between invention, innovation and use, and ongoing interactions between actors, networks, institutions and technologies

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BASIC ASSUMPTIONS ABOUT INNOVATION

- Division of labour: clear division of labour – government provides, science discovers, industry applies and consumer adapts; increase in R&D will automatically translate into more innovation
- Conflict vs. consensus: most often embedded in a military-industrial complex that takes defence needs as forerunners and large industries as the “natural” intermediary to translate scientific advances into commercial application; open conflict with new firms and industries that are not part of the club
- Technological and social progress: the link between the two is largely uncontested

- Division of labour: multiple closely interacting actors with different but partially overlapping roles contributing to the overall performance of the system (a)/ clear division of labour – the task of the government is to facilitate the operation of existing markets and to create markets where they do not yet exist; left to themselves markets provide novel products and services at optimum quantity and price (b)
- Conflict vs. consensus: evolutionary in rhetoric but functionalist in practice, emphasis on cooperation between various actors, leading to the fulfilment of system functions (a)/ tends to be conflict-oriented, mainly stressing international competitiveness of states and competition between enterprises (b)
- Technological and social progress: the link between the two is largely uncontested

- Division of labour: blurred boundaries, multiple actors crossing various domains and enacting overlapping roles, resulting in the co-production of science, technology and society
- Conflict vs. consensus: mix of competition and cooperation is required to achieve disruptive socio-technical systems change
- Technological and social progress: non-neutrality of technology, specific technological designs and the directionality of innovative activities might serve to create, solidify or amplify environmental and social problems


BASIC ASSUMPTIONS ABOUT OUTCOMES

- Dealing with consequences: new technologies are associated with high degree of uncertainty and unpredictability making it virtually impossible to address major environmental and social impacts proactively
- Causality: stress on innovation as a motor of economic growth leads to public welfare as a bonus


- Dealing with consequences: largely reactive, major environmental and social impacts are usually addressed after they have occurred, sometimes with a particular emphasis on the provision of adequate market stimuli (b)
- Causality: stress on innovation as a motor of economic growth and increased competitiveness leads to public welfare as a bonus

- Dealing with consequences: proactive, stress on anticipating alternative futures associated with certain technological choices
- Causality: stress on innovation as means for directly addressing environmental and social challenges leads to economic growth and increased competitiveness as a bonus


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MAIN HAZARDS

- Government failure: insufficient funding for basic R&D
- Market failure: negative externalities that require regulation

- System failure: innovation system fails to perform as a synergistic whole and to enhance innovative activities (a)
- Government failure: too many state restrictions on business activities (b)
- Market failure: regulatory need to deal with negative externalities in a way that would not stifle entrepreneurship (b)

- Transformative failure: failure to induce fundamental transformation to socio-technical systems forming the backbone of modern societies
- Societal and environmental needs failure: failure to solve extra-economic and collective problems on multiple scales

PARALLEL COUNTER-NARRATIVES

- Appropriate Technology movement, focus on small-scale solutions

- Politics and democratisation of Science and Technology
- Inclusive and interactive

- Technological fix: strong state intervention with massive investment in Big Technologies which promise to solve large social and economic issues



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This course was developed and delivered by faculty
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