GLOBAL CLUSTERS:

Cross-perspective analysis of clusters in theory and reality
Identification and mapping of the principal international clusters

Executive Summary

For some years now, cluster-focused strategies have been warmly embraced in academic and political circles. The term "cluster" is something of the flavour of the day with the concept proving to be of considerable appeal.

At the meeting point of the sectoral and the spatial, clusters have sparked renewed interest since they are now viewed as a key element in ensuring the competitiveness of regions against the backdrop of growing globalisation; they are gaining widespread currency both as methods of research for analysing industries and as levers for public action aimed at bringing companies together to face common challenges and placing support infrastructures at their disposal.

Looking beyond the current fashion for "clusters", the IAU's contribution aims to call on an inventory-based approach to clarify the concept of clusters on the theoretical level and investigate some of its political applications while also selecting and studying global clusters, closer analysis of which may be useful in meeting regional economic challenges.
This exploratory work is therefore intended to examine clusters from different angles:

- **Analysing the theoretical contributions to the topic of clusters.**
To which conceptual and spatial framework do they belong? What are the components and expected impacts? What are the advantages as well as the weaknesses of these theoretical contributions? Are there robust tools for characterising them, but above all for measuring their effectiveness together with their impact on regional economies?

- **Identifying and characterising the pro-cluster policies implemented around the world** by means of non-exhaustive examples. There are many "cluster" initiatives internationally, each with its own specific features, different objectives, a particular institutional and political context: "agglomerated" clusters, clusters in high-performance networks, geographical groupings which are concentrated to varying degrees, certification procedures,

selective policies or a basic support strategy to create a conducive environment, etc.

- Mapping the 250 clusters identified with a set of maps grouping the clusters by global size, by theme and type of regional anchorage means their distribution on a global scale can be visualised. This research effort provides an illustration of the diversity of international clusters, from recognised "leaders" through to emerging clusters.

Summary:

Updated by Michael Porter, the clusters often take varied forms depending on the local contexts and are far from homogenous. The clusters, which have been extensively researched for over fifteen years, are in fact heterogeneous in nature, in terms of their constituent elements and the concretisation of their objectives. Moreover, the actual situation of clusters identified or certified as such worldwide is complex, multifaceted and evolving.

Paradoxically, on the methodological level, in the absence of a clear definition, the success of the concept renders it increasingly vague: everything becomes a "cluster" the moment we observe a geographic concentration of activities of the same type or a network of highly innovative economic players. The concept raises questions since it pulls together, sometimes artificially, extremely varied initiatives which nonetheless have in common the fact that they constitute groupings of industrial and scientific players which meet up, organise and develop partnerships within formal or informal networks, which facilitate the circulation of information, attract new talent through their dynamism, and around which the public authorities decide to focus economic development initiatives as a priority, whether construction of infrastructures (roads, incubators, science parks) investment in training and the scientific base, or assistance with

establishing financial or strategic structures (risk capital, strategic monitoring instruments).

In fact, the success of certain clusters has shone the spotlight on the external economies that the concentration of knowledge and local environments can give rise to, so stimulating the competitiveness of regional economies: Silicon Valley, Catalonian clusters, not to mention the German *Kompetenznetze*, are all frequently cited examples which conceal widely varying realities; the success of a cluster is often specific to the local cultural environment, the legal framework and the social context of each country or region.

So it is that certain public policies or initiatives in favour of clusters seek to foster the strong regional anchorage of their players who act as a magnet for activities which have a tendency to build up around the cluster, much in the same way as the US clusters whose figurehead remains Silicon Valley but also Italian industrial districts. Other initiatives are aimed at stimulating the networking of skills and stronger links within a region or a country, as for instance practiced by the Kompetenznetze in Germany to promote innovation and obtain local economic benefits. Finally, some initiatives come midway between the two, articulating efforts to stimulate the heart of a localized cluster and to facilitate enhanced networking of skills.

In this context, the approach adopted by IAURIF is aimed at illustrating the diversity of approaches worldwide to identify or promote clusters. It is worth citing two major initiatives: the US Cluster Mapping Project of the Institute for Strategy and Competitiveness by Michael Porter and the Europe INNOVA European programme, as well as more local initiatives such as the Nordic Innovation and Bayern Innovativ.

The identification of clusters has revealed a kind of "visibility index" for these initiatives on the global chessboard. Ultimately, a mere 250 world-class

clusters were selected so as not to over-estimate the numerous clusters which are in reality just industrial sectors more or less grouped together on scales which are sometimes extremely broad. Far from being exhaustive, this list of "hotspots" is in no way intended as a ranking of clusters: it merely enables classification of the clusters identified using different methods by geographical area and by technological or sectoral theme: databases, empirical studies, European approaches, country-specific initiatives, and bodies to promote clusters, etc.

This study is aimed at identifying the clusters with the highest international profile and the related initiatives, as well as the clusters whose components or activity themes contribute to highlighting the competitive positioning of the territories.

One of the strengths of this approach is its regional dimension. It provides an excellent gateway into analysis of the economic offering of the regions and their regional marketing priorities. In this respect, the cluster is a valuable working framework since it takes account of both national and regional policies aimed at bolstering certain sectors of excellence, actions to promote their image in these days of intense media coverage of inter-metropolis competition as well as the sites where major companies have set up, without however making them the only indicators of the vitality of a regional economic fabric. This working framework is particularly pertinent in mature or developing sectors (ICT, biotechnologies) although its limitations become evident in the emerging sector of eco-activities and in respect of initiatives taken by certain countries, such as China, where the selection is focused more on science and technology parks close to universities or public research centres. Indeed, the partnerships and knowledge transfers developing around science parks may serve as the basis for the emergence of clusters but they are just one of the tools of a cluster policy, even if they do represent decisive infrastructures, with a high international profile, on which clusters

rely for increasing the productivity advantages which players gain from the proximity factor.

On the other hand, one of the limitations of this approach is the under-estimation of the scientific and technological challenges of clusters when they seek to identify partners internationally: the 250 clusters selected shed more light on the competitive positioning of regions than the possession of scientific or technological know-how greatly prized in partnership relations by industry and research players. The most interesting partnerships are often created between different types of players with complementary skills.

Whatever the configurations favoured, the mobilisation of both public and private players to ensure the success of clusters is considered essential. For the initiatives undertaken, this relies on a necessary interlinkage and consistency between regional policy, scientific and technological policy and industrial policy. It must ensure that the private sector picks up the baton, for a continuation of efforts over time.

Opinion is divided as to whether robust tools are lacking for gauging the effectiveness of clusters or policies conducted in their favour and their regional impacts. On the scale of the cluster, a certain flexibility in its organisation is justified, provided that the objectives are attained. On the scale of the region, the relation between appeal and growth and the set up of cluster policy remains obscure. Appropriate indicators and more advanced monographs demonstrating the success or failure of these policies are required, partly to meet concerns sometimes raised by the strategy of competitiveness clusters in the context of the Paris area: what are the unintended effects of these clusters on key issues such as intellectual property and technological capture (of local know-how by foreign players in the case of international cooperation or technological expertise of SMEs by multinationals within the same cluster), cooperation within clusters (how is it envisaged and experienced in concrete terms by the

players?), the duplication of efforts by public authorities on different regional echelons etc.?

As for the relations that clusters cultivate with the region, it should be recalled that the success of a cluster is often specific to the local cultural environment, not to mention the legal framework or social context of each country or region.
Two stumbling blocks must be avoided.
The first is to believe that organisation of local players into clusters can be ordered from on high. In reality, the institutional networks introduced by committed policies cannot always sweep away the problems of cooperation encountered between different types of players, with contrasting interests and rationalities.
The second concerns the regional contours of the clusters. The cluster's relations with the host region are essential to ensuring its success and it is with this viewpoint in mind that we have guided this exploratory study and will continue to analyse field research. In fact, beyond the founding threesome of business, R&D structures and training organisation, analysis of the elements contributed by the region, in all its dimensions, is essential to understanding the rationales and contributions of the cluster. It is in this perspective of analysis of the environment of clusters that we have built an identity datasheet which breaks down its ecosystem into major components: the cluster's players, but above all the "resources" (human, regional, financial, collective, etc.) of the regional and local system.
At the same time, it is important not to enclose the cluster within its regional limitations: businesses acquire and continue to acquire certain scientific and technological expertise which is rare or complementary on the global scale, in other words, outside of the region. Keen to offset the eventual deficits in their regional offering, the regional authorities certainly have "a vested interest in helping companies to acquire knowledge, know-how or useful technology in this manner instead of seeking to artificially develop a local, public or semi-public offering which,

moreover, is unlikely to give rise to the critical mass or skill base required, unless the world's best talent can be attracted by means of appropriate incentives".

The clusters working framework also gives an excellent overview of the current technological and economic challenges at international level, challenges which merit more detailed analysis by means of case studies.
The five fields defined to classify the global clusters (Mobility and security; Health - Life sciences; Creative industries; Information science - ICT - nanotechnologies; Environment - Energy - Building & Public Works), reveal a strong sectoral or technological convergence between the world's major regions around similar positionings and challenges.
The mapping illustration reflects the global balances and imbalances: absence of cluster rationales in countries with under-developed economies, structuring initiatives in emerging countries, forms of clusters undergoing recomposition in industrialised countries, industrial districts or groupings of companies modernising traditional activities. There are therefore multiple geographical dimensions: from rationales of networks on a national scale or beyond, to localized groups at the level of "regions", through to urban clusters or science parks.

At the conclusion of this initial research effort, it strikes us as particularly useful to proceed with more in-depth analysis of clusters by means of case studies. The French *pôles de compétitivité*, along with other similar initiatives, are now placed in a European perspective and give rise to inter-cluster procedures: cooperation agreements with foreign clusters, joint participation in European programmes, etc.
The key challenges of cooperation between European clusters (critical mass on the global level, sharing of a common vision to reap the benefits of complementarity throughout the value chain) are now a key challenge for the competitiveness of European regions. It is in fact more in the direction of European

partners (clusters, institutions, European commission, programmes, etc.) that we must look given the institutional similarities and cultural practices already under way. It is however essential not to lose sight of countries such as Japan, South Korea, Singapore and Taiwan, whose economic models merit greater attention, particularly due to their rapid development in keeping with the major themes of the future or offering original models accelerating their competitiveness.

The selection of clusters studied in the second phase of the study will be made on a regional basis, revealing the diversity of the forms of clusters, of which we will analyse the most pertinent themes. One of the key challenges will be to analyse how public authorities give impetus to the economic development of their region or their metropolis by means of cluster policies and to anticipate the manner in which these policies interlink with other systems of support in terms of innovation or regional development. As we now envisage, at regional level, the reorganisation of a diversified industrial base on several high-valued-added sectors, the comparison with smaller metropolises (such as Copenhagen, Stockholm, Munich and Montreal), organised around a limited number of clusters of excellence which are both valued and recognised internationally, may provide an invaluable source of information in this respect.

This selection, which will have to be fine-tuned with our partners (competitiveness clusters, experts, researchers, etc.) may concern the Nordic countries including Denmark and Sweden, around health-related themes amongst others, Spain, the German *Kompetenznetze*, and Silicon Valley for the region's capacity to reposition itself around clean technologies and finally the original and highly dynamic forms of Asian clusters now growing up and primarily focused on creative industries, design and ICTs.

For more details:

- IAU île-de-France, *Clusters mondiaux : regards croisés sur la théorie et la réalité des clusters ; identification et cartographie des principaux clusters internationaux*, janvier 2008.[1]

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[1] The whole report can be downloaded on the IAU île-de-France website (only in French):

http://www.iau-idf.fr/fr/nos-etudes/detail-dune-etude/etude/clusters-mondiaux.html

Global Clusters in " Health - Life Sciences "

Turku Bio Valley

Région de Saskatchewan

Life Sciences cluster Vancouver

Seattle

Minneapolis / St. Paul / Rochester

San Francisco Bay Area

Chicago

Greater Los Angeles
San Diego

West Havana

Chuncheon Bio-Industry Fondation (CBF)

Beijing - Zhongguancun (ZGC)

Daeduk Science Town

Hokkaido Super Cluster Promotion Strategy Bio

Tokyo-Kanto

Northern Osaka (Saito) Biomedical Cluster

Kobe Medical Industry City

Zhangjiang Hi-tech Park

Hsinchu Biomedical Science Park

Jerusalem's Health & Life Sciences cluster

Rehovot-Tel Aviv

Genome Valley

Bombay-Pune-Aurangabad

Bangalore Bio

Biovalley Malaysia   Biopolis - Singapour

NZBio

Bio21 Melbourne

East Coast USA

Ottawa Life Sciences cluster

Montréal InVivo

Toronto - Guelph - London

Massachusetts Biotechnology Cluster

Philadelphie

New York - New Jersey

Washington-Baltimore

Triangle Research Park - Raleigh

Zoom Europe

Uppsala BIQ

Göteborg

Scottish Life Sciences cluster

Medicon Valley Alliance

Øresund Food Network

England's Northwest

BioTop

Cambridge Biotech Cluster

Oxford

Foodvalley

Heidelberg Biocluster

BioValley

Bio-M

Medicen Paris Region

Greater Zurich Area Life Sciences

Lyon Biopole

Lombardie

CBM - Cluster in Biomedicine (Friuli Venezia Giulia)

Biobask 2010

BioRegió de Cataluña

Naples

Cluster's main activity

■ Health
■ Life Sciences
■ Biotechnologies
■ Food Industry

Cluster's Geography

○ City
□ Region
△ Network
◇ Transnational

Share of R&D expenditure in GDB (%)

0,5   1   2,5

non available

0   1 000 km

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Sources : Clusters : IAU île-de-France - 2007 ;
Map : Institut de la statistique
du Québec - 2007

NB : non-exhaustive list of global clusters
(identifiedand selected by IAU îldF)

Global Clusters in " **Creatives Industries** "

Vancouver

San Francisco
Hollywood

Jamaica's Music Industry

Vigo

Bollywood
Bombay

Bangkok

Singapour

Pajubookcity
Digital Media City

Tokyo
Sweet Valley
Softopia Japan /Techno Plaza

Taipei

Technopark Hong kong

Creative Content

Nouvelle Zélande

East Coast USA

Montréal

Silicon Alley
New-York

Tc2

Zoom Europe

Stockholm recorded music
industry cluster

Centre d'Expertise
Médias numériques

Copenhague

Digital Media district

Amsterdam/Rotterdam

North and Cross-Border
region creative media cluster

Londres

Cap Digital

Berlin - Brandenburg

Cluster "Medien"

Paris

Milan

Bucarest

Cluster's main activity

- ■ Cultural Industries - ICT
- ■ Cultural Industries / Media / Advertising
- ■ Software - Multimedia
- ■ Fashion / Design / Architecture
- ✳ Creative Metropoles acting
  as "Magnets"

Cluster's Geography

- ○ City
- □ Region
- △ Network
- ◇ Transnational

0   1 000 km
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Share of R&D expenditure
in GDB (%)

0,5   1   2,5

non available

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Map : Institut de la statistique
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Global Clusters in "Information Science - ICT - Nanotechnologies"

Oulu Cluster

Zelenograd

Vancouver ICT cluster

Silicon Forest

Silicon City Chicago

Los Angeles

Silicon Valley

Colorado Photonics Industry Association

Phoenix optics Tucson
Austin

San Diego

Florida Photonics Cluster

Silicon Wadi

Barhein
Dubai

Centre for design and software

Bangalore IT

Malaysia Multimedia Super Corridor
Singapore Photonics and Optic cluster

Campinas Silicon Valley

Kyushu Silicon Cluster Project

Gumi Digital Electronics Industrial Cluster

Banwol-Sihwa Components & Material Cluster

Software park - Zhongguancun
Da Lian

Daedeok Innopolis
Gwangju Photonics Industry Cluster
Kun Shan
Wuhan Optics Valley of China
Shenzen High-tech industrial Park
Dongguan IT cluster
Hong-Kong
Shanghai
Hang Zhou
Hsinchu Science Park
Southern Taiwan science park

Hokkaido Super Cluster Promotion Strategy IT
Nagano-Ueda smart device cluster
Bit Valley (Developing IT-Ventures)
Aichi Nagoya Nano-Manufacturing Cluster

East Coast USA

Ottawa Photonics
Montreal ICT cluster
Boston Route 128
Toronto - London
Boston's Cyberdistrict
Wall Street
New York Photonics
Silicon Alley
Pittsburgh IT
Triangle Research Park - Raleigh
Atlanta

Zoom Europe

Kista science city
Helsinki ICT cluster
The NorCOM Communication Cluster
Scottish ICT cluster
Oresund IT
Dublin
Dublin et Silicon island
Cambridge Silicon Fen
Point One
Safe Trans
Microsystemes de Basse-Saxe
Londres
Informatik / IT Aachen - Regina
Digital Signal Processing Valley
Francfurt
Cluster "Finanzdienstleistungen"
Systematic Paris Region
Mechatronik-net
Zurich
Cluster "Informations- und Kommunikationstechnik"
Torino Wireless
Sistemi intelligenti integrati
GAIA País Vasco
Veneto nanotech
Minalogic
Hi-Mech and Advanced Machinery (Emilie-Romagne)
Etna Valley
@22barcelona
Solutions Communicantes Sécurisées

Cluster's main activity

- Optic, Software Electronic systems
- ICT Electronic
- Mécatronic
- Microelectronic - Nanotechnlogies
- Finance & Technology

Cluster's Geography

○ City
□ Region
△ Network
◇ Transnational

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non available

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Global Clusters in " **Mobility and Security** "

Moscou

Seattle

Denver

Saint Louis

Los Angeles

Houston

Cluster de empresas
automociom de Galicia

Tel Aviv

Tianjin

Ulsan Advanced Automotive
Component Supply Cluster

Shanghai

Tokyo

Aichi - Toyota

Guangzhou's Automobile Industry Cluster

Automotive Cluster

East Coast USA

Aéro Montreal

Detroit

Intelligent Transportation
Society of America

Sécurité active automobile

Atlanta

Zoom Europe

Automotive Sweden

Telematics Valley

Lancashire (Blackburn)

West Midlands
(Birmingham)

Aviation Cluster

Stuttgart
/Baden-Württemberg

Mov'eo

Balka

Pannon Automotive Cluster

ACstyria Autocluster
GmbH

Piemont

Toolmakers Cluster
of Slovenia

Cluster de Automocion
de Euskadi

Aerospace valley

Catalogne

Cluster's main activity

■ Aerospace - Defense

■ Transports & Mobility

■ Automotive & Mobility

Cluster's Geography

○ City

□ Region

△ Network

◇ Transnational

0   1 000 km

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Global Clusters in " Environment - Energy - Building "

Biofuel Region
Centre d'expertise Merinova
Centre d'expertise Jyväskylä

Région de Saskatchewan
Vancouver
Seattle
Portland
Chicago
Silicon Valley
Northern Colorado
Clean Energy Cluster
Arizona ETIC
Austin

KANSAI Project Green Cluster
Nagano-Ueda smart device cluster
Kitakyushu
Xuzhou Cleantech park
Shanghai
Project to Create Manufacturing
Industy in Tokai Region
Chugoku Region

Hyderabad
Scitech Pune

East Coast USA

Windsor / Ontario
Grand Boston
New York

Zoom Europe

Telemark Environment
and technology Cluster
The Pulp
and Paper Cluster
Centres d'expertise
de Lahti et d'Helsinki

Copenhague

Northwest Envirolink
EnCluster
Brussels
NIK
Fuel Cell Network Nordrhein-Westfalen
VMD
Kurs
Umweltcluster Bayern
Freiburg region
KUMAS

Pays Basque, Galice,
Navarre, Andalousie

Cluster's main activity

■ Innovative Materials
■ Environment: energy,
Materials, ecoactivities

Cluster's Geography

○ City
□ Region
△ Network
◇ Transnational

0   1 000 km

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