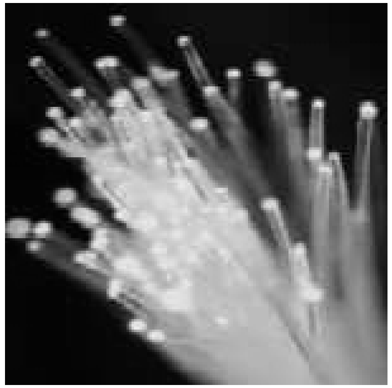

The Quebec Optics Cluster

by :

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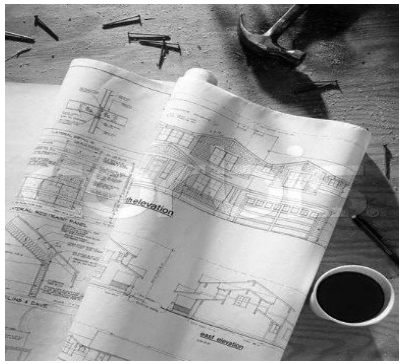
Outline

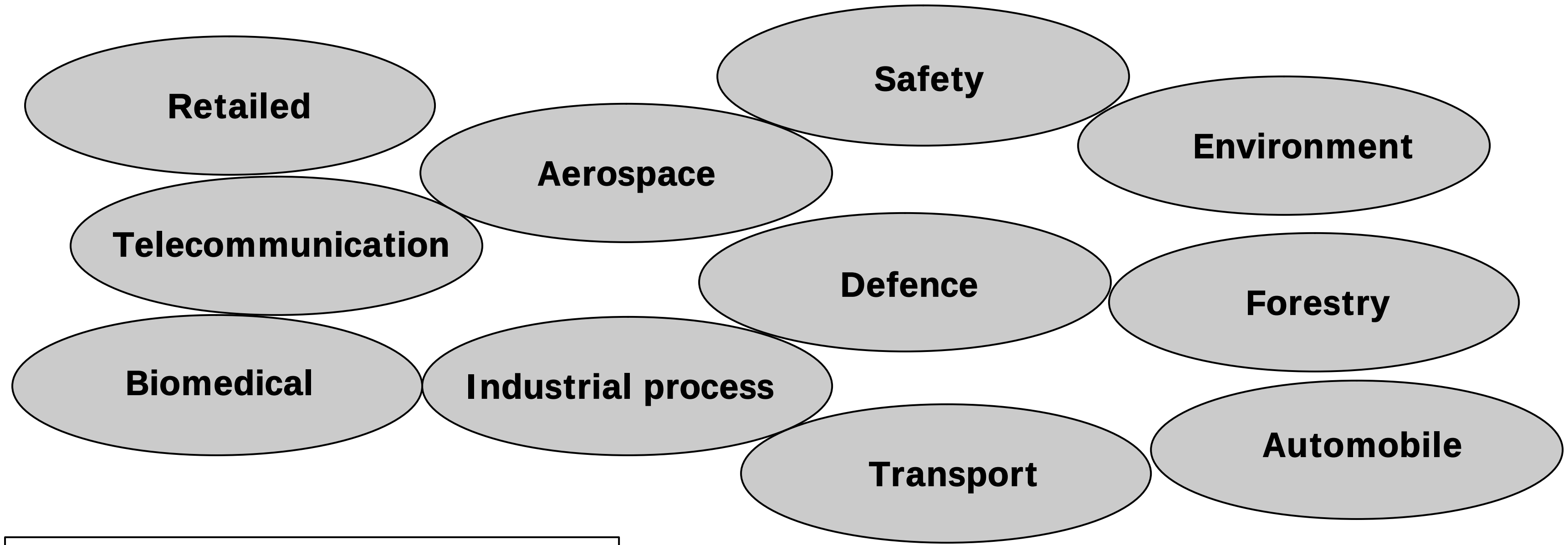
1. **Introduction**
   - ✍ **Optics definition**
   - ✍ **Milestones**
   - ✍ **Industry's characteristics**
2. **Preliminary Results**
   - ✍ **Capacity to Innovate**
   - ✍ **Capacity to Exchange Knowledge**
   - ✍ **Capacity to create and use Knowledge**
3. **Next Steps**
   - ✍ **Clustering (actual situation & perception)**
   - ✍ **Next steps in the project**



Optics World Introduction

Optics/photonics (also known simply as optics) is a rapidly emerging field of scientific, technological, and industrial activity with wide-ranging applications. Optics has to do with the production, manipulation, transmission, and detection of photons, fundamental components of light composed of waves and energy particles. *

✍ Principals Sectors of the optic/photonic technologies:



***** *Source:* **Quebec Optic City 's Web site**
http://www.quebecciteoptique.com/en/definition.asp

Milestones in the Quebec Optics Cluster...

- **1960:** DRDC (Defence & Research Development Canada) : CO2 Laser Discovery

Transition from the traditional optics to the modern optics

- **1964: Université Laval** — Alberic Boivin (LOH) **1974:** LROL & **1989:** COPL
- **1985:** INO (National Optical Institute)
- **1989:** COPL (center d'optique, photonique et Laser)

Transition from the research application to the industrial application: Exfo, ABB Bomem, Gentec

- **1998:** Cluster concept introduction : Bob Brault Visit
- **1998:** GOPQ (Groupe Optique/Photonique Québec)
- **1999:** Quebec optic city
  - ***THE clustering experience !!!!***
- **2003- :** CODEM

Industry's Characteristics

- 22 companies
- 3 Major Training centres
  - Université Laval
  - Cégeps (Limoilou + La Pocatière)
- 3 Major Research centres:
  - National Optical Institute **(INO)**
  - Defense Research and Dev. Canada **(DRDC)**
  - Centre d 'optique photnonique et laser **(COPL)**
- 4 Venture Capital Firms
  - Innovatech (Quebec Gouv.)
  - BDC (Business Dev. Bank of Can)
  - CED (Canada Economic Dev)
  - Desjardins Investments
- 10 Support Organizations

Average number of employees by company : 56
64% of companies have less than 50 employees

QUEBEC OPTIC CITY
Employees and Sales

	Number	Number of employees	$$$ of sales for the sector
Companies	21*	1171	$214 Millions
Research Institutes	3	377	
Total	24	1548	

Source: Journal Le Soleil, Samedi 22 Mars 2003

*** Data available only for 21 companies**

Industry’s Characteristics

R&D

- **3 Major Research centres** known worldwide
- Major public investments (laboratory, white rooms, equipment, etc.)
- **Humpty Dumpty phenomenon** A small amount of companies with a lot of resources in research
- **Companies’ activities** principally **R&D oriented** (science based)
- Companies are in short run Production (no mass production)

Labour Situation

- **Strong Concentration of Optics highly-qualified researchers**
- Large technical and creative labour pools
- University Laval programs and quality of teaching
- Lack of expertise in :
  - **Marketing and Commercialization**
  - **Unilingual & Experience**
  - Industrial conception
  - System production
- **Quality of life hard to sell !** “Quebec city is a great place to live but it is not (yet) a great business location.”

Optical Applications

- High Level of **diversification** among companies
- **Telecom downturn:** Spare time to invest in the organizational restructuring process

International Position

✍ **High level of int’l activities** more than 80% of companies’ sales are abroad

✍ **Small players** compare to the others in the world (only a few market shares by company)

Infrastructure & Geographical situation

- **Highly focused geographical area** (small size of the city)
- **Difficult access to regional & int. airport**

2. Preliminary Results:

Capacity to Innovate, Exchange, Create & Utilize Knowledge

Cluster's Capacities to Innovate

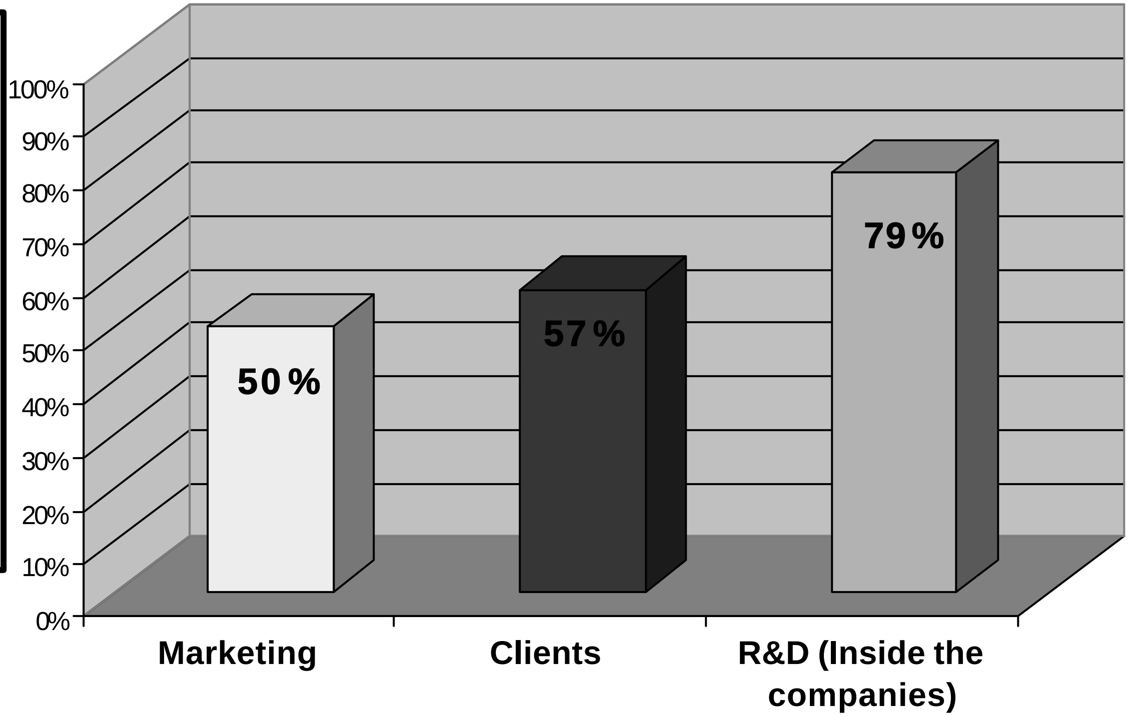
Do firms in the cluster innovate ?

100% yes

Was this a most important innovation ?

94% world first innovation

What is the relative importance of the following local sources of ideas and information for your product, service and process development?



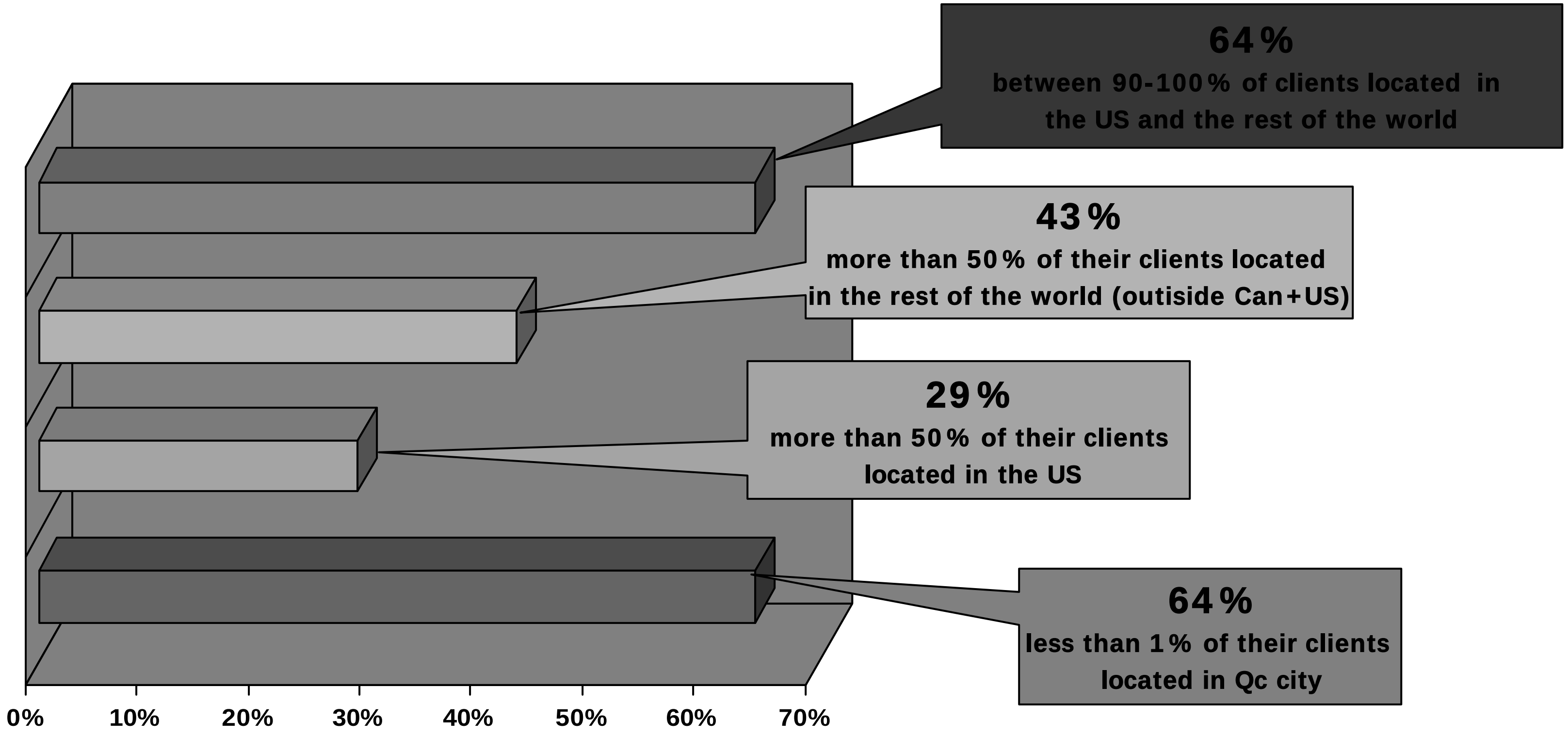
Less important innovation sources:

- **Suppliers**
- **Parent or affiliated companies**

Capacity to exchange knowledge: Main sources of New Employees

- Main source of managers:
  - → Other Companies in Quebec city (57%)
- Main source of scientists
  - → Université Laval (66%)
- Main source of sales and marketing staffs:
  - → Other Companies in Quebec city (57%)
- Main source of production staff:
  - → Other Companies in Quebec city (47%) and Training center in Quebec city (53%)

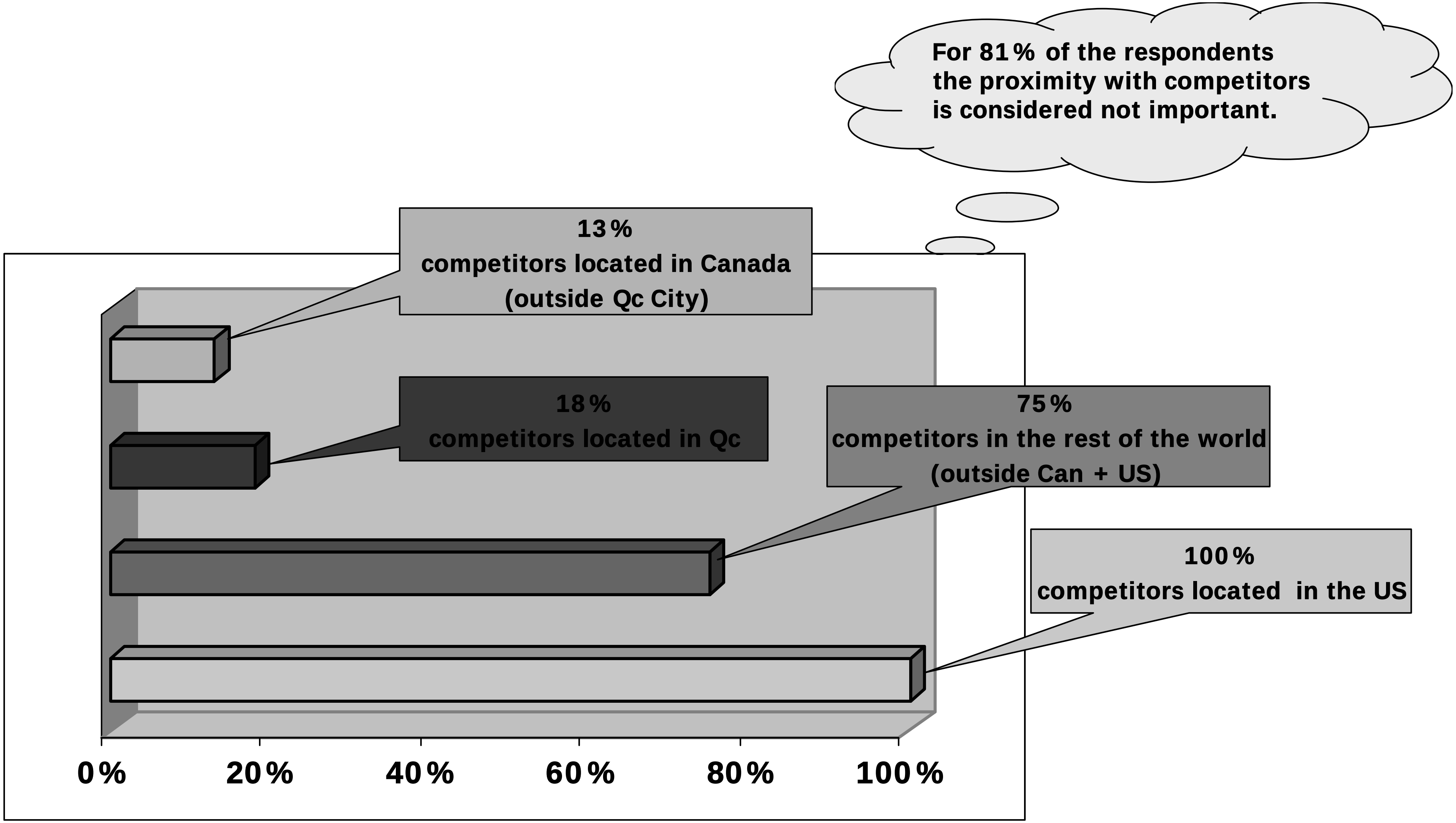
Capacity to Exchange Knowledge: Key Clients' Localization



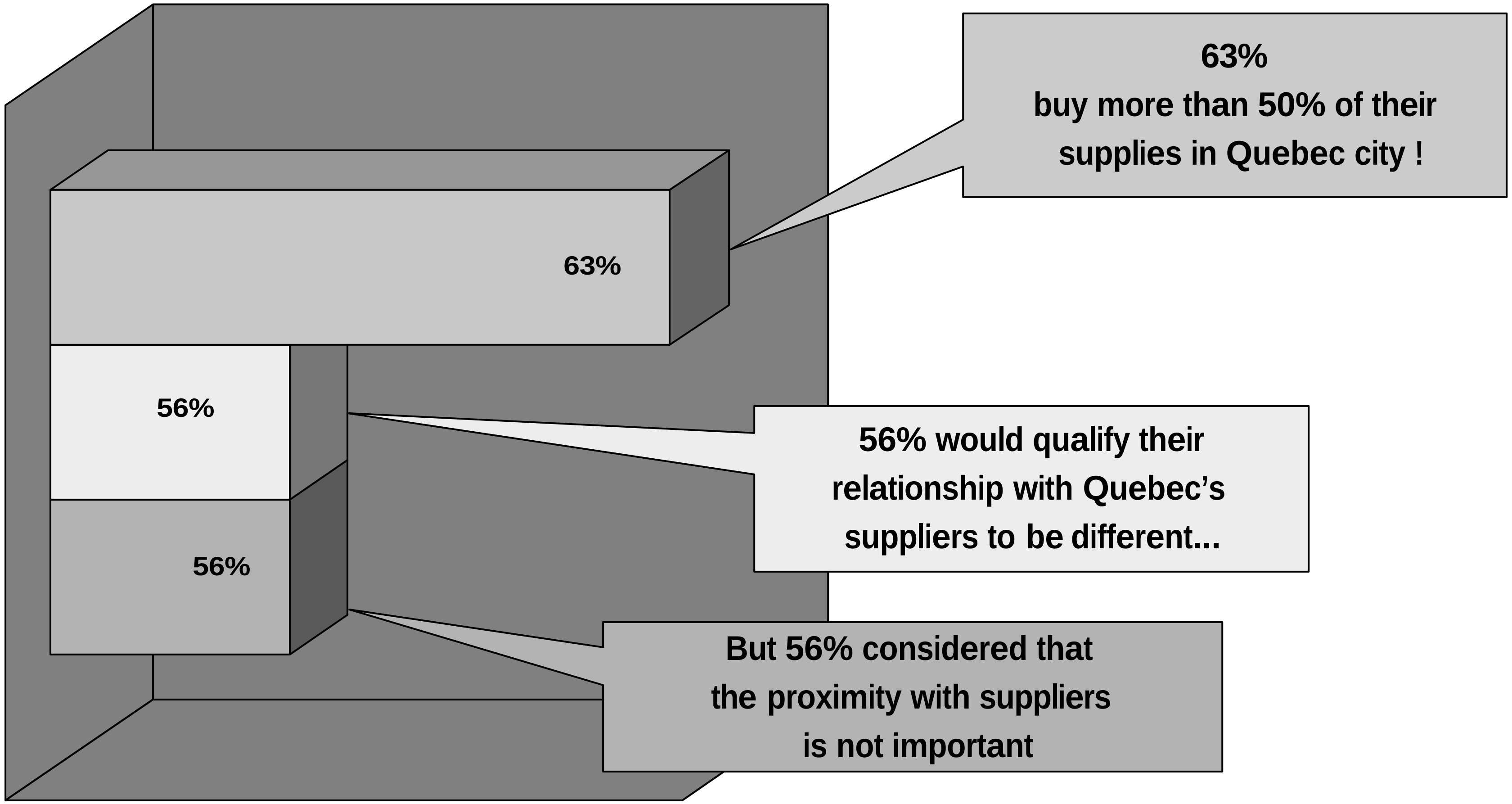
Interesting Facts:

- 70% of the respondents that have clients in Qc city say that their relationships with these clients are different.
- 56% of all the managers say that proximity with clients is important.
- only 25% would relocate their companies to be closer to their clients.

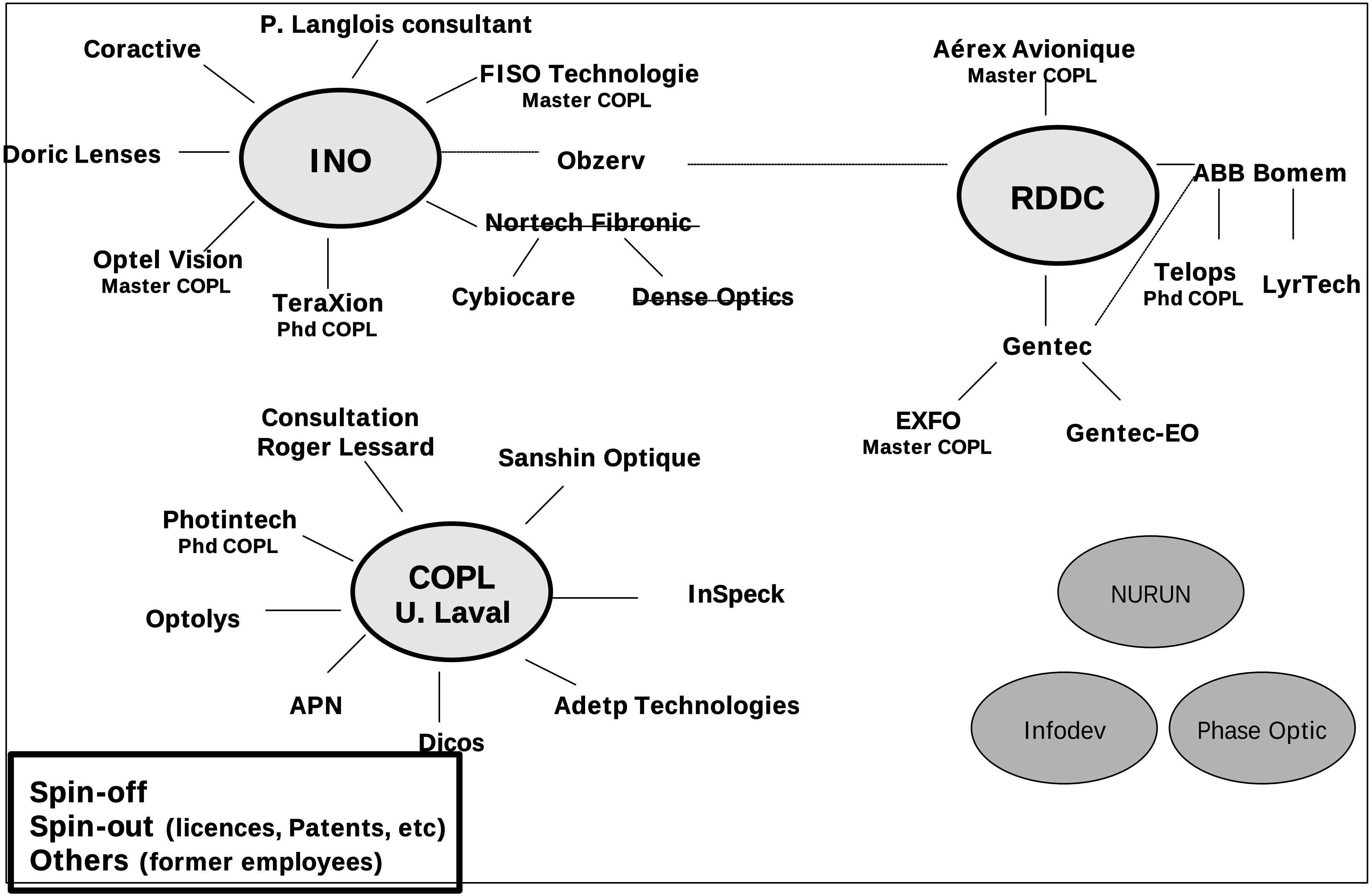
Capacity to Exchange Knowledge: Competitors ' Localization



Capacity to Exchange Knowledge: Suppliers' Localization



Capacities to Exchange, Create and Utilize Knowledge



Source : INO- adaptation Mélanie Kéroack

2. Preliminary Results

Capacity to Exchange Knowledge: Social Network Analysis

The Collection of Relational Data

1) The Socio-Metric Questionnaire:

LIST OF ORGANIZATIONS (from "Cité de l'optique")	***HOW FREQUENTLY DOES YOUR ORGANIZATION HAVE CONTACTS WITH THE FOLLOWING ORGANIZATIONS?***				
	Never	**Rarely**	**Some-times**	**Often**	**Very often**
Organization A					
Organization B					
Organization C					
Etc.					

2) Response rate: about 78 % (still in progress)

3) Treatment of relational data:

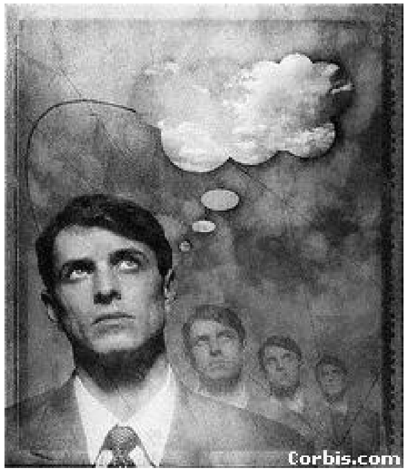
-We took the highest frequency scores, except for relations between firms and other organizations, preferring to believe the firms.

4) Software used: UCINET 6 for data treatment & analysis and NETDRAW for graph drawing

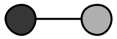
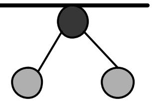
Questions addressed

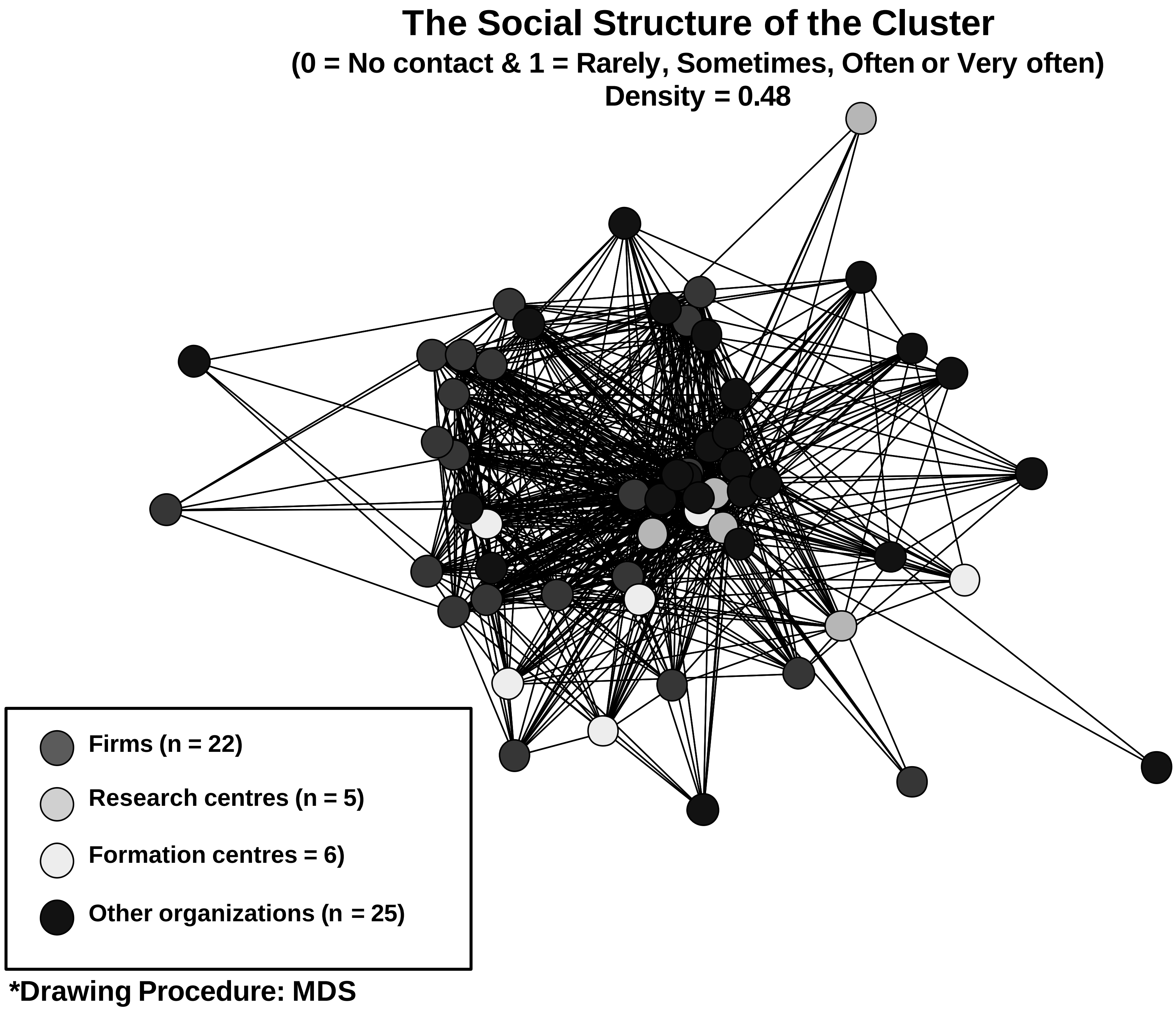
A) What types of organizations are in the center of the cluster?

B) What is the proportion of strong versus weak ties in the cluster?



A) The Centrality Issue (Top 5)

Number of Direct Ties (Freeman's Degree) 	Brokerage (Number of Broker Positions) 
1) Research center 1 (54/57)	1) Research center 1 (706)
2) Support Organization 1 (48/57)	2) Support Organization 1 (488)
3) Support Organization 2 (47/57)	3) Support Organization 2 (485)
4) Firm 1 (46/57)	4) Firm 1 (439)
5) Support Organization 3 (44/57)	5) Support Organization 3 (380)


The Social Structure of the Cluster
(0 = No contact & 1 = Rarely, Sometimes, Often or Very often)
Density = 0.48
Firms (n = 22)
Research centres (n = 5)
Formation centres = 6)
Other organizations (n = 25)
*Drawing Procedure: MDS

B) The Tie-Strength Issue

OPERATIONAL DEFINITION:

✍**Weak Ties = Rarely or Sometimes**

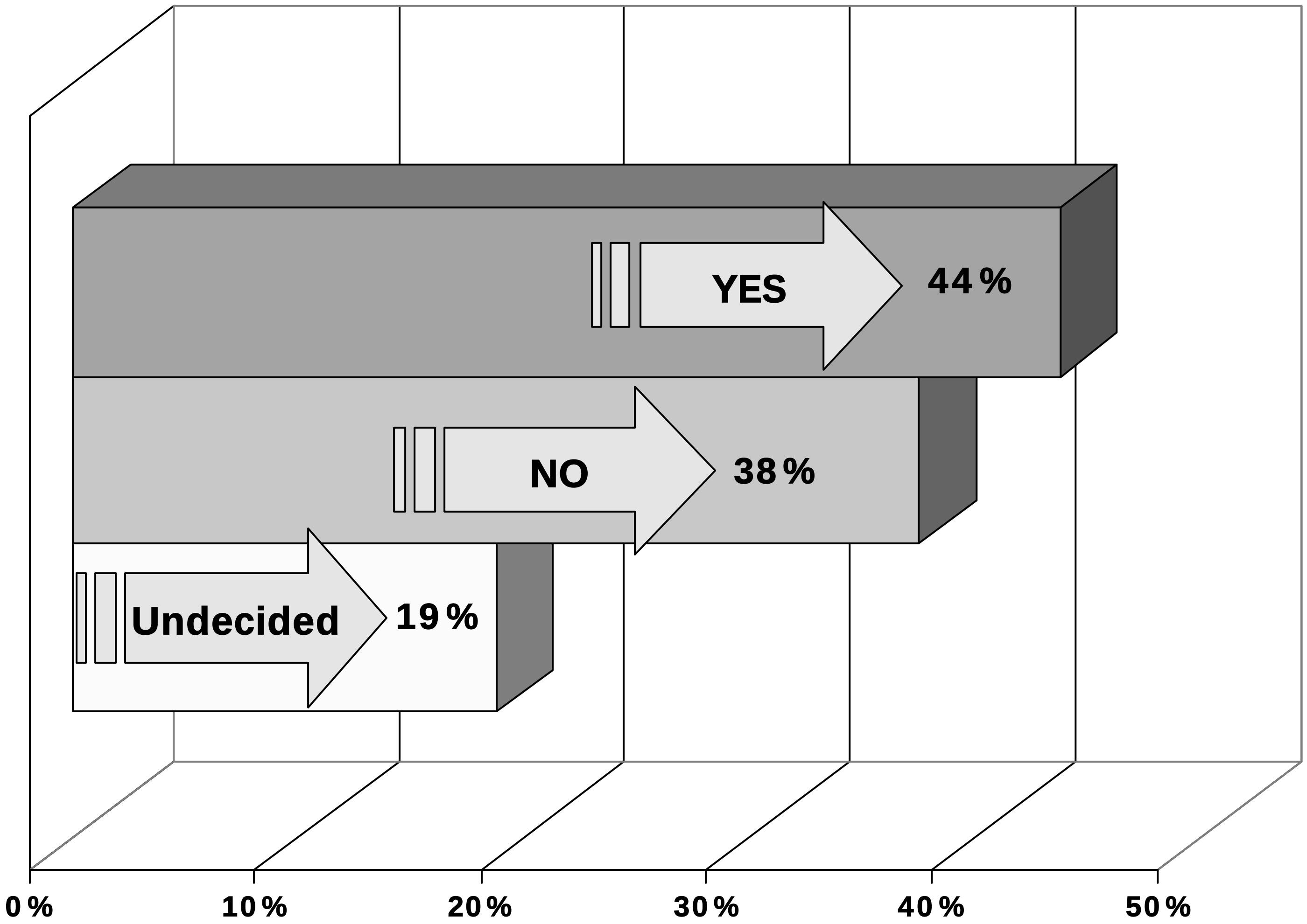
✍**Strong Ties = Often or Very often**

	% of Weak Ties	% of Strong Ties
The whole cluster	62.5	37.5
Relations between firms	78.3	21.7
Relations between other organizations	55.2	44.8
Relations between firms & other organizations	63.3	36.7

3. Next Steps....

« THE » Question :

Do you consider your company to be part of a cluster ?



Next Steps…

- Preliminary Results suggest:
  - Behaviour: Cluster (Social Network Analysis)
  - Perceptions: No cluster (Interviews)
- Large Gap between perceptions and behaviours:
  - This gap will need further investigation
- Cluster’s Capacity to evolve:
  - Companies’ size + number & Short Run Production
- Research Project still in Progress:
  - Interviews and Analysis Continuation.
  - Association between network position and innovative behaviour.

Thank you for your attention !

Any Questions ?

“There is no power to change greater than community discovering what it cares about…Reality doesn’t change Itself we need to act.”

Source: Wheatley Margaret, Turning to one another “simple conversation to restore hope in the future”.

ANNEXES …….

« Social and cultural factors (labour, mobility, sharing info, etc.) form the glue which makes the cluster operational…. »

The development of clusters, Environment Transport Region, London, June 2000.

Cluster Policy in Quebec City

- Innovation:
  - R&D taxes credit program
- Production:
  - Production technician taxes credit program (Cité de l'Optique)
- Commercialization:
  - Market development subvention program (PADCO)
- Training:
  - Optical formation taxes program (PAFO)

Most Popular Cluster’ Activities

1- Government Relations	✍Lobbying ✍Coordination of public and private investments
2- Formation	CEO training ✍Other training Research project jointly
3- R&D	✍Fundamental research ✍Applied research
Production	Production Production projects in collaboration Buying of supplies jointly
Sales & Marketing	Market Research ✍Sales activities jointly
Logistic	Storage jointly Transportation jointly

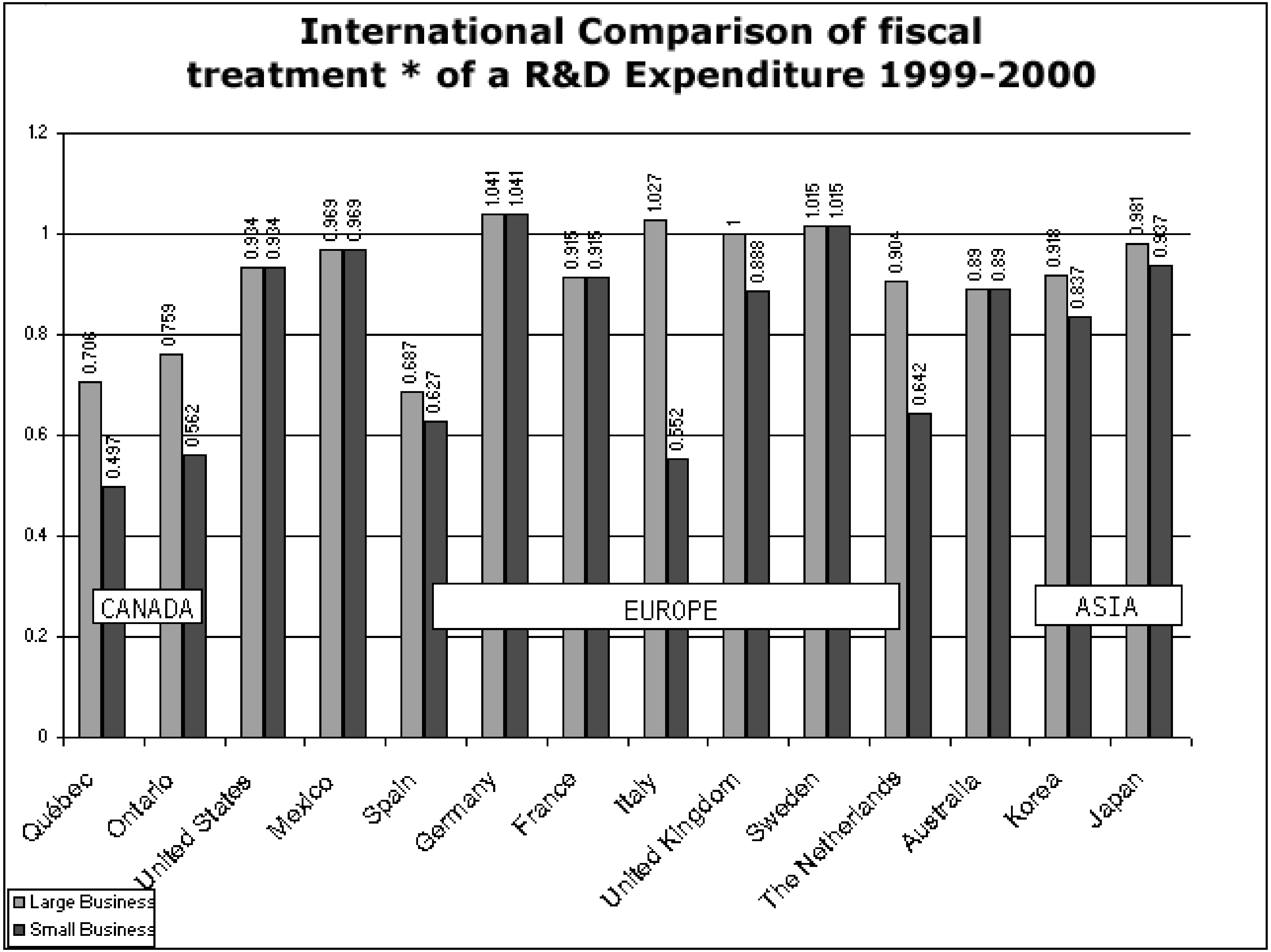
Source : ENSR Study Clusters, Spring 2001.

Annexe: Role of Research Institutes: Knowledge Transfer

- RDDC:
  - Four times a year « Technological Morning »
  - Scientific Articles Publications
  - Conferences (Quebec & Abroad)
  - Defence contact
- INO:
  - The results are sent to the members
  - Most scientific Articles Publications are available via Internet
  - Conferences around the world
  - Visit of INO for different industrial groups (to show what they can do with the fiber)
- COPL:
  - Contacts with companies very often to discuss about it
  - No formal forum to exchange about it but a lot of informal exchanges (Master & Phd projects)

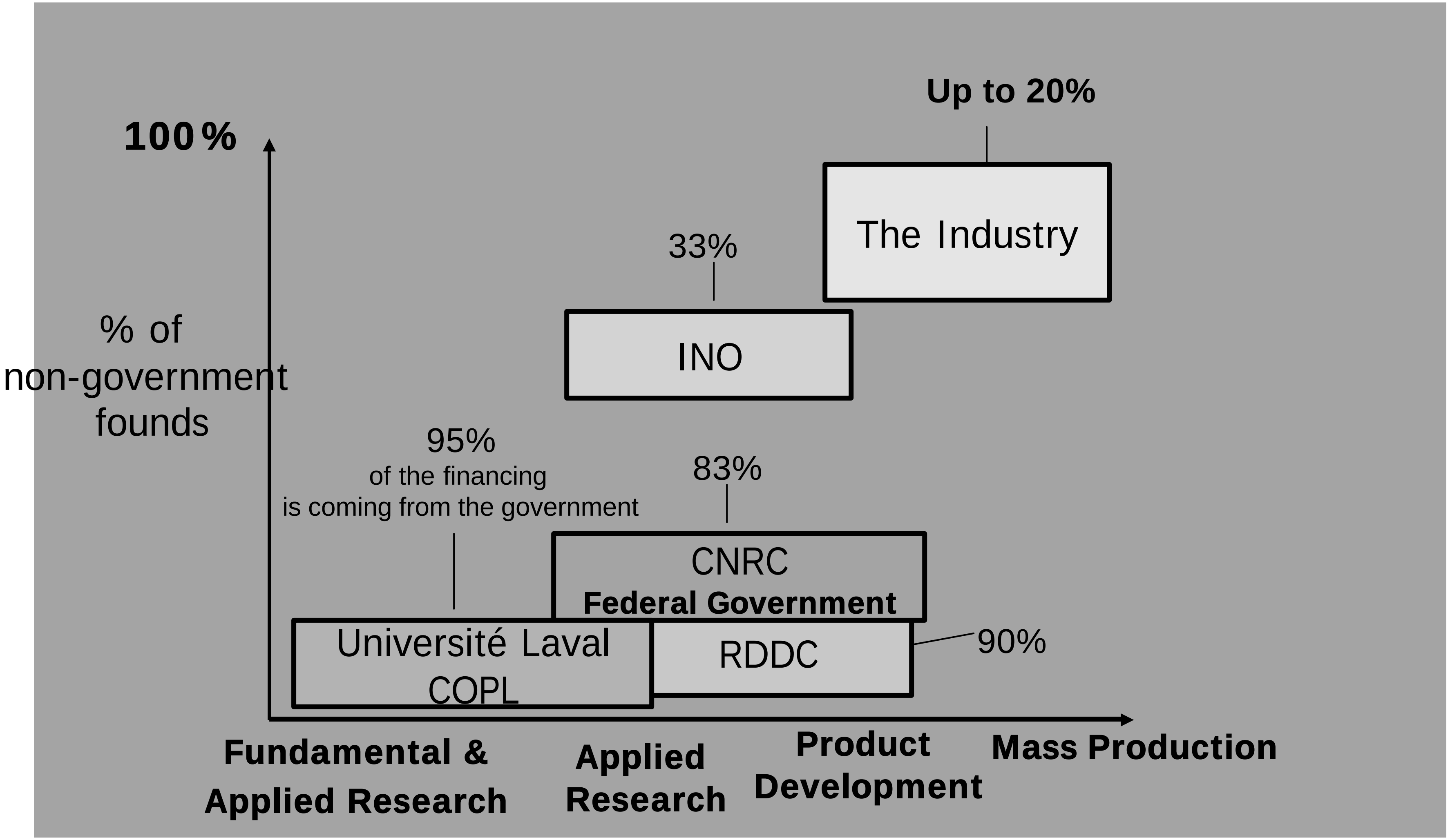
Role of Research Institutes: Collaboration

	RDD	INO	COPL
Formal research projects	**Yes** $30 Millions for contract each year	**Yes** that is our core business	**Not really formal** but Co direction of Masters & PhDs Projects
Member of the institute working in companies	**No** but we would like to do it in the future	**No**	**Marginal:** Only one or two
Research consortium Participation	**Yes**	**Yes** Actively with the CIPI	**Yes** with the CIPI consortium
Licences or patents attached to invention	**Yes**	**Yes**	**2 or 3** per year but not necessary with companies
New technology development	**Yes** All the time !!!	**Yes**	**Yes** the number is always increasing
Formation program development	**No**	**No** put often our scientists give classes at the universities	**Yes** new certificate in optic
Member of the industry working for your institute	**Yes**	**No** (too many secret projects)	**No**



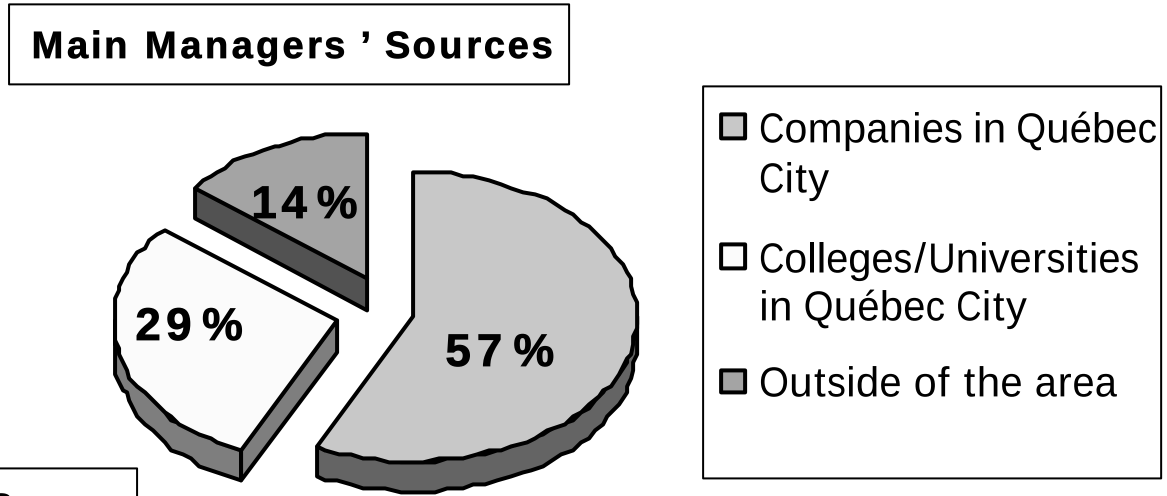
Source: KPMG http://www.infostat.gouv.qc.ca

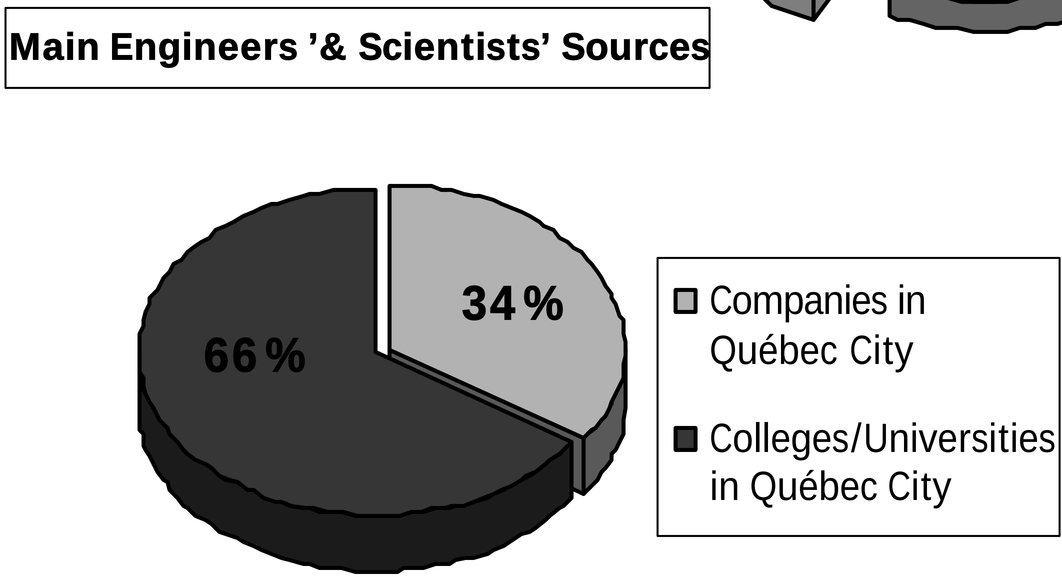
Capacity to Create Knowledge



Source: INO

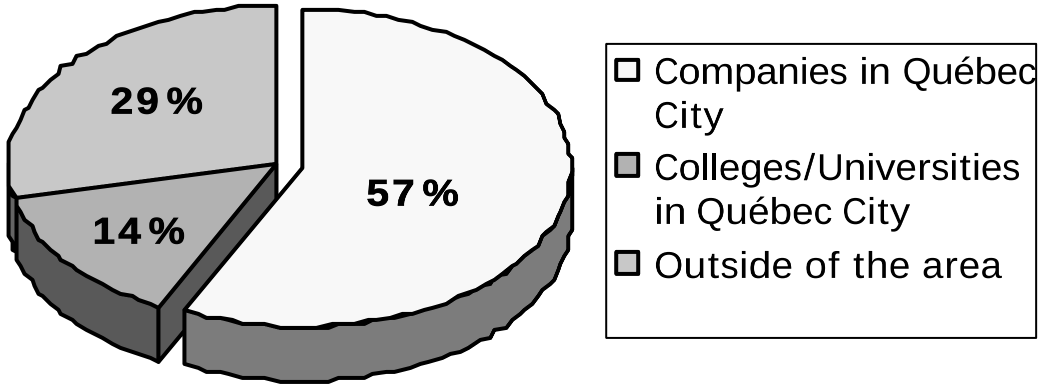
Capacity to Exchange Knowlege: Main Sources of New Employees



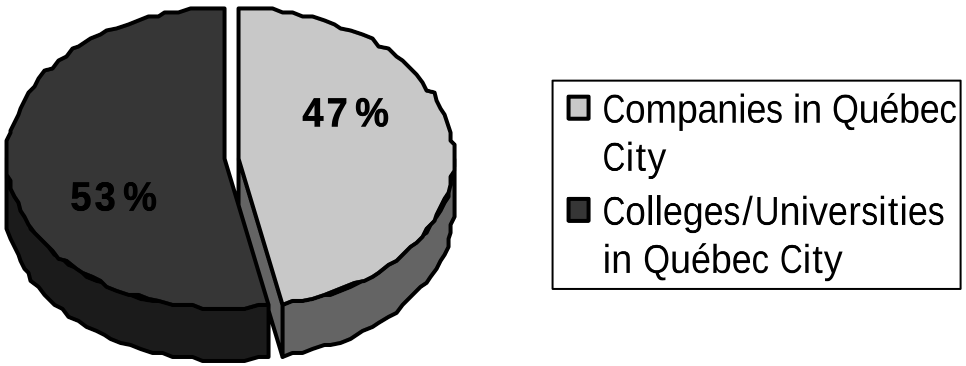


Capacity to Exchange Knowlege: Main Sources of New Employees

Main Sales and Marketing Staff's Sources



Main Production Staff's Sources



« THE » Question :

Do you consider your company to be part of a cluster ?

YES
Why?

- **Companies ' small size: easy to meet and to know everybody.**
- **The presence of 3 important research centres**
- **Existence of apolitical organization where entrepreneurs can discuss about confidential aspects**
- **Existence of common interests and problems**

No
Why?

- **Absence of collaboration among companies**
- **No dynamism in the city for the cluster.**
  "I don't feel I'm part of the cluster at all !"
- **No tonus and vertebral column in the cluster. Companies are too young and the amount is too low.**
- **Everybody is preoccupied by its own success... "no time to invest in that !"**
- **The emphasis of the cluster is too much on telecom**
- **No added-values activities "I don't have time to loose to go meet people that I know already."**
- **Too small world, too much gossiping. "I 'd rather talk to entrepreneurs outside the cluster."**
- **Very low level of companies' participation.**
  " Sometimes there is more support organizations at the meetings than entrepreneurs !"

Cluster Strengths and Weaknesses

	STRENGHTS	WEAKNESSES
LABOUR	✍Large pool of skill scientists, engineers and production workers.	✍Unilingual Francophone. ✍Low entrepreneurial culture. ✍Marketing expertise's deficit. ✍Low level of specialized workers (system, industrial design, etc.)
TECHNOLOGY	✍A lot of first world class innovation.	✍No big market potential.
FUNDING	------	✍Low competition. ✍Strict selection criteria: a lot of concession needs to be made.
PHYSICAL INFRASTRUCTURE	✍Proximity to raw materials ✍Availability of production space and very innovative equipments.	✍ Low level of automation (high production cost). ✍Difficult accessibility to market (airport issue).
TAX & FISCAL POLICY	✍A lot of collaboration between the government and the industry. ✍Government is proactive in adapting public policy to the sector.	✍Ending of Taxes credit program in 2005...
QUALITY OF LIFE	✍People from Quebec wants to stay in Quebec but...	✍The quality of leaving is not easy to sale to strangers....
NETWORKING	✍Good business support services. ✍Several support organizations (sometimes too many !). ✍Many relations between the actors.	✍More could be done by the clustering organization.

Conclusion
Cluster 's Evolution Capacity