A Study on Conditions and Promotion Policy for Successful Regional Innovation

- Developing Japanese-Type Sustainable Regional Clusters -

The 10th Regional Cluster Seminar
May 28th, 2004

Noboru MAEDA, Ph.D.

Professor, Graduate School for Creative Cities, Osaka City University

Affiliated Fellow, National Institute of Science and Technology Policy

A Study on Conditions and Promotion Policy for Successful Regional Innovation

1. Purpose

2. Definition of a Cluster

3. Methodology

4. Topics Studied

   4.1 Conditions of Overseas Success

   4.2 Growth Phase

   4.3 Classification of Cluster Creation

   4.4 Importance of Venue for Innovation - "Ba"

   4.5 Importance of Start-Up

   4.6 Collaboration Between Industry, Start-Up, Academia, and Research Institutes

   4.7 Distribution of Research Institutes

   4.8 Overseas Cluster after the Bubble Period

5. Developing Japanese-Type Clusters and Conditions for Success

6. Policy Recommendation

Purpose

Policy Prescription for
Central and Local Governments:

How to Develop Japanese-Type
Sustainable Regional Clusters

Why are clusters necessary?

1. Regional innovation is increasingly important for international competition.

2. Advancements in information and communication technology support creation of clusters to utilize knowledge in regions, not merely inviting factories to the regions.

3. Regionally-based sustainable habitats are more essential than industrial agglomerations.

4. Movement to the independent regional model, utilizing regional advantages, from the catch-up model with its focus on the Tokyo Metropolitan area.

Definition of a cluster

by Porter, Michael E., "On Competition," Harvard Business School Press, 1998

What is a cluster in a broad sense?

Clusters are
geographically close groups
of interconnected companies and associated institutions
in a particular field,
linked by common technologies and skills.

+ α

Innovative cluster in a narrow sense

Industrial Agglomeration vs. Network vs. Cluster

- Japan has fewer start-ups, spin-offs, and less competition than other countries.

Category	Member	Behavior	Effect
Industrial agglomeration	Corporations Local governments	Collaboration	Efficiency
Network	Corporations Research institutes Local governments	Collaboration	Efficiency Less significant innovation
Cluster	Corporations Research institutes Local governments Connecting function Start-ups	Collaboration Competition	Efficiency More significant innovation Habitat

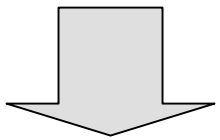
Definition of cluster by NISTEP

- Industrial and intellectual agglomerations
- With high-tech elements through collaboration with universities, research institutes, and specific regional industries
- Connected to sustainable developing regions
- Members compete and collaborate

Methodology

Identify conditions to form and promote clusters overseas

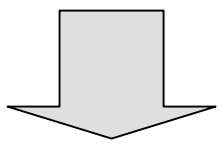
- Based on field studies and interviews



Identify the unique features of Japanese-type clusters

- Based on field studies and interviews of

17 prospective Japanese Clusters



Identify policies to promote Japanese-type clusters

Regional Innovation Committee

8 Sessions Held between July 2002 to March 2004

Chairman:	Dr. Syuuichi Matuda (Professor, Waseda University)
Committee:	Dr. Kazuyori Kanai (Professor, Hokkaido University.)
	Dr. Akio Nishizawa (Professor, Tohoku University.)
	Dr. Noboru Maeda (Professor, Osaka City University)
	Mr. Fuminori Yoshida (President & Representative Director & Corporate Vice President, Amgen Limited)
	Mr. Allen Miner (President, Sun Bridge Corporation)

Job titles are as of March 2004.

Comparison with Other Studies on Clusters

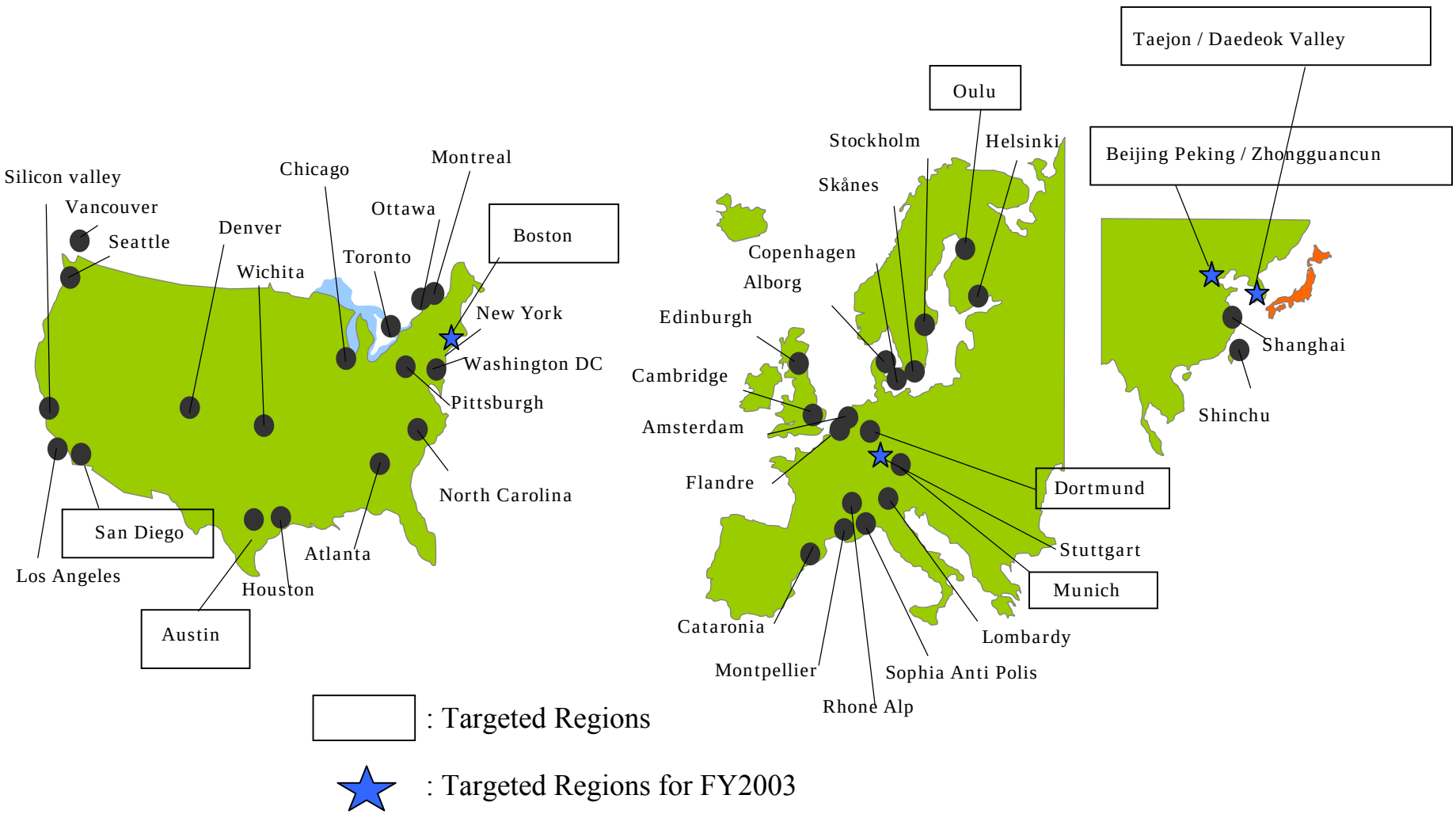
1.COC (1998-2000)	- Professor Porter, Harvard University - 20-30 year time-series analyses of economic conditions for cluster development -data gathering and interviews of 5 advanced cases in the US
2.OECD (1997-2001)	- The Cluster Committee - Comparative analysis and classification of clusters in member countries as the national innovation system
3.SPRIE (2002-2003)	- Professor Miller, Stanford University - Development Bank of Japan was responsible for the survey in Japan. - Survey on regional innovations and entrepreneurships in the US, Japan, China, and some other countries
4.DBJ (2002-2003)	- DBJ's regional branches - Survey on regional clusters in Japan, comparable with SPRIE
5.METI (2002-2003)	- The Committee on cluster research, "Strategy for Japanese Industrial Clusters," 2003 - Theoretical study for Japan's industrial cluster strategy and field studies on Japanese and overseas clusters

Topics Studied

1	Conditions for success overseas	…..	16 conditions for success
2	Growth phase	…..	Repeated cycle of germinal, launch/exploratory, and growth
3	Classification of cluster creation	…..	Types of promotion, invitation, regional collaboration, and start-ups
4	Importance of venue for innovation –"Ba"	…..	Effects of contact and gathering
5	Importance of start-ups	…..	Start-ups, key for further development
6	Collaboration between industry, start-ups, academia, research institutes	…..	Start-ups, bridging industry, academia research Institutes
7	Distribution of research institutes	…..	Inviting and utilizing public research institutes
8	Overseas clusters after the bubble period	…..	Munich, Austin, and Korea

Key Factors for Success in Clusters Overseas

Globally Recognized Clusters



Case Studies on Advanced Clusters Overseas

U.S.	Silicon valley: IT Cluster Most advanced cluster in the world, with promising clusters in biotechnology and communication San Diego: Biotechnology and pharmaceutical Cluster 3rd place in biotechnology area in the US, with promising communications cluster Research Triangle: Pharmaceutical biotechnology cluster promising clusters in communications, chemistry, and plastics Austin: IT Cluster Significant growth, selected the best city in the US in 2001
E.U.	Munich, Germany: Biotechnology and Pharmaceutical Cluster Located in suburban area, called Gene Valley Dortmund, Germany: Electronics and Machinery Succeeded in transforming from heavy industry (coal and steel) Sophia Anti Polis, France: Information and Communication Technology Cluster Similar characteristics with Tsukuba City in Japan, but with promising start-ups Oulu, Finland: Information and communication technology cluster Model for successful cluster in Finland during the depression in the 1990s

Development of Pharmaceutical and Bio Regional Cluster

(Research Triangle Park, North Carolina, USA)

Conditions	Preparatory Period 1959	Formation Period 1965	Growth Period 1984	Maturity Period 1995
Unique Resources	University City Duke Univ. (Durham), Univ.of NC(Chapel Hill), NC State Univ. (Raleigh)			
Sense of Crisis	Decline of tobacco industry, income/capita 47th place in 48 states, students leave the state for employment			
Benefit of Contact	Research Triangle Institute & Foundation founded in 1959 (13km x 3km)			
Core Company	Invitation	Burroughs Welcome1973	Glaxo1983	Ciba-Geigy1984
Core Research Institute	Invitation National Institute of Environmental Health and Science 1965	US Environment Protection Agency 1970	70 research institutes and universities on genome, bio informatics, proteomics	
Connecting Function	CED, Council for Entrepreneurial Development			
Support	NCBC, North Carolina Bio-technology Center 1984			
Global Development	Global companies account for the half of the RTP companies, Eisai Co., Ltd.			
Spin-Off	GlaxoSmithkline as Anchor Firm more than 1, 000 spin-offs			
Nation-Wide Recognition	Sales activities by Governor of North Carolina targeting the world			
Quality of Life	Creation of shopping malls and theaters for spouses of university professors			

16 Key Factors for Promoting Successful Clusters Identified through Advanced Cases Overseas

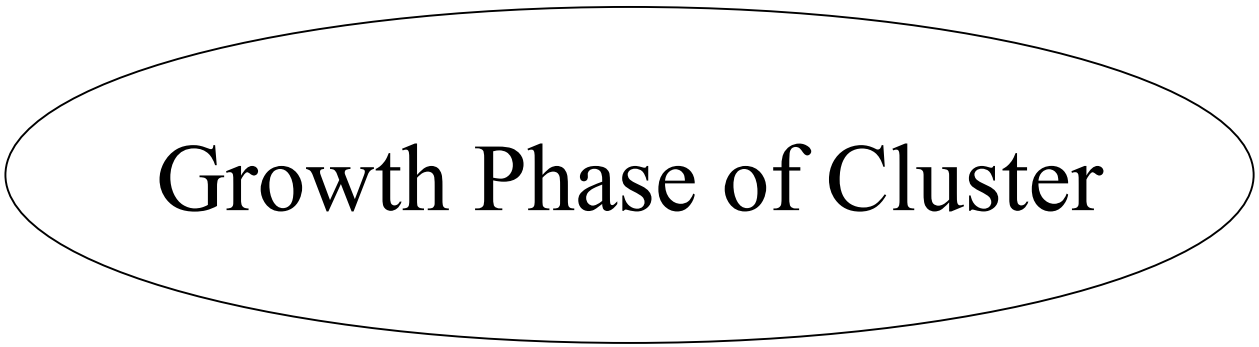
1. Particular Region	1	Access to the cluster center within 30 minutes
	2	Crisis awareness as being in the same region
2. Particular Industry	3	Selection and concentration of industries which utilize regional assets
	4	Existence of Anchor Companies, able of playing a leading role in initial period
3. R&D	5	World class R&D
	6	Collaboration between industry, university, and government
4. Start-ups	7	Vitality of start-ups
	8	Start-ups collaborate with major corporations and universities
5.Support and Collaboration	9	Existence of supporting infrastructures in its region, including finance, management, technology, and manufacturing
	10	Existence of coordinating organizations for corporations and universities
6. Visionary	11	Having a key person to develop a vision for the future in order to attract researchers
7. Interactions with Other Industries	12	Interactions with other clusters within the region
8. Global Evolution	13	Market expansion by targeting the world, and promoting innovation
9. Result of Initial Public Offering	14	Gain confidence and achieve high growth by IPO
10.Nation-Wide Recognition	15	Achieve high reputation
11. Quality of Life	16	Attract human resources from all over the world

Clusters developed due to economic crises in traditional industries

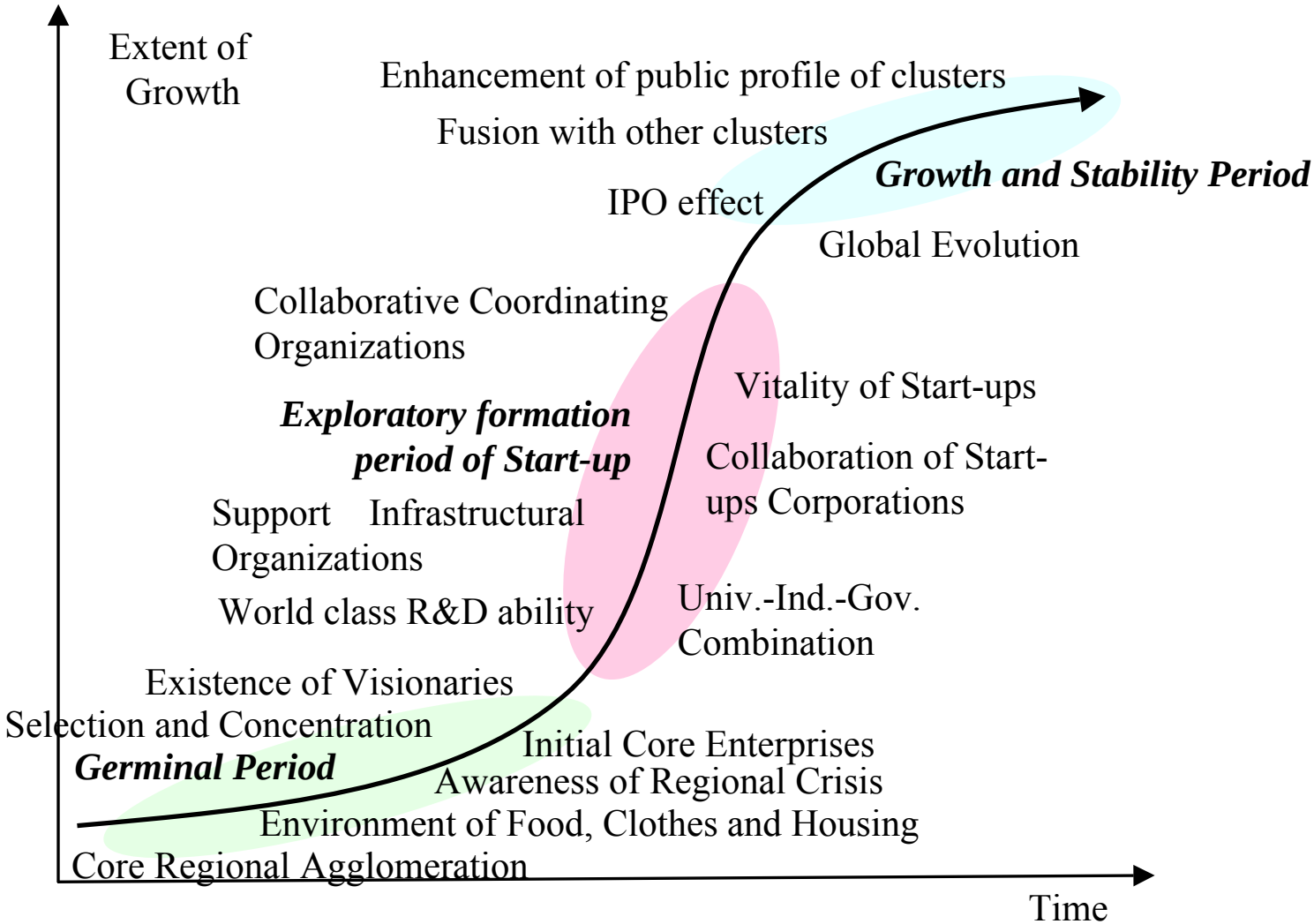
Cluster	Economic Crises
Austin (IT)	The decline of Texas' type of industry in the mid-1980s Promising students sought jobs elsewhere
San Diego (Bio)	The end of Cold War in the end of the 1980s Lay-offs by aviation and defense industries
North Carolina (Bio)	The decline of tobacco industry Promising students sought jobs elsewhere
Silicon valley (IT)	Companies and students left for the East Coast in the 1950s Eager to have them back to the West Coast
Munich (Bio)	Bio engineers left for UK and the US in the mid 1990s Eager to achieve the first place in the biotechnology field in EU, ahead of UK
Dortmund (IT)	The end of industrial area with decline of coal and steel industries in the 1980s Fall in city's population
Sophia Anti Polis (ICT)	Recession/depression led large corporations' to reduce their workforces in the early 1990s Families declined to go back home countries
Oulu (Communication)	Bankruptcy of raw material development, around in 1975 Promising students sought jobs elsewhere

Contribution of Public Research Institutes for Cluster Development

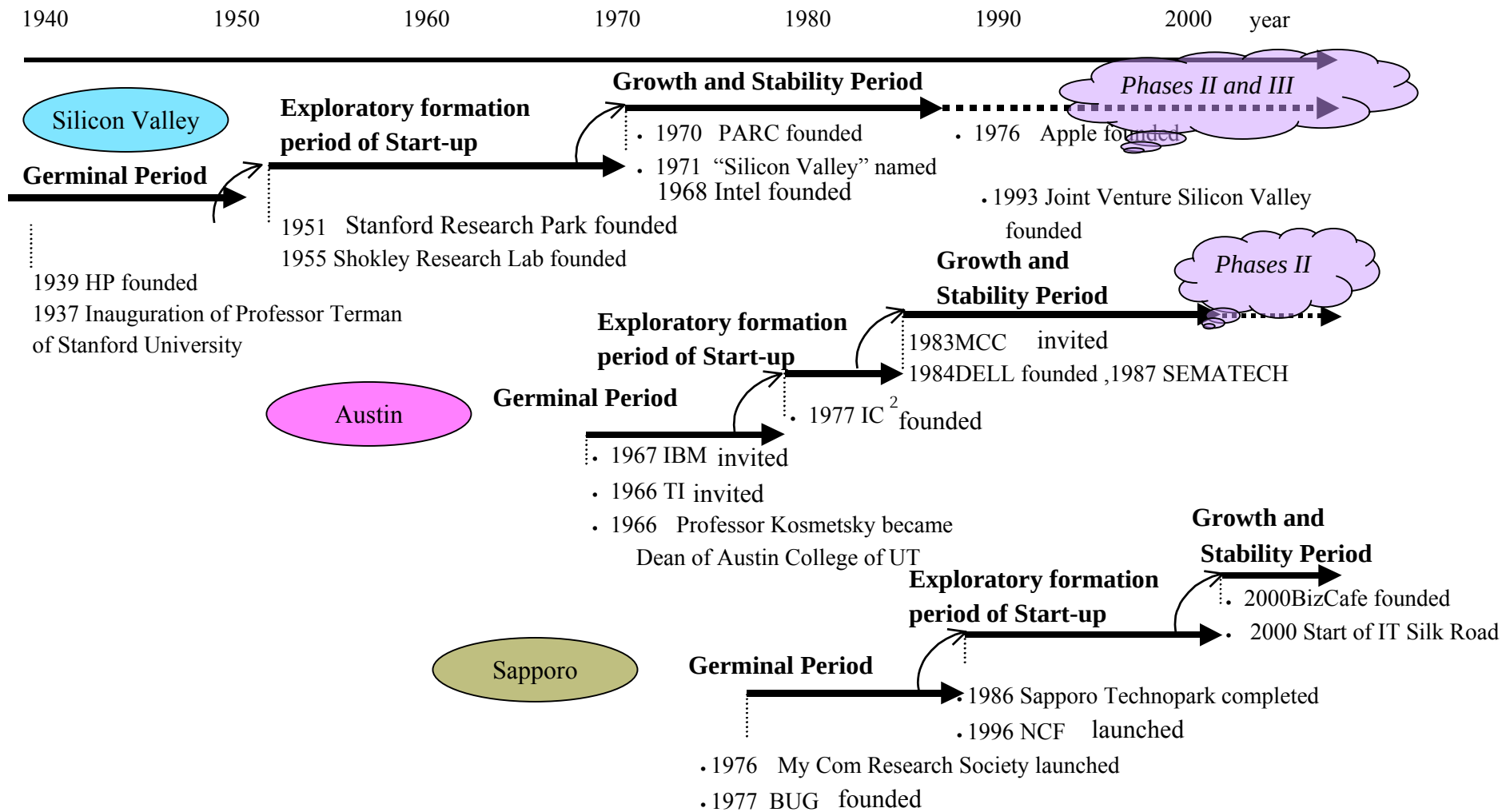
Cluster	Major research institutes other than universities
Austin (IT)	Microelectronics & Computer Technology Cooperation: MCC 1983 SEMATECH (Semiconductor Manufacturing Technology) 1987
San Diego (Bio)	Scripps Institute of Oceanography 1903, Salk Institute 1960
North Carolina (Bio)	National Institute of Environmental Health Sciences: NIEHS 1965
Silicon valley (IT)	Stanford Research Institute 1946 Shockley Semiconductor Laboratory 1956 Xerox PARC (Palo Alto Research Center) 1970
Munich (Bio)	National Research Center for Environment and Health Institute for Biochemistry
Dortmund (ICT)	Fraunhofer Institute for Materials Research and Logistics 1984
Sophia Anti Polis (ICT)	French National Center for Scientific Research: CNRS French National Institute for Research in Computer Science and Control: INRIA European Telecommunications Standard Institute 1988 European Headquarters, World Wide Web Consortium: W3C
Oulu (Communication)	VTT Electronics, Technical Research Centre of Finland 1970


Growth Phase of Cluster

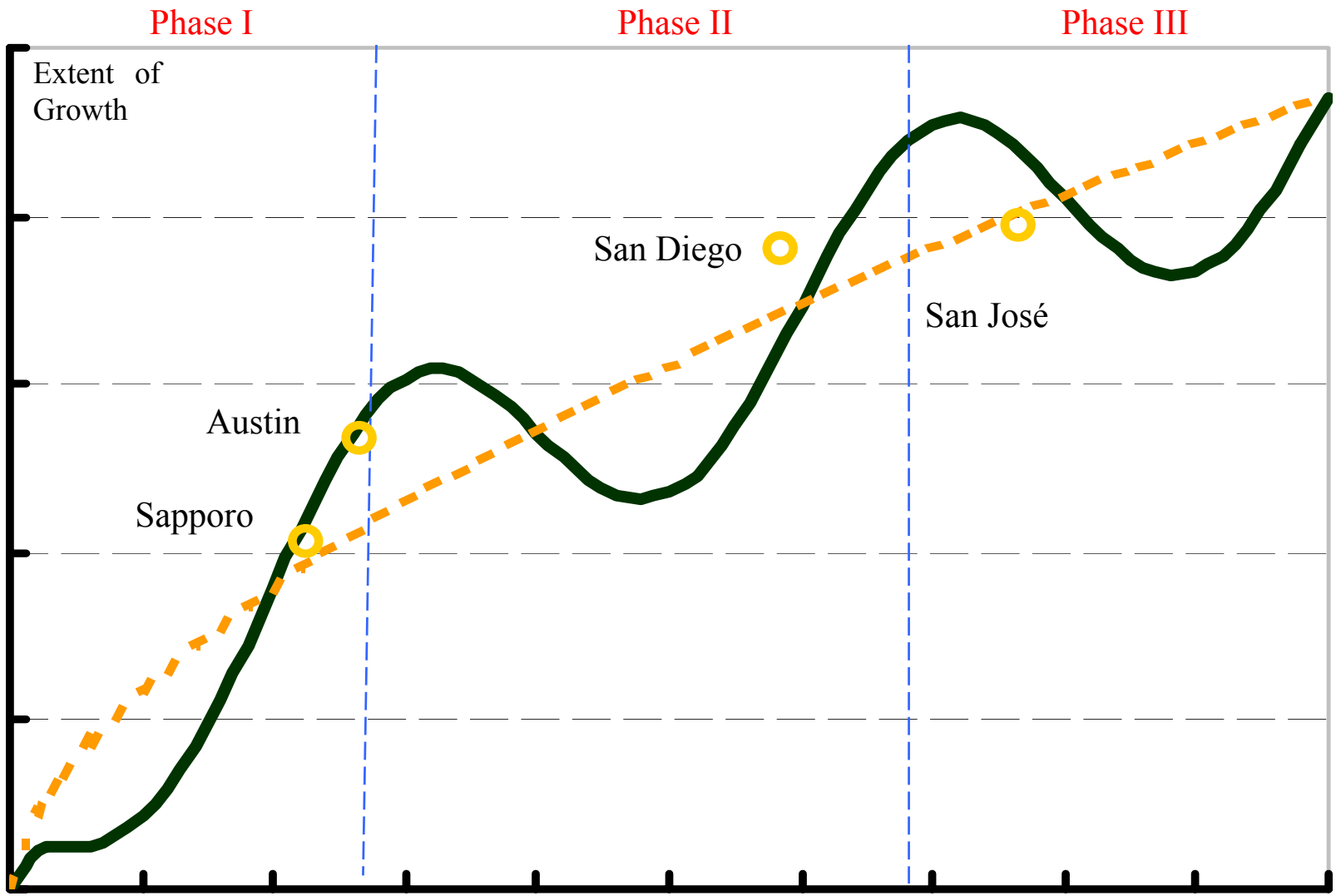
Process of Growth in Phase I



Time Series Development of Clusters



Phase Curve of Cluster Growth

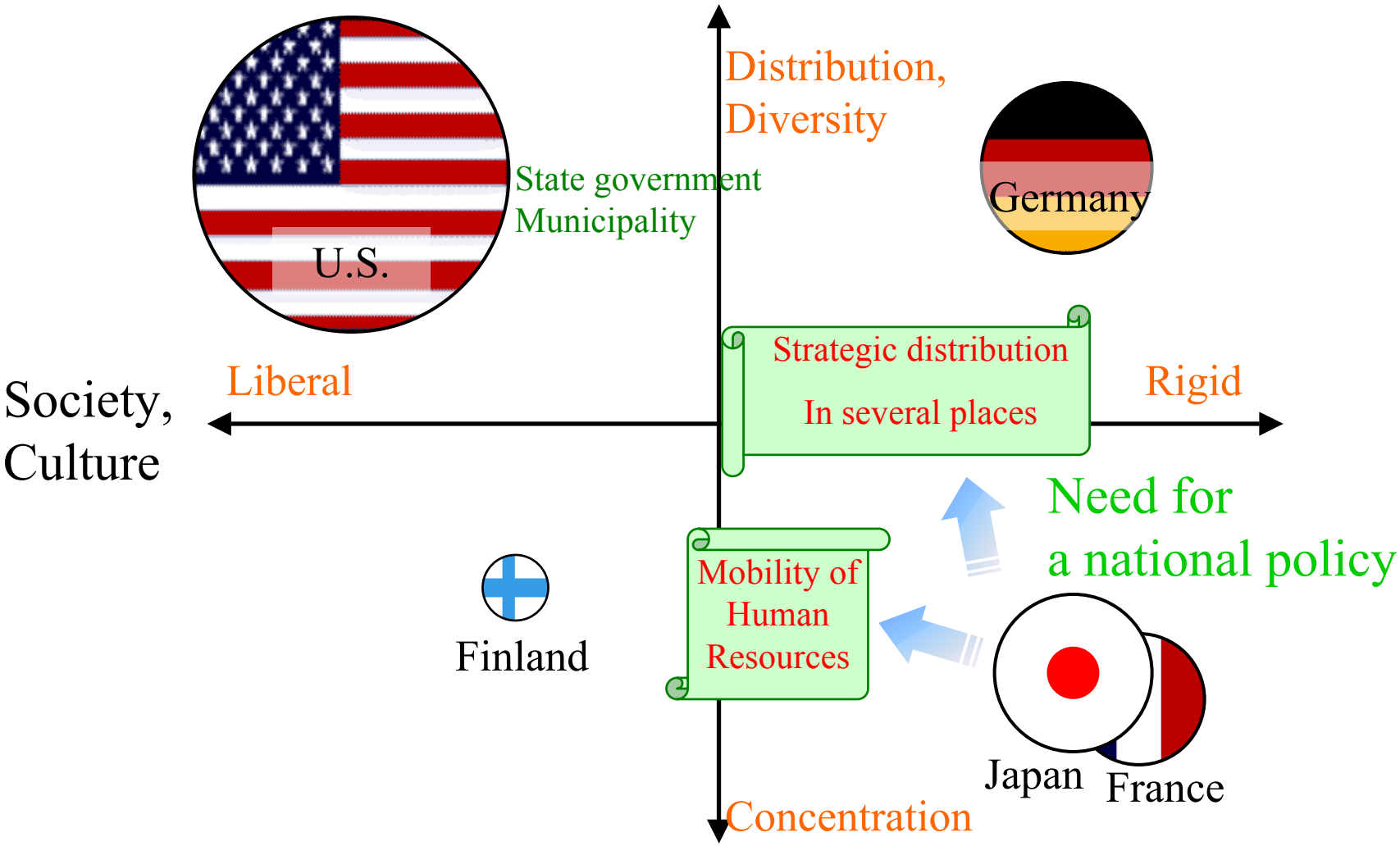


Classification of Cluster Creation

Key Factors for Cluster Formation in the Initial Period
- First Steps -

1. Local governments invite university, companies, research institutes for cluster formation.
   - Austin and Research Triangle
2. Collaboration between local industries, research institutes, and local governments.
   - Oulu, Dortmund, and Kita Kyusyu
3. National policy to create industrial clusters
   - Munich and Kobe
4. Spin-off start-ups from local industries and research institutes
   - Silicon Valley, San Diego, Sophia Anti Polis, Sapporo Valley, Hamamatsu, and Toyohashi

The Unique Features of Social Infrastructure, Society, and Culture and Policy for Developing Clusters in Major Countries



Importance of Venue for Innovation - "Ba"

Necessity of Nucleus Venue for Innovation - "Ba"

“Benefit of Contact ”

⇨ Daily contact contributes to producing tacit knowledge, further creating explicit knowledge.

- Take into account the “union” between industry, academia, and research Institute in Germany

- Less effect found with “collaboration”

Local Enterprises, Start-Ups, Major-Corporations,Universities, Student, Coordinators, Support Institutions

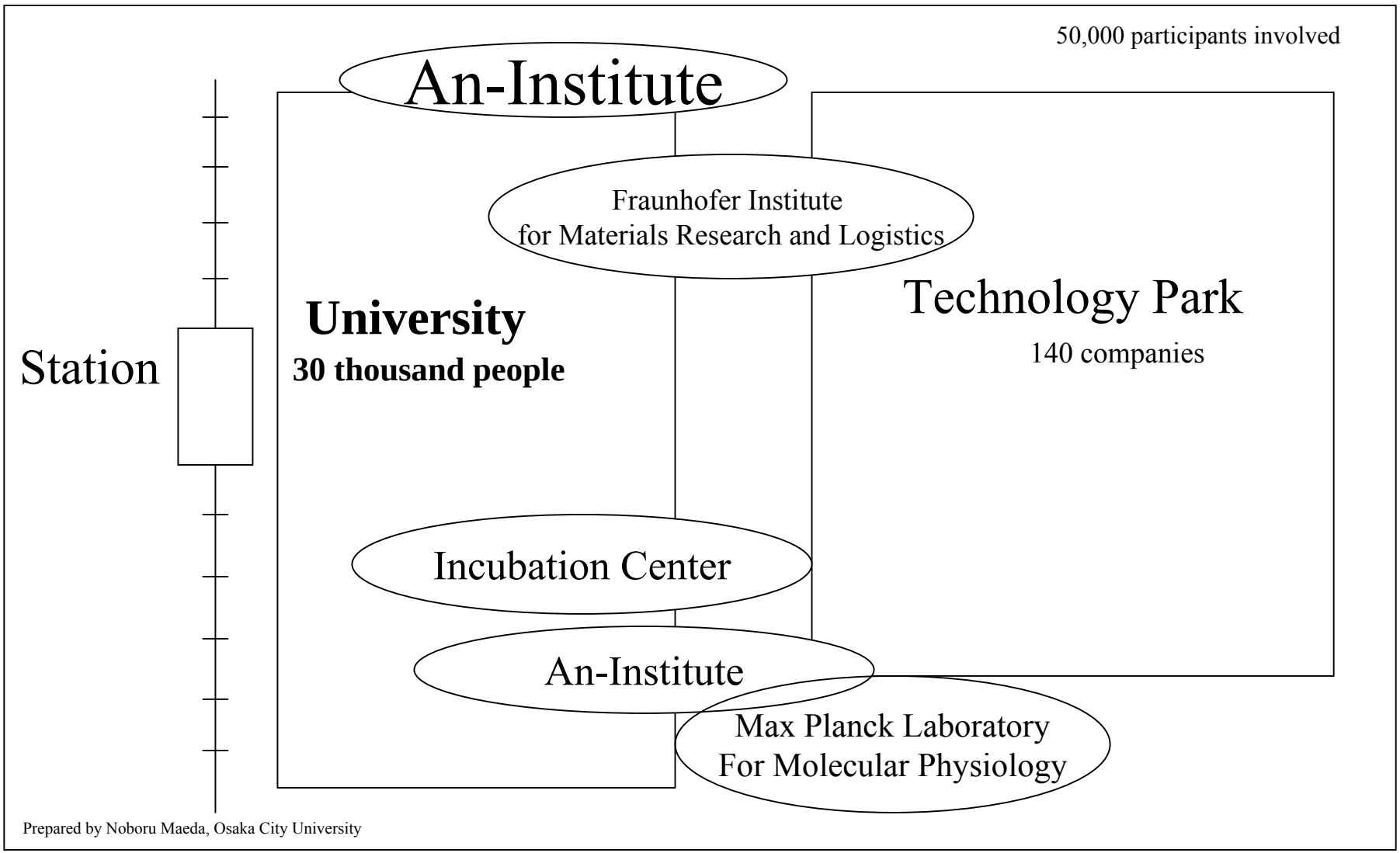
⇦ Invite actors to the nucleus “venue” accessible within 5 minute.

“Benefit of gathering” is also important in order to interact with individuals outside the region. To be specific, “benefit of gathering” includes easy access to airports and the local government buildings.

Regional Collaboration

between Industry, Start-up, Academia, and Research Institution

Dortmund

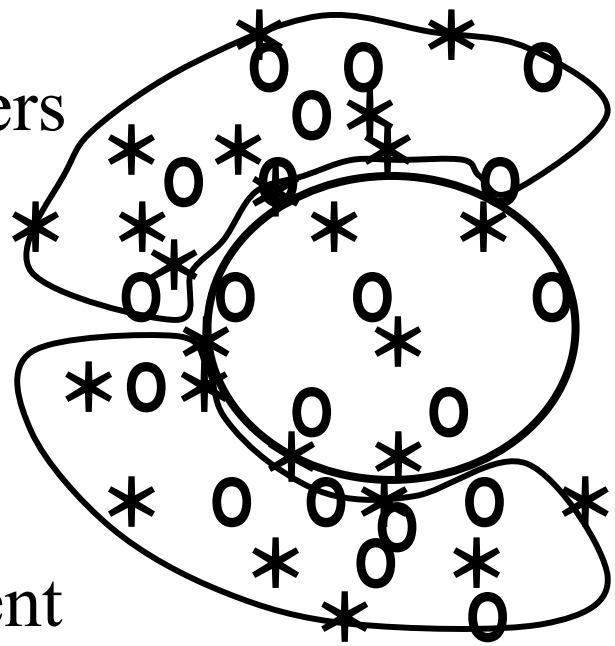


Regional Collaboration

Fraunhofer Institute for Machine Tools and Factory Management,

Technical University Berlin & Fraunhofer Institute

for Production Systems and Design Technology



∗ FhG Researchers

o Faculty

Graduate student

FhG Institute

Facility for Experiment

Buildings of University

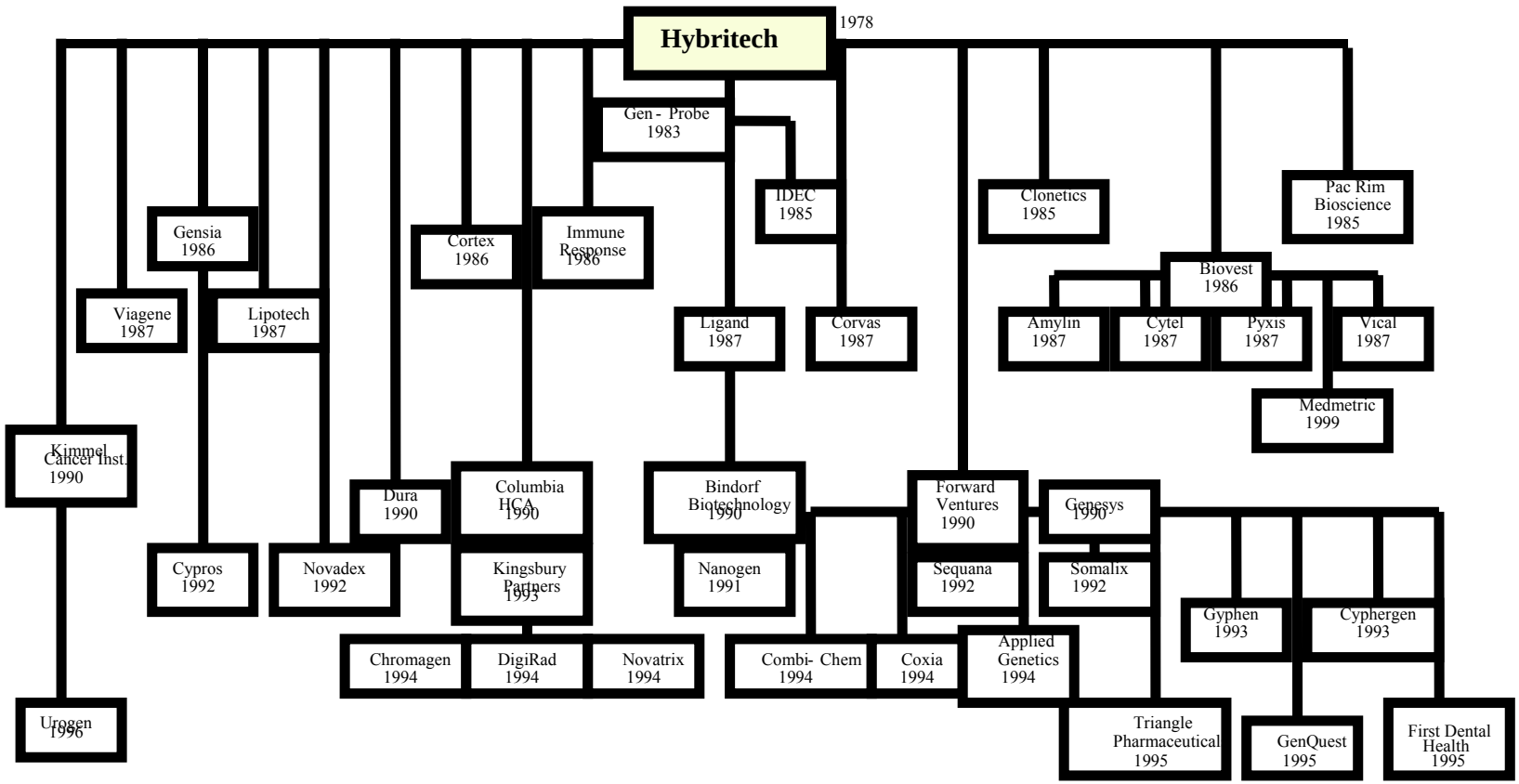
Prepared by Noboru Maeda, Osaka City University

Importance of Start-Up

Spin-off Tree in San Diego

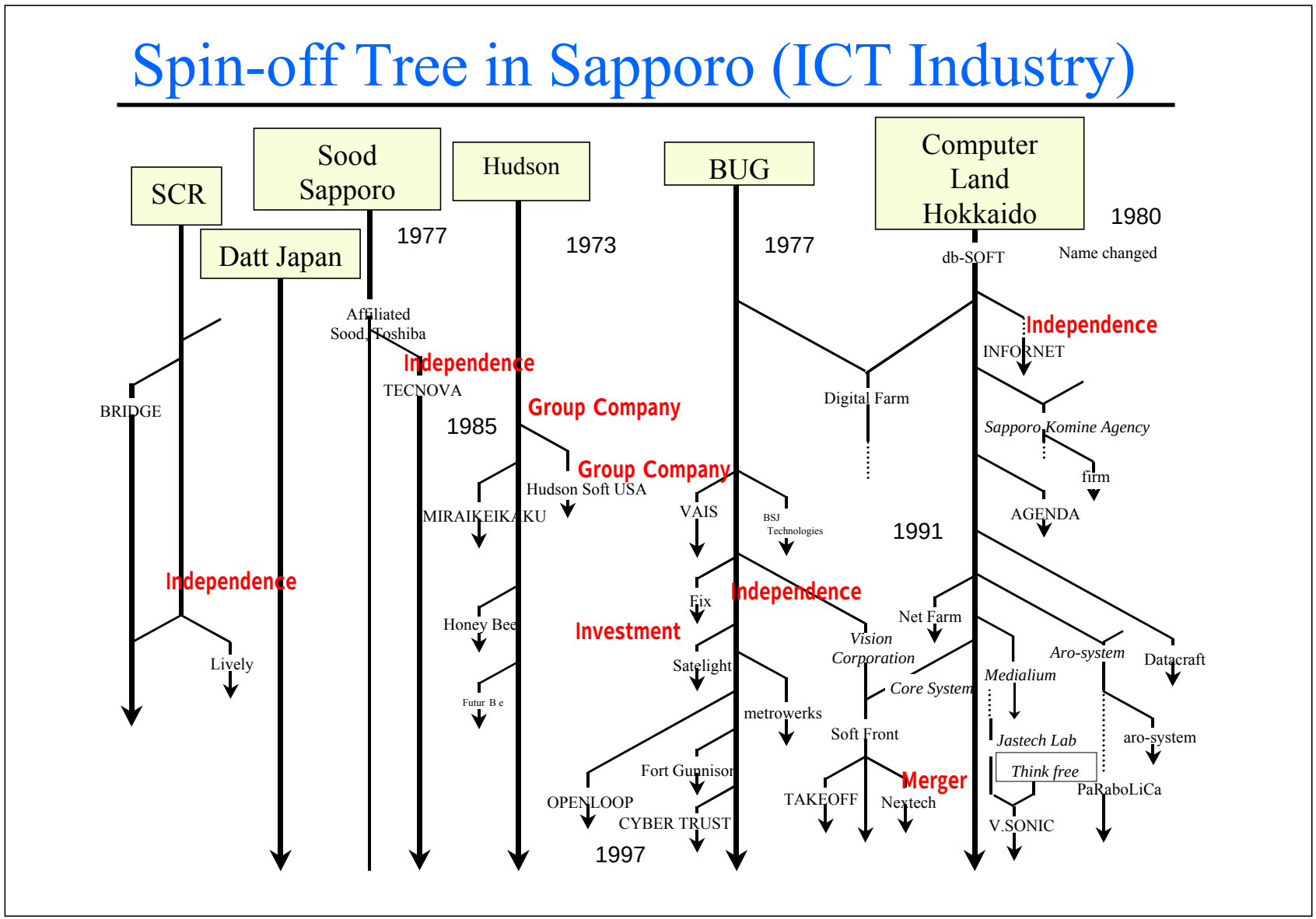
Start-ups from Hybritech Inc. in San Diego

(Pharmaceutical, Bio-technology)



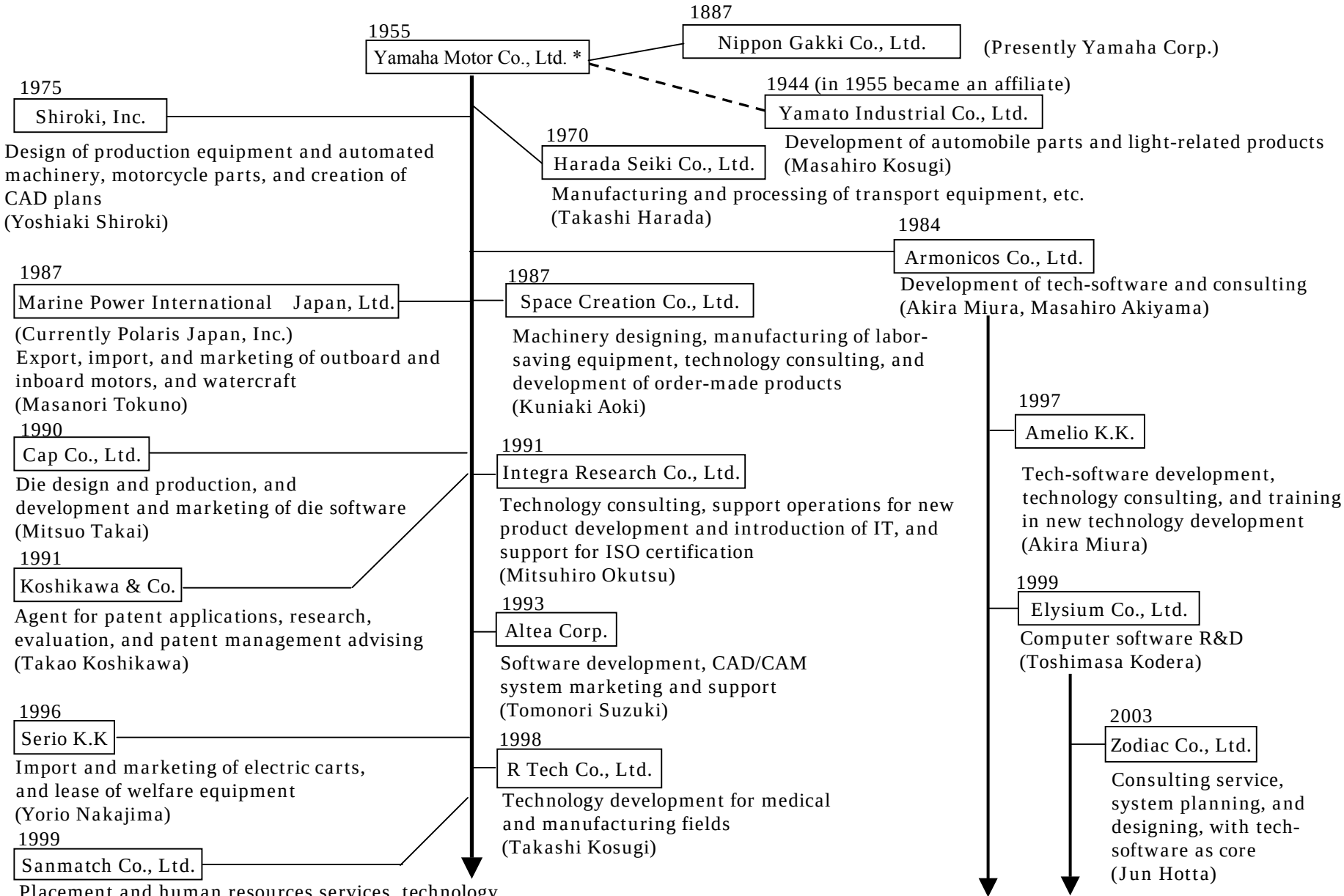
Source: Cluster of Innovation, Council on Competitiveness

Spin-off Tree in Sapporo



Source: "The Birth of Sapporo Valley," Yellowpage 2000

Spin-off Tree in Hamamatsu Region



* Listed companies

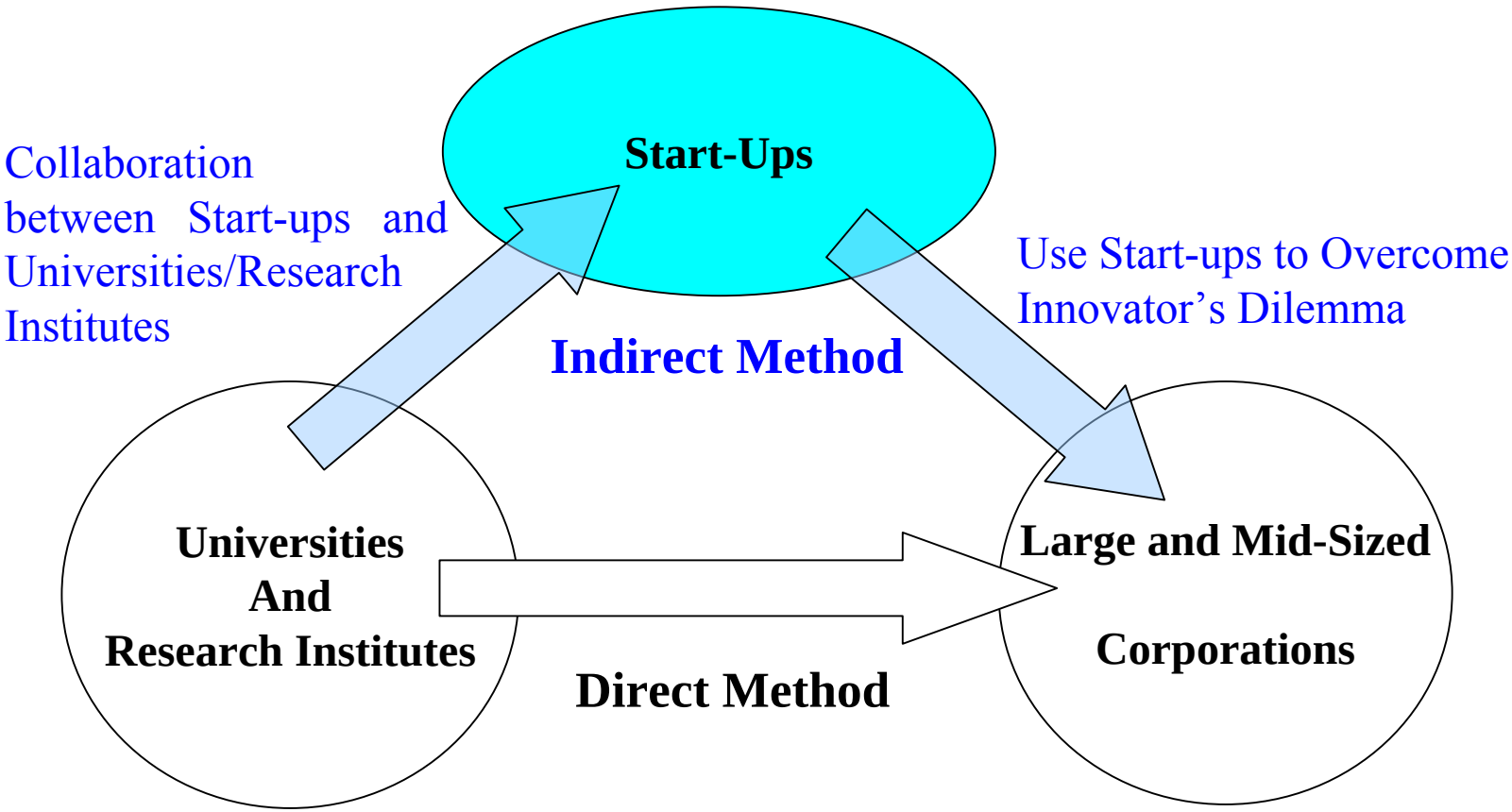
Source: Third Policy-Oriented Research Group, NISTEP, in cooperation with the Hamamatsu Chamber of Commerce and Industry

Collaboration Between Industry, Start-Up, Academia, and Research Institute

New Way of Collaborating with Start-Ups

From Industry-Academia-Research Institute Collaboration

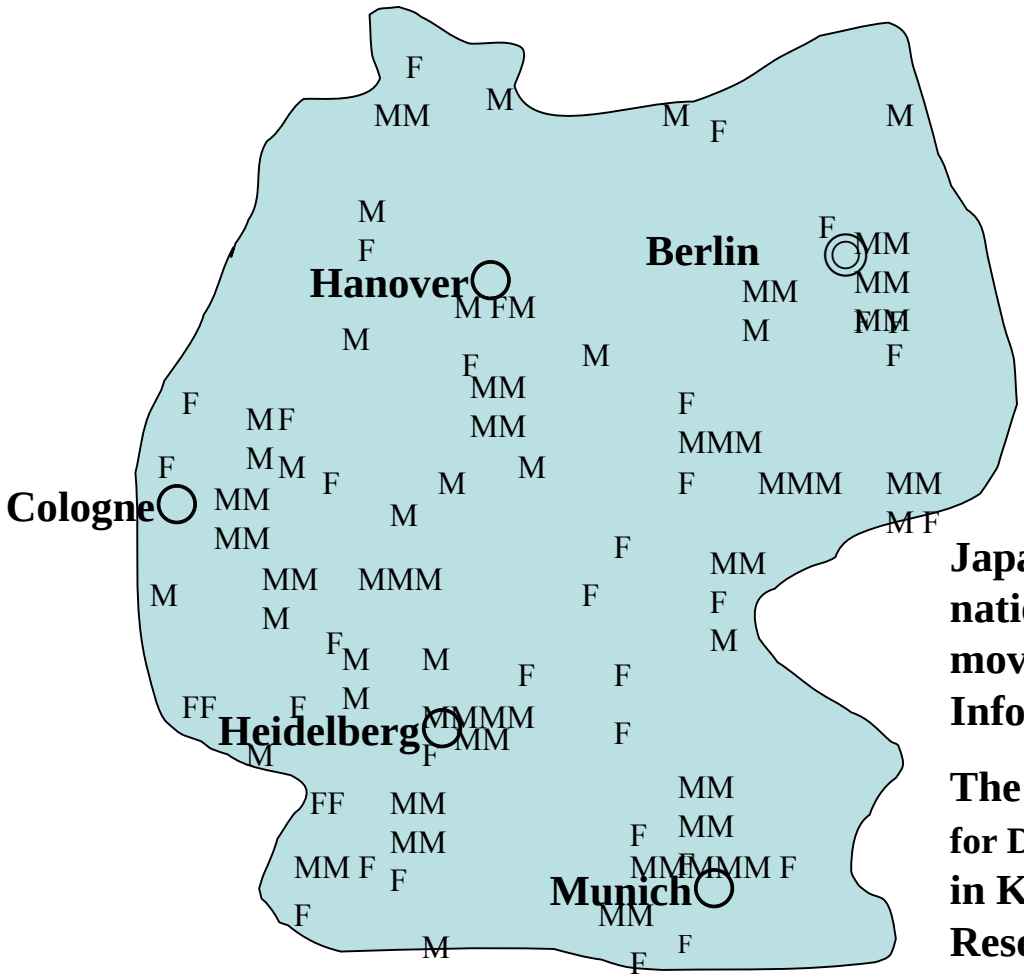
To Industry-Start-up-Academia-Research Institute Collaboration



Distribution of Research Institutes

Max Planck Institute & Fraunhofer Institute

(81 basic research institutes, MPG and 47 applied research institutes, FhG)



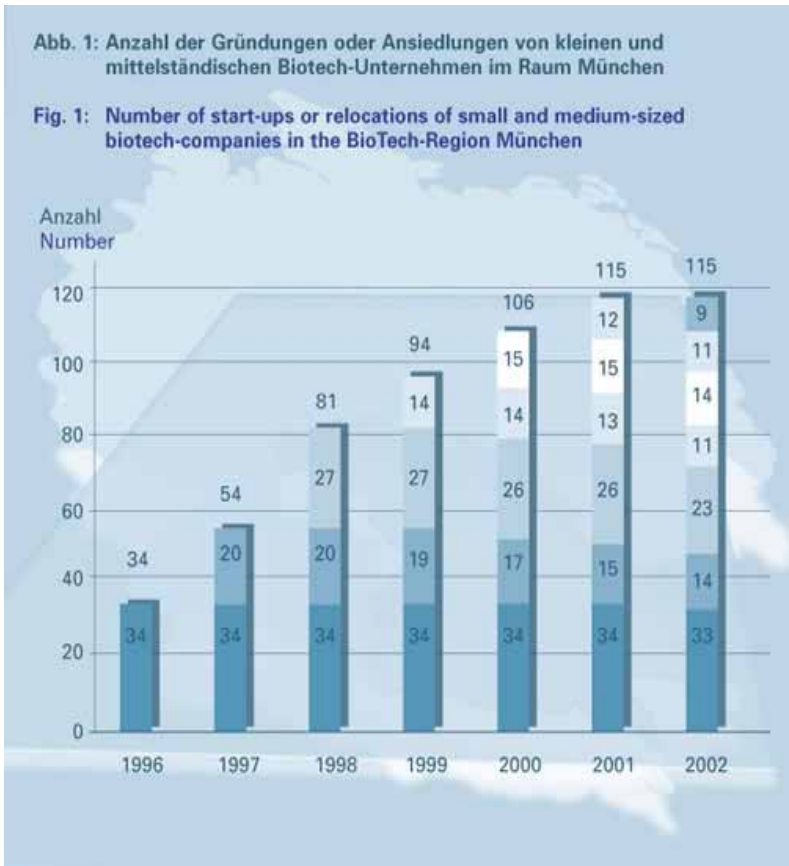
Germany: National research institutes on basic and applied research are scattered across the country. Each institute constitutes a Center of Expertise in each specific field.

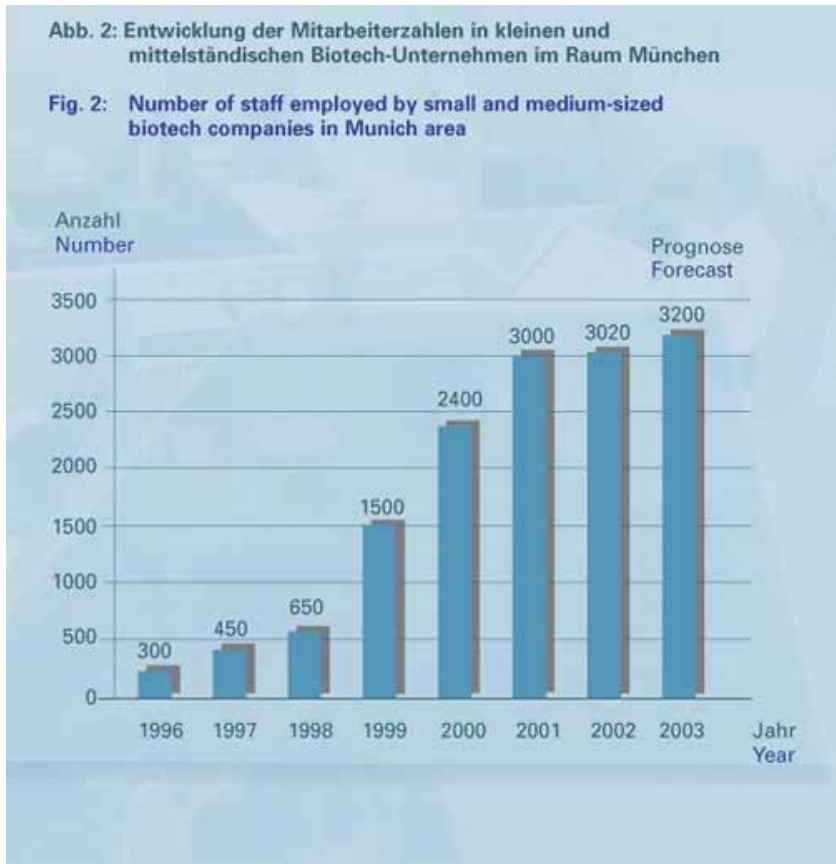
Japan: necessary to disperse national research institutes, i.e. move National Institute of Informatics to Sapporo.

The latest cases include The Center for Developmental Biology, RIKEN in Kobe, and Tissue Engendering Research Center, National Advanced Institute of Science and Technology, in Amagasaki.

Clusters Overseas after Bubble Period

Bio Cluster in Munich





Souce：http://www.bio-m.de

⇨ No significant increase nor initial public offerings, but not declining

Daedeok Valley, Taejon, Korea

Used be "Tukuba" in Korea but has grown dramatically

- Initiated in 1970 to create another "Tsukuba,"
- Involved 16,000 researchers at four universities, 30 government affiliated research institutes, and 25 private research institutes in five square kilometers

In contrast to Tsukuba, 17,000 researchers at 270 research institutes

- Drastic restructuring of the research institutes due to Asian economic crisis in 1997
- Promotion of spin-off policy by President Kim in 1999

Korea Advanced Institute of Science and Technology: KAIST

- Education and research institution in science and technology, belonging to the Ministry of Science and Technology (MOST)
- 7,000 students, including 2,500 doctoral course students
- Has created 300 technology start-ups since 1995, with 130 in the incubator in the university

Electronics and Telecommunications Research Institute: ETRI

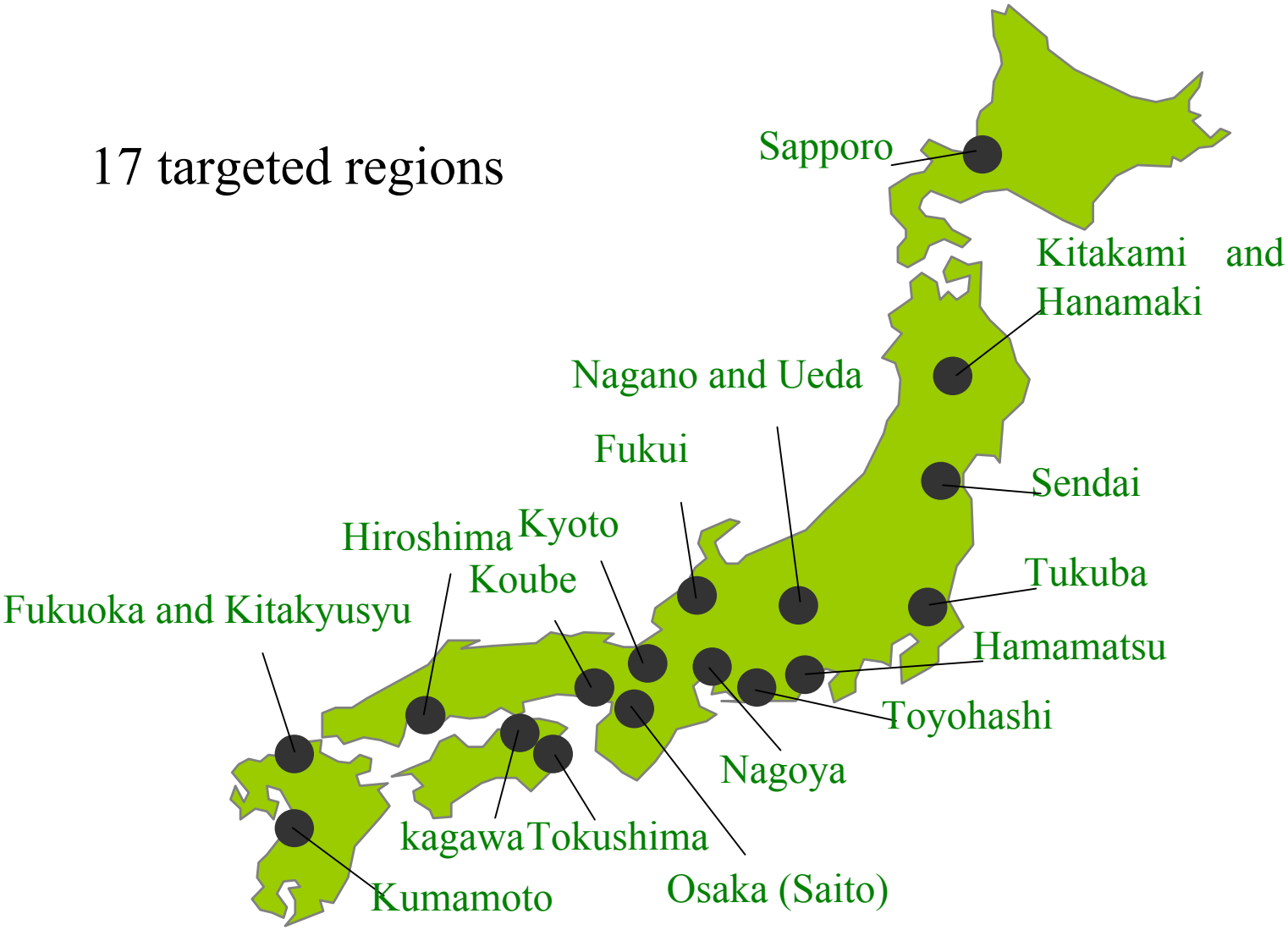
- Non-profit government-funded research organization, comparable with the research institute of the Nippon Telegraph and Telephone Corporation
- 20,000 researchers
- Created 100 spin-off start-ups in four years

Half of start-ups went bankruptcy after the IT bubble, but keeping more than 10 percent entrepreneurial activity rate, according to the Global Entrepreneurship Monitor report.

Developing Japanese-Type Clusters and Conditions for Success

Prospective Japanese clusters

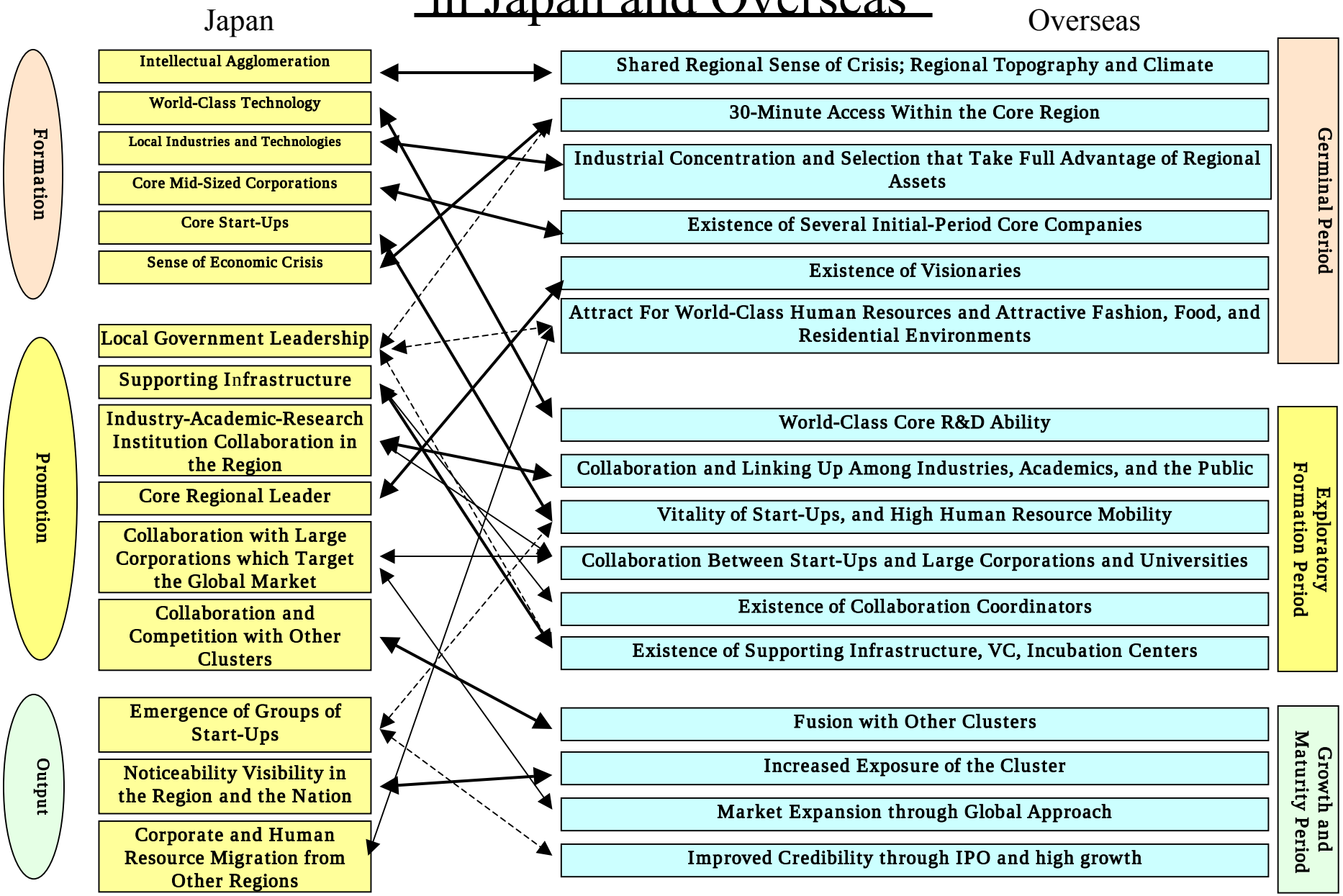
17 targeted regions



Key Factors for Successful Regional Clusters in Japan

Formation	1 Intellectual Agglomeration
	2 World-Class Technology
	3 Local Industries and Technologies
	4 Core Mid-Sized Companies
	5 Core Start-Ups
	6 Sense of Economic Crisis
Promotion	7 Local Government Leadership
	8 Supporting Infrastructure
	9 Collaboration between Industry, Academia, and Research Institute in the Region
	10 Core Regional Leader
	11 Collaboration with Large Corporations Targeting the Global Market
	12 Collaboration and Competition with Other Clusters
Output	13 Emergence of Start-Ups
	14 Visibility in the Region and the Nation
	15 Corporate and Human Resource Migration from Other Regions

Key Factors for Successful Regional Clusters in Japan and Overseas



Recommendation for Developing Japanese-Type Clusters

-Silicon Valley cannot be applied to Japanese-type cluster because of the unique features of the Japanese administration, society and culture.

- Important lessons from overseas cases, but no need to satisfy all the 15 conditions for success.

Proposal for Comparative Analysis by Grading " *, ** , *** "

***: Excellent in the field

**: Good in the field

*: Fair in the field

⇦ Selection and Concentration

- Every region has its unique advantages, approximately three each.

- First steps for developing regionally-based clusters are subject to strategic selection and concentration of advantages of its regions.

Sapporo IT Cluster

(Formation Base : (3) Core Start-Ups)

Conditions of Japanese-Style Success		Strengths at the Time of Base Formation	Promotion Conditions for the Near Future (Proposal)	Keywords
Formation (1)	1 Intellectual Agglomeration		**	Establishment and Attraction of IT-Focused Research Institutions
	2 World-Class Technology			
(2)	3 Local Industries and Technologies			
	4 Core Mid-Sized Companies			
(3)	5 Core Start-Ups	***		BUG, Hudson, and Computer Land Hokkaido, etc.
(4)	6 Sense of Economic Crisis			
Promotion	7 Local Government Leadership			
	8 Supporting Infrastructure			
	9 Industry-Academic-Research Institution Collaboration in the Region	**		Hokkaido University's Micro Computer Study Group
	10 Core Regional Leader	*		Hokkaido University Professor Yoshinao Aoki
	11Collaboration with Large Corporations with the Aim to Access the Global Market		**	Collaboration with Large Corporations In and Out of Hokkaido is Essential
	12 Collaboration and Competition with Other Clusters		*	Fusion with a Bio Cluster in Hokkaido
Output	13 Emergence of Start-Ups			
	14 Visibility in the Region and the Nation			
	15 Corporate and Human Resource Migration from Other Regions			

Fukui Nano-Cluster

Formation Base: (2) Corporate Agglomeration

Conditions of Japanese-Style Success		Strengths at the Time of Base Formation	Promotion Conditions for the Near Future (Proposal)	Keywords
Formation (1)	1 Intellectual Agglomeration			
	2 World-Class Technology			
(2)	3 Local Industries and Technologies	***		Textile Industry and Galvanizing Technology
	4 Core Mid-Sized Companies			
(3)	5 Core Start-Ups		*	Emergence of Start-Ups
(4)	6 Sense of Economic Crisis			
Promotion	7 Local Government Leadership	**		Coordinated Efforts by the Prefecture Government, Prefectural Foundations, and Prefectural Laboratories
	8 Supporting Infrastructure			
	9 Industry-Academic-Research Institution Collaboration in the Region			Collaboration Between Fukui University and Local Industries (Urban Area Operations, etc.)
	10 Core Regional Leader	*	***	Leaders who can lead the region with their global perspectives are needed
	11Collaboration with Large Corporations with the Aim to Access the Global Market		**	There are only few potential customers among local large corporations (Large companies in Osaka)
	12 Collaboration and Competition with Other Clusters			
Output	13 Emergence of Start-Ups			
	14 Visibility in the Region and the Nation			
	15 Corporate and Human Resource Migration from Other Regions			

Kobe Bio Cluster

Formation Base: (4) Sense of Economic Crisis

Conditions of Japanese-Style Success		Strengths at the Time of Base Formation	Promotion Conditions for the Near Future (Proposal)	Keywords
Formation (1)	1 Intellectual Agglomeration			
	2 World-Class Technology	**		Riken and its Center for Developmental Biology
(2)	3 Local Industries and Technologies			
	4 Core Mid-Sized Companies			
(3)	5 Core Start-Ups		*	Would the pickup group of start-ups be able to produce successful results?
(4)	6 Sense of Economic Crisis	***		Starting point was the Great Hanshin-Awaji Earthquake in 1995
Promotion	7 Local Government Leadership	*		Basic Concept by Bechtel, Inc.
	8 Supporting Infrastructure			
	9 Industry-Academic-Research Institution Collaboration in the Region		**	Would the Kobe University be able to play a central role?
	10 Core Regional Leader			
	11Collaboration with Large Corporations with the Aim to Access the Global Market		***	Would the collaboration between large corporations and start-ups progress?
	12 Collaboration and Competition with Other Clusters			
Output	13 Emergence of Start-Ups			
	14 Visibility in the Region and the Nation			
	15 Corporate and Human Resource Migration from Other Regions			

Comparison of Key Factors for Success by Type of Formation Base

Conditions of Japanese-Style Success		7 areas of Intellectual Agglomeration		6 areas of Industrial Agglomeration	
		Strengths at the Time of Base Formation	Promotion Conditions for the Near Future (Proposal)	Strengths at the Time of Base Formation	Promotion Conditions for the Near Future (Proposal)
Formation	Intellectual Agglomeration	1.7	0.0	0.0	0.3
	World-Class Technology	1.3	0.0	0.7	1.2
	Local Industries and Technologies	0.3	0.0	2.5	0.0
	Core Mid-Sized Companies	0.6	0.0	1.0	0.2
	Core Start-Ups	0.3	2.1	0.0	0.8
	Sense of Economic Crisis	0.0	0.0	0.0	0.0
Promotion	Local Government Leadership	0.4	1.0	0.8	0.0
	Supporting Infrastructure	0.0	0.0	0.0	0.0
	Industry-Academic-Research Institution Collaboration in the Region	1.0	0.6	1.0	0.5
	Core Regional Leader	0.0	0.3	0.0	1.0
	Collaboration with Large Corporations with the Aim to Access the Global Market	0.0	1.0	0.0	0.8
	Collaboration and Competition with Other Clusters	0.0	0.7	0.0	0.3
Output	Emergence of Start-Ups	0.0	0.0	0.0	0.3
	Visibility in the Region and the Nation	0.4	0.0	0.0	0.2
	Corporate and Human Resource Migration from Other Regions	0.0	0.3	0.0	0.3

Figures in the table are averages, calculated with ***=3.0, **=2.0 , *=1.0.

Major Features of Sustainability in Each Regional Innovation Factor

Factor	Features of Sustainability
Human Resources	- Training in technology and science with diverse skills and qualifications in the region's higher education institutions (universities and vocational schools)
	- Maintain and attract individuals with practical ability, experience, rich start-up drive (including those who return to their home areas from urban centers)
	- Creation of circulatory/chain-reactive spin-off start-up by these type of individuals
Tangible Assets	- Develop and maintain "hard infrastructure," such as research facilities, analysis/measuring equipment, trial manufacturing plant, and incubation facilities
	- Real-time and continuous provisions of "technology seeds" based on knowledge creation by universities and other sources, and also are expected to lead to successful businesses
Financing	- Utilization of public funds and programs as an initial-phase trigger
	- Secure capital to fund trial manufacturing development, and mass production tests (venture capital, stock markets, and taking full advantage of various investment and financing systems)
	- Reinvestment of business profits in the knowledge creation cycle
Information	- Build regional common venues and networks to share and disseminate information on : major players in the industry, academia, and government involved in forming and developing clusters; operative technology and business seeds originating in corporations and universities, and developed by spin-off start-ups

For Further Development of Japanese-Type Cluster

1. Human Resource Mobility and Improving "The Ability to Attract"
   -Make the region attractive venue for both the Japanese and Non-Japanese
2. Forming Public R&D Bases and Strengthening Their Functions
   - Universities and Public Research Institutes are critical in knowledge creation
3. Creating Venue and Deepening Collaboration Through Network Building
   - Improve functionality through system restructure and human resource mobility
4. The Ideal for Japanese-Style Leadership by Diverse Key Persons (Visionaries)
   - Insights, clear vision, and centripetal force that enable formation of effective future strategies
5. The Role and Importance of High-Tech Start-Ups and Creating Regionally-Based Start-ups
   -New actors that cross organizational borders and can mediate between parties
6. Promotion of Multi-Layered Clusters
   - Cluster phase evolution through globalization of market and human resource mobility
7. Viewpoint of Active Utilization of Local Industries
   - Finding potential technology in regions

Intellectual Cluster

“ Developing Successful Sustainable Clusters”

depends on whether or not industries and technologies in regions are able to succeed by themselves after the termination of the five-year Intellectual Cluster Project.

Policy Prescriptions for National and Local Governments

Local governments:

- Recognize the unique features in each region;
- Identify the most important conditions for development;
- Further strengthen regional advantages

Selection and concentration vary according to regions' characteristics.

National Government:

- Build cluster groups with most advanced technologies which can compete with other world-class clusters in specific regions (including the Tokyo Metropolitan Area) decided by competitions between regions

Policy to be adopted by whole government, nor just each ministry.

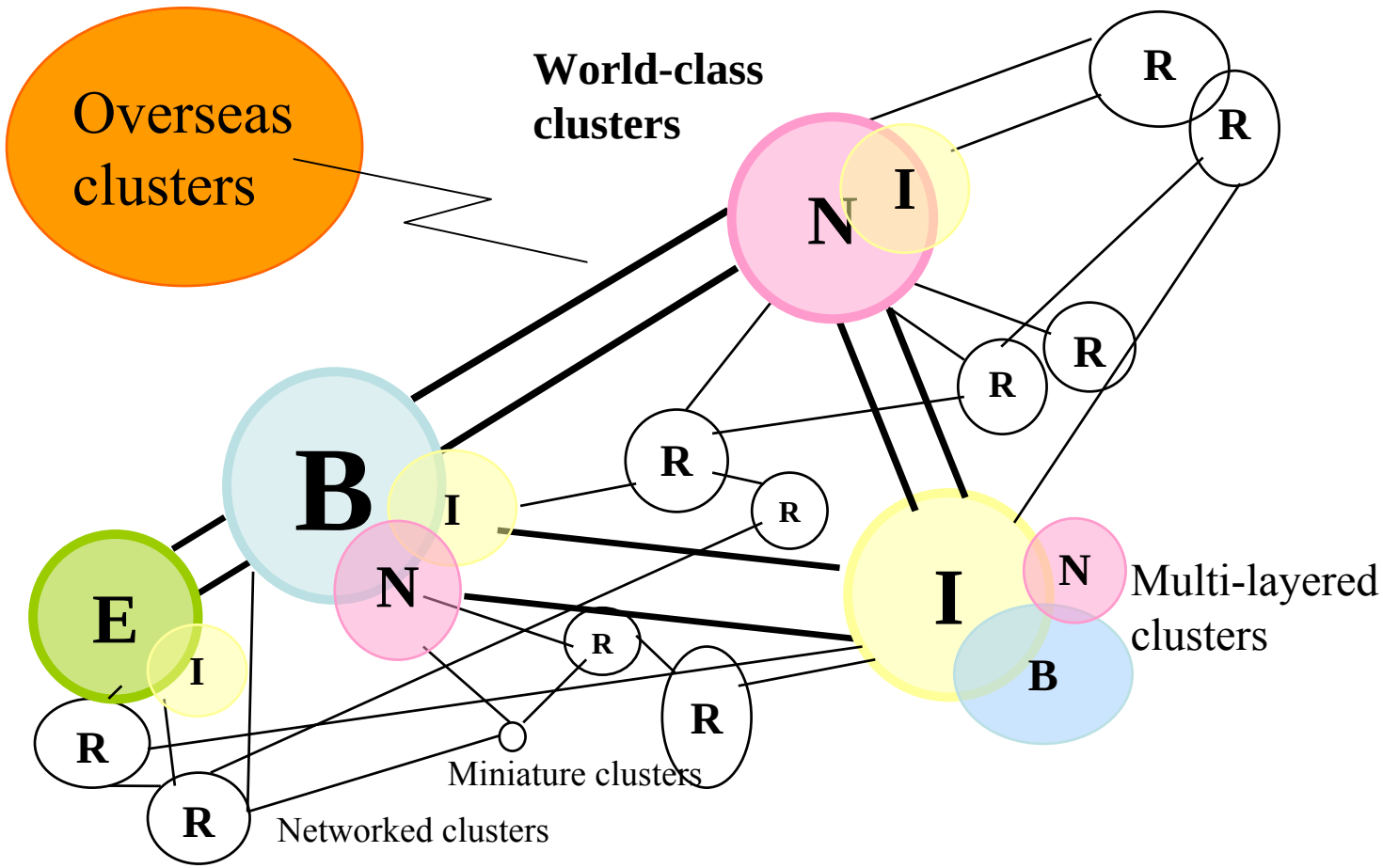
Industries and Technologies,Expected to Show Japanese Advantages

1. Robots (Pet, Care, Industry, Crime prevention, rescue and cleaning)
2. Cellular Phone (photo, movie, and access to internet)
3. Fuel Cells (for cellular phone, home, industry and car)
4. Information Appliances (entertainment, crime prevention, education, household chores, and game)
5. Comics, Animation, Game (preparation of contents)

Example: How to utilize the Yokosuka Research Park, able to attract individuals with knowledge in cellular phone technology from around the world?

Cluster Groups in Japan

Concept of Cluster Groups that Includes the Tokyo Metropolitan Area In the Framework of the National Innovation System (NIS)



I: IT, B: Bio, N: Nano-tech, E: Environment, R: Regional clusters