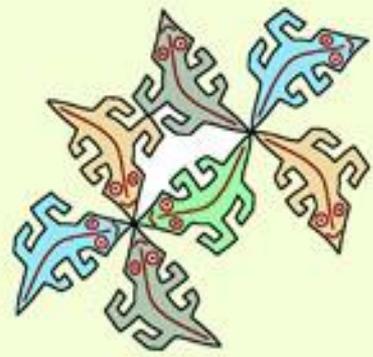


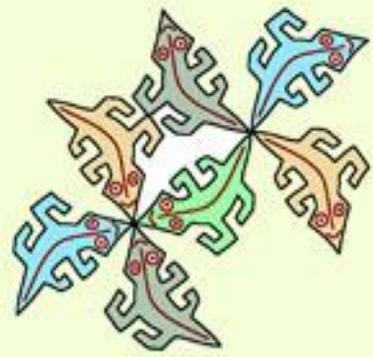
Global Perspectives on the 'Knowledge Commons' Concept

Can Sustainable-Development-Related
Knowledge be Framed as Global Commons?



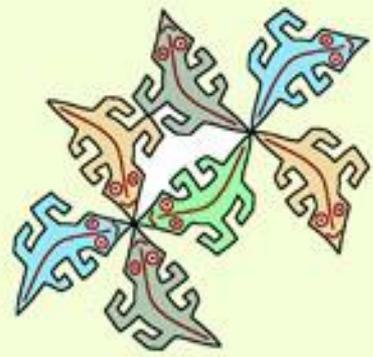
Addressing the question: our road map.

1. **Some concepts:** the commons, knowledge, and the knowledge commons.
2. **Knowledge growth:** 1650 to 2010, and trends.
3. **The knowledge commons and development:** what history teaches us.
4. **Challenges:** barriers to make the knowledge commons useful for development.
5. **Final reflections:** what to do to take advantage of the wealth of knowledge.



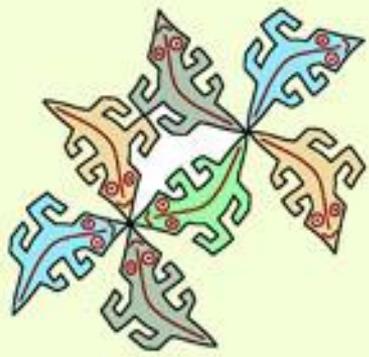
The concept of the commons

- The commons are sources of goods that can be used collectively by groups of people.
 - The commons can be natural resources such as rivers, lakes, fisheries, forests, atmosphere, deep sea, corals, and so on.
 - The commons also can be human constructed such as streets, public buildings, highways, playgrounds, Internet, and knowledge.
- The commons can be a matter of controversy.
- History is full of examples of wars for the dispute of the commons.



Preventing the Tragedy of the Commons

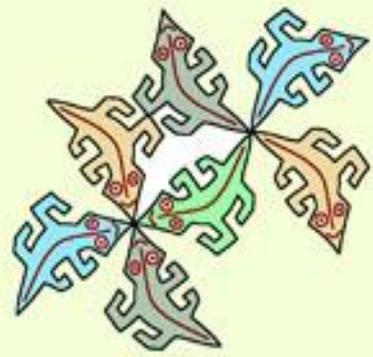
- In 1965, Mancur Olson made explicit the challenges of collective action: common interests not necessarily lead to consistent action.
- In 1968, Garret Hardin stated that the future of the commons was a tragedy: if individual and collective interests were in contradiction, individual behavior would conspire against collective interests.
- In 2009, Elinor Ostrom was awarded with the Nobel Prize in Economics for her work showing that users of a commons can self-organize to achieve sustainability managing the commons.
- Ostrom has shown that sustainable management of the commons requires to build an institutional arrangement capable of preventing overuse and free riding.



Knowledge is a resource of critical importance

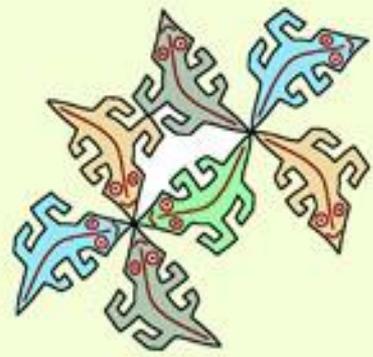
- From pre-history to current days, knowledge has played a vital role to humanity.
- Technologies of fire control and stone axe shaped life of humans for over one million years.
- All civilizations have had elites of knowledge workers: storytellers, accountants, engineers, mathematicians, prognosticators, strategists, and so on.
- After 1750, knowledge has increased its importance. Now, in the twenty-first century, knowledge has become the single most important resource.
- Social and economic development cannot be seen separated from knowledge production and flow.





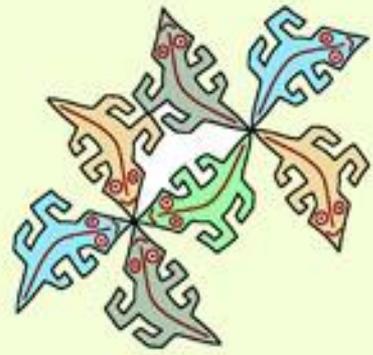
The Concept of Useful Knowledge

- Useful knowledge is knowledge about any regularity or pattern of nature that, potentially, can be applied to generate economic value or benefit human beings.
- This approach does not focus on the origin of knowledge, but on the potential benefits of knowledge application.
- Useful knowledge does not refer to truth or false, or to any epistemological feature of its origin. It refers to its reliance for practical application.



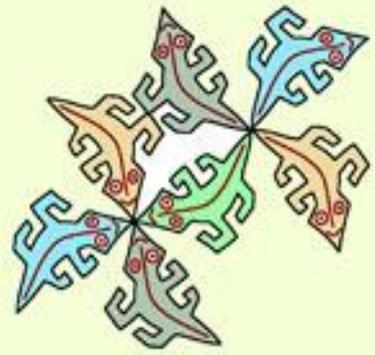
Propositional Knowledge

- Propositional knowledge catalogs natural and social phenomena, it refers to 'know what' about nature and society.
- It explains what things are and how they work.
- Propositional or Ω knowledge is important for making sense of the world.
- Propositional knowledge includes scientific knowledge but also include all sets of known patterns, empirical tables, documented experiences, interpretations and local beliefs that can be applied to practical uses.



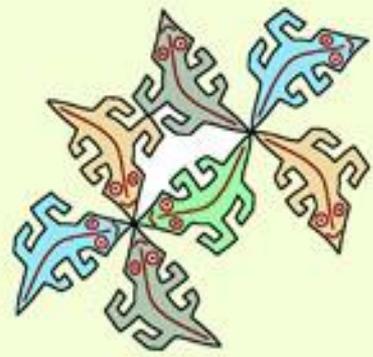
Prescriptive or λ knowledge

- Prescriptive knowledge, or λ knowledge is the collection of techniques and instructions for manipulating nature and social institutions for human purposes.
- Archetypal expressions of prescriptive knowledge are:
 - recipes for doing a drug,
 - instructions for building a bridge
 - a manual containing norms for managing a natural resource commons



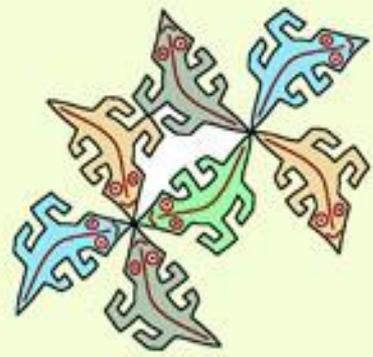
Knowledge as Resource

- Intangible
- Non-rivalrous
- Human made
- Tacit and explicit
- Exists inside in minds and stored in artifacts



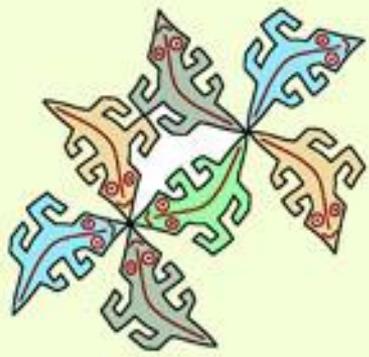
Knowledge and Innovation Evolve Together

- For 12 thousand years, after the Neolithic revolution, economic and technological history of countries was an up and down curve without clear tendencies.
- According to Joel Mokyr, the knowledge base of innovation was narrow, conspiring against its success likelihood.
- After 1750, this stagnation was broken by the systematic accumulation of knowledge and the dynamism of technical innovation



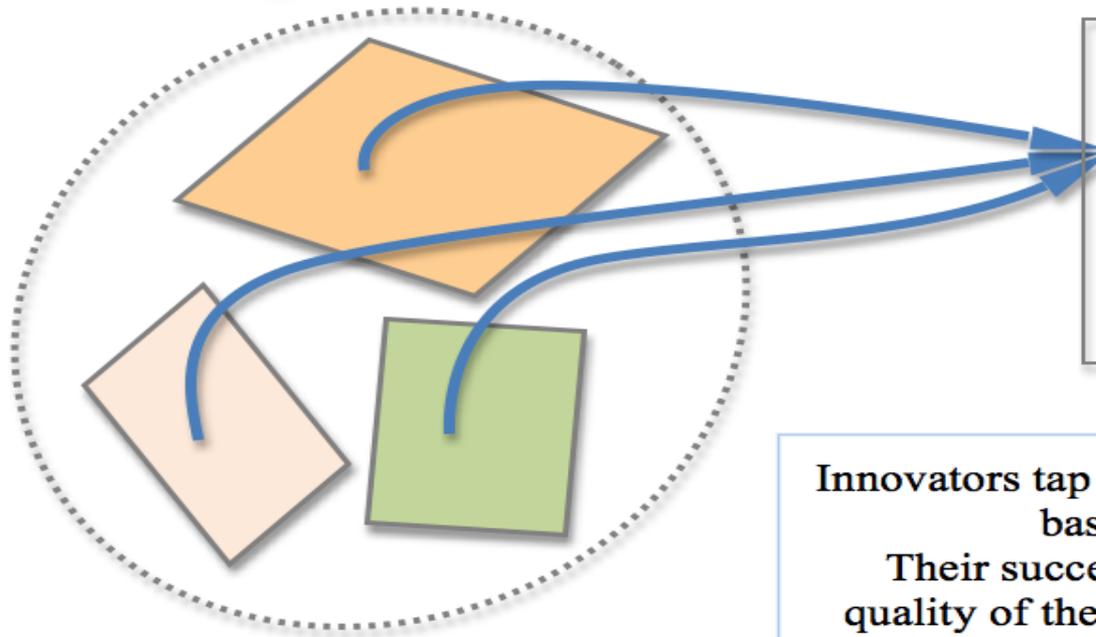
Propositional knowledge is the base of new techniques

- All technique requires a set of propositional knowledge that, in some degree, “explains” the phenomenon that is being manipulated.
 - Engines with internal combustion could not be invented before the development of thermodynamics.
 - Knowledge about microbiology had a decisive impact in the development of medicine: before and after the development of microbiology.
- This set of propositional knowledge is the epistemic base of the technique.



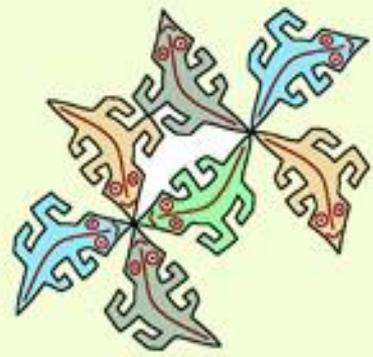
The synergy between Knowledge and Technology

**Propositional Knowledge
or Epistemic Base**



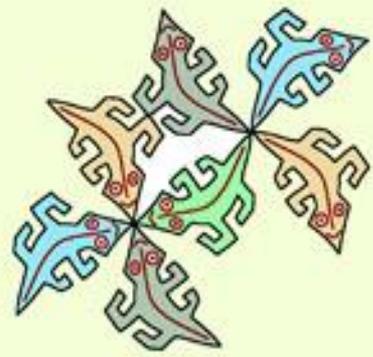
**Innovation
or New
Prescriptive
Knowledge**

Innovators tap on the knowledge base they can access. Their success depends on the quality of the knowledge of the epistemic base they rely on.



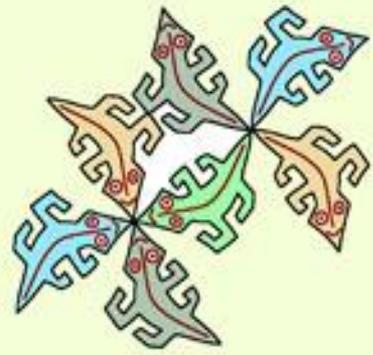
The cognitive challenge for Innovators

- For any innovative effort, it is critical how broad is the epistemic base that local innovators can effectively access and assimilate.
- Frequently, innovators struggle with problems whose understanding is already part of the stock of knowledge, but it is hard for them to access and assimilate that knowledge.
- Absorptive capacity of innovators becomes critical.



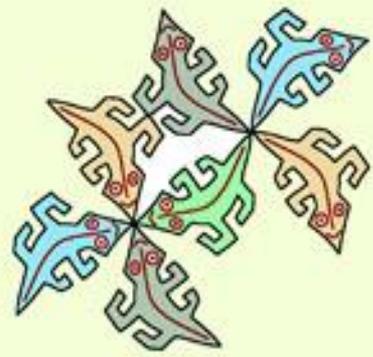
The knowledge commons

- After the “invention” of language, knowledge has become a social phenomenon.
- Thinking and communicating are intertwined.
- The knowledge we use is a social construction.
- Thinking is a recycling industry.
- The knowledge we use today is the heritage of thousands of years of social effort.
- For its own nature, knowledge is a commons.



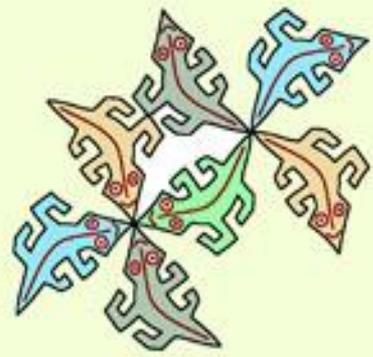
The Three Commons

- Nature: Earth and its biosystems
- Physical constructs, or the manmade world
- Knowledge
 - In our heads, flowing in this conversation and imbedded in the technology we are using)
 - Indeed, the manmade world is a result of knowledge



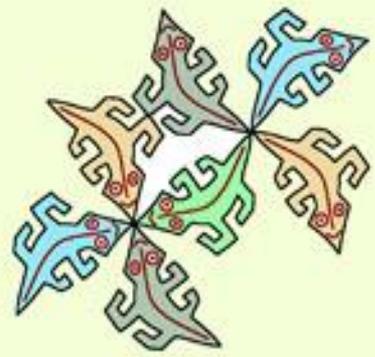
The 7 Steps of the History of the Knowledge Commons

1. Before language: individuals, tacit knowledge, only prescriptive knowledge
2. Oral language: small groups, explicit knowledge, propositional knowledge
3. Written language: storage outside people's mind, access exclusive of national elites
4. Alexandria Library: first attempt for creating a universal culture
5. Printing: massive diffusion of knowledge into the middle classes
6. Scientific method: systematic production, start of exponential accumulation of knowledge
7. Internet/digital technologies: the achievement of a universal culture global storage and sharing of knowledge

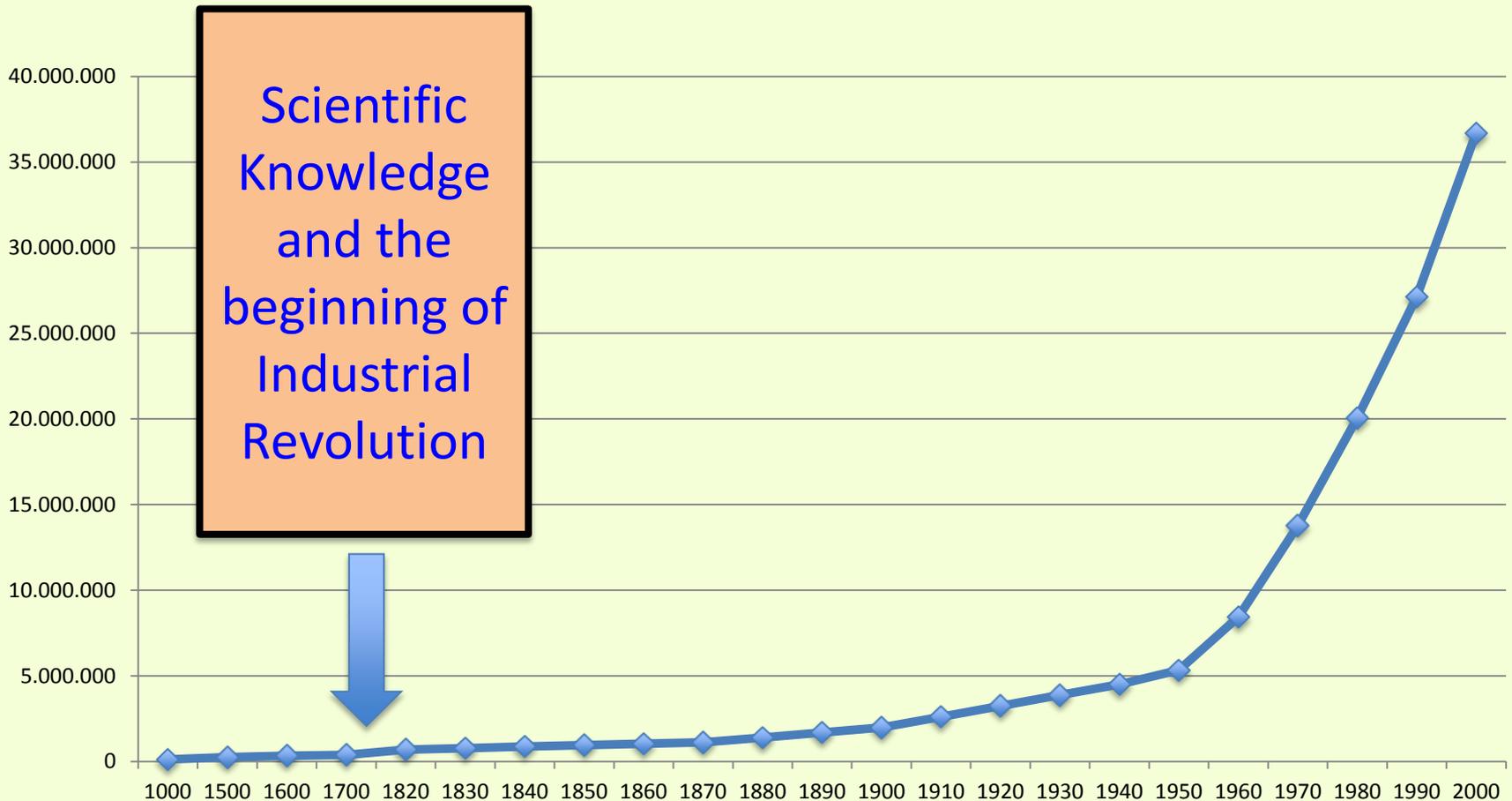


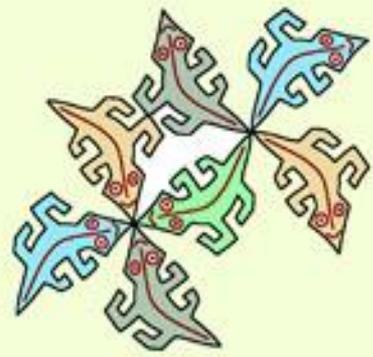
Knowledge has been growing exponentially for over 360 years

- From 1650, to current days, 50 million of academic articles have been published.
 - The annual exponential growth of academic articles is between 3.0% to 3.5%.
 - Between 1995 and 2007, patenting has been growing 5.2% each year.
- Currently, over 1.5 million of academic articles are published each year.
- Additional to its growth, complexity and sophistication of knowledge are also increasing.



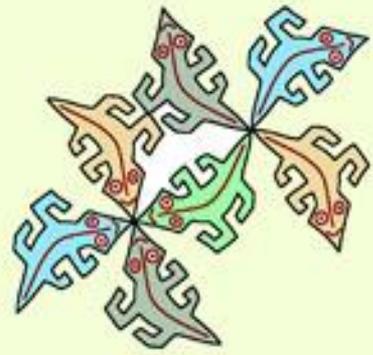
Knowledge and Economy, a 1.000 years story





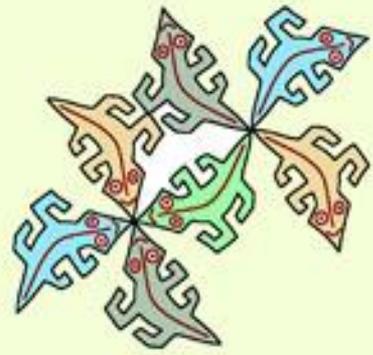
The Open Access Movement

- Academic articles increase between 3% to 3.5% annually
- Open access is growing faster than academic knowledge, approximately 25% annually
- This difference means that the accessibility to academic literature is going through a process of qualitative change.
- By 2000, almost 20% of academic production was open access.
- If this trend goes on for five more years, open access journals will be the predominant form of academic literature.



Barriers from the supply side

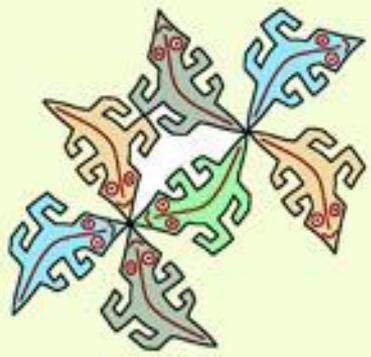
- **Digital divide.** Urban X Rural
- **Language barrier:** most knowledge is only in English
- **Censorship:** Lack of democracy in many countries
- **Non-digitization:** Materials of Museums and libraries.
- **Additional barriers**
 - Scarcity: lack of knowledge for some critical problems
 - Fragmentation: knowledge is dispersed
 - Structural complexity: the level of abstraction and complexity prevents knowledge diffusion.



Barriers from the demand side

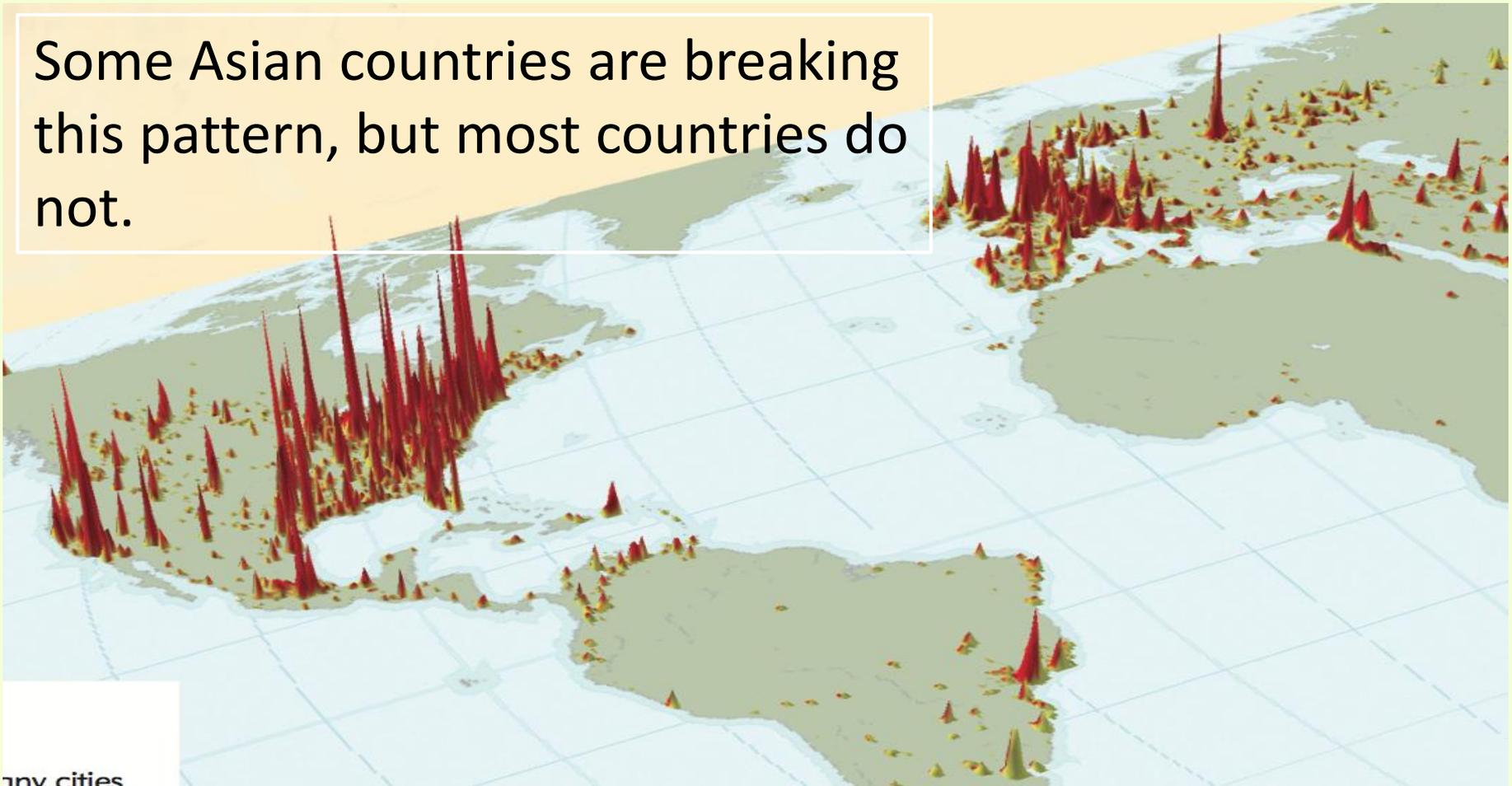
- The awareness of the need and importance of external knowledge,
- Knowledge about existence of knowledge,
- The capacity to assimilate and contextualize external knowledge, and
- The conditions to apply new knowledge to develop innovative solutions.

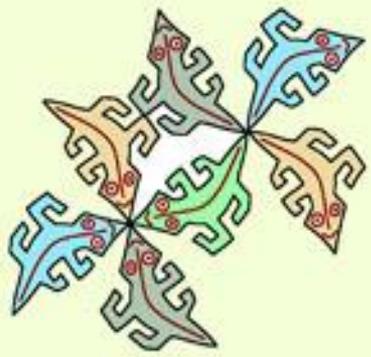
These four elements work as a chain. If a single link is not present, the demand will not fully realize.



Innovation is concentrated in world-class metropolises

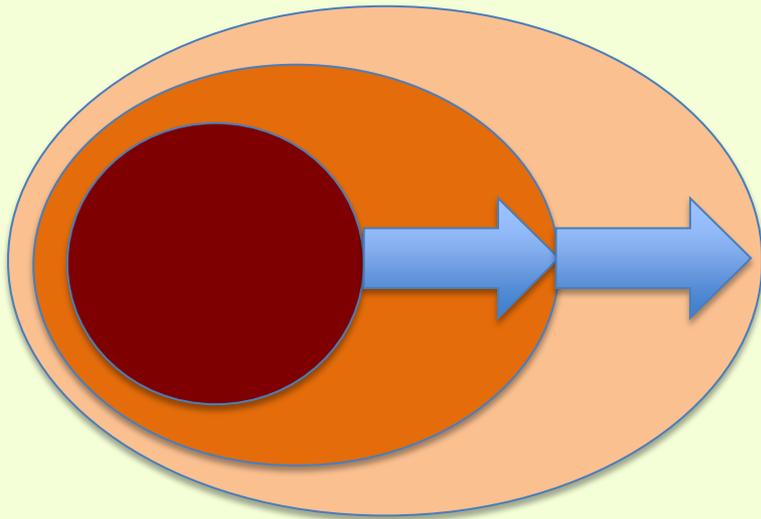
Some Asian countries are breaking this pattern, but most countries do not.



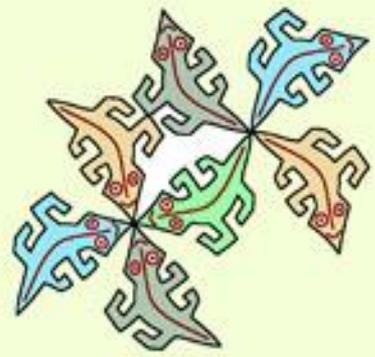


A relevant question

Growing wealth of
knowledge
Growing accessibility to
knowledge



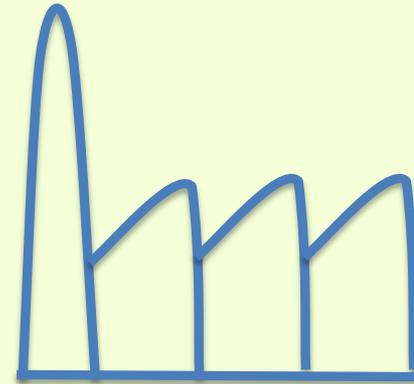
Who are going
to take
advantage of
the wealth of
knowledge?

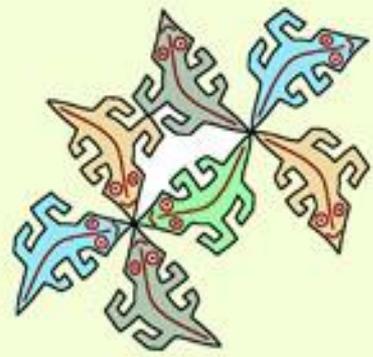


Knowledge Diffusion

Internet,
Education,
Technology,
Social experience,
Social network,
Work experience,
Institutions

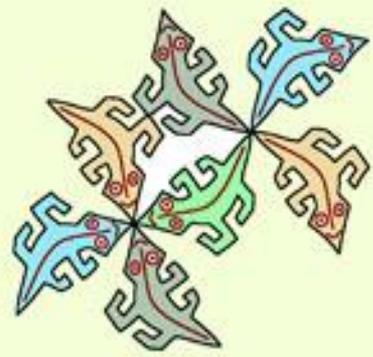
Google





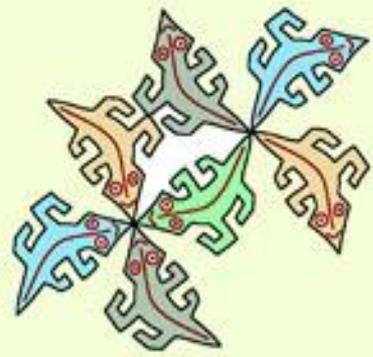
Absorptive Capacity versus Cognitive Blindness

- Absorptive capacity is a set of cognitive skills that make possible to assimilate and apply external knowledge.
- Without absorptive capacity we can remain **cognitively blind**.
- Prior related knowledge is a precondition to identify the importance and to absorb new knowledge.



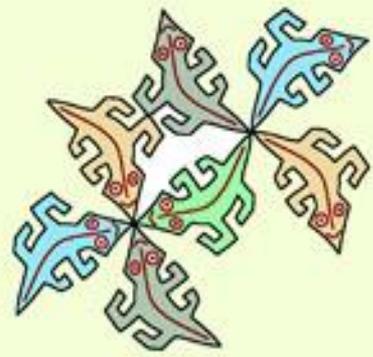
Knowledge Communities

- Absorbing and creating new knowledge is not a work of individuals, but of communities.
- Cognitive agency is achieved through knowledge communities
 - Thought collectives (Fleck, 1979),
 - Epistemic community (Hass, 1992)
 - Communities of practice (Wenger, 1989).
- Knowledge communities are networks inside and crossing existing institutions.



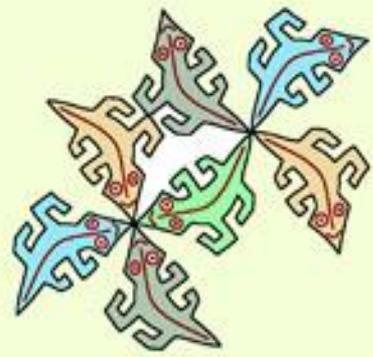
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Thank you

Ferreira, S. (2011), Evolution and Future of the Knowledge Commons: Emerging Opportunities and Challenges for Less Developed Societies. (Draft to be published in *Knowledge Management for Development Journal*)

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