

# INTELLIGENT CITIES

## Building 3<sup>rd</sup> Generation Systems of Innovation

Nicos Komninos

URENIO Research Unit - Aristotle University

MSc Technology, Innovation and Entrepreneurship  
City - Affiliated Institution of the University of Sheffield

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# URENIO Research Unit

The screenshot displays the URENIO website interface. At the top, the logo reads 'URENIO URBAN AND REGIONAL INNOVATION Research Unit'. Below it, a banner states 'A University Lab specialising in the creation of Innovation Environments' and 'Intelligent Cities Innovation Knowledge Systems and Digital Spaces'. The main navigation includes 'HOME', 'ENGLISH', and 'CONTACT'.

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- INVENT
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- VIRTUAL TECH PARK
- RTP of C MACEDONIA
- ... of C MACEDONIA

**Portal: Innovation, Environments of Innovation, Intelligent Cities & Regions**

**Exploring Innovation through Collaboration**

The sixth edition of BusinessWeek's special supplement "Inside Innovation" focuses on relationship between collaboration networks and innovation. According to the editor Bruce Nussbaum, "Innovation through collaboration is a management philosophy that leading-edge corporations increasingly embrace. But it takes a highly sophisticated skill to manage networks that span the globe, and only 5% get it right, according to Forrester Research." Continue reading...

Posted at 11 September 2007 in Collaborative Innovation - Edit this post

**Is the failure of Municipal Wi-Fi Networks the dawn of e-services to citizens?**

Currently, all over the web numerous articles and posts can be identified that are elaborating on the epidemic of the Municipal Wi-Fi networks failures. For example according to an article recently published in WIRED, two major and immense published projects in San Francisco and in Chicago have failed. Continue reading...

Posted at 6 September 2007 in Digital Cities - Edit this post

**Google WiFi in San Francisco Continued...**

According to that latest report by Chris Nuttall, FT.com correspondent, in San Francisco the "Muni WiFi" movement has been dealt a double blow with the collapse of its San Francisco and Chicago schemes to provide blanket wireless coverage. Continue reading...

Posted at 3 September 2007 in Digital Cities - Edit this post

**First year of Google WiFi in Mountain View**

Google's Mountain View WiFi network is one year old. The network has 400+ mesh routers, covers 31 square kilometers (12 square miles) and 25,000 homes. Google has released interesting statistics on how many people are using it, traffic growth, percentage of use, etc. Continue reading...

Posted at 27 August 2007 in Digital Cities - Edit this post

**A New Model to Accelerate Start-Ups**

Just as the "American Idol" television series is stirring up the music business, a group of entrepreneurs is quietly adopting a similar format to change the face of the venture capital and

**Categories**

- Knowledge Economy
- Innovation
- Innovation Measurement
- Innovative Companies
- Innovative Clusters
- Technology Parks
- Innovative Cities & Regions
- Regional Systems of Innovation
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- Virtual Innovation Environment
- Virtual Clusters
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**http://www.urenio.org**

The URBAN AND REGIONAL INNOVATION Research Unit is a University Lab in the Aristotle University of Thessaloniki.

Main activities of URENIO:

- (a) research on innovative clusters, cities and regions,
- (b) global watch on innovation environments, and
- (c) the post-graduate seminar on Intelligent Cities and Systems of Innovation.

# Outline

*Introduction: Evolving systems of innovation*

*I. Intelligent cities: The concept*

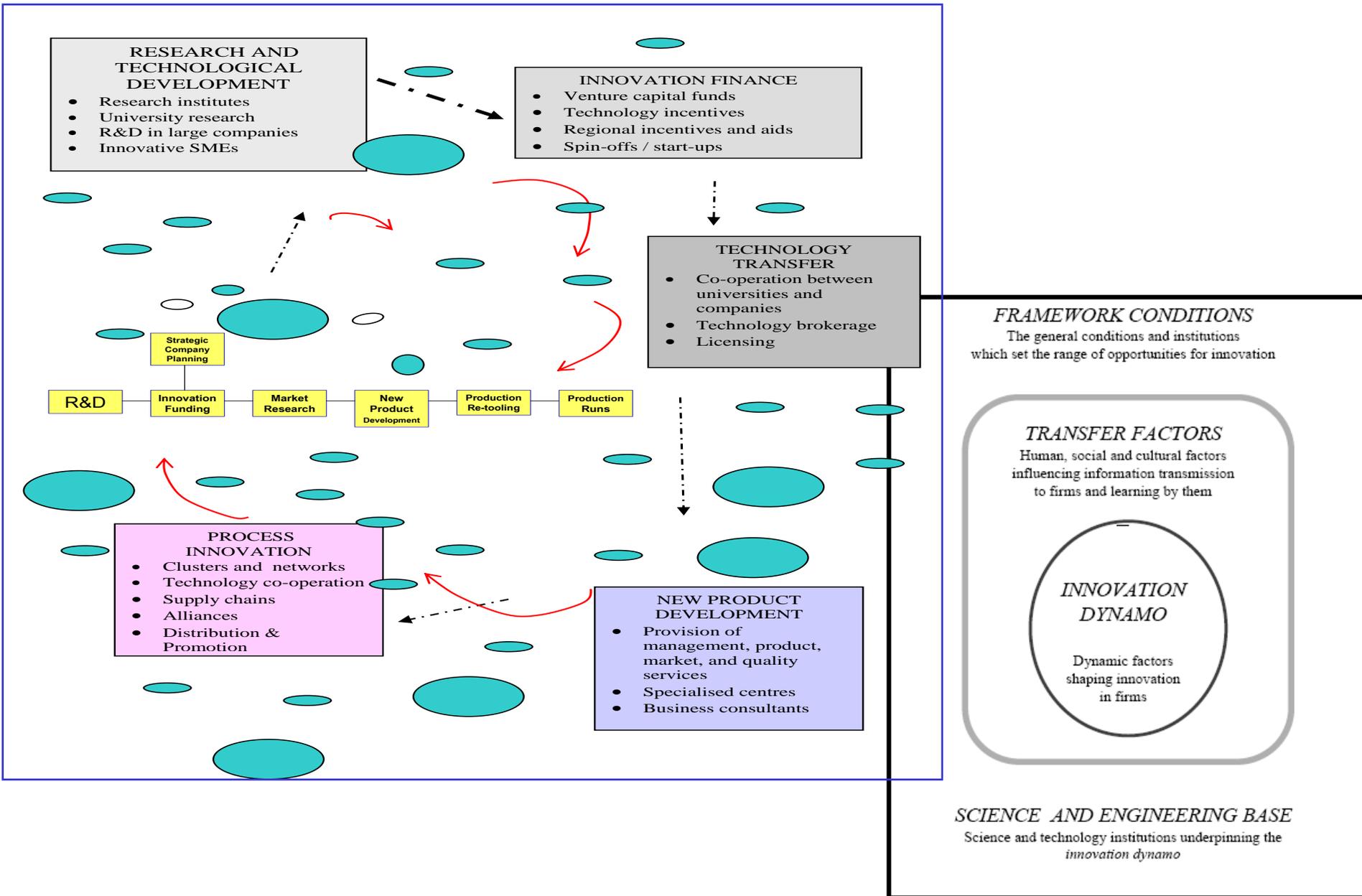
*II. Identifying intelligent city strategies: The Intelligent Community Forum awards*

*III. Intelligent cities building blocks*

*IV. Intelligent cities as third generation systems of innovation*

# *Introduction: Evolving systems of innovation*

# Systems of innovation



# *1st generation systems: Technology districts*

## *Innovation within the technology district*

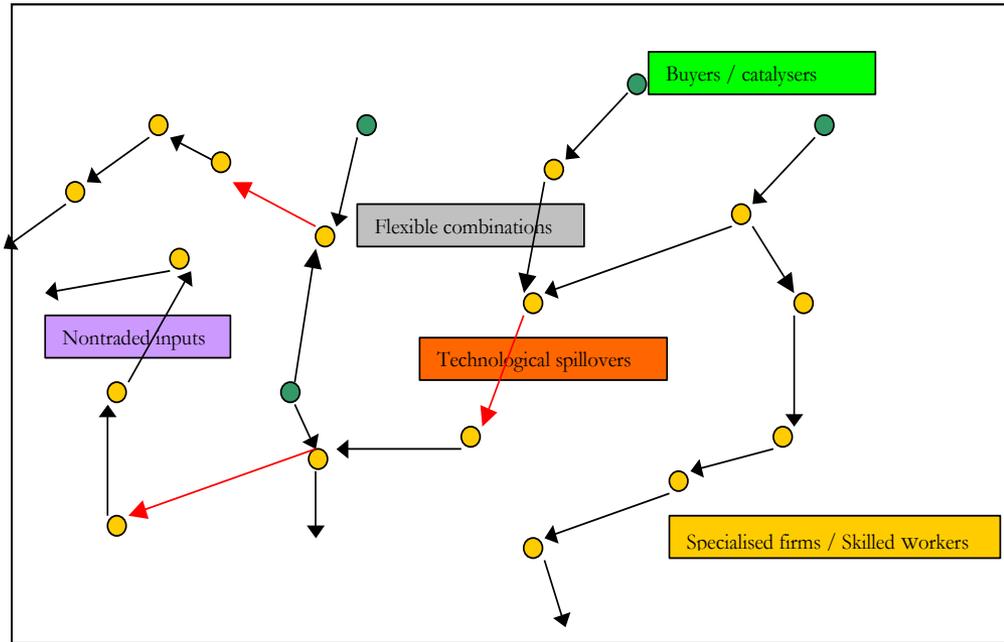
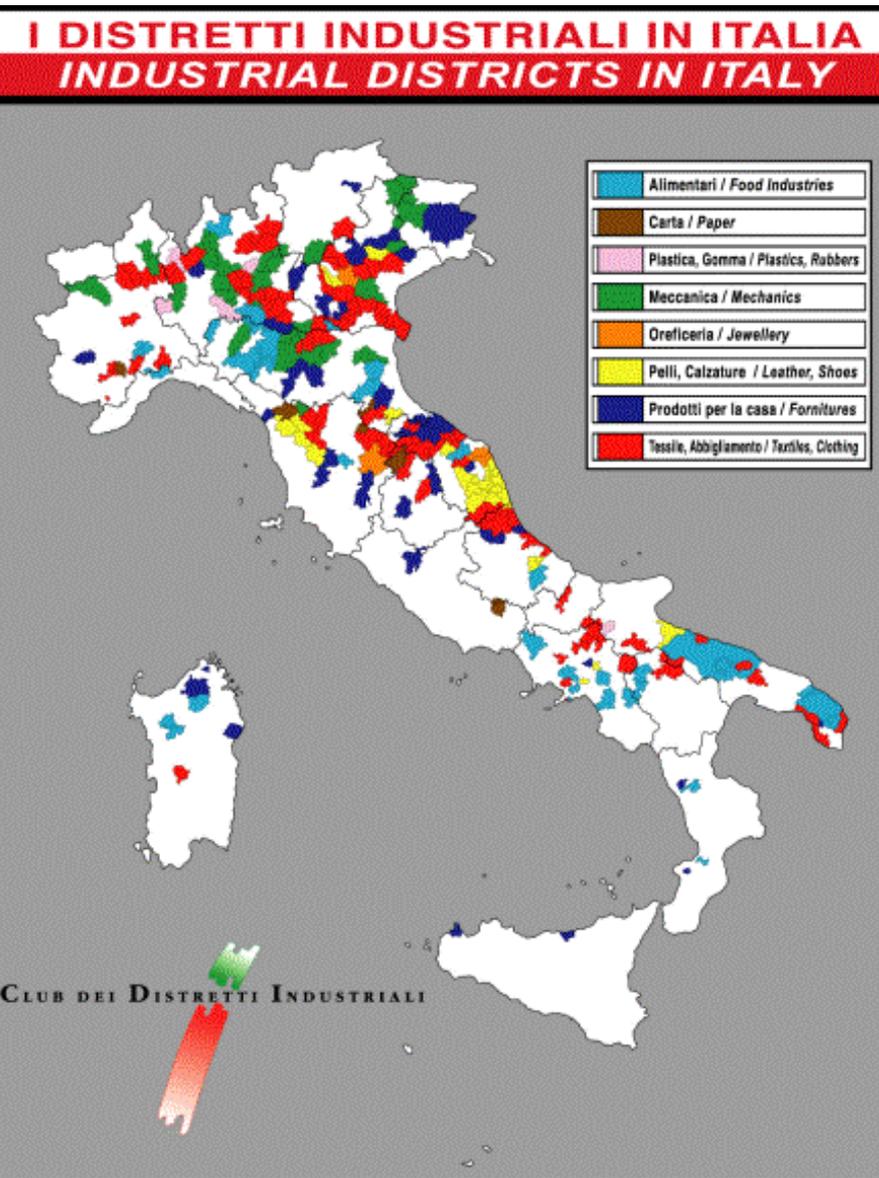
The first explanations which linked innovation and territory appeared in early 1980s in writings about **industrial districts**. The foundations of this paradigm can be traced back to 1977, when Bagnasco published his study on the Third Italy, describing small cities and communities of central Italy flourishing on the basis of small company clusters belonging to the same industry.

Michael Porter popularized the concept of industry clusters in his book **The Competitive Advantage of Nations** (1990). Porter recognized that the majority of economic activity takes place at the regional level and his ideas are commonly applied to cities and regions. Porter provides a simple definition of two types of clusters: vertical clusters, and horizontal clusters. Vertical clusters are made up of industries that are linked through buyer-seller relationships. Horizontal clusters include industries which might share a common market for the end products, use a common technology or labour force skills, or require similar natural resources.

The basic definition of a cluster is “geographical concentrations of industries that gain performance advantages through co-location, which refers to agglomeration economies, either of scale or scope.

# 1st generation systems: Technology districts

## Type 1: Industrial districts in traditional sectors



- |   |  |
|---|--|
| <p><i>Basic elements</i></p> <ul style="list-style-type: none"> <li>• Specialised firms / skilled workers</li> <li>• Buyers / catalysers</li> </ul> | <p><i>Structuring elements</i></p> <ul style="list-style-type: none"> <li>• Flexible combinations</li> <li>• Nontraded inputs</li> <li>• Technological spillovers</li> </ul> |
|---|--|

# *1st generation systems: Technology districts*

## *Type 2: Technology districts in high tech sectors*

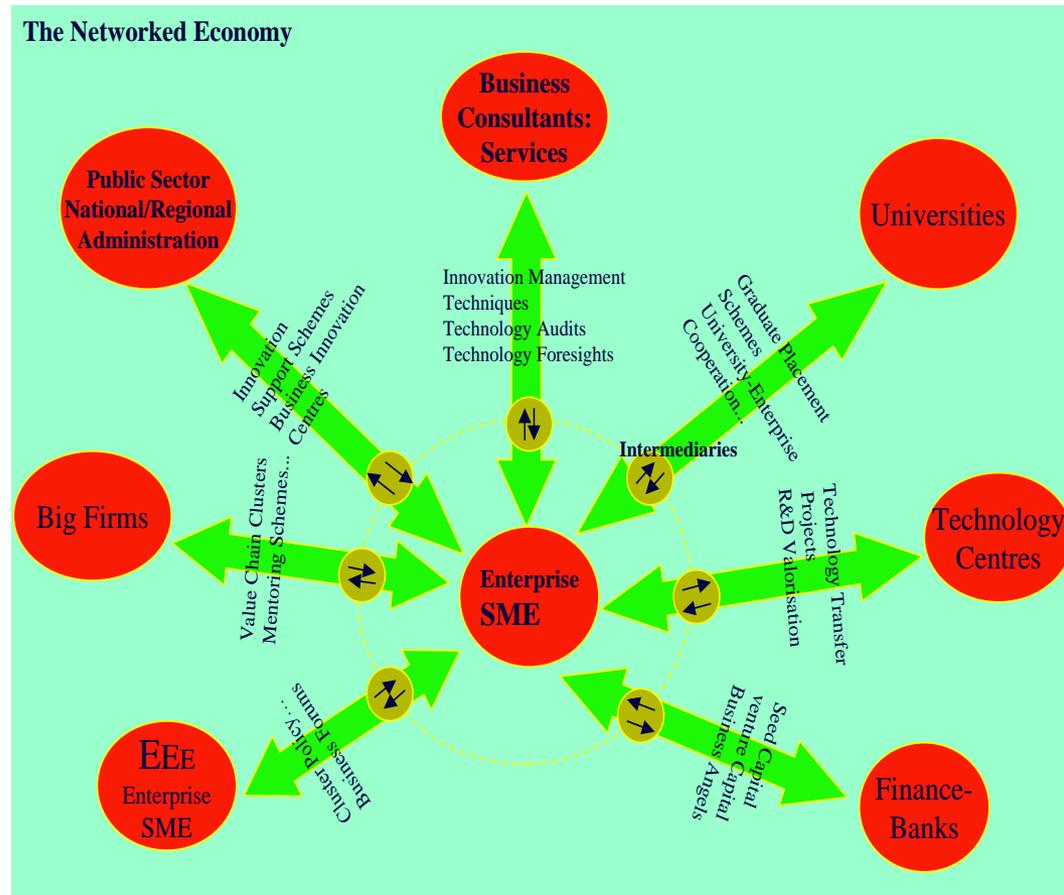
### The Silicon Valley pattern in Europe: Rhone Alpes / Cambridge

- **Basic research, knowledge generation** and application capability of the kind normally found centred on advanced private research or leading edge public research laboratories.
- **Venture capital** is crucial as the means by which ideas have been screened and selected are given a chance to fly as commercial products or services.
- **Law firms** are important as gatekeepers, advising firms on appropriate investors, counselors assisting entrepreneurs to access other services, and sources of contracts for many things ranging from recruitment to contract manufacturing.
- **Specialist consultants** in business and technological services ranging from management accountants rather than simple auditing services, head hunting services and specialist engineering, software and media, and regulatory advisers or property development services, including specialised public provision.
- **A local value chain** of firms that can conduct, for example contract manufacturing, design and fabrication, and various fairly prosaic supplies like logistics, or exhibition organisation and specialised catering services.

# 1st generation systems: Technology districts

## Type 3: Horizontal clusters

Lawson and Lorenz (1999) argue that the technological dynamism of districts is dependent on the firms within them, sharing two forms of cooperation: (1) the provision of **collective goods and services** such as training, education, R&D, and (2) sharing of certain norms of reciprocity such as information, subcontracting, refraining from wage competition. Reciprocity was identified as the key element of technological dynamism, reducing the risks associated with new product development and discouraging wage competition.

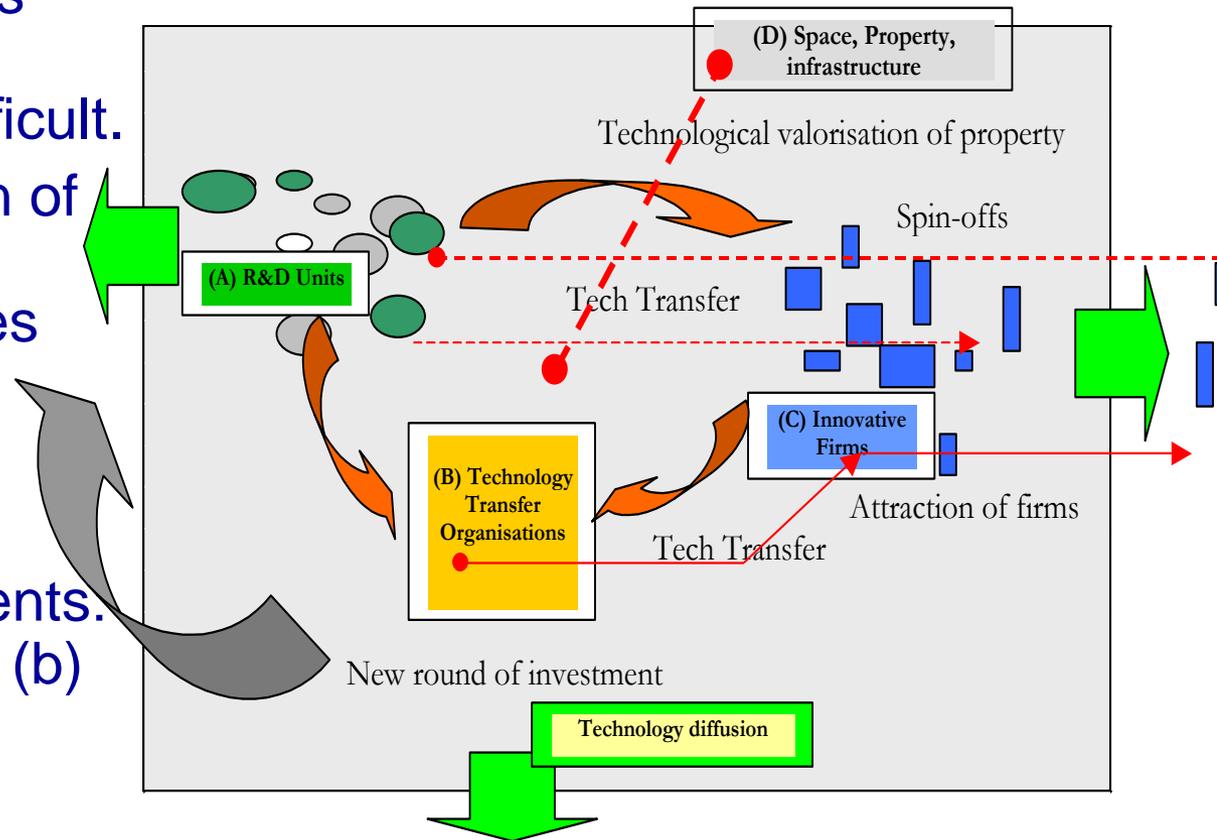


Source: Landabaso, 1999

# 1st generation systems: Technology districts

## Type 4: Planned districts: science and technology parks

- The complexity of networks within the district makes 'technology districts planning' extremely difficult.
- The nearest application of the district concept to regional planning comes through science and technology parks.
- 400 cases in Europe
- Four constituting elements. (a) land+infrastructure, (b) R&D, (c) technology intermediaries, (d) innovative companies
- Four types of technology networking

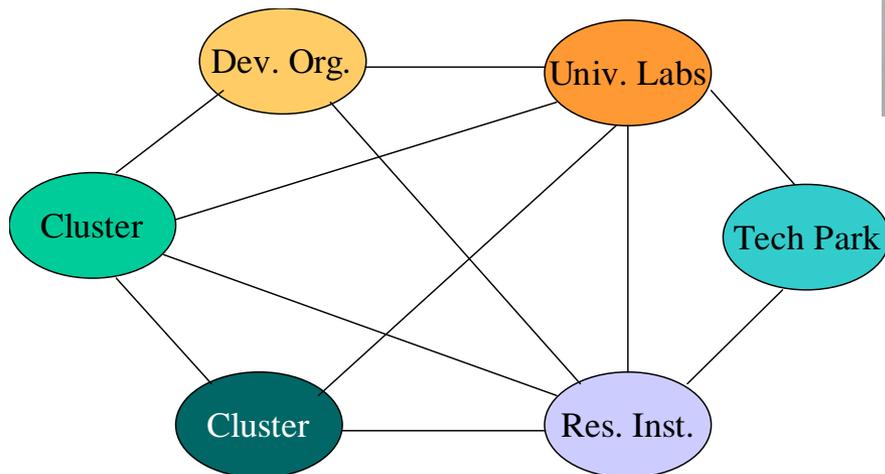


# 1st generation systems: Technology districts

## Type 5: Multi-district / park areas

### TECHNOPOLES

- In some countries (France, Italy) more than one districts, clusters, and science parks were developed within the same urban system, creating larger technopoles.
- Techopoles or technopolis are multi-cluster systems.
- The emphasis is on clusters and networks. Networks of collaboration, communication and co-ordination ensure the cohesion and synergy among the individual poles.



*Montpellier: Four clusters:  
Agro food, Pharmaceutical,  
Media, Automation +  
Housing + Leisure*

# 1st generation systems: Technology districts

## Innovation mechanism in districts and technology parks

The innovation mechanism within the cluster / district is based on three factors:

- The concentration of many and diverse **skills** in the cluster or district covering various fields of knowledge and production. Even in cases where the whole cluster focuses on a single industrial sector, the multiplicity of skills comes from specialisation in different stages of the production process.
- The **cooperation networks** between the members of the cluster. Cooperation produce innovation, as the later stems from the combination of skills, knowledge, and qualities that are put together. A minimum number of cluster members is necessary, and 100 companies has been considered as the threshold for the definition of a production complex as an industrial district.
- The presence of “**catalysts**” that facilitate combinations among the many and diverse skills and units. The function of the catalyst, at Prato, for example, is ensured by the *impannatori*, who constantly re-organise the productive processes of the district in relation to orders. VC functions as catalyst in high tech clusters. The central administration and liaison offices in the case of technology parks.

# *2nd generation systems: Learning regions*

## *The institutional breakthrough in innovation theory*

In 1990s, a radical shift from district theory took place. Three changes occurred:

**From district theory to learning regions.** The contribution of the District theory write Lawson and Lorenz (1999) was more in the area of understanding the territorial foundations of inter-firm cooperation than in understanding the contribution of territorial clustering to a firm's capacity to **learn and generate new knowledge**.

**From individual to organisational learning:** Individual learning refers to the acquisition of information, knowledge, understanding and skills, through participation in some form of education, training, whether formal or informal. Organisational learning depends upon individual learning and builds upon. OL amplifies the knowledge created by individuals, by appropriating knowledge from outside or by creating new knowledge in interaction and collaboration with other organisations

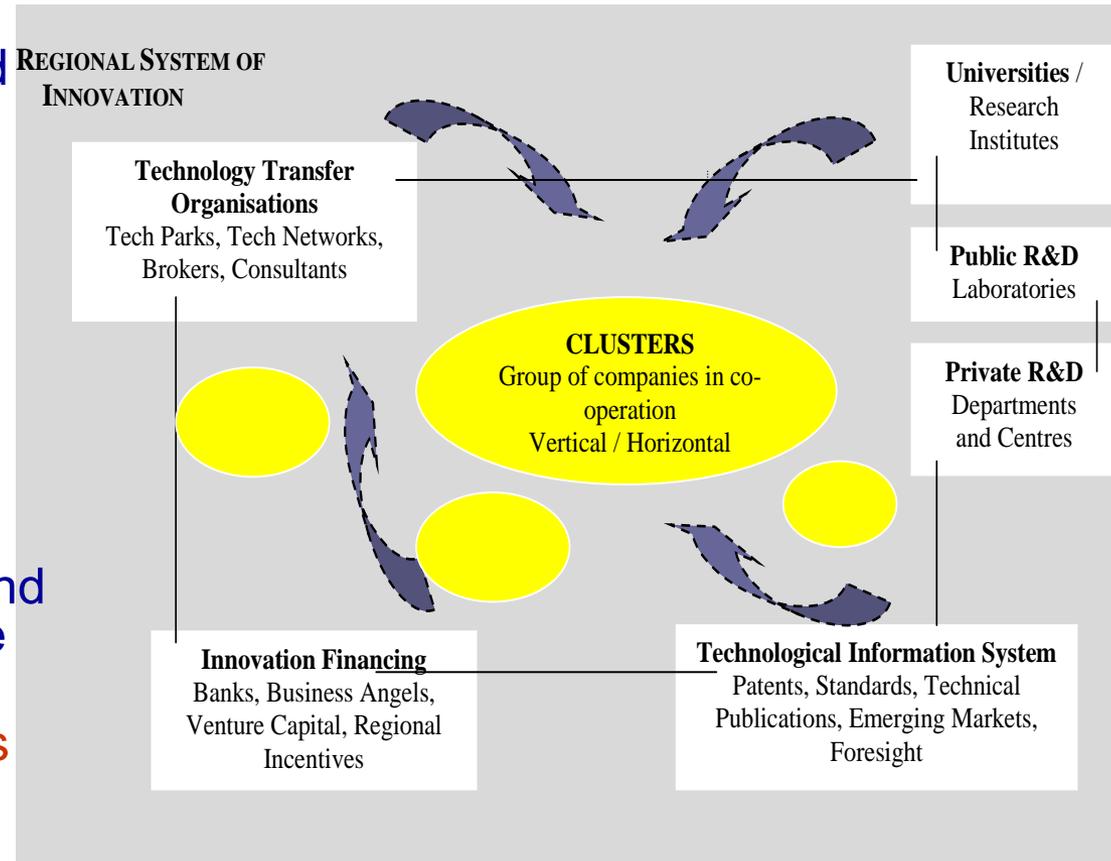
**From linear (within the Lab) to systemic (within the territory) innovation :** A process hermetically sealed within the research lab of the large company has been transformed into a system that covers an entire city-region involving participants from the finance, the technological, and the production communities.

# 2nd generation systems: Learning regions

## Learning regions: The institutional innovation mechanism

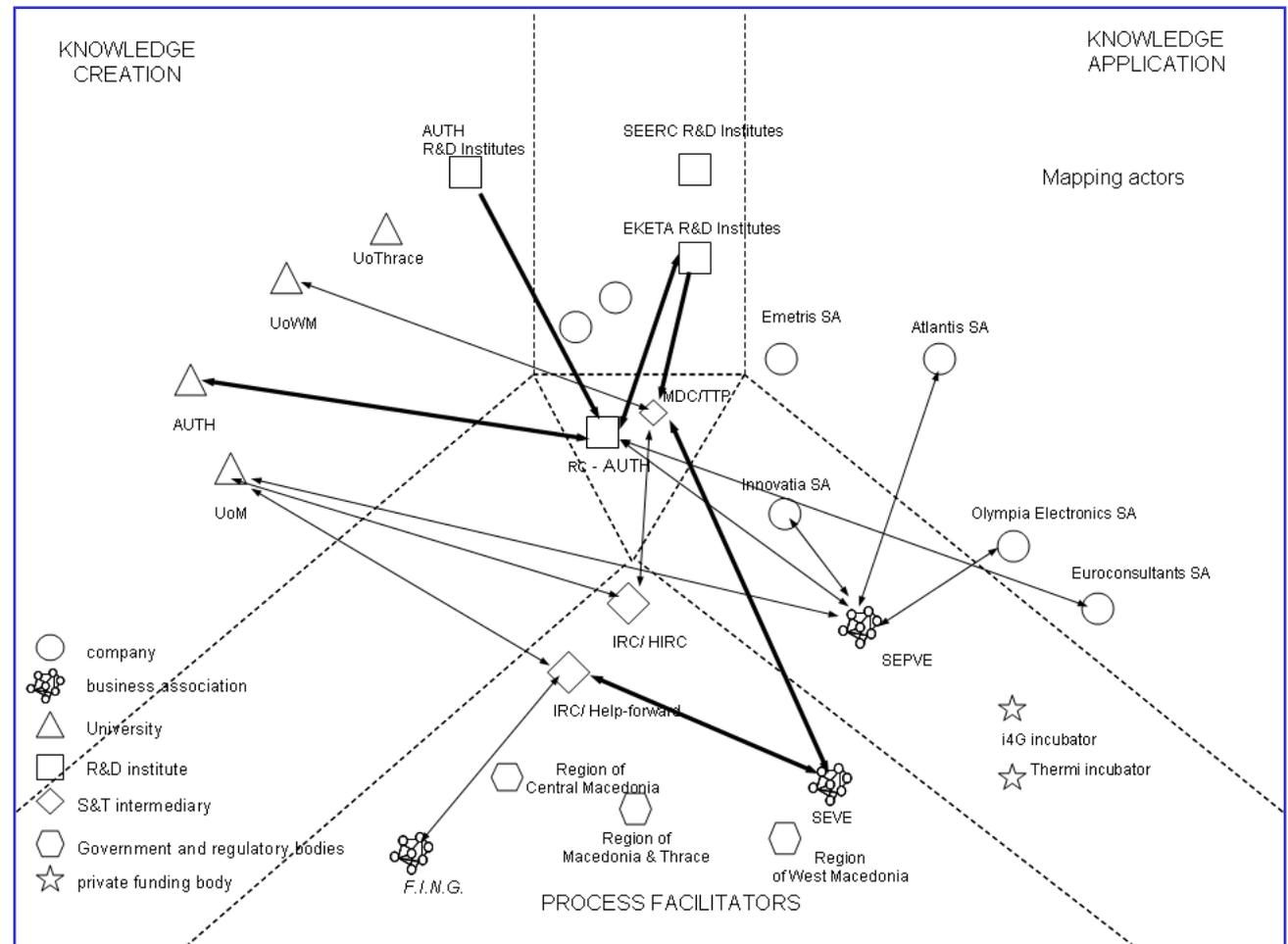
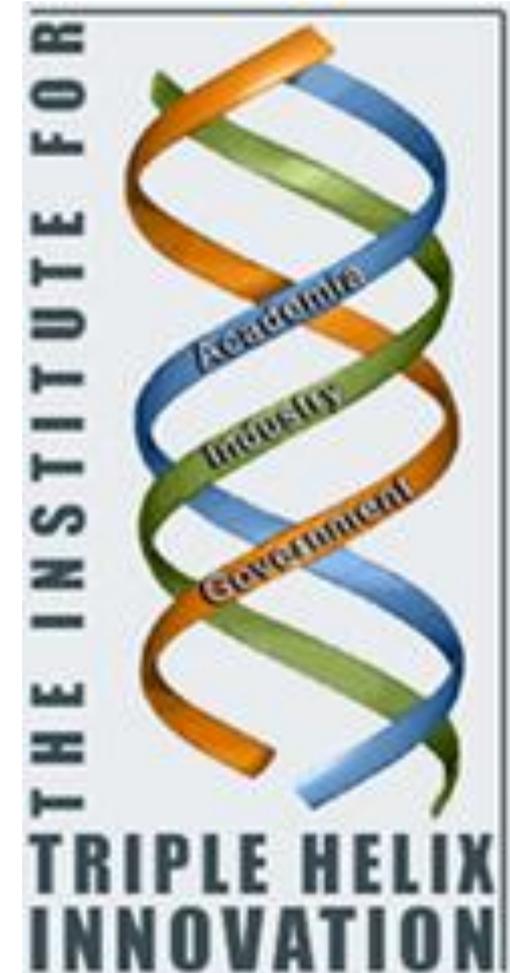
The region is conceptualised as living organisation with technology learning, management, selection, and knowledge development capabilities

- **Innovation is based on a system of clusters, R&D, tech transfer, and finance**
- The system includes (1) demand and supply institutions, (2) **knowledge networks**
- Networks allocate 'formal' and 'tacit' knowledge and enable collaborative innovation
- **Institutions work as switches selecting (on) and rejecting (off) innovations**
- Priorities are on intangible infrastructure, skills, human capital, finance, cooperation and social capital



# 2nd generation systems: Learning regions

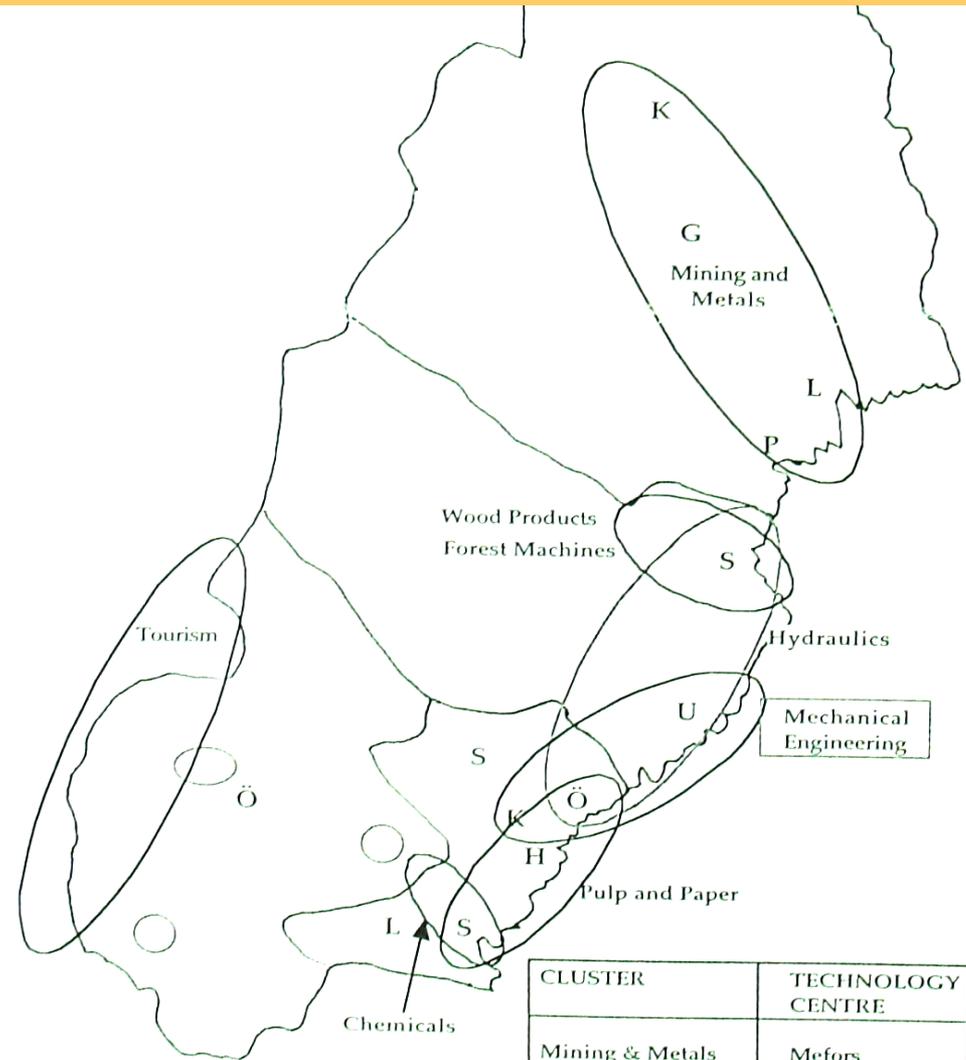
## A relevant approach: The Triple Helix



The model denotes the “university-industry-government” relationship as a complex of interdependent institutional spheres, which overlap and complement each other along the process of innovation.

# 2nd generation systems: Learning regions

## Learning regions as institutional cluster



CLUSTER	TECHNOLOGY CENTRE
Mining & Metals	Mefors MIFU Trätekt
Wood Products Hydraulics	ITH
Mechanical Eng	IUC
Pulp & Paper	None
Chemicals	None

# 2nd generation systems: Learning regions

## A policy derivative: Regional Innovation Strategies

In 1994, core concepts of the 'learning region' paradigm (collaborative networks, organisational learning, institutional agreements, social capital, political consensus) were adopted by the European Commission

A new family of policy schemes was introduced having a strategic view over technology and innovation at the regional level: Regional Innovation and Technology Transfer Infrastructures and Strategies (RITTS), Regional Technology Plans (RTP), Regional Innovation Strategies (RIS), and Programmes of Regional Innovative Actions (PRIA).

The objective is to create **regional systems of innovation** capable to sustain and facilitate innovation in small companies in manufacturing and services

The screenshot displays the IRE Network website with the following content:

- IRE Network**  
Innovating Regions in Europe
- Navigation Menu:** Home, IRE Network, IRE Network Services, Regional Innovation Strategies, News and Events, Find a Document, Search the Network
- Latest News:**
  - METHODOLOGICAL WORKSHOP FOR RIS PROJECTS**  
The first methodological workshop for the new Regional Innovation Strategy (RIS) projects will take ...
  - MINUTES OF THE MLP LAUNCH CONFERENCE**  
The minutes and presentations of the Mutual Learning Platform (MLP) launch conference are available ...
  - MINUTES FROM THE BENCHMARKING PROJECTS MEETING**  
The minutes of the 'regional innovation policy impact assessment and benchmarking' projects meeting ...>> MORE
- Welcome to the Innovating Regions Website**
  - About the IRE Network
  - IRE Projects
  - IRE Network Services
- Highlighted Region - PRAGUE**

The ultimate objective of Prague's Regional Innovation Strategy - developed within the BRIS project between 2002 and 2004 - is to help enhance the region's competitiveness by developing a knowledge-based economy.

>> Prague Strategy >> MORE STRATEGIES
- Network Directory**
  - Regions
  - Who's who
  - Mutual Learning Platform
  - Subgroups
  - Thematic Networks
  - Regions of Knowledge
  - Steering Group
  - IRE Secretariat
  - European Commission
- Map Search - click the map!** (Map of Europe)
- Upcoming events**
  - 29/06/2005 - 9th IRC Annual Meeting - Open Day - Brussels, BE
  - 07/07/2005 - First Methodological Workshop for 'Regional Innovation Strategy' projects - Vilnius, LT
  - 16/09/2005 - Workshop of the MLP working group 'Regional benchmarking' - Brussels, BE
- Publications**
  - RIE Magazine May 2005 (EN)**  
Innovation culture as a central element in regional competitiveness is the focus of this issue of the 'Regional Innovation in Europe' magazine ...
  - Regional Innovation in Europe
  - IRE Network News
  - IRE Electronic Newsletter

# 2nd generation systems: Learning regions

## Regional Innovation Strategies

### RIS principles are reflected into the method :

1. Raising awareness about innovation and building a regional **consensus** among key regional actors;
2. Analysis of the **regional innovation system** (its actors and their interaction), including technology and market trends assessment, technology foresight and benchmarking with other regions ;
3. Analysis of the **strengths and weaknesses of regional firms**: assessment of regional demand for innovation services, including technology audits (in SMEs in particular) and surveys regarding firms' needs and capacities, including management, finance, technology, training, marketing, etc.;
4. Assessment of the regional **innovation support infrastructures** and policy schemes;
5. Definition of a **strategic framework** – including a detailed action plan and the establishment of a monitoring and evaluation system. The action plan may involve pilot actions and feasibility studies as well as concrete projects that might be financed under existing structural funds operational programmes.

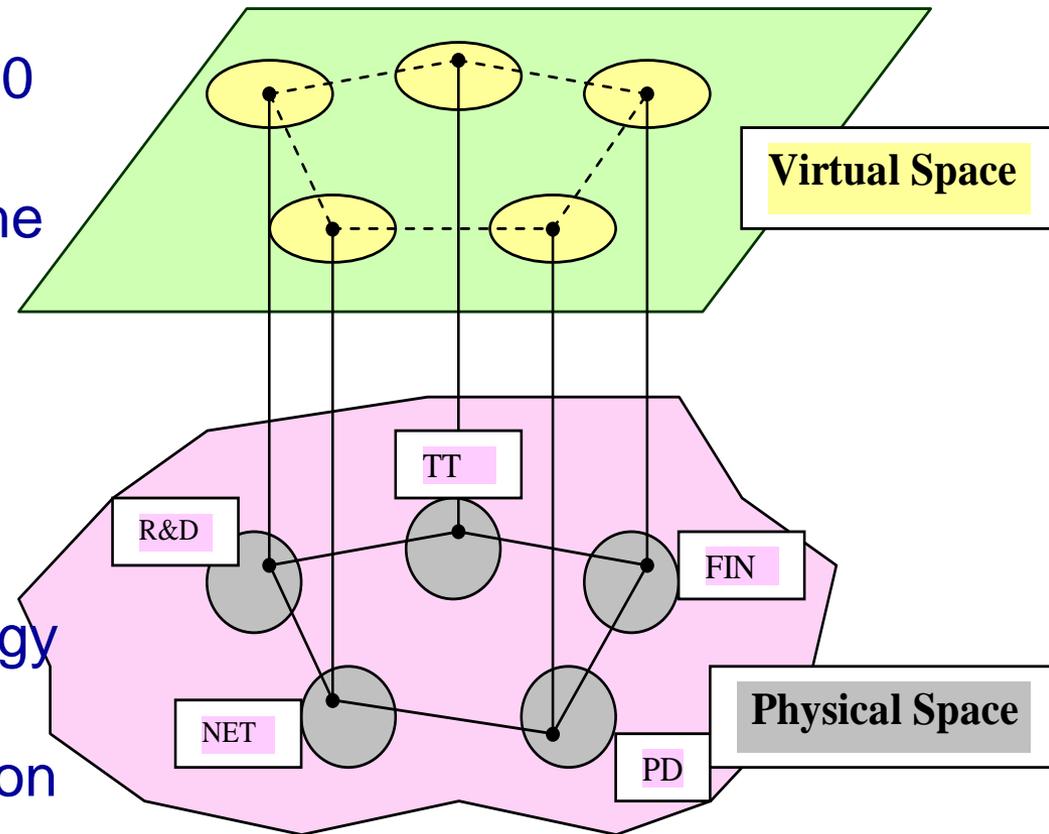
# 3rd generation systems: Intelligent cities and regions

## Innovative clusters + Virtual collaborative spaces

New trends appeared after 2000 linking regional innovation to knowledge management and the information society

Key processes:

- Dematerialisation of infrastructure
- Online learning and technology management
- Virtual technology co-operation and exchange
- Virtual communities
- Digital promotion of innovation
- Technology transfer as communication



*Intelligent regions correspond to territories combining strong innovation systems with IT infrastructure and digital innovation services*

# Different innovation systems

## Advantages and weaknesses

	Advantages	Weaknesses
Clusters/ Technology districts	<ul style="list-style-type: none"> <li>• Direct participation of companies</li> <li>• Well known and wide spread concept</li> </ul>	<ul style="list-style-type: none"> <li>• Planning barriers</li> <li>• High development costs</li> <li>• Innovation through infrastructure ?</li> </ul>
Learning regions / Regional systems of innovation	<ul style="list-style-type: none"> <li>• Wide system of reference</li> <li>• Participation of R&amp;D institutions</li> <li>• Emphasis on institutions – Long term intervention</li> </ul>	<ul style="list-style-type: none"> <li>• High level of institutional thickness</li> <li>• Strong public-private partnership</li> </ul>
Digital innovation environment / Intelligent regions	<ul style="list-style-type: none"> <li>• Low development cost</li> <li>• Easy access</li> <li>• Global communication and networks</li> <li>• Involvement of people</li> </ul>	<ul style="list-style-type: none"> <li>• Internet diffusion</li> <li>• IT literacy</li> <li>• Complex environments</li> <li>• Technophobia of managers</li> </ul>

# *I. Intelligent cities: The concept*

# I. Intelligent cities: The transfer of a concept

- The concept of 'intelligence' has been always been attributed to the individual, characterizing outstanding human mental achievements. Human intelligence has a number of specific characteristics: **perception** (allowing to receive and process sensory information to build representations of the world); **communication** (allowing information to be exchanged); **learning and memory** (allowing information to be stored and represented in multiple ways); and **planning and feedback action** (allowing the formulation of goals and the evaluation of progress) (Beckman 2004).
- Human intelligence is the model and measure for any form of intelligence. However other intelligences also exist.
- Artificial: (AI) is "the study and design of intelligent agents" where an intelligent agent is a system that perceives its environment and takes actions which maximizes its chances of success. John McCarthy, who coined the term in 1956, defines it as "the science and engineering of making intelligent machines." (See, also the Turing Test).
- Collective: 'the capacity of human communities to co-operate intellectually in creation, innovation and invention'; 'the collective learning and creative process realized through exchanges of knowledge and intellectual creativity'; 'the sharing of knowledge, know-how and experience in order to generate a higher individual and collective benefit than if they remained alone; 'the co-operation to solve more complex problems than individuals can'.

# I. Intelligent cities: The transfer of a concept

- Innovation is a substantial feature of intelligence

- ‘I think of intelligence as the high-end scenery of neurophysiology - the outcome of many aspects of an individual’s brain organization which bears on doing something one has never done before..... I like Jean Piaget’s emphasis that intelligence is what you use when you don’t know what to do. This captures the element of novelty, the coping and groping ability needed when there is no ‘right’ answer, when business as usual isn’t likely to suffice.’

(Calvin, W. H. (1998) *How Brains Think. Evolving Intelligence, Then and Now*)

- Integration of intelligences. Bringing human, collective, and artificial intelligence together: Intelligent environments

# I. *Intelligent cities: The transfer of a concept*

The transfer of the concept to the field of cities highlights the influence of two major paradigms of our time: the ICT paradigm, and the revive of the bio-paradigm, seeing the city as a living organism (see F.L. Wright 'The Living City', and the current Living Labs).

Many different meaning / uses of the term:

'Intelligent city' as metaphor:

- The case of Cyber cities / Smart cities.

'Intelligent city' with a literal and not metaphorical use of the term, but referring to machine intelligence / AI:

- The case of Intelligent environments.

'Intelligent city'' with a literal meaning, but taking also into account the intelligence of the city population and the public machines that they dispose and use:

- The case of intelligent communities

# I. Intelligent cities: The transfer of a concept

## From the Wikipedia



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## Intelligent cities

From Wikipedia, the free encyclopedia

The term **intelligent city (IC)** has been used with various meanings. At least five different descriptions of what an intelligent city is can be found in the literature:

- ICs have been frequently defined as **virtual** reconstructions of **cities**, as **virtual cities** (Droege, 1997).<sup>[1]</sup> The term has been used interchangeably as an equivalent of 'digital city', 'information city', 'wired city', 'telecity', 'knowledge-based city', 'electronic communities', 'electronic community spaces', 'flexicity', 'teletopia', 'cyberville', covering a wide range of electronic and digital applications related to digital spaces of communities and cities (MIMOS).
- Another meaning was given by the World Foundation for Smart Communities, which links digital cities with smart growth, a development based on information and communication technologies. 'A Smart Community is a community that has made a conscious effort to use information technology to transform life and work within its region in significant and fundamental, rather than incremental, ways' (California Institute for Smart Communities, 2001).<sup>[2]</sup>
- ICs are defined as **intelligent environments** with embedded information and communication technologies creating interactive spaces that bring computation into the physical world. From this perspective, intelligent cities (or intelligent spaces more generally) refer to physical environments in which information and communication technologies and sensor systems disappear as they become embedded into physical objects and the surroundings in which we live, travel, and work (Steventon and Wright, 2006).<sup>[3]</sup>
- Intelligent cities are also defined as territories that bring innovation systems and ICTs within the same locality. The **Intelligent Community Forum** (2006)<sup>[4]</sup> has developed a list of indicators that provide a framework for understanding how communities and regions can gain a competitive edge in today's Broadband Economy. Being an IC it takes a combination of: (1) significant deployment of **broadband communications** to businesses, government facilities and residences; (2) effective education, training and workforce able to perform **knowledge work**; (3) policies and programs that promote **digital democracy** by bridging the **digital divide** to ensure that all sectors of the society and citizens benefit from the broadband revolution; (4) **innovation** in the public and private sectors and efforts to create economic clusters and risk capital to fund the development of new businesses; and (5) effective economic development marketing that leverages the community's broadband to attract talented employment and investments.
- Along the same line, intelligent cities (communities, **clusters**, regions) are those territories characterized by high capacity for learning and innovation, which is built-in the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and **knowledge management**. The distinctive characteristic of intelligent cities is the increased performance in the field of innovation, because innovation and solving of new problems are distinctive features of intelligence (komninos 2002<sup>[5]</sup> and 2006<sup>[6]</sup>).

### The three dimensions of intelligent cities

[\[edit\]](#)

# *1. Intelligent cities: The transfer of a concept*

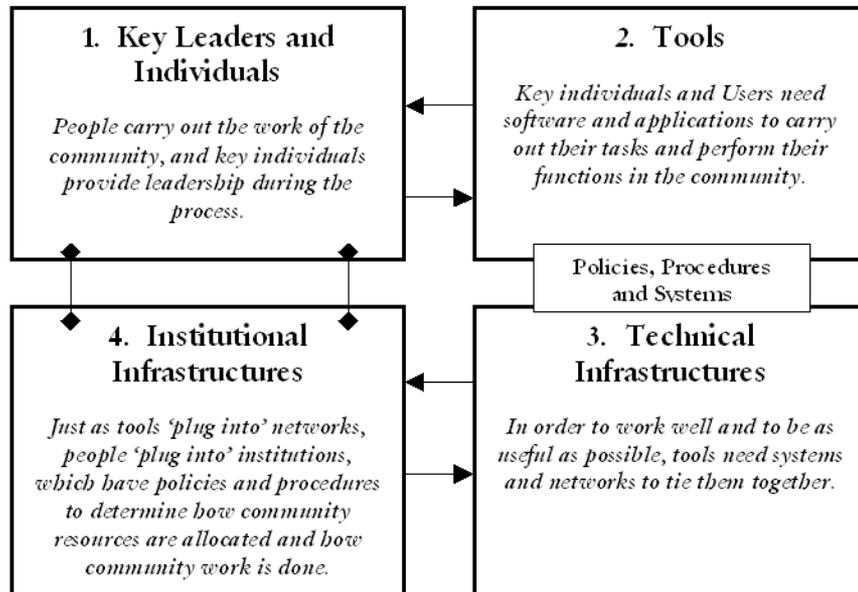
Consequently, speaking literally and not metaphorically, the term 'intelligent city' should be given to a territory:

- with developed knowledge-intensive and innovation-based activities;
- with embedded routines of social co-operation allowing knowledge and know-how to be acquired and adapted;
- with a developed information and communication infrastructure, digital spaces, and knowledge management tools; and
- with a proven performance to innovate, manage and resolve problems that appear for the first time, since the capacity to innovate and manage uncertainty are the critical factors for characterizing intelligence.

# I. Intelligent cities: The transfer of a concept

## Metaphorical use of the term

### Smart communities



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**The World Foundation for Smart Communities**  
 Linking local communities to the Global Information Economy

**Welcome to Smart Communities**  
 The World Foundation for Smart Communities is a nonprofit educational organization founded to promote the concept and facilitate the implementation of "smart communities" -- communities using information technology as a catalyst for transforming life and work to meet the challenge of the new millennium. Learn more about the [Foundation](#) >>>

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 "This growing concern with urban sprawl, coupled with the nostalgic yearning which the New Urbanism movement represents, are evidence of sweeping changes in public attitude toward physical space..."

**Cyberpace and Cyberplace** By John M. Eger  
 "Until flesh-and-blood human beings can be digitized into electronic pulses in the same way in which computer scientists have transformed data and images, the denizens of cyberspace will have to live DR (In real life)...a very real, physical place called 'cyberplace.'" [Read more >>>](#)

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# I. Intelligent cities: The transfer of a concept

## Combining innovation and ICTs



### Intelligent Community Forum

Dedicated to economic growth in the broadband economy for communities large and small

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#### WHAT'S NEW



ICF Director of Development and Co-founder Louis Zacharilla gave the keynote address at the **Wireless Cities Conference** in Dundee, Scotland, an ICF [Top7 Community](#). [Click here for a pdf of the presentation.](#)



ICF Executive Director and Co-Founder Robert Bell

#### AWARDS

##### ICF Announces the Smart21 in Waterloo October 25

ICF announced the first selection in the coveted race for [Intelligent Community of the Year](#) during the [Intelligent Communities and Broadband conference](#) organized by the City of Waterloo, ICF's 2007 Intelligent Community of the Year. The announcement is also posted in a new blog titled "[The Smart 21 of 2008.](#)" We welcome your comments. The next step is the [Top Seven announcement](#) which will be made on January 14 during PTC'08.

#### SUMMIT

##### Building the Broadband Economy 2008

New York City, May 14-16, 2008



Lifetime Achievement Award:  
Sunderland UK - BBE 2007

ICF will hold the 2008 edition of its annual summit on May 14-16, 2008 at Polytechnic University in Brooklyn, New York. [BBE 2008](#) will feature the Top Seven Intelligent Communities of 2008, to be named in January at PTC'08 in Honolulu, and presentation of the 2008 Intelligent Community of the Year award.

#### SERVICES

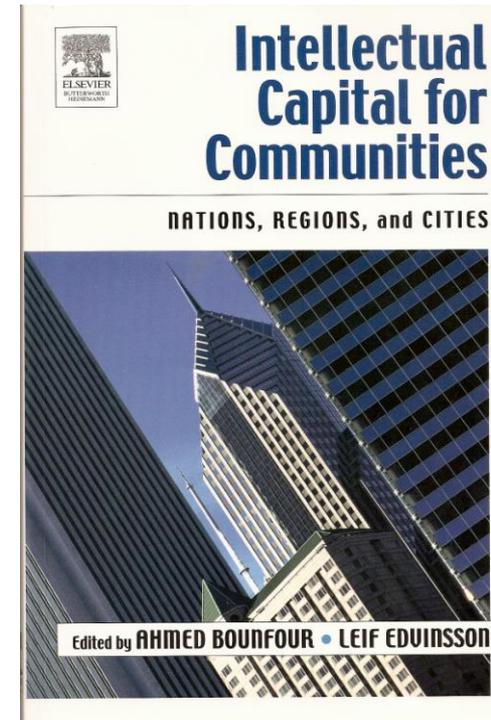
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# I. Intelligent cities: The transfer of a concept

## Emphasis on intellectual capital

- 'Intangible or intellectual capital resources are now largely recognized as the most important competitive advantage'.
- Corporate level: 'Intangible investments (R&D, innovation, knowledge creation, marketing, advertising) are the most important sources of performance'.
- Community level: Ragusa (1301-1806): A city of intelligence - Social intelligence / political + institutional / organised
- Measuring, accounting IC
- Cultivating / nourishing

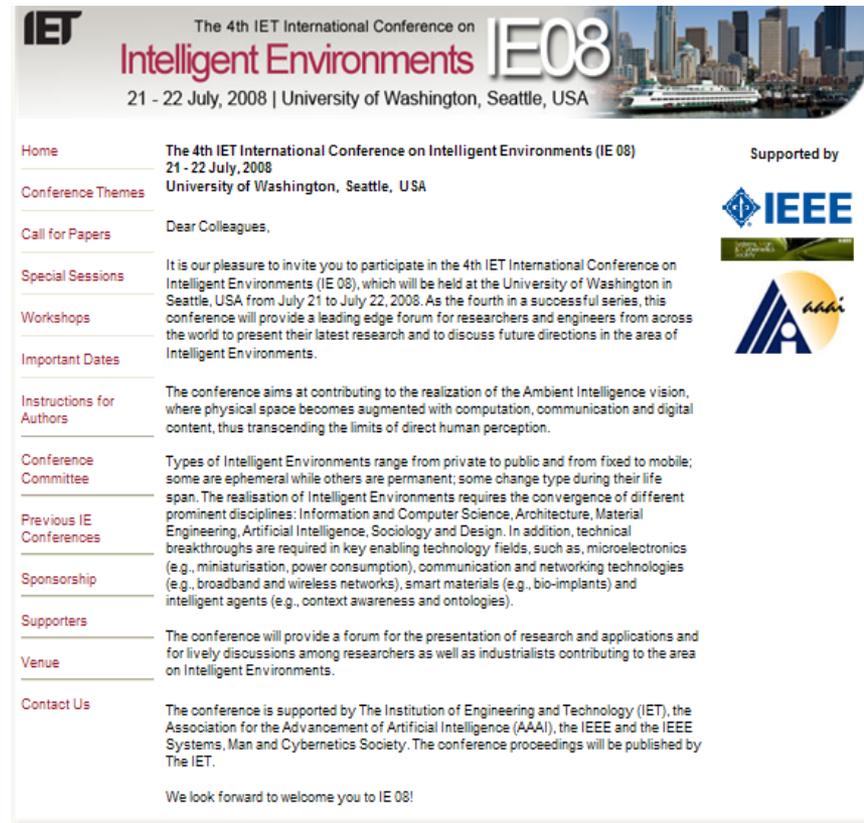


# I. Intelligent cities: The transfer of a concept

## Emphasis on machine intelligence

“Types of Intelligent Environments range from private to public and from fixed to mobile; some are ephemeral while others are permanent; some change type during their life span. The realisation of Intelligent Environments requires the convergence of different prominent disciplines: Information and Computer Science, Architecture, Material Engineering, Artificial Intelligence, Sociology and Design.

In addition, technical breakthroughs are required in key enabling technology fields, such as, microelectronics (e.g., miniaturisation, power consumption), communication and networking technologies (e.g., broadband and wireless networks), smart materials (e.g., bio-implants) and intelligent agents (e.g., context awareness and ontologies)” (IE 08).



The screenshot shows the homepage for the 4th IET International Conference on Intelligent Environments (IE08). The header features the IET logo, the conference title, and the dates (21-22 July, 2008) at the University of Washington, Seattle, USA. A banner image shows a city skyline with a boat in the foreground. The main content area is a table with navigation links on the left and detailed information on the right. The navigation links include Home, Conference Themes, Call for Papers, Special Sessions, Workshops, Important Dates, Instructions for Authors, Conference Committee, Previous IE Conferences, Sponsorship, Supporters, Venue, and Contact Us. The detailed information includes a welcome message, the conference's purpose, and a list of supporters (IET, IEEE, AAMI).

Home	The 4th IET International Conference on Intelligent Environments (IE 08) 21 - 22 July, 2008 University of Washington, Seattle, USA
Conference Themes	
Call for Papers	Dear Colleagues,
Special Sessions	It is our pleasure to invite you to participate in the 4th IET International Conference on Intelligent Environments (IE 08), which will be held at the University of Washington in Seattle, USA from July 21 to July 22, 2008. As the fourth in a successful series, this conference will provide a leading edge forum for researchers and engineers from across the world to present their latest research and to discuss future directions in the area of Intelligent Environments.
Workshops	
Important Dates	
Instructions for Authors	The conference aims at contributing to the realization of the Ambient Intelligence vision, where physical space becomes augmented with computation, communication and digital content, thus transcending the limits of direct human perception.
Conference Committee	Types of Intelligent Environments range from private to public and from fixed to mobile; some are ephemeral while others are permanent; some change type during their life span. The realisation of Intelligent Environments requires the convergence of different prominent disciplines: Information and Computer Science, Architecture, Material Engineering, Artificial Intelligence, Sociology and Design. In addition, technical breakthroughs are required in key enabling technology fields, such as, microelectronics (e.g., miniaturisation, power consumption), communication and networking technologies (e.g., broadband and wireless networks), smart materials (e.g., bio-implants) and intelligent agents (e.g., context awareness and ontologies).
Previous IE Conferences	
Sponsorship	
Supporters	The conference will provide a forum for the presentation of research and applications and for lively discussions among researchers as well as industrialists contributing to the area on Intelligent Environments.
Venue	
Contact Us	The conference is supported by The Institution of Engineering and Technology (IET), the Association for the Advancement of Artificial Intelligence (AAAI), the IEEE and the IEEE Systems, Man and Cybernetics Society. The conference proceedings will be published by The IET.  We look forward to welcome you to IE 08!

# *I. Intelligent cities: The transfer of a concept*

## *Embedded systems at various scales of the city*

### Smart Cities

Mobility

Public Space

Prototyping & Fabrication

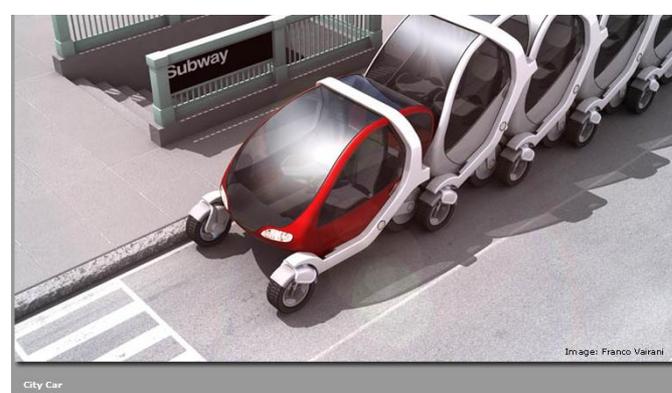
**Group Information**

Welcome from Prof. Mitchell! | [Project List](#) | [People](#) | [Links](#) | [Contact](#) | [Press Information](#) | [Publications](#) | [Credits](#)



# 1. Intelligent cities: The transfer of a concept

## Embedded systems at various scales of the city



# *I. Intelligent cities: The transfer of a concept*

## *Living Labs: The city as living lab for innovation*

### **European Network of Living Labs: Human Dimension of Technology**

**As part of the official programme of the Finnish Presidency, the European Network of Living Labs is being launched on 20 November in Espoo, Finland. The initiative aims to set up a new European Innovation Infrastructure where users play an active role in the innovation and can influence this to better serve their own needs.**

(20/11/2006) Living labs move research out of laboratories into real-life contexts to stimulate innovation. This allows citizens to influence research, design and product development. Users are encouraged to co-operate closely with researchers, developers and designers to test ideas and prototypes.

Functioning as Public-Private Partnerships, especially at regional and local level, living labs provide some advantages over "closed labs": They stimulate new ideas, provide concrete research challenges and allow for continuous validation of research results. At a pan-European level, a large-scale network of living labs could become a strong tool for making the innovation process of industry more efficient and dynamic by stimulating the involvement of citizens of differing cultures and societal backgrounds who can provide rich feedback in context on the use and impact of the technologies being researched.

The European Network of Living Labs is launched just as a large group of experts gathers in Finland for the IST Event 2006. Several conference sessions will explore in detail the living labs approach, and offer researchers across Europe the opportunity to become involved.

The concept has already been embraced by industry and other stakeholder organisations. Concrete examples of living labs already operating include the Helsinki Living Lab (in Arabianranta), Mobile City Bremen in Germany, the Botnia Lining Lab in Sweden and Freeband in the Netherlands.

#### **Launching Event**

#### **Speech of Finnish Prime Minister Matti Vanhanen**

#### **IST 2006 Networking session**

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## *II. Identifying strategies: The ICF awards*

# II. Identifying IC strategies: The ICF awards



## Intelligent Community Forum

Dedicated to economic growth in the broadband economy for communities large and small

About ICF   Events   News   Research   Services   Subscribe   Home   Log in

### About ICF

The Intelligent Community Forum (ICF) is a nonprofit think tank that focuses on job creation and economic development in the broadband economy. Our area of interest is the local community, both large and small, in the developing and developed economies of the world. ICF [conducts research](#), creates [conference content](#), publishes information and presents [annual awards](#), all in an effort to:

 **Identify and explain the emergence of the [broadband economy](#) and its impact at the local level.** This is the new global economy emerging from the deployment of broadband on the international, national and local levels around the world. The broadband economy challenges us all, whether we live in a thriving metropolitan area or a poor rural region. In the broadband economy, adaptability outweighs legacy; skills, not resources, are the key to future; and innovation, not location, creates a competitive advantage.

 **Research and share [best practices](#) by communities in adapting to the changing economic environment and positioning their citizens and businesses to prosper.** There is no "one best model" for economic development in the broadband economy. Each successful community develops strategies based on its unique history and challenges, and overcomes specific local obstacles to put programs into place. But successful strategies share many common elements, and communities can learn enormous amounts from each other's successes and failures, and by sharing with others, speed their own development as well.

 **Celebrate the [achievements of communities](#) that have overcome challenges to claim a place in the economy of the 21st century.** Communities around the world are making huge strides to overcome legacy challenges, develop strategies and put effective programs and policies into place. ICF celebrates leadership through an Awards program that searches the globe for the best models of each year and publicizes their achievements.

For ICF, a "community" is a town, village, city or metropolitan area - or occasionally a state, province or other larger region - that has a distinct identity and the ability to act in a unified manner as a single entity. Its citizens and businesses identify themselves with that community enough to set aside small-scale differences and cooperate for the good of the whole.



# II. Identifying IC strategies: The ICF awards

Each year, the Intelligent Community Forum presents a 10-month awards program for Intelligent Communities and the public-sector and private-sector partners who contribute to them. The goal of the awards program is to raise awareness of how communities can develop and maintain local prosperity and inclusion amid the challenges of the Broadband Economy, and to generate valuable data on their best practices.

## JULY **Call for Nominations**

The process begins in early summer, when ICF issues a call for nominations for Intelligent Communities. Over the next 100 days, ICF receives completed nomination forms from hundreds of communities as well as from Correspondents: companies, institutions and individuals appointed by ICF to encourage applications from communities with which they are familiar. Communities large and small, urban and rural, in developed and developing nations, are eligible. Click on the link to access award criteria, deadlines and nomination forms.

## OCTOBER **The Smart21**

In late autumn, ICF announces its Smart21 Communities, an initial group of honorees that become finalists for the next phase of the program. Selection is based on review of nominations submitted by communities since the summer. The Smart21 are communities or regions with a documented strategy for creating a local prosperity and inclusion using broadband and information technology to attract leading-edge businesses, stimulate job creation, build skills, generate economic growth, and improve the delivery of government services.



## JANUARY **The Top Seven Intelligent Communities**

In January, at the Pacific Telecommunications Council conference in Honolulu, ICF selects one out of every three of the Smart 21 for its prestigious Top Seven Intelligent Communities of the Year announcement. Each year's Top Seven receive media coverage both locally and internationally, and become the finalists for ICF's Intelligent Community of the Year award.



## MAY **Intelligent Community Awards**

In May, at ICF's *Building the Broadband Economy* conference in New York City, one of the Top Seven is selected as the **Intelligent Community of the Year**. In addition, ICF names the:



**Broadband Applications of the Year**, presented in two categories, based on a global online vote beginning in January:

- The **Commercial Award** goes to a provider of computer-based applications delivered over broadband that have the potential to expand or create sustainable new industries and lead to employment growth.
- The **Nonprofit Award** goes to the provider of a computer-based application using broadband to make a positive contribution to human welfare.

**Intelligent Facility of the Year**, presented to a building, facility, campus or office park that use broadband and information technology to add value to the property and contribute to the formation or growth of an intelligent community.

**Intelligent Community Visionary of the Year**, presented to an individual or an organization whose work promotes the development of broadband as an engine of economic growth, social inclusion and human progress.

# II. Identifying IC strategies: The ICF awards

## Intelligent Community Indicators

In a study funded by the Province of Ontario, Canada, the Intelligent Community Forum defined five critical success factors for the creation of Intelligent Communities. This list of "Intelligent Community Indicators," as the study termed them, provided the first conceptual framework for understanding all of the factors that determine a community's competitiveness in the [Broadband Economy](#).

### 1. Broadband Infrastructure

Whether we know it or not, we live today in the broadband economy, where the competitiveness of a community depends in part on its ability to connect at broadband speeds to the World Wide Web. Whether or not they are effectively served by private-sector carriers, Intelligent Communities are not content to leave their broadband destiny entirely in the hands of the market. Instead they express a clear vision, craft effective public policies and promote equitable access to broadband assets.

### 2. Knowledge Workforce

Intelligent Communities exhibit the determination and demonstrated ability to develop a workforce qualified to perform knowledge work. This is not simply a matter of possessing universities able to crank out post-grads with science and engineering degrees. Effective development of knowledge workers extends from the factory floor to the research lab, and from the loading dock to the call center or Web design studio.

### 3. Innovation

Intelligent Communities seek to foster or attract innovative businesses, because they are the ones that will grow in terms of employment and contribution to the tax base. Intelligent Communities foster innovation with economic development programs, by creating an environment that attracts creative people, and by promoting the formation of, and access to, the risk capital that fuels new business growth.

### 4. Digital Inclusion

It is no exaggeration to say that the broadband revolution has the potential to create a golden age of prosperity, knowledge and freedom. But it has just as much potential to foster a "gilded age," in which the benefits go to a privileged few in the age-old pattern that has hindered development around the world for centuries. What will determine the difference between gold and gilding? Enlightened policies and effective programs created by governments at the local, regional and national levels.

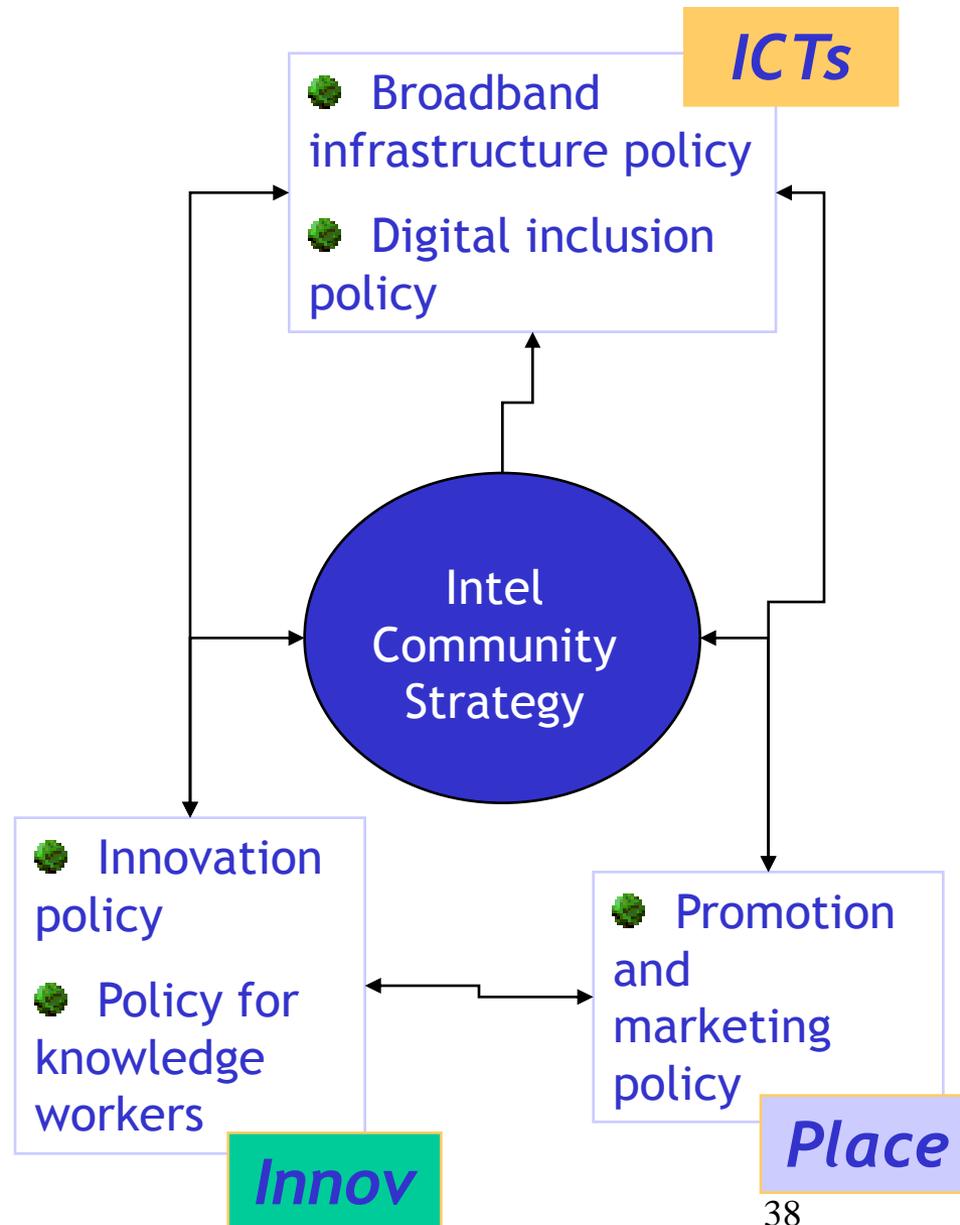
### 5. Marketing

Globalization of markets, capital flows and business operations puts a premium on the ability of communities to market their "intelligence." Intelligent Communities market themselves effectively, based on knowledge of the competitive offerings of other cities and regions, clear understanding of what leading-edge businesses require, and a determination to deliver it.

## II. Identifying IC strategies: The ICF awards

The logic of the ICF for identifying and assess intelligent communities

- Is not a benchmarking approach based on indicators measuring the performance of the community
- The 5 criteria used do not measure the resources of a city / community
- Communities get awards for their strategies
- The criteria focus on policies, programs and projects contributing to the making of intel communities
- The criteria evaluate the commitment and effectiveness of local strategies and authorities to sustain an economy based on innovation and broadband networks / services
- Communities get the awards because they excel in one or more criteria. No need to excel in all 5 criteria.



# II. Identifying IC strategies: The ICF awards

1

## Intelligent Communities and Broadband Infrastructure

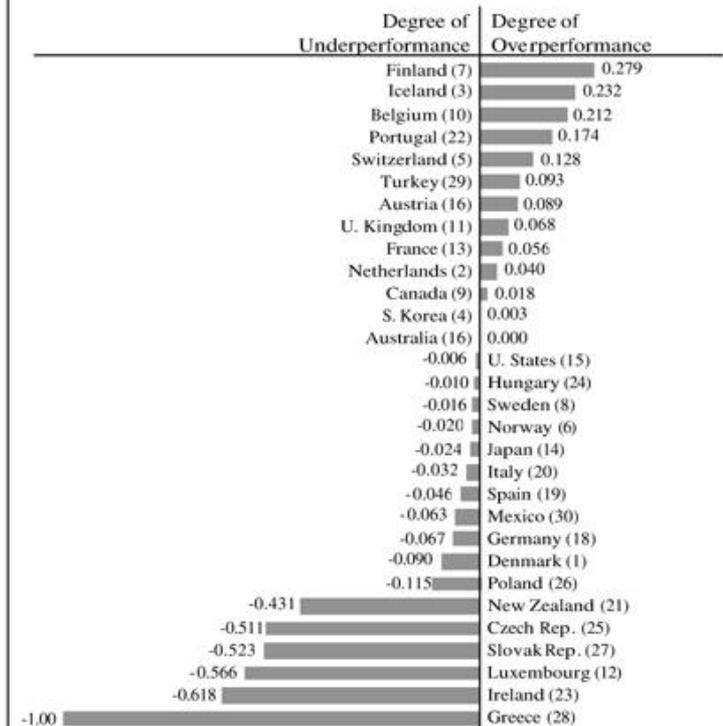
Whether or not they are effectively served by private-sector carriers, Intelligent Communities are not content to leave their broadband destiny entirely in the hands of the market. Instead they -

- Express a clear vision of their broadband future
- Craft public policies that encourage the development and adoption of broadband services
- Promote equitable access to them by organizations and individuals at all rungs of the economic ladder

To provide policymakers a tool to compare broadband subscription rates between countries, the ICF presents the Broadband Performance Index (BPI).

This index quantifies the relationship between a country's broadband subscriptions per capita and that country's economic and demographic endowments.

Figure 1. Broadband Performance Index  
(December 2006 OECD Rank from Table 1 in Parenthesis)



# II. Identifying IC strategies: The ICF awards

2

**What is a Knowledge Worker?** The term "knowledge work" was coined by management consultant Peter Drucker in his 1973 book *Management: Tasks, Responsibilities, Practices*. In this book, Drucker forecast that, within one or two decades, it would become impossible to maintain a middle class lifestyle by working with one's hands. During the previous thirty years, it had been the growth of assembly-line industries that created the American middle class because, after years of labor struggle, these industries had become places where relatively uneducated people could earn good salaries from hard work.

Drucker's prescient comment signaled that the world we knew was changing. He called the new work that would be required to enter the middle class "knowledge work" and the people who performed it "knowledge workers."

## Contributors to the Knowledge Workforce

How does a community equip its workforce to succeed at knowledge work in the highly competitive environment of the broadband economy? It takes a mix of contributions from the public and private sectors.

### Public-Sector Contributors

- Strong early childhood and elementary-secondary education that stresses both conventional literacy and numeracy and computer literacy
- Community colleges and technical schools that provide a means for those lacking a university education to gain career-specific and sector-specific skills and climb the economic and social ladder

### Public-Private Contributors

- Universities and colleges, which typically draw some or all of their financial support from the public sector, even if they are private institutions. They provide undergraduate and graduate education that prepares students for advanced knowledge work.
- Nonprofit associations and NGOs that provide specialized training and certification

### Private-Sector Contributors

- Continuing-education training offered by employers for their employees
- Private-sector training organizations that serve individual students and develop courses to meet the needs of employers

# II. Identifying IC strategies: The ICF awards

## Innovation

Whether in the private or public sectors, innovation means the ability to –

- Conceive of improvements in existing services, products, technology or infrastructure
- Test the improvements for feasibility, cost and, most important of all, market acceptance
- Implement them quickly and efficiently
- Market them effectively

Studies of the effectiveness of economic development programs have noted that, in most communities, 80% of resources go toward attracting inward investment by companies outside the region. But these companies typically contribute only 20% of the community's economic growth. Where does most of the economic growth come from? From companies already in the community.

Intelligent Communities do not neglect the need to attract outsiders, but focus most of their efforts on helping existing businesses and institutions innovate and bring their innovations to market.

### How to Promote Innovation

What can government do in this area? Innovation is the business of business, as well as of the many non-business institutions such as hospitals, universities, and development banks. But local, regional and national governments have a role to play in creating the economic and social environment in which innovation can thrive. Intelligent Communities foster innovation by:

#### Identifying and focusing resources on innovative local companies.

Innovation is one of the most powerful drivers of business success. It is the small-to-midsize innovators that create employment in economies where the large brand name companies have been shrinking payrolls for decades. Government in Intelligent Communities know who their innovators are, understand what they need and work to help those companies obtain funding, finding qualified employees and gain access to markets, and connect with other innovators in business and education.

**Improving access to risk capital.** Companies can grow modestly using cash flow, but strong growth takes capital provided by risk-taking investors. Major financial cities offer ready access to capital for the right company, but in smaller cities and rural areas, the challenges are greater.

Government can assist innovative companies by learning about capital markets and working through state or provincial agencies, as well as national government programs, to connect their companies to private and public sources. They can also identify national and international associations or NGOs to which corporate and institutional investors belong and use them as channels to capital markets.

#### Creating e-government programs that deliver information and services to constituents more efficiently, on a 24x7 basis and at a lower cost.

E-government can also be a very effective way to increase citizen participation in government through Web streaming of administrative meetings, e-surveys and e-voting. At the same time, e-government can contribute to job creation for local technology companies, build computer literacy among citizens, and foster the development of a more innovative



## II. Identifying IC strategies: The ICF awards

### 4

#### Increasing Inclusion

Intelligent Communities use the new tools of the broadband economy to increase economic, social and political. They work to ensure that disadvantaged communities have the opportunity to participate in the broadband economy by eliminating barriers, providing skills training and creating incentives. Success in digital inclusion feeds success in each of the other Indicators by increasing the number of broadband users, improving the quality of the workforce, boosting innovation and providing the kind of success stories that make good marketing.

The poor and poorly-educated face many barriers to participation in the broadband economy, including -

- Low levels of literacy, which block access to the text-based world of the Internet
- Inability to pay for home information technology or broadband access
- Lack of understanding of the benefits of computers and the Internet in their lives

Intelligent Communities seek to overcome these barriers by improving standards in public schools, creating programs to subsidize IT and broadband purchases and provide public access to computers and broadband networks, and by offering training programs to all ages in basic computer literacy and uses of the Internet.

#### The Role of e-Government

Economic participation is ICF's core focus, but it is important to note the rise of e-government as a means to increase participation in democratic government. The increasing number of successful projects that put social services, purchasing, permitting, approvals and even voting online create powerful incentives for citizens to go online as well. This not only benefits the citizens directly - it promotes a culture of use for broadband and the Internet that becomes a competitive advantage for the entire community.

# II. Identifying IC strategies: The ICF awards

## 5

### Effective Marketing

Globalization of markets, capital flows and business operations puts a premium on the ability of communities to market their "intelligence." Intelligent Communities market themselves effectively, based on a knowledge of the competitive offerings of other cities and regions, clear understanding of what leading-edge businesses require, and a determination to deliver it.



#### What does "effective marketing" mean?

Effective marketing begins with the determination to put the Intelligent Community strategy and programs at the center of economic development efforts. This is a key point. Far too many communities have strong strategies and execute them effectively - but fail to put this dramatic story front and center in their efforts to promote themselves internally to citizens and local businesses, and externally to potential inward investors. Telling their story effectively involves:

- **Strong public relations.** Local, regional, national and international press can provide wide exposure of interesting community development stories, if they are packaged and promoted professionally. An investment in professional public relations typically repays itself many times over in awareness of a community and the pride of its citizens and businesses. Promotable events include the introduction of economic development strategies and the introduction of new programs.
- **Measuring and Reporting.** One of the most effective and least expensive way to keep both local and national/international attention for a community's effort is to measure changes in the community - public perception, broadband deployment, program participation, etc. - to publish these reports, and to make their publication another promotable event for the public relations program. The surveys can be as in-depth or brief as the budget provides, but by doing them regularly, Intelligent Communities demonstrate commitment to continuous improvement to their citizens, businesses and potential investors.
- **Conferences and Rankings.** Many Intelligent Communities stage regional and national conferences, usually in partnership with a trade association or other recognized independent organization. These conferences focus on issues common to many communities but use the host community as an example. They also identify the large number of rankings, indexes and awards that cover communities, digital government, broadband deployment and other fields, and nominate themselves repeatedly. (ICF's Intelligent Community Awards program is one example.) These efforts dramatize the community's progress and provide recognition regionally, nationally and even internationally.

## II. Identifying IC strategies: The ICF awards during 2000-2007

	Asia - Australia (11)	Americas (12)	Europe (7)
2001	<ul style="list-style-type: none"> <li>■ Bario, Malaysia</li> <li>■ Singapore (4,42M)</li> </ul>	<ul style="list-style-type: none"> <li>■ LaGrange, Georgia, USA (26K)</li> <li>■ Nevada, Missouri, USA (8,6K)</li> <li>■ New York, USA (8,10M)</li> </ul>	<ul style="list-style-type: none"> <li>■ Ennis, Ireland (21K)</li> <li>■ Sunderland, UK (283K)</li> </ul>
2002	<ul style="list-style-type: none"> <li>■ Bangalore, India (6,00M)</li> <li>■ Seoul, S. Korea (10,30M)</li> </ul>	<ul style="list-style-type: none"> <li>■ Calgary, Alberta, CA (900K)</li> <li>■ Florida, high tech corridor, USA (5,38M)</li> </ul>	
2003-04	<ul style="list-style-type: none"> <li>■ Taipei, Taiwan (2,60M)</li> <li>■ Victoria, Australia (4,70M)</li> <li>■ Yokosuka, Japan (430K)</li> </ul>	<ul style="list-style-type: none"> <li>■ Spokane, Washington, USA (196K)</li> <li>■ Western Valley, Nova Scotia, CA (21K)</li> </ul>	<ul style="list-style-type: none"> <li>■ Glasgow, UK (660K)</li> </ul>
2005	<ul style="list-style-type: none"> <li>■ Mitaka, Japan (173K)</li> <li>■ Tianjin, China (11,00M)</li> </ul>	<ul style="list-style-type: none"> <li>■ Pirai, Brazil (23K)</li> <li>■ Toronto, Ontario, CA (2,48M)</li> </ul>	<ul style="list-style-type: none"> <li>■ Issy-les-Moulineux, FR (62K)</li> </ul>
2006	<ul style="list-style-type: none"> <li>■ Gangnam District Seoul (547K)</li> <li>■ Ichikawa, Japan (466K)</li> </ul>	<ul style="list-style-type: none"> <li>■ Cleveland, Ohio USA (4,10M)</li> <li>■ Waterloo, Ontario, CA (115K)</li> </ul>	<ul style="list-style-type: none"> <li>■ Manchester, UK (430K)</li> </ul>
2007		<ul style="list-style-type: none"> <li>■ Ottawa-Gatineau, Ontario-Quebec, CA (1,15M)</li> </ul>	<ul style="list-style-type: none"> <li>■ Dundee, Scotland, UK (142K)</li> <li>■ Tallin, Estonia (401K)</li> </ul>

### *III. Intelligent cities building blocks*

### *III. Building blocks: Innovation systems*

Intelligent cities and regions are territories with high capacity for learning and innovation, which is built-in the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and knowledge management.

Two **contemporary movements** converge in the making of intelligent cities:

- Innovation, systems of innovation, clusters, technology districts, regional systems, and
- Digital community spaces, digital cities, digital collaborative spaces, broadband deployment, web 2.0.

### III. Building blocks: Innovation systems

The ground of intelligent cities and regions is made by systems of knowledge-intensive and innovative organizations forming districts, poles, zones, and clusters.

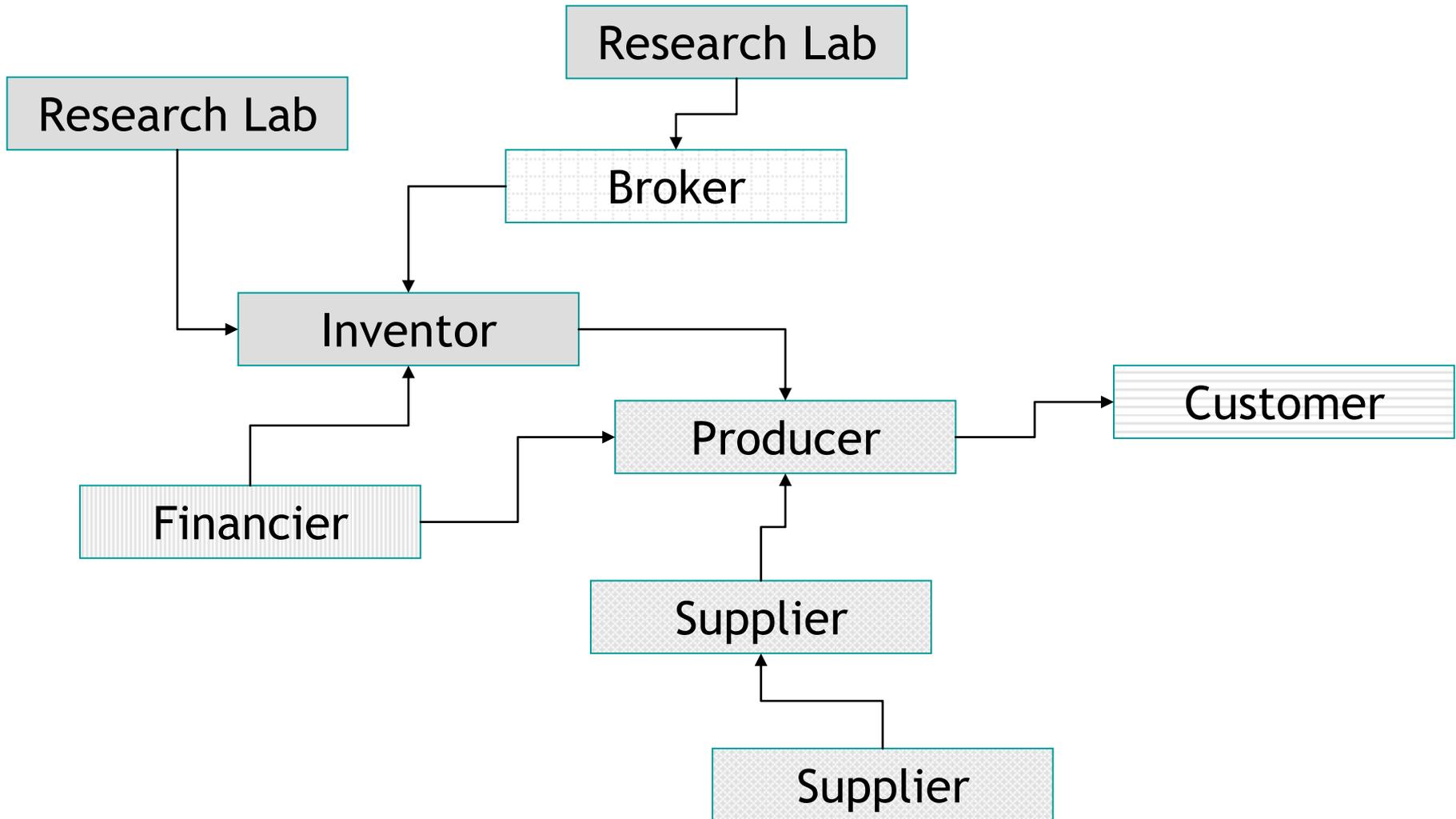
*‘Innovation is the implementation of a new significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations’ (Oslo Manual, Third Edition, 2005)*

Today, the mainstream view for innovation is that it is systemic:

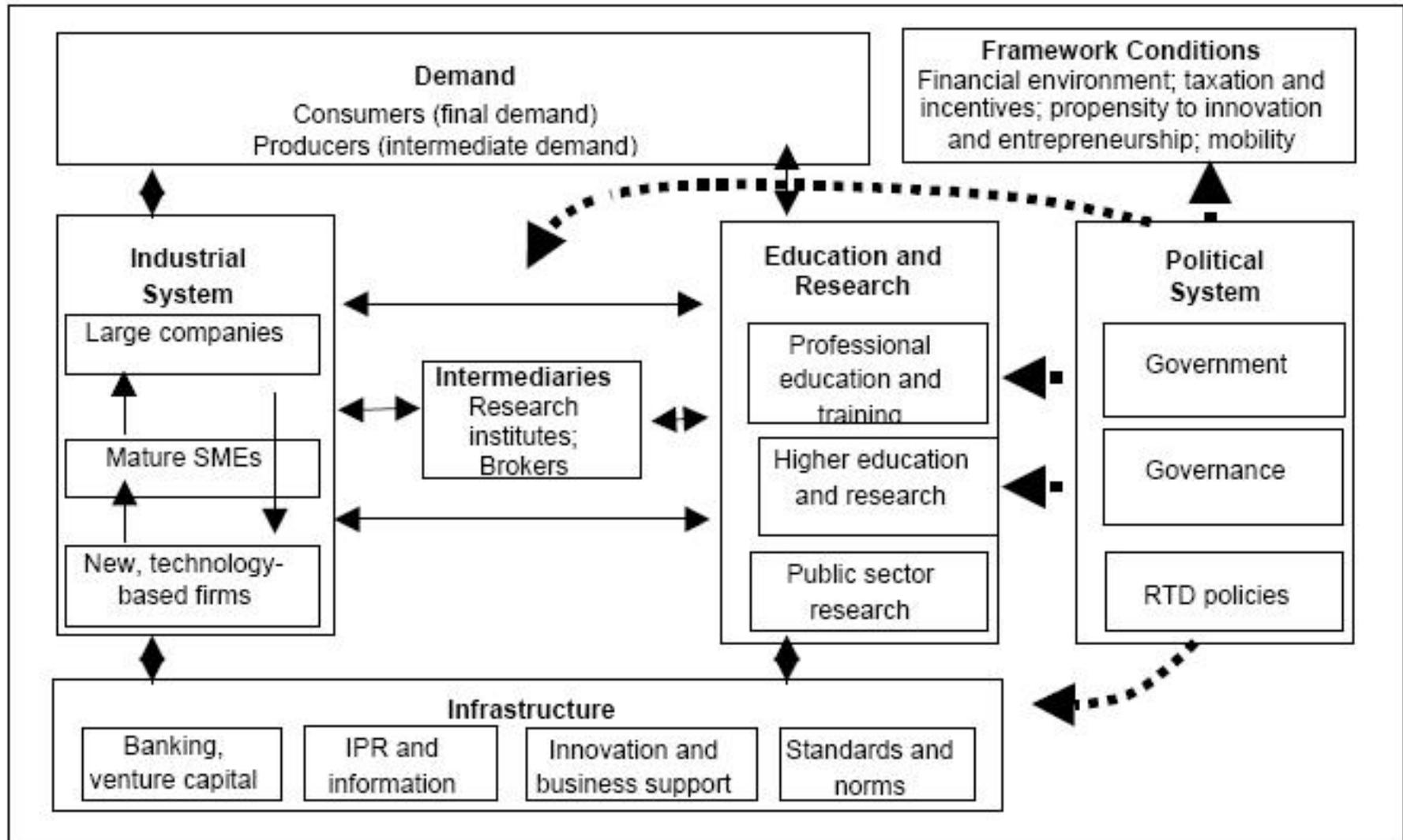
- the traditional Schumpeterian model, regarding innovation as an internal activity of the firm, and
- the linear innovation model of stages-gates have been found inadequate.

Innovation is increasingly regarded as a collaborative and evolutionary process taking place within **clusters** enhancing discovery and idea generation and selecting the most plausible innovations.

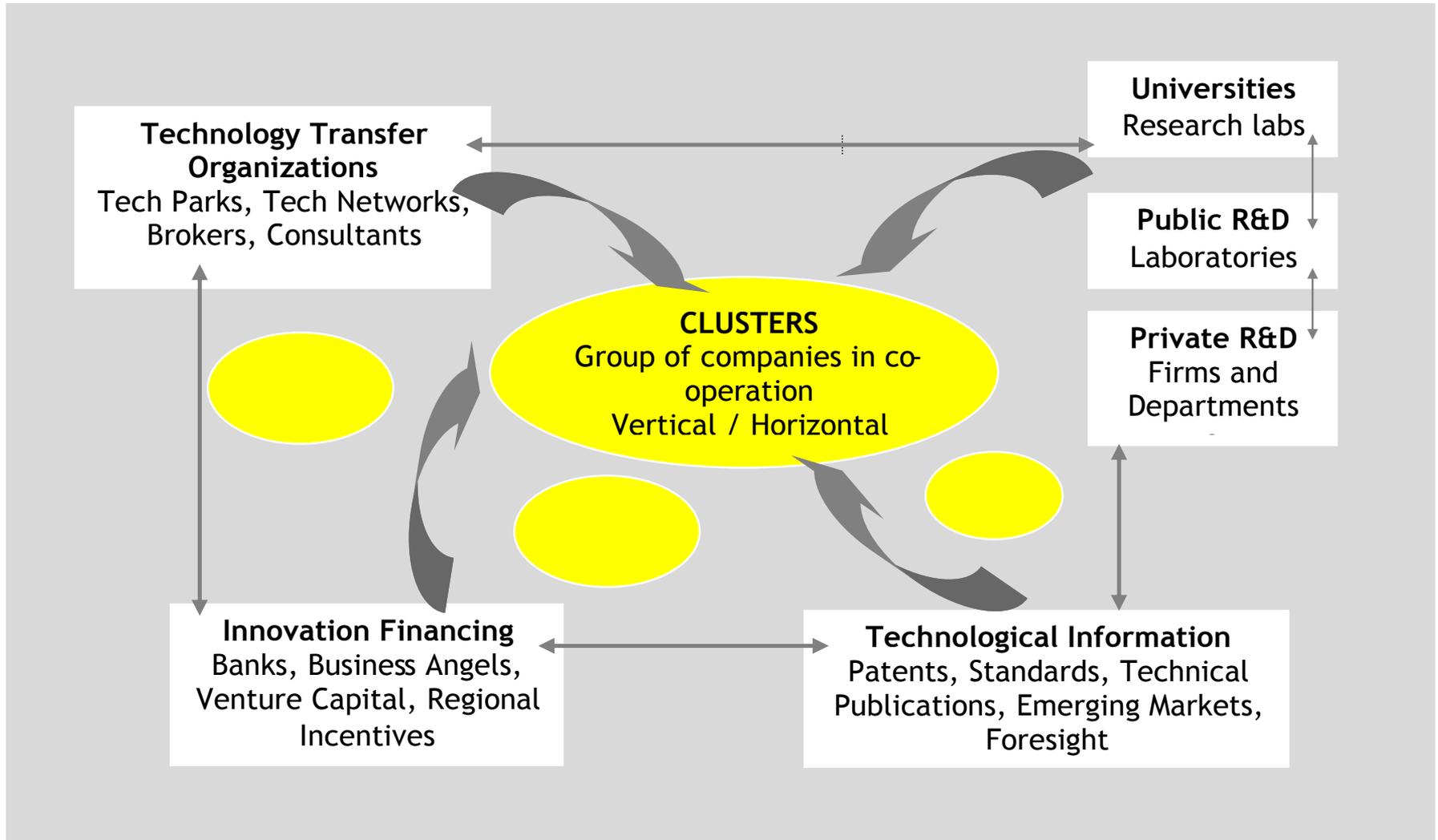
### III. Building blocks: Innovation systems



### III. Building blocks: Innovation systems

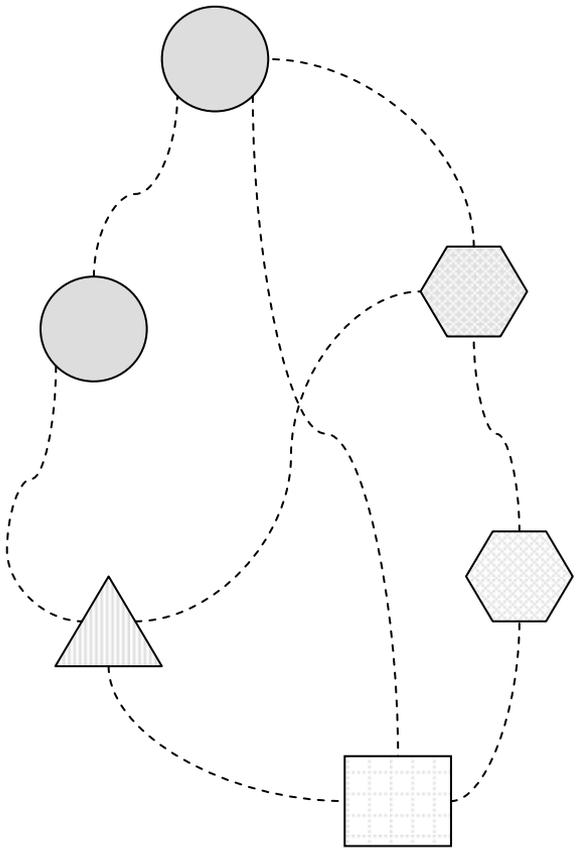


# III. Building blocks: Innovation systems

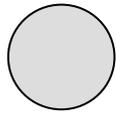


# III. Building blocks: Innovation systems

**Innovation Network**  
partners belong to four categories

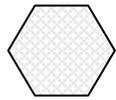


**Inventors**



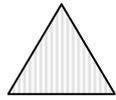
Intellectual powerhouses (like MIT, Oxford, HP Labs) that conduct basic research and design products and services that result in patentable inventions.

**Transformers**



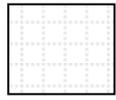
Multifunction production and marketing companies (like Dell, IBM, Infosys) that convert inputs from Inventors and other Transformers into innovations.

**Financiers**



Funding sources (VCs, Vulcan, ICICI Bank) for Innovation Network service providers especially Inventors and start up Transformers.

**Brokers**

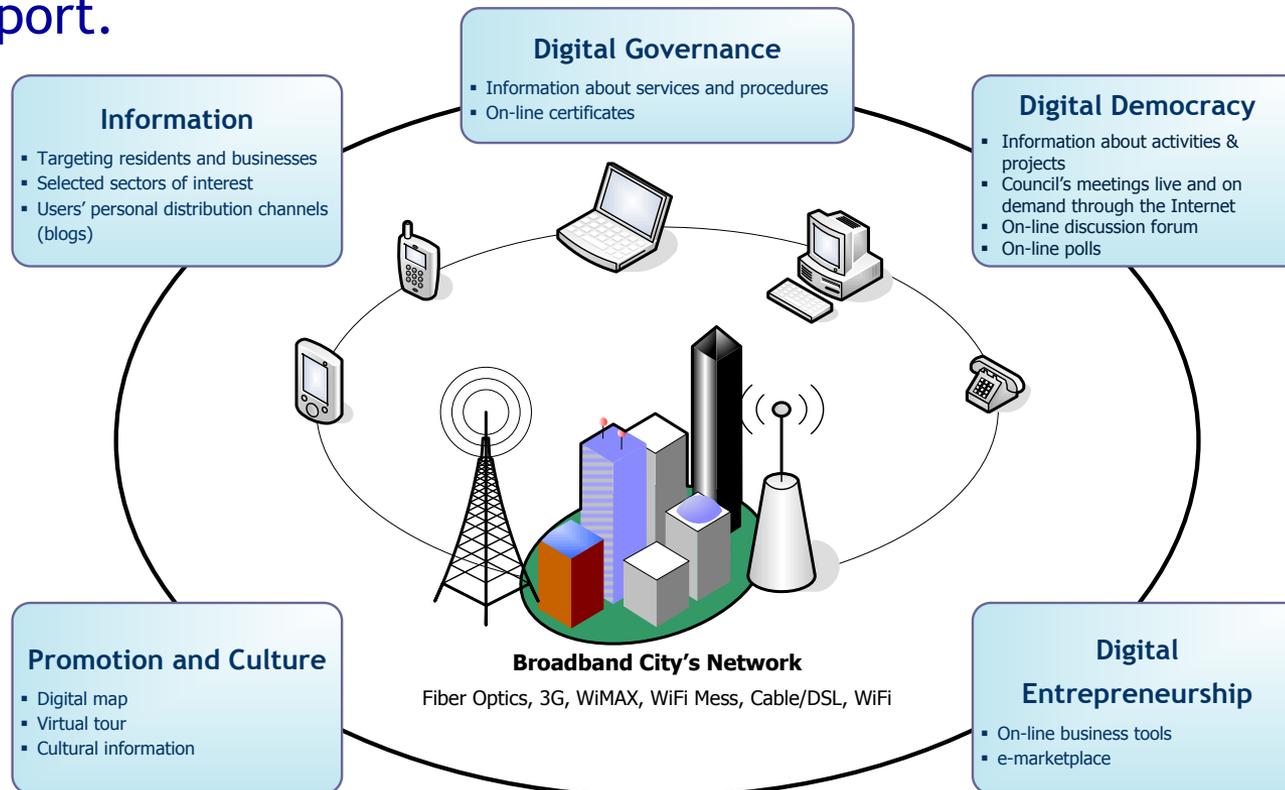


Market makers (yet2.com, InnoCentive) that find and connect Innovation Network service providers, buying and selling or enabling service delivery.

# III. Building blocks: Digital cities and virtual collaborative spaces

The digital city is the dominant form of community space corresponding to a territory.

Digital cities cover a very wide range of digital networks and software applications facilitating multiple aspects of the social and economic life of cities: commerce, transactions, health, education, work, leisure, transport.



# III. Building blocks: Digital cities and collaborative spaces

Two major publications:

- *Digital Cities: Experiences, Technologies and Future Perspectives (2000)*
- *Digital cities (2002)*

consider that a digital city is a metaphor:

‘As a platform for community networks, information spaces using the city metaphor are being developed in worldwide’

‘It is evident that “digital city” is a metaphor. Metaphors (from Greek metaphora - transfer) serve to create new meanings by transferring the semantics of one concept into the semantics of another concept. Metaphors are habitually used to interpret an unknown “world” (perception, experience, etc.) - the target - in terms of a familiar world - the source.’

‘digital city is a metaphor called to denote a complex digital product with properties structurally similar to the ones of physical cities’

How accurate is this description?

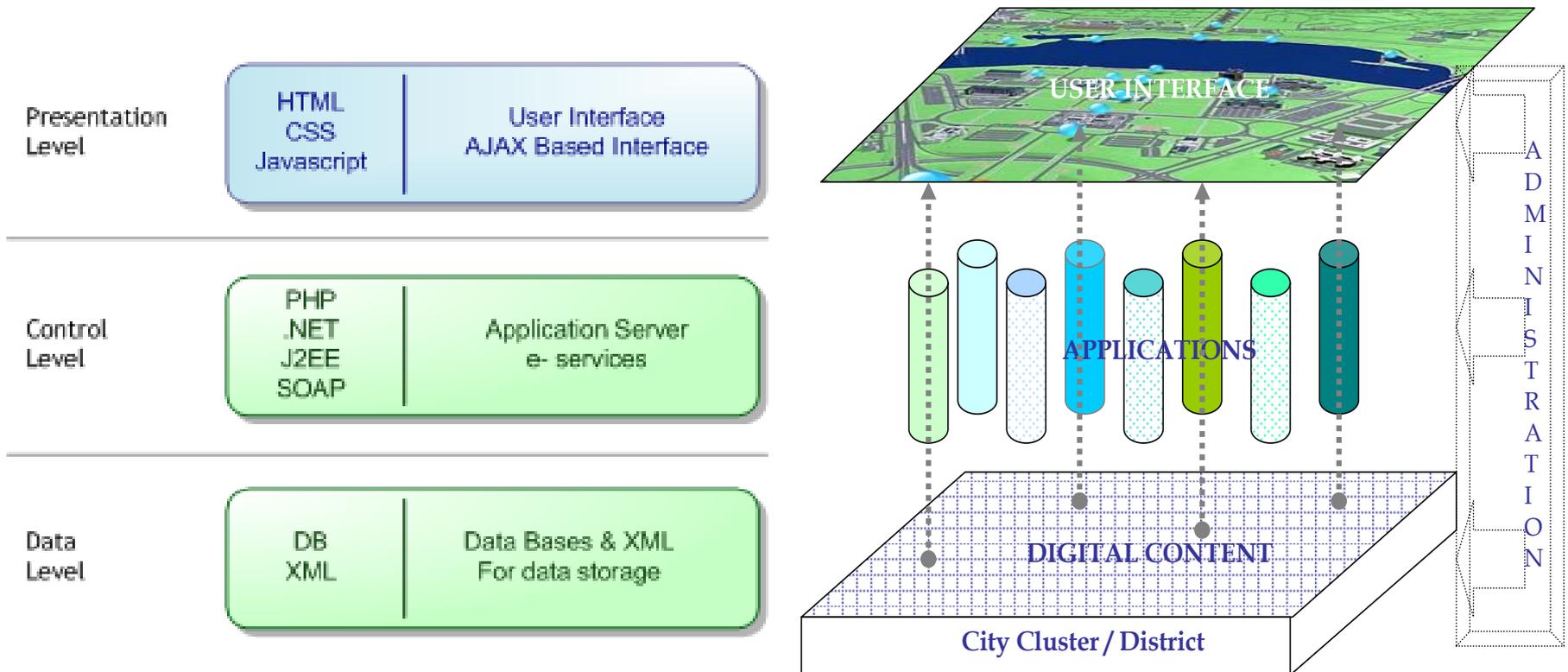
### III. Building blocks: Digital cities and collaborative spaces

Instead of considering the digital city as metaphor we would argue that digital cities are **community / collaborative spaces** build as **networks of distorted representations** of the city.

- The digital representation of the city is distorted for two reasons. First, it represents a city partially and not accurately; and second, it may include virtual elements non-existent in the physical space.

- The community space is network-based because each element of the digital city is linked to an element of the physical city, and to other digital elements of the community space. Limitless relationships and dynamic combinations between its constituting digital elements are possible.

# III. Building blocks: Digital cities and collaborative spaces architecture



- The architecture of digital cities may be described by a four level structure:
- The information storehouse, including all digital content: texts, images, video, multimedia.
  - The applications level, which structure the digital content and provide online services: information, commercial, and governmental services.
  - The user interface, the web pages that users visit in order to get the services provided.
  - The administration, a tool for managing user rights to the applications and the digital content.

### *III. Building blocks*

**L1:** The basic level of an intelligent city is the city's **innovative clusters**, in manufacturing and services. This level gathers the creative class of the city made by knowledgeable and talented people, scientists, artists, entrepreneurs, venture capitalists and other creative people, determining how the workplace is organized and how the city is developing.

**L2:** A second level is made of **institutional mechanisms** regulating knowledge flows and co-operation in learning and innovation. This level gathers institutions enhancing innovation: R&D, venture capital funds, technology transfer and training centers, intellectual property, spin-off incubators, technology and marketing consultants.

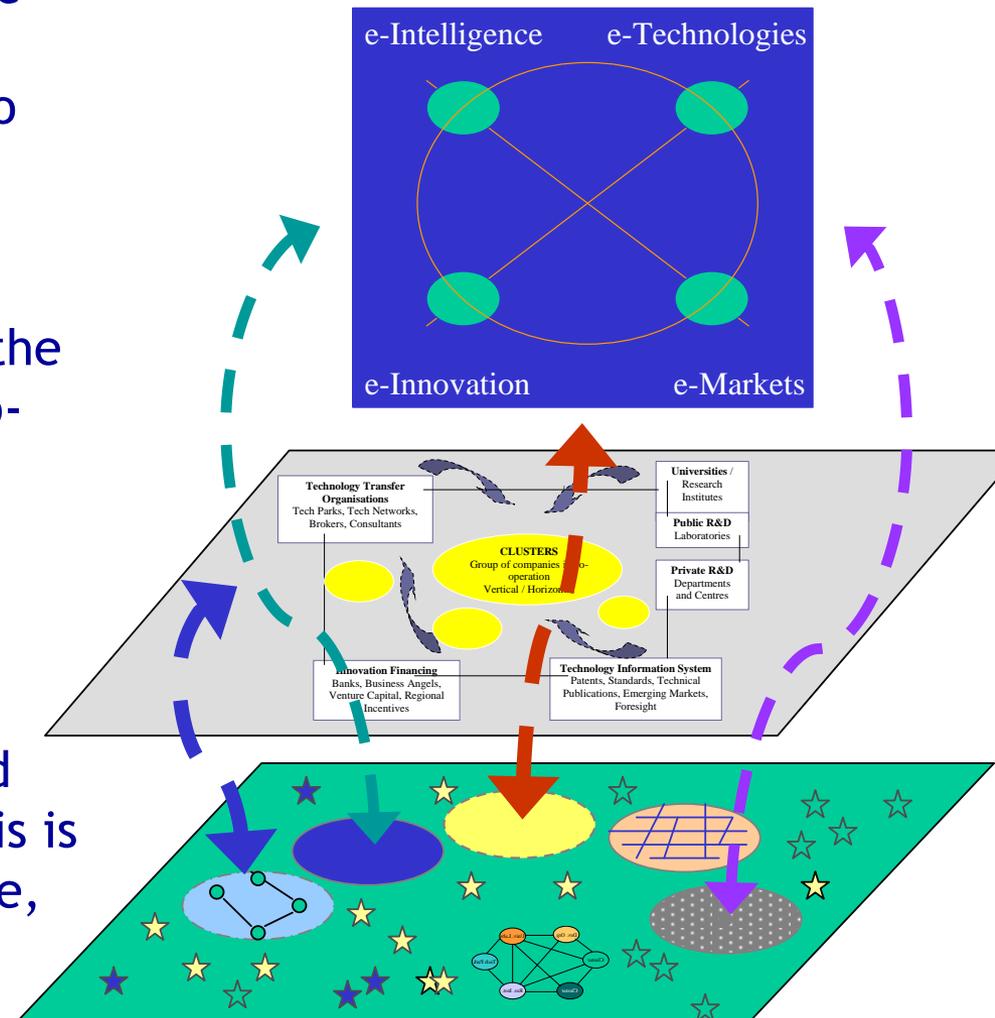
**L3:** The third level is made up by **information technology and communication** infrastructures, digital tools and spaces for learning and innovation. These technologies create a virtual innovation environment, based on multimedia tools, expert systems, and interactive technologies, which facilitate market and technology intelligence, technology transfer, spin-off creation, collaborative new product development, and process innovation.

# III. Building blocks

The first level relates to people in the city: the **intelligence, inventiveness and creativity of the individuals** who live and work in the city.

The second, relates to the **collective intelligence** of a city's population. "the capacity of human communities to co-operate intellectually in creation, innovation and invention".

The level relates to **artificial intelligence embedded into the physical environment** of the city and available to the city's population. This is a public communication infrastructure, digital spaces, and public problem-solving tools available to the city's population.



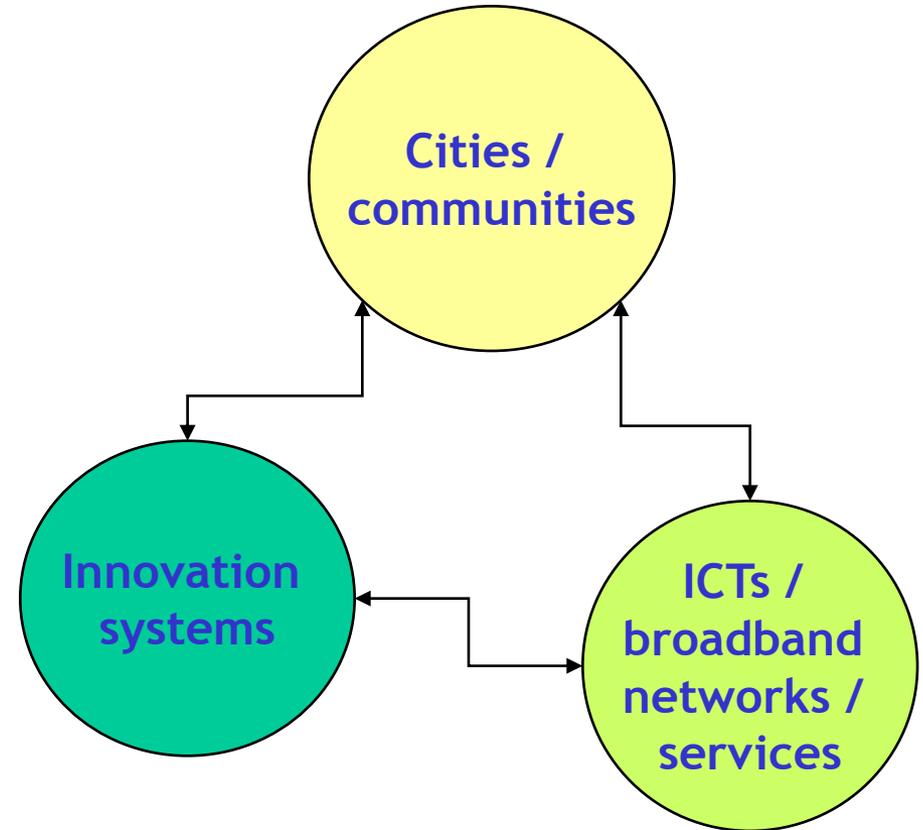
*IV. Intelligent cities as 3<sup>rd</sup> generation systems of innovation*

# IV. The functioning of intelligent cities

Intelligent cities as development paradigm deal with the wider issue of relationships among:

- Cities
- Innovation
- ICTs and broadband networks / services

Which is the internal connection of these processes? Which are the advantages offered to innovation because of localization and digitalization?



# IV. The functioning of intelligent cities

## Cities and innovation systems

- Locality and the making of the innovation system
- Simultaneous presence and operation of all system's components
- External economies. Functioning costs of the innovation system. Cooperation costs.
- Geographical proximity as precondition of tacit knowledge flows.
- Local communities, trust, social capital, cooperation in innovation

## ICTs and innovation systems

- ICTs, communication, codification-decodification, explicit knowledge
- ICTs facilitators of knowledge transmission within the innovation system / participation processes
- ICTs and global extension of innovation networks

ICTs operate at the internal knowledge functions of the innovation system

- Gathering, processing, storing information
- Technology brokering
- Cooperative innovation and product development
- Global marketing and product promotion

## IV. *The functioning of intelligent cities*

Virtual innovation environments, digital cities and digital collaborative spaces add new dimensions to cluster-type innovation systems (based on proximity-cooperation) and to learning-region-type innovation systems (based on institutional cooperation):

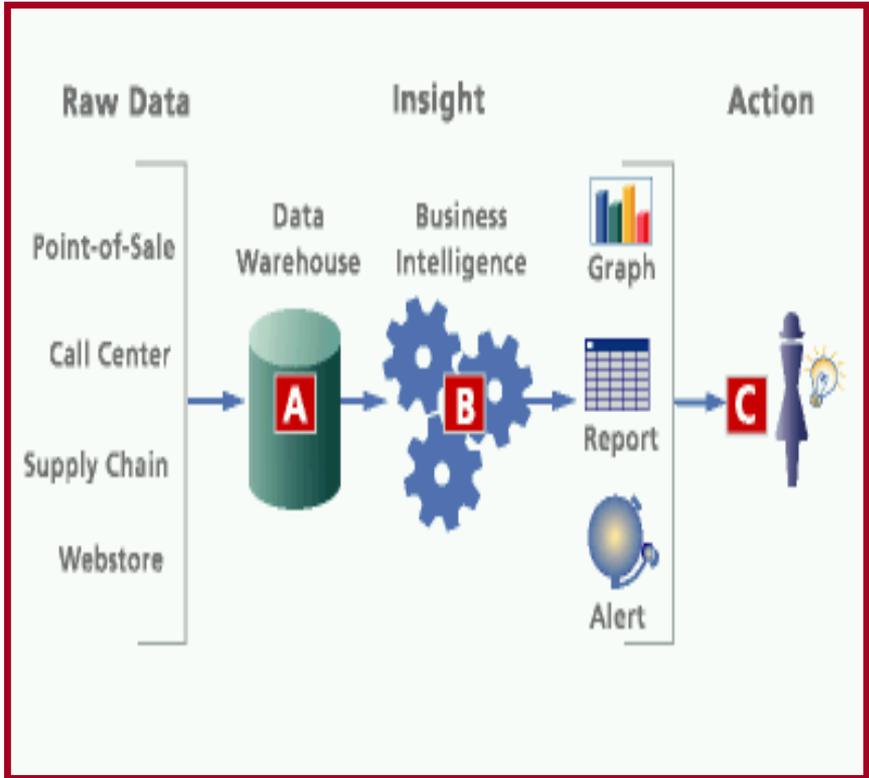
- A global dimension, stemming from the cooperation among organizations dispersed all over the world, και
- An intelligent dimension, stemming from the use of ICTs and networks of knowledge / information collection, elaboration, application, and automation.
- A social involvement dimension (web 2.0)

Because of these new functionalities, Intel cities / clusters may be considered as 3<sup>rd</sup> generation systems of innovation, after clusters and learning regions.

# IV. The functioning of intelligent cities

## F1: Strategic intelligence based on networks

A field of innovation which has enormously profited from collaborative digital spaces is strategic intelligence.



*Digital space for cluster intelligence*

# IV. The functioning of intelligent cities

## F2: Technology transfer and absorption networks

Knowledge networks in technology transfer are substantially enhanced by digital community spaces.

Technologies are stored into databases and online marketplaces of technology for license are created.

Technology marketplaces are coupled with online services : consulting services assessing a portfolio of intellectual property; evaluation; legal assistance through the deal-making process.

The screenshot displays the miod website interface, which is a collaborative space for technology transfer. The header features the miod logo and the tagline "sistema madri+d". Navigation links include CONTACTO, AYUDA, MAPA, REGISTRO, and SUSCRIPCIÓN. A search bar is located at the top left, and a language selector is at the top right.

The main content area is divided into several sections:

- Buscar:** A search bar with a "IR" button.
- Actividades de los grupos de investigación:** A section for research group activities.
- QUÉ ES MADRI+D:** A section explaining the initiative.
- INFORMACIÓN I+D+I:** A section for R&D+I information.
- INNOVACIÓN TECNOLÓGICA:** A section for technological innovation.
- CENCIA Y SOCIEDAD:** A section for science and society.
- buscador miod:** A search tool for investigators, companies, and news.
- El experto le asesora:** A section for expert advice.
- Foros:** A section for forums.
- Documentos:** A section for documents.
- Convocatorias:** A section for calls for proposals.
- Indicadores:** A section for indicators.

Statistical data is provided:

- 16364 Investigadores
- 5141 Grupos de Investigación
- 13874 Proyectos I+D
- 98 Tecnologías
- 1920 Empresas
- 6350 Profesionales Inscritos
- 1305 Ofertas de Empleo

Additional sections include:

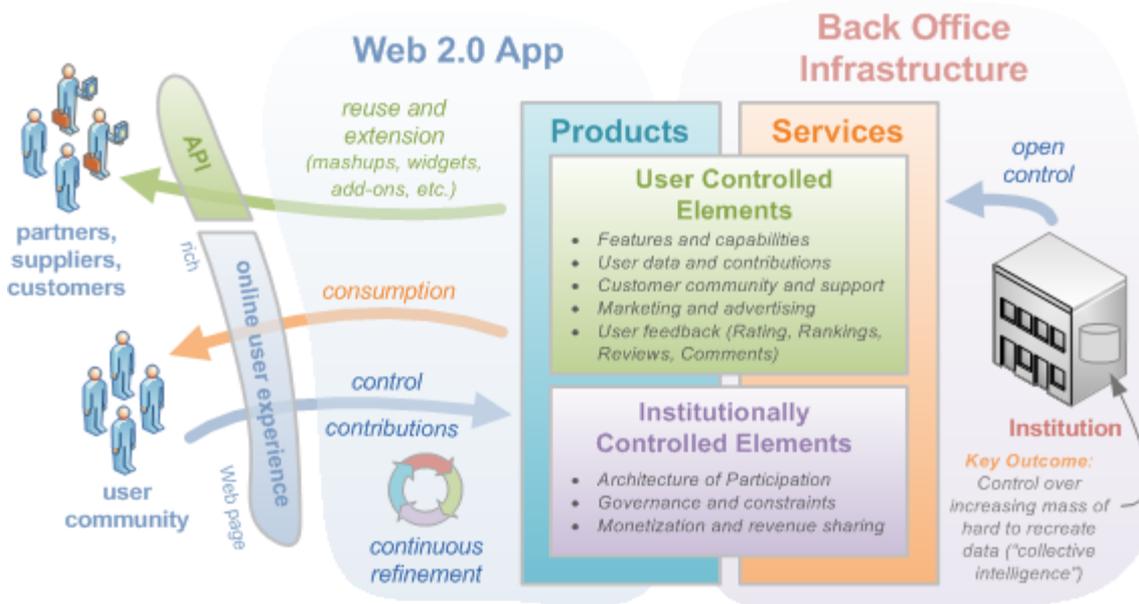
- + NOTICIAS I+D+I:** News articles such as "Aumento significativo de las resistencias a los antibióticos en la última década" and "España suspende en móvil UMTS... y por muchos años".
- + DESTACADOS:** Featured content like "PHOTOESPAÑA 2006", "Plan de Ciencia y Tecnología CM 2005-2008", and "Novela y Ciencia: Ilotas a Fritz".
- + AGENDA:** Upcoming events like "2nd Congress of European Microbiologists" and "Plataforma Tecnológica Española de Química Sostenible".
- oficinas miod:** A section for offices.
- weblogs miod:** A section for weblogs.
- biospain biotec 2006:** A section for biotechnology events.
- VIDEO: Madrid, un lugar para la Ciencia y la Tecnología:** A video about Madrid's role in science and technology.
- PRIMER FINALISTA del Premio a la Excelencia:** A section for the award of excellence.

Collaborative space for tech transfer

# IV. The functioning of intelligent cities

## F3: Collaborative innovation networks

### Product Development 2.0: Using the Web to Put Users in Control and Co-Create Better, Richer Products Faster



Source: <http://web2.wsj2.com>



Collaborative innovation environments based on community spaces, are expert systems that may lead to problem resolution step-by-step, for instance through the stages of problem solving;

# IV. The functioning of intelligent cities

## F4: Global promotion and outsourcing

Marketing, promotion and e-marketplaces are mainstream functions of digital cities. It is the area that most digital cities are active.

Digital promotion take multiple forms: direct marketing, attraction of people and investments, procurement and purchasing, auctions, community and e-government services.



The image shows a screenshot of the website [www.inparma.it](http://www.inparma.it), which is titled "The whole city in a click!". The website features a navigation menu with options: HOME, ABOUT US, ADVERTISING, HELP, JOIN US, and ITALIANO. The main content area displays a virtual tour of a clothing store, with a large orange banner at the top reading "afa adorni". The store interior is visible, showing shelves of folded clothes, a counter with a basket of plants, and a display case. The display case contains various items, including a "No.Lita" sign, a "MASON'S WOMAN RITES" sign, a "CIVIDINI CASHMERE" sign, a "Belstaff" sign, a "MONCLER GRENOBLE" sign, and a "MICHIKO KOSHINO" sign. The name "Cristiano Fissore" is written in cursive at the bottom right. The address "Via XXII Luglio, 2/B Parma - Tel. 0521237982" is displayed at the bottom.

**www.inparma.it**  
The whole city in a click!

CLICK HERE AND ENTER **Virtual TOUR**

HOME ABOUT US ADVERTISING HELP JOIN US ITALIANO

Immobili

**TURISMO**

- Virtual Tour
- Guida al turista
- Parma in tavola
- Ristoranti
- Alberghi
- Parma by night

**VIVERE A PARMA**

- Cinema
- Teatro
- Musica
- Arte
- Incontri
- Libri
- Fiere
- Il culto a Parma
- Per i più piccoli
- Feste e sagre
- Sport
- Fitness
- Parma notizie

**SERVIZI**

- Servizi di utilità
- Link della città
- Altri link
- Numeri utili
- Finanza on-line
- Assicurazioni

**INPARMA**

- Chi siamo
- Pubblicità
- Help
- Collabora con noi
- Copyright

**afa adorni**

**No.Lita**  
north little italy  
N.Y.C.

**MASON'S**  
WOMAN RITES

**CIVIDINI**  
CASHMERE

**Belstaff**

**MONCLER**  
GRENOBLE

**MICHIKO KOSHINO**

*Cristiano Fissore*

**Digital City of Parma**

Via XXII Luglio, 2/B Parma - Tel. 0521237982

## *IV. The functioning of intelligent cities*

Four functions emerge out of the integration of human creativity, institutional capacity, and digital networking:

**F1: Intelligence:** Systematic collection, analysis, understanding and diffusion of information concerning new product announcement, technologies, industrial statistics, performance indicators, market shares, price trends, etc.

**F2: Technology absorption,** based on licensing agreements for the transfer of intellectual property rights, cooperative R&D or contract R&D, and spin-offs creation.

**F3: Collaborative innovation:** bridging separate technology fields and enhancing complementary roles and skills along the innovation chain.

**F4: Promotion of clusters and localities,** reducing costs in all forms of transactions: logistics in the supply chain; marketing and advertising; information on policies, regulations, technical standards, and incentives; finding partners, buyers, sellers, and services.

Intelligent cities are still in their early days.

To date, most applications are being developed with respect to innovative clusters and technology parks, as intelligent clusters, intelligent technology districts, and technology parks. In these islands of innovation, the innovation system is being enriched by communication infrastructure, expert systems, and knowledge management tools, creating an integrated physico-virtual innovation system.

Their architecture, as described, includes

- three levels (physical, institutional, digital) and
- four functions (intelligence, technology transfer, innovation, and promotion).

Within the physico-digital innovation environment, human and institutional factors predominate. Digital spaces and the online expert tools act as **facilitators** of human and collective intelligence.

# Intelligent Cities