



Anchors Away!

The evolution of an ICT cluster
after the sinking of its flagship company



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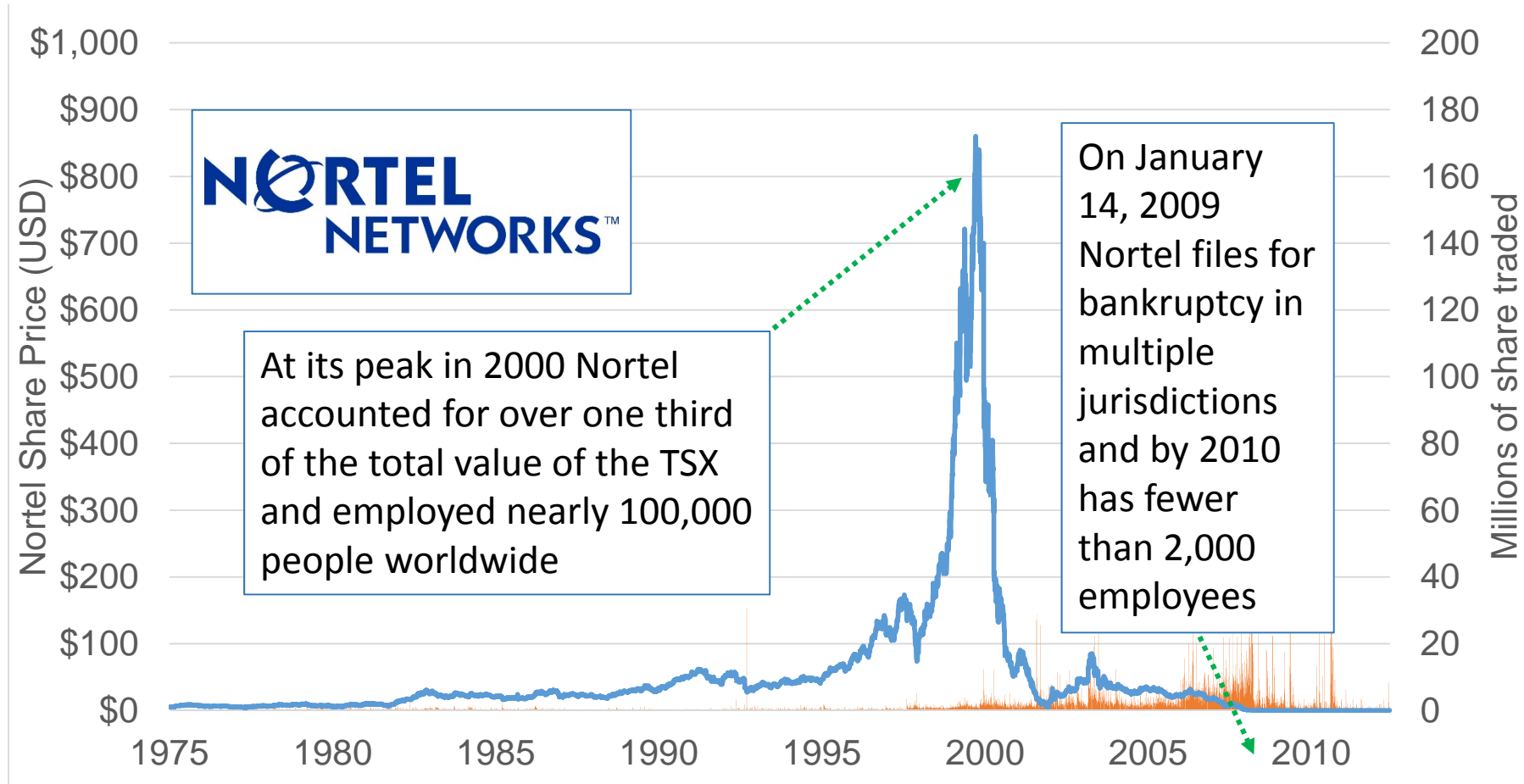
Gregory M. Spencer
University of Toronto



Peter Kedron
Oklahoma State Univ.



THE SPECTACULAR RISE AND FALL OF NORTEL NETWORKS



RESEARCH QUESTIONS ???

How resilient was the Ottawa-Gatineau ICT cluster in response to the collapse of Nortel?

What happened to Nortel's inventive capacity?

- Did it remain? Leave? Dissipate?

What were the main sources of the ICT cluster's resiliency?

- Creative destruction/entrepreneurship?
- New entries (from elsewhere or away from home)?
- Existing firms?

To what extent can 'Knowledge Space' measures explain Nortel's inventive footprint?



LITERATURE

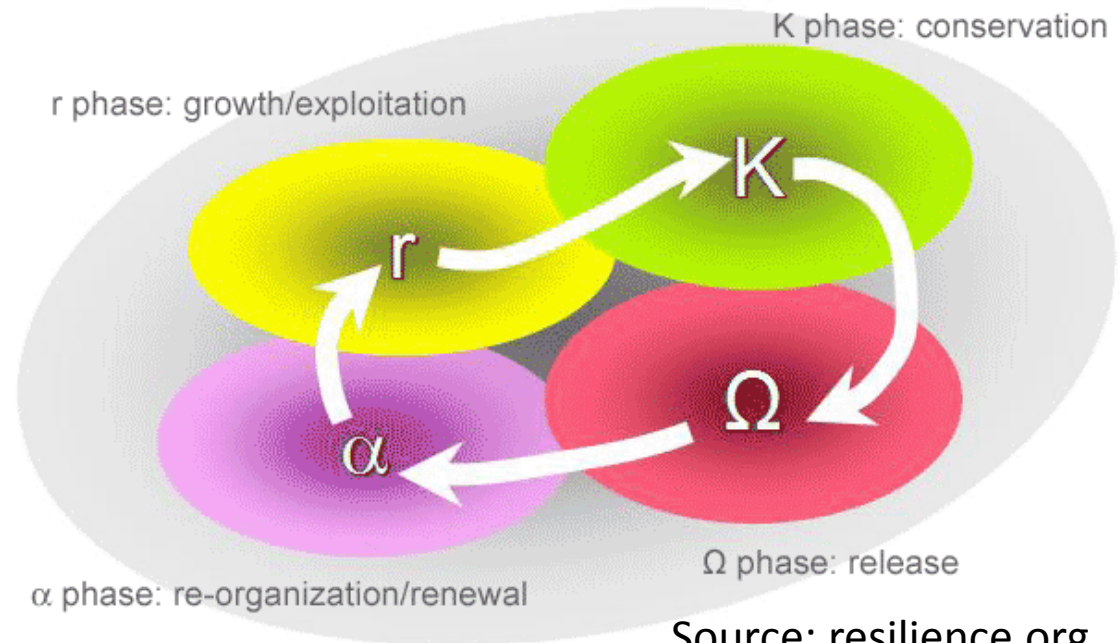
Building on the University of Ottawa study (Calof et al 2014) that investigated why Nortel collapsed and the impact of the collapse.

Three related literatures

- Clusters & Local Ecosystems
- Local/Regional Resiliency
- Evolutionary Economic Geography

Systems approach to adaptive cycles

Socio-Spatial Dialectic
“Firms and Space”



APPROACH AND METHODS

- “Follow” Nortel inventors in order to understand the evolution of the inventive capacity of the Ottawa-Gatineau ICT cluster

- Identify where former Nortel inventors went during and after the company’s collapse (i.e. new firms; existing firms; local/non-local)

- Investigate Nortel’s technology evolution through its ‘Knowledge Space’ at home and abroad.

- Develop a method to enhance our understanding of locational choices of high-tech firms driven by ‘local’ expertise rather than the search for ‘cheap’ factors of production



UNITED STATES PATENT and TRADE-MARK OFFICE

uspto.gov



USPTO PATENT # GRANT DATE

US007956846B2

(12) United States Patent Ording et al.

(10) Patent No.: US 7,956,846 B2 (45) Date of Patent: Jun. 7, 2011

(54) PORTABLE ELECTRONIC DEVICE WITH CONTENT-DEPENDENT TOUCH SENSITIVITY

(56) References Cited

(75) Inventors: Bas Ording, San Francisco, CA (US); Scott Forstall, Mountain View, CA (US); Greg Christie, San Jose, CA (US); Stephen O. Lemay, San Francisco, CA (US); Imran Chaudhri, San Francisco, CA (US); Scott Herz, Santa Clara, CA (US)

INVENTORS

(73) Assignee: Apple Inc., Cupertino, CA (US)

ASG.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 699 days.

(21) Appl. No.: 11/620,027

(22) Filed: Jan. 4, 2007

(65) Prior Publication Data

US 2008/0216001 A1 Sep. 4, 2008

Related U.S. Application Data

(60) Provisional application No. 60/756,833, filed on Jan. 5, 2006.

US PATENT CLASS

(51) Int. Cl. G06F 3/041 (2006.01)

(52) U.S. Cl. 345/173; 715/763

(58) Field of Classification Search 345/173-178; 178/18.01-18.09; 704/1-10; 715/763 See application file for complete search history.

U.S. PATENT DOCUMENTS

Table of U.S. Patent Documents with columns for number, class, date, and inventor name.

OTHER PUBLICATIONS

Centroid, http://faculty.evansville.edu/ck6/tcenters/class/centroid.html, printed Apr. 28, 2006, 4 pages. Electric Potential, http://en.wikipedia.org/wiki/Electrical_potential, printed Dec. 28, 2007, 5 pages. Electrostatic Potential, Scalar Potential versus Vector Field, http://www.phy.duke.edu/~rgb/Class/phy42/node10.html, printed Apr. 19, 2006, 6 pages.

* cited by examiner

Primary Examiner — Richard Hjerpe Assistant Examiner — Sahlu Okebato

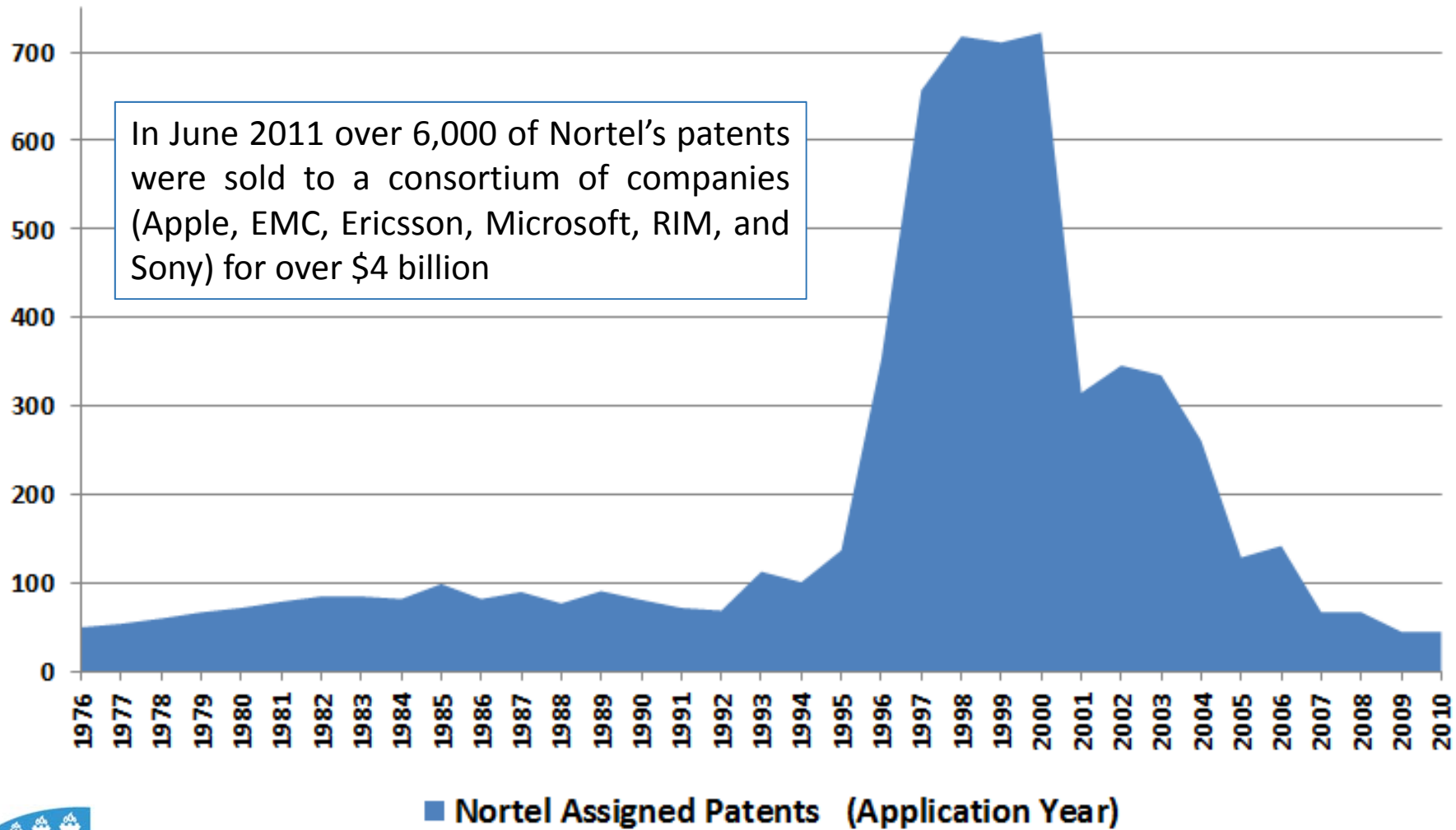
(74) Attorney, Agent, or Firm — Morgan, Lewis & Bockius LLP

(57) ABSTRACT

A portable electronic device, having a touch-sensitive display, displays a plurality of icons on the touch-sensitive display. A contact region when a user makes contact with the touch-sensitive display is detected. Whether the contact region corresponds to one of the plurality of icons is determined in accordance with an electrostatic model.

24 Claims, 11 Drawing Sheets

NORTEL'S HIGHLY INVENTIVE HISTORY



LOCATING NORTEL... the “FIRM-SPACE-NEXUS”

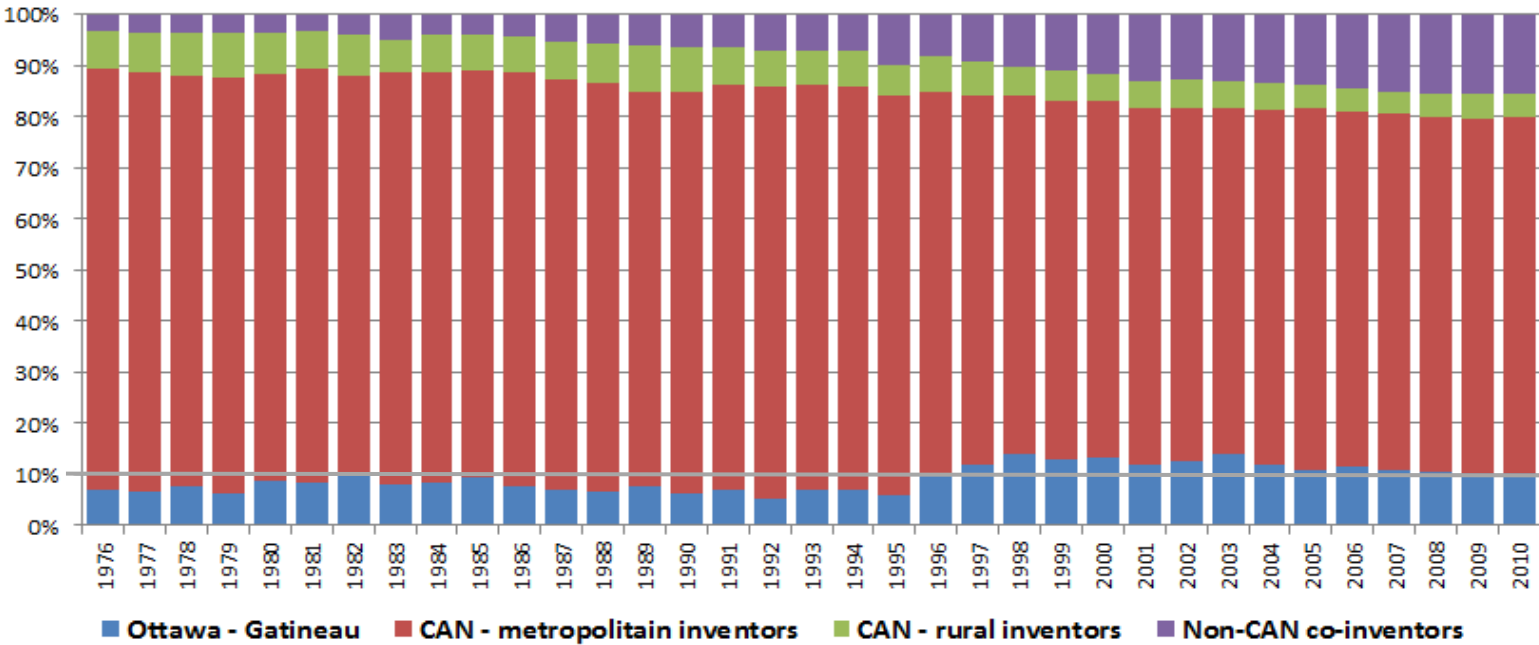
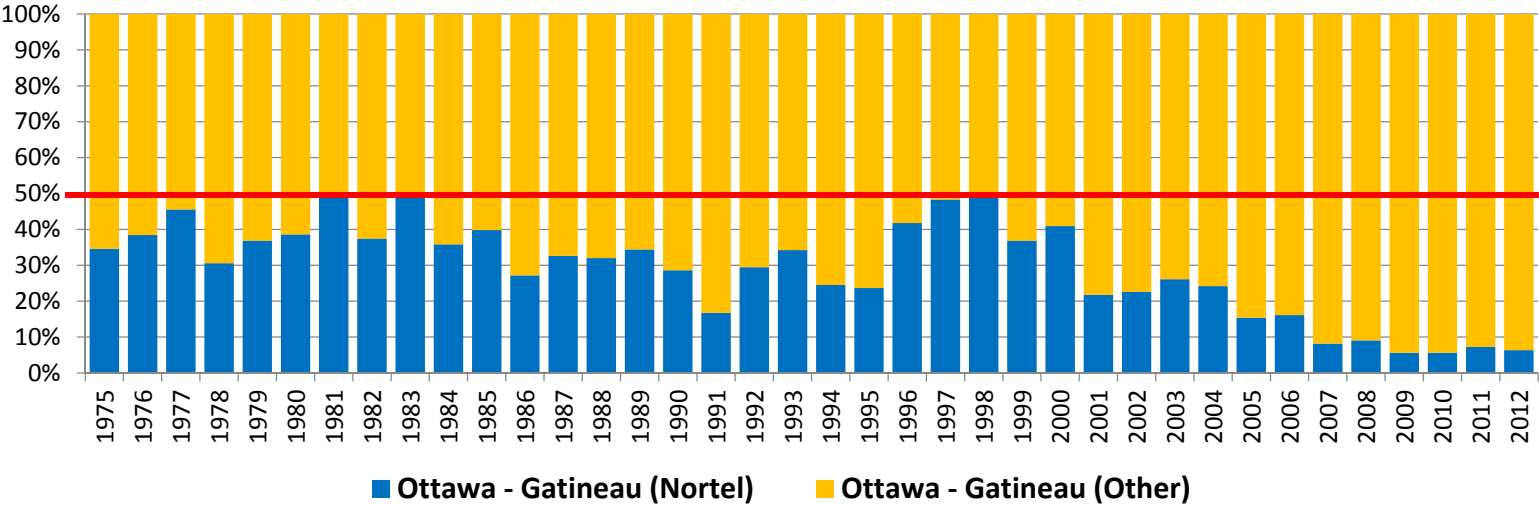


HQ – Mississauga, ON

Nortel's R&D centres:
Ottawa (R&D headquarters),
Montreal, Belleville, and Calgary.
In the US - Research Triangle Park
(NC), Richardson (TX), Billerica
(MA), and Santa Clara (CA).

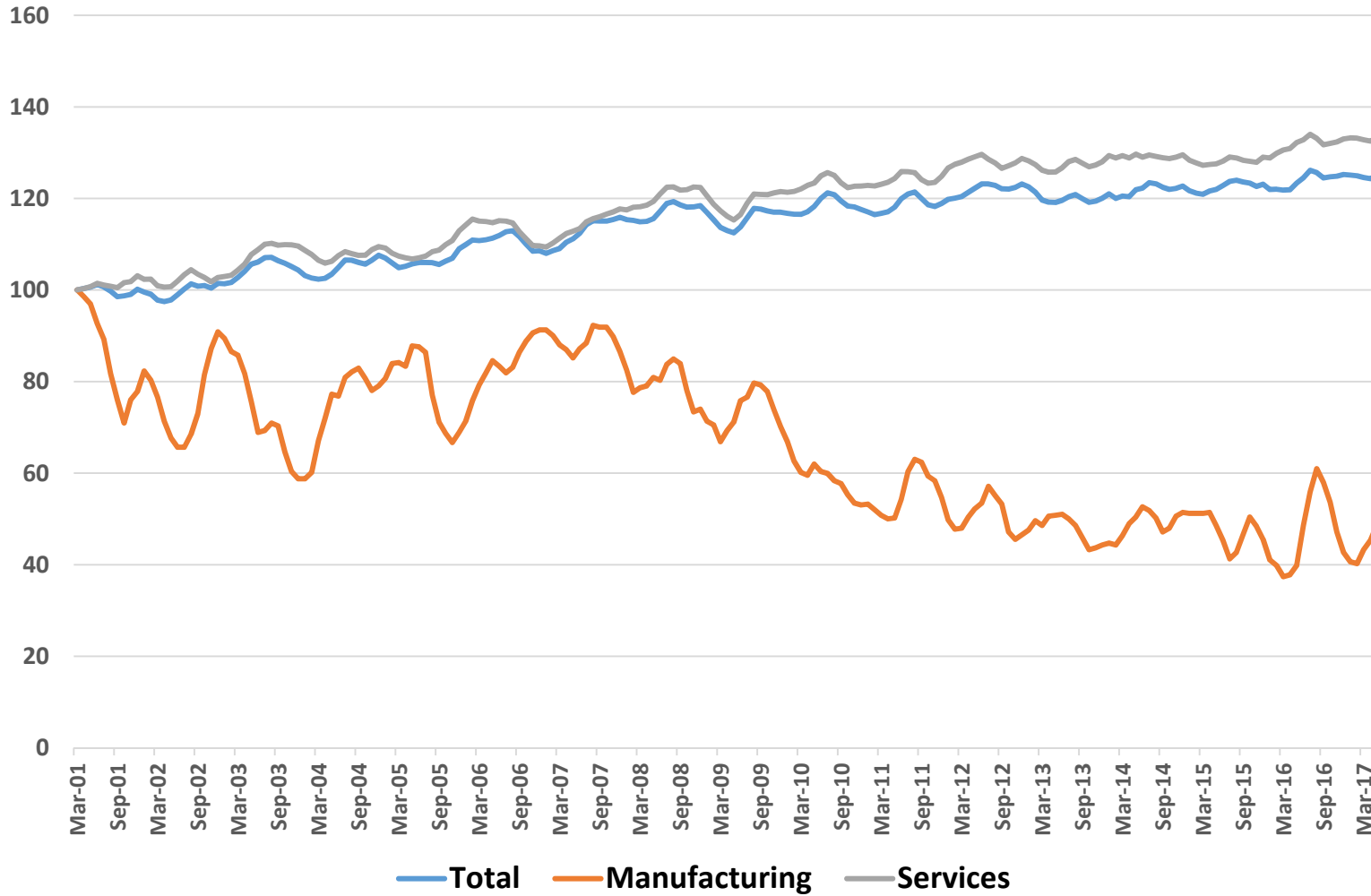


CANADIAN AND OTTAWA-GATINEAU INVENTOR POPULATION

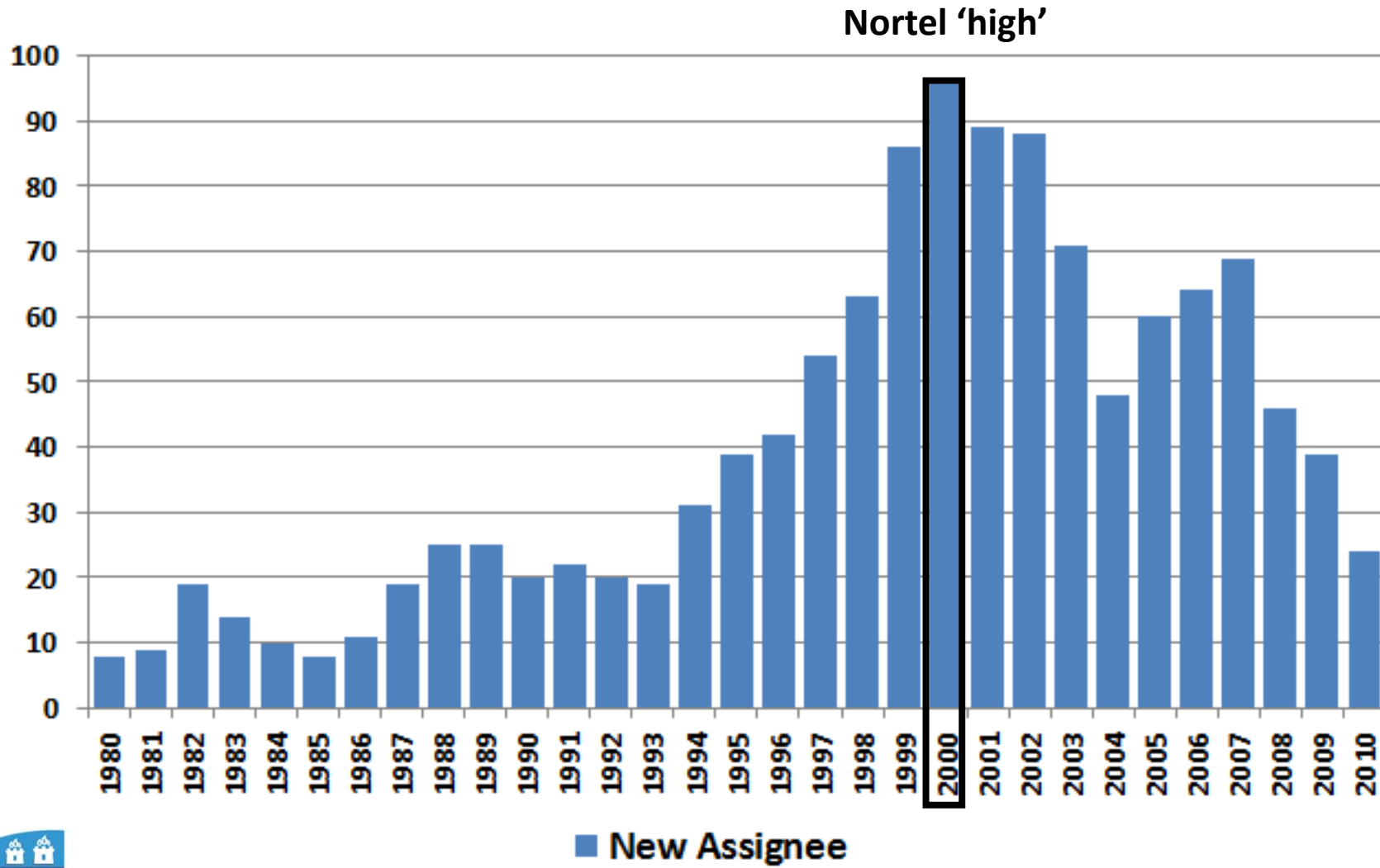


LOCAL IMPACT NOT AS SEVERE AS EXPECTED

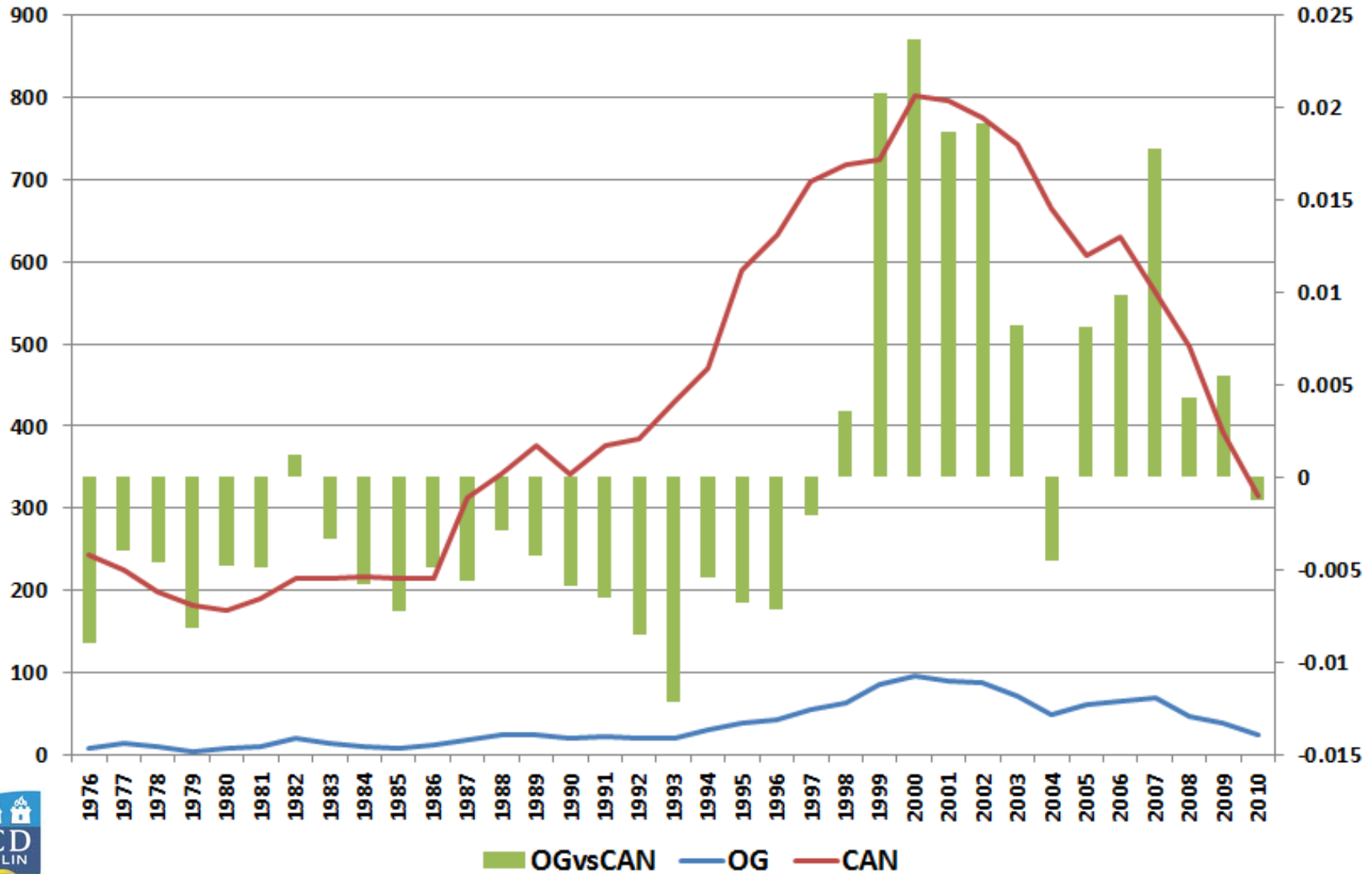
Monthly employment in Ottawa-Gatineau (March 2001 = 100)



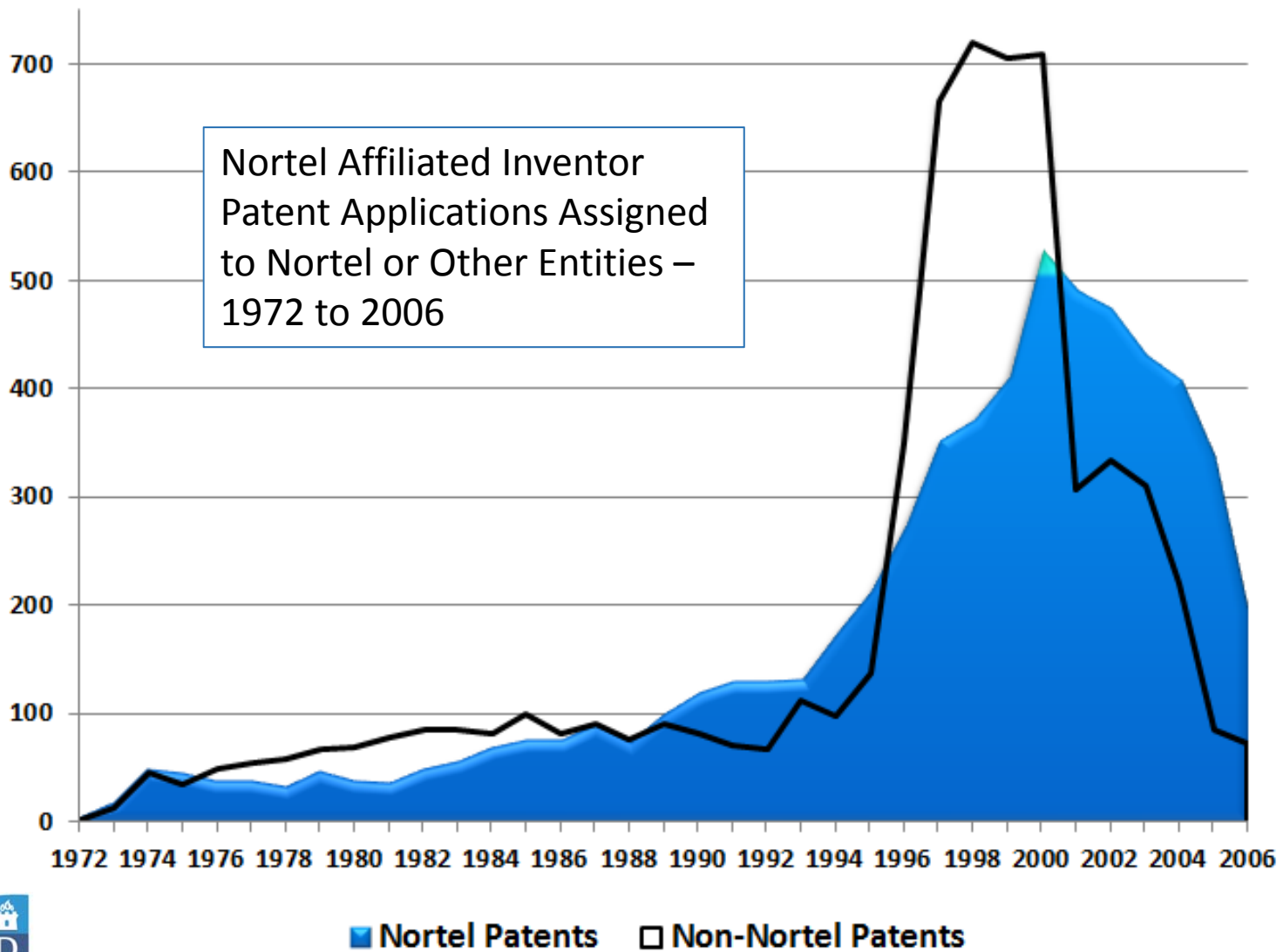
ENTREPRENEURSHIP?



FIRST-TIME ASSIGNEES CAN vs. OTTAWA-GATINEAU



THE 'GIVE' AND 'TAKE' OF KNOWLEDGE EXTERNALITIES



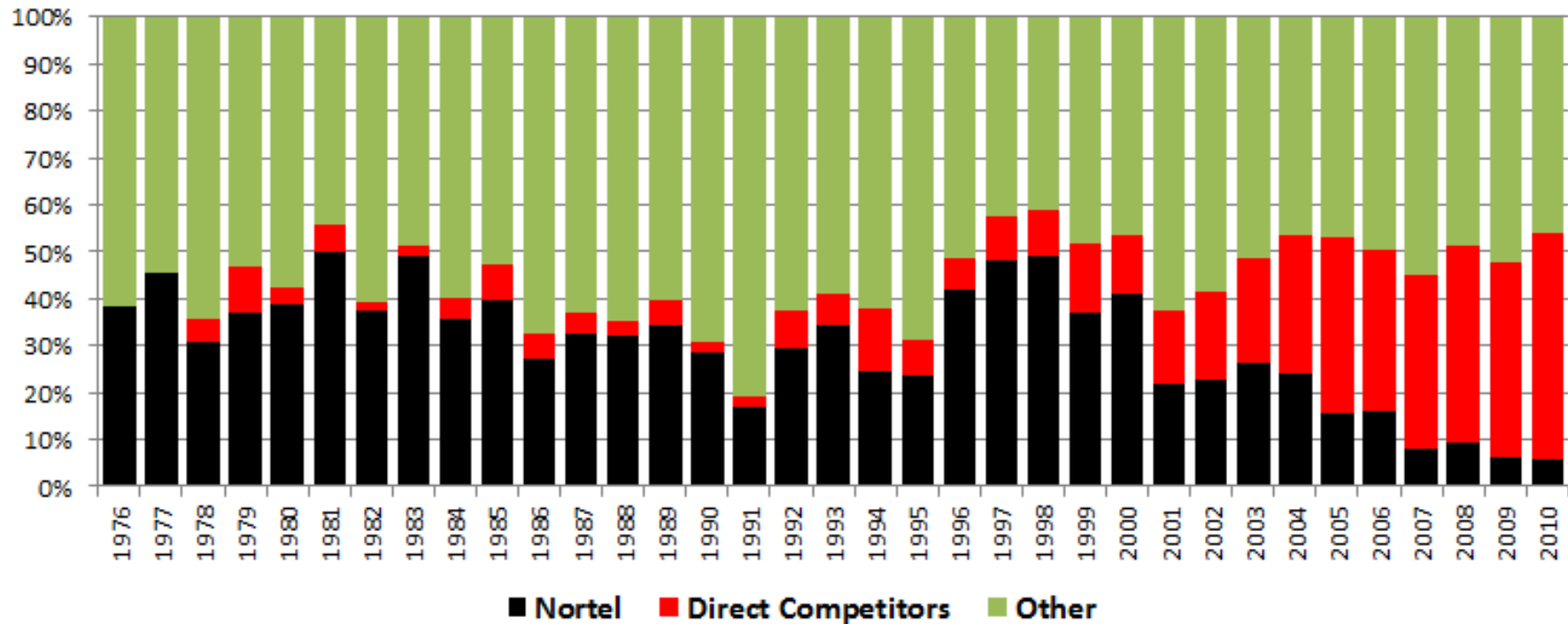
Nortel:
6,219

Other Entities:
6,127

Number of Assignees:
931



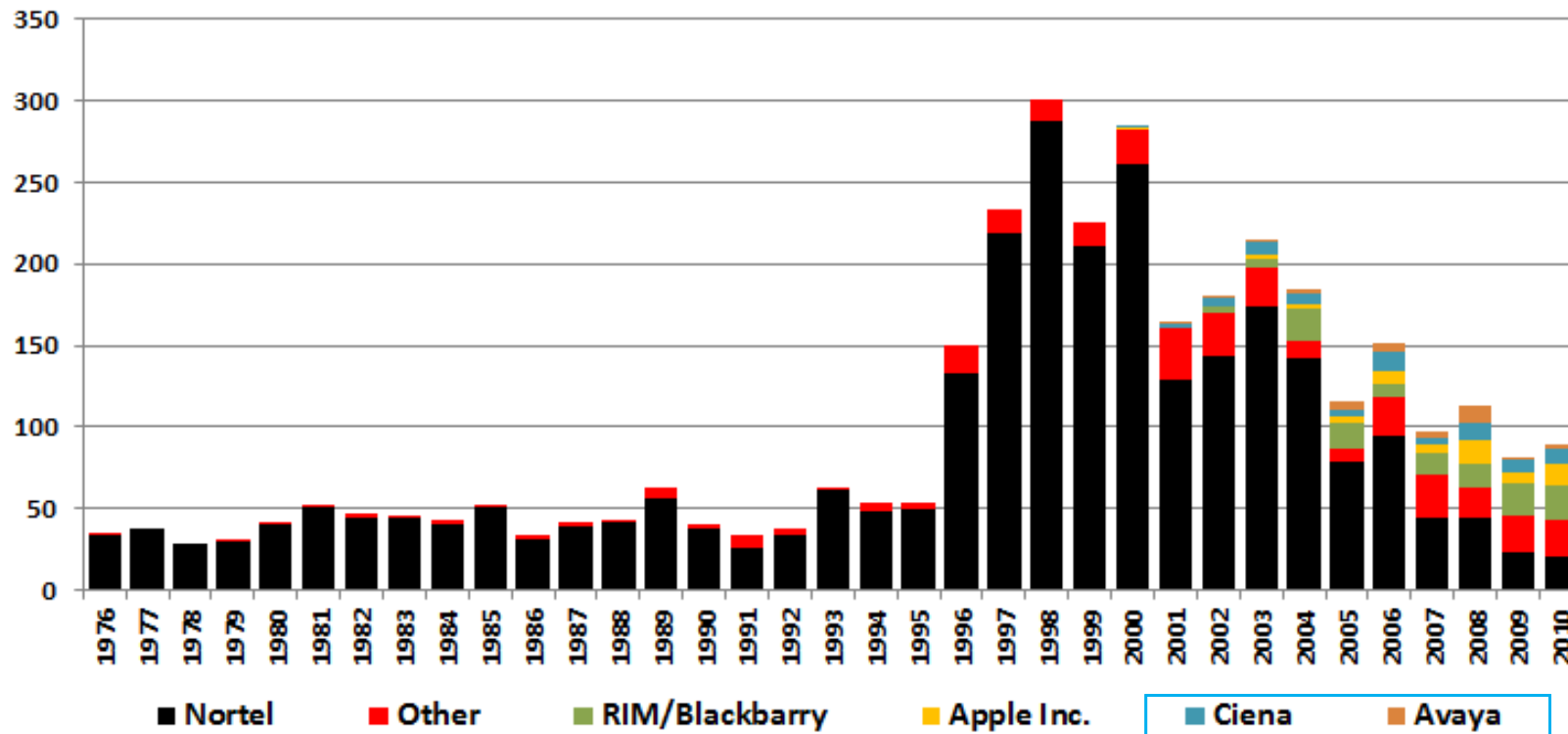
THE RISE OF NORTEL'S COMPETITORS IN OTTAWA



Competitors are firms that invent and combine the same classes found in Nortel's knowledge space



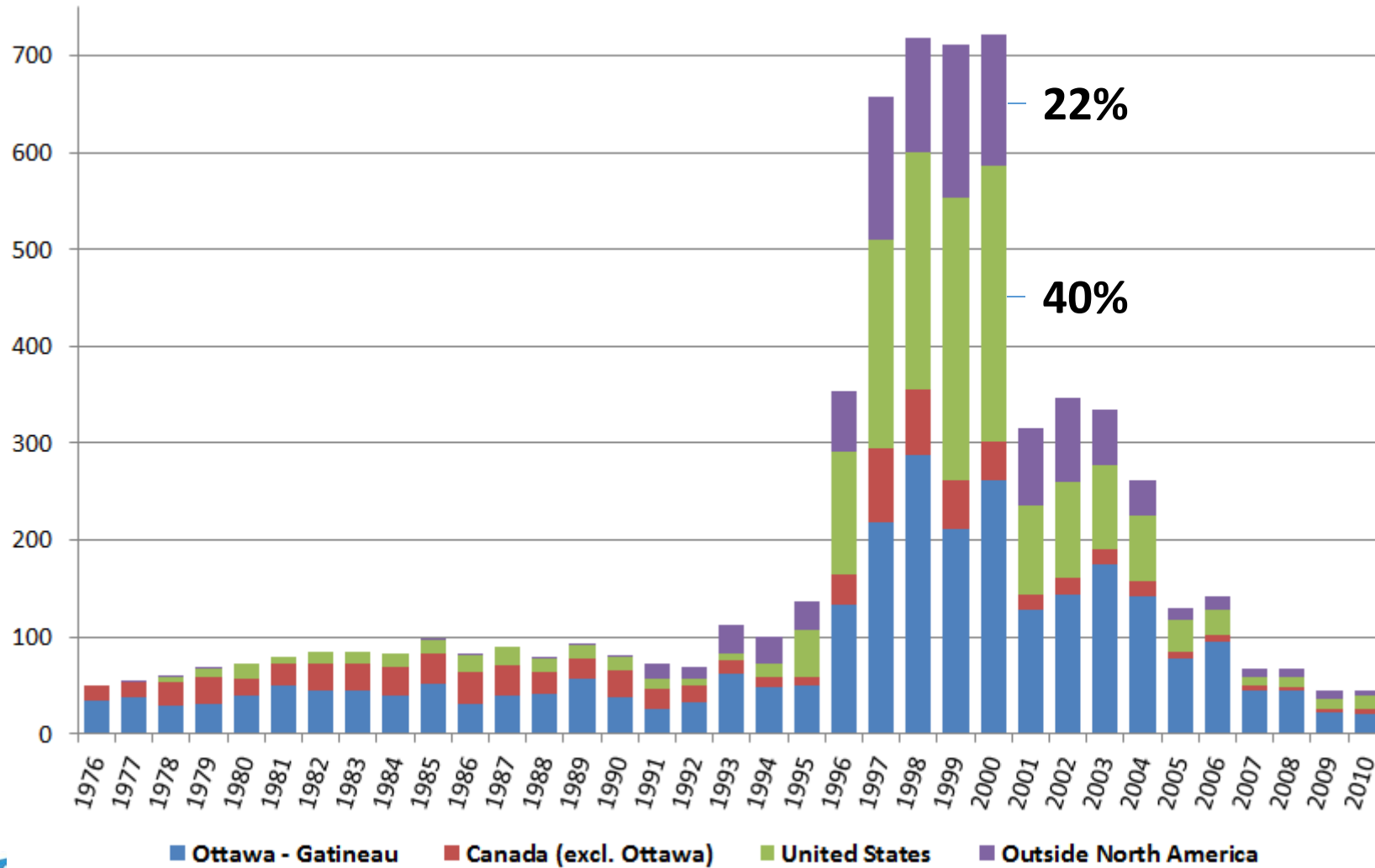
NORTEL INVENTORS – WHERE DID THEY GO?



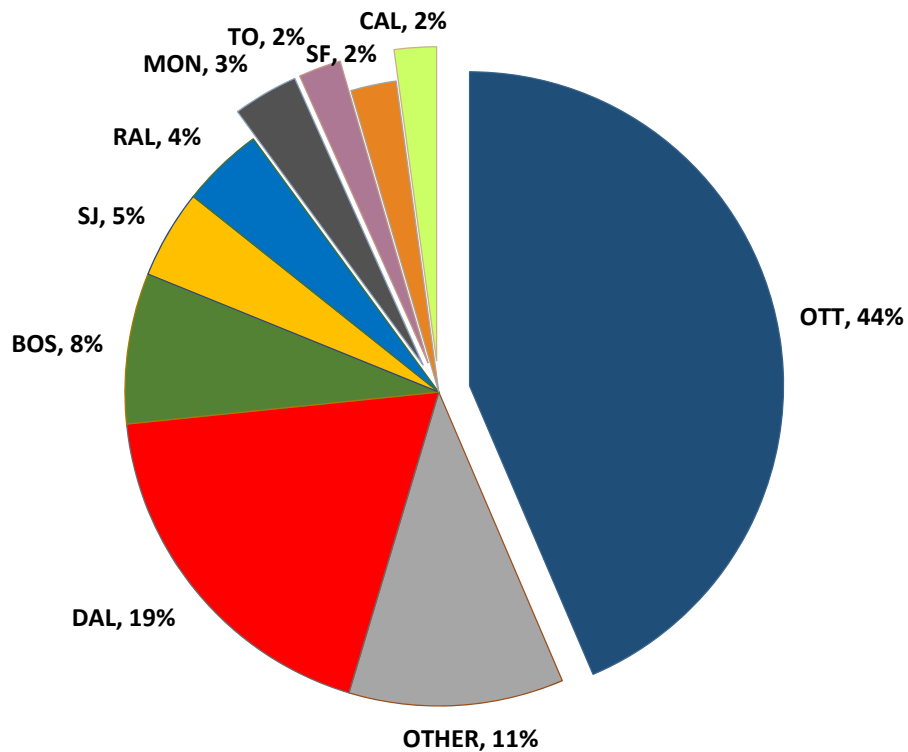
RIM/Blackberry	Apple	Ciena
Avaya	Alcatel Lucent	InterDigital
Cisco	Ericsson	LG
PMC Sierra	IBM	Altera



NORTEL PATENTS OVER TIME

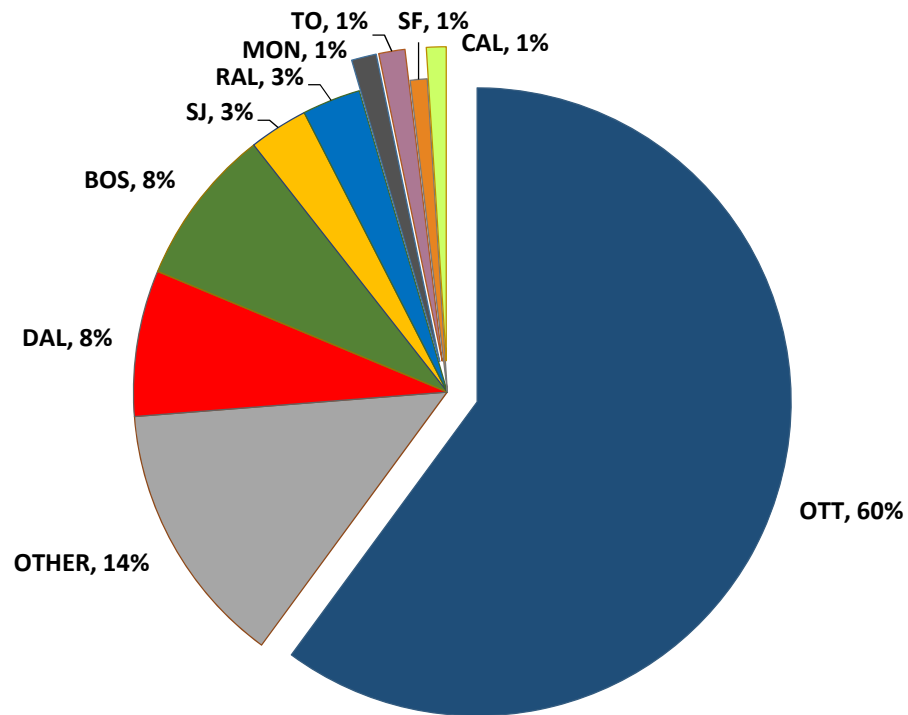


NORTEL'S INVENTIVE FOOTPRINT



1996 – 2000

2,356 Patents



2001 – 2005

1109 Patents



KNOWLEDGE EXPERTISE & RE-COMBINATION ABILITIES

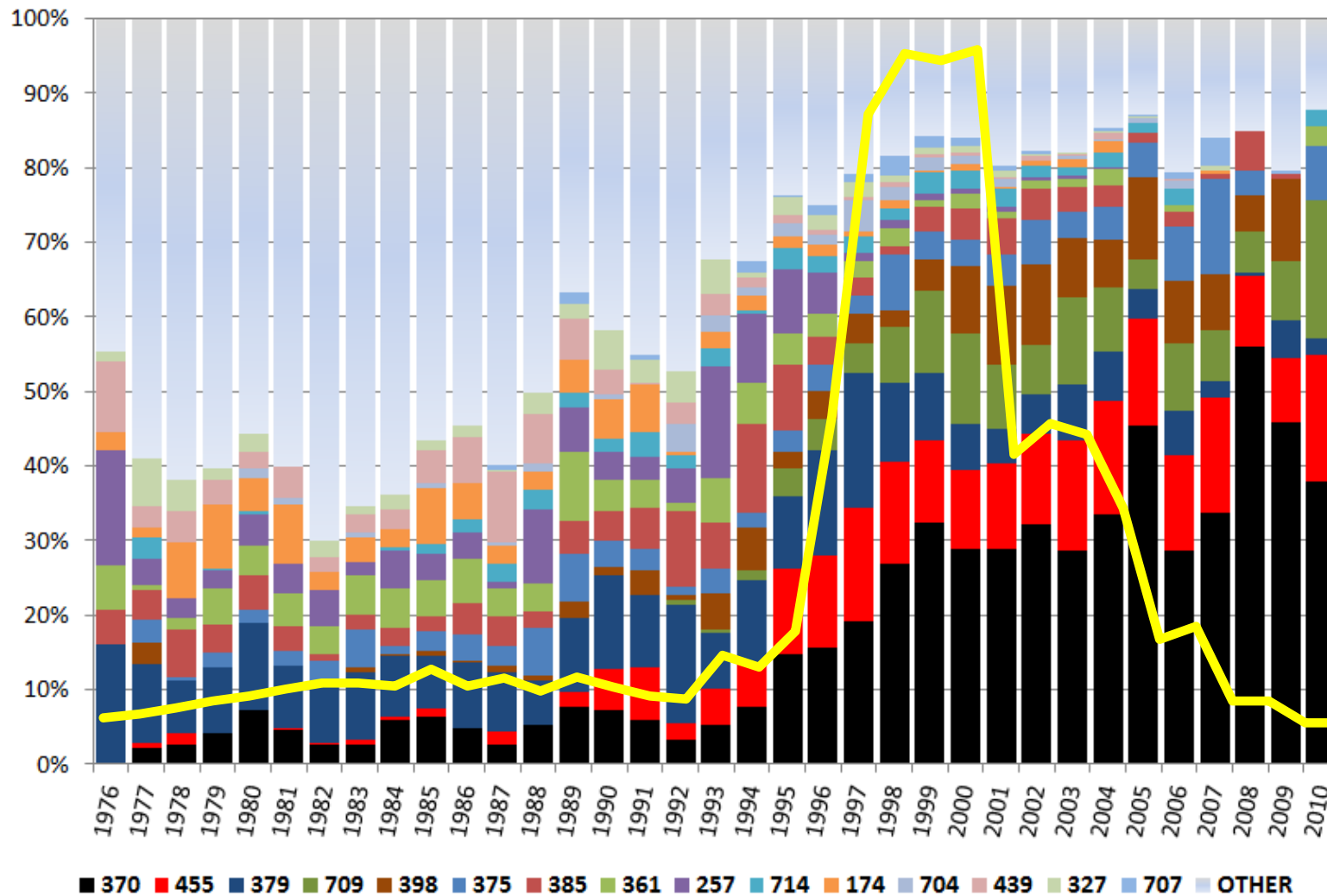
		US PATENT CLASS
(51) Int. Cl.	<i>G06F 3/041</i>	(2006.01)
(52) U.S. Cl.	345/173; 715/763
(58) Field of Classification Search	345/173-178; 178/18.01-18.09; 704/1-10; 715/763
See application file for complete search history.		

- There are 438 main technology classes indicating expertise in specific knowledge domains.
- Most patents are allocated to more than one technology class
 - Patents' co-classes provide the opportunity to study the evolution of novel combination of new or existing technology

...the **relatedness** [co-occurrence] of technology classes in a place determines the technological **competency** or **coherence** of a region...



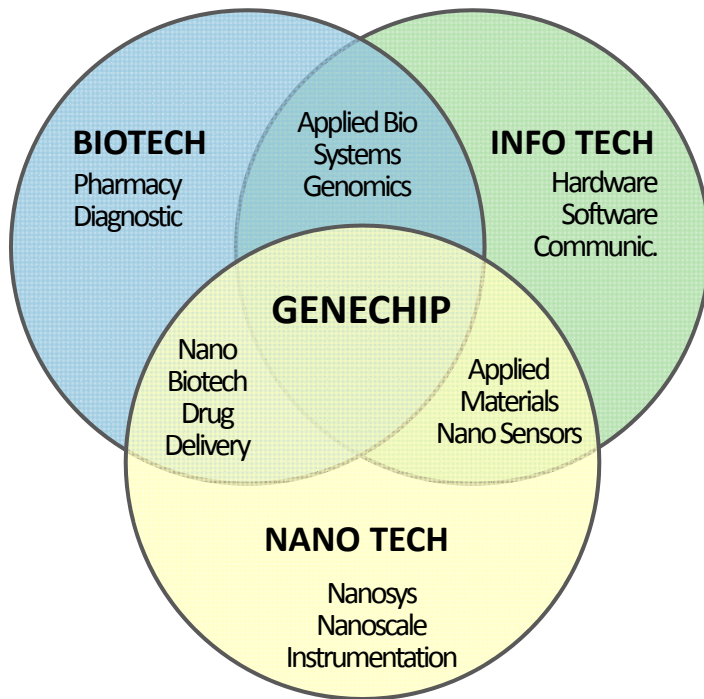
NORTEL'S TECHNOLOGY DOMAIN(S) OVER TIME



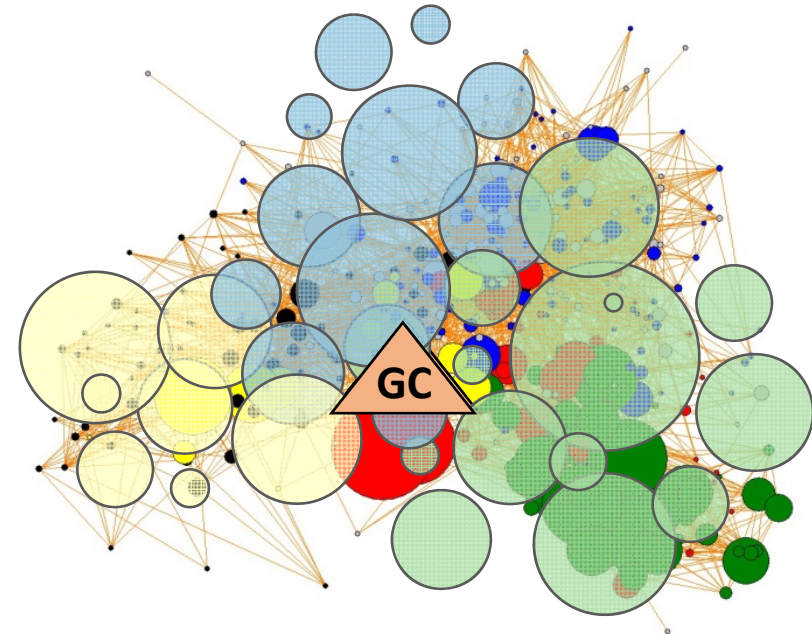
- | | |
|---------------------------------------------------------------------------------------------|-------------------------------------------------|
| 370 Multiplex communications | 398 Optical communications |
| 455 Telecommunications | 375 Pulse or digital communications |
| 379 Telephonic communications | 385 Optical waveguides |
| 709 Electrical computers and digital processing systems:
multicomputer data transferring | 361 Electricity: electrical systems and devices |

THE KNOWLEDGE SPACE – CONCEPTUALIZATION

Economic Reality



Knowledge Space

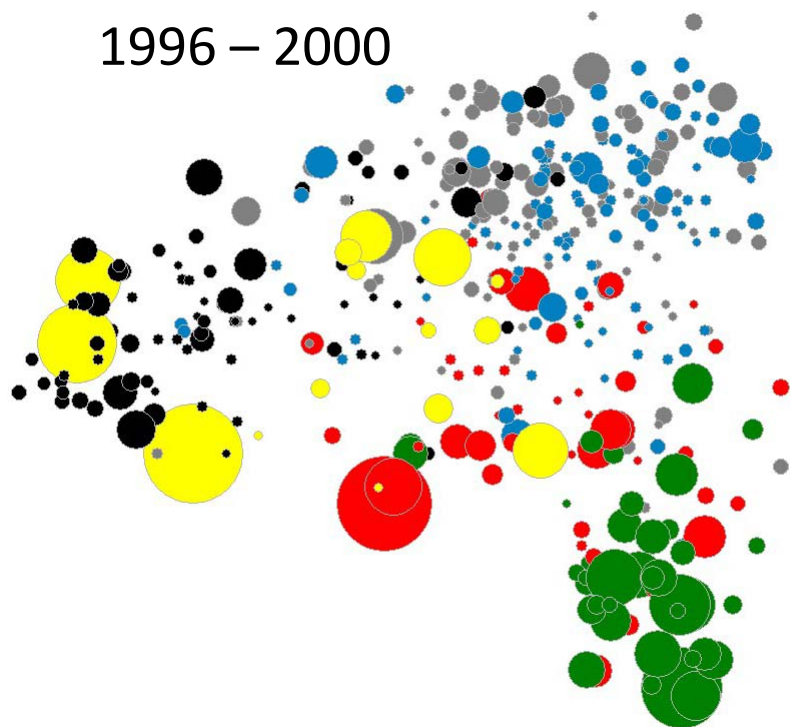


Kogler D. F., Rigby D. L. & Tucker I. (2013) Mapping Knowledge Space and Technological Relatedness in US Cities, *European Planning Studies*.

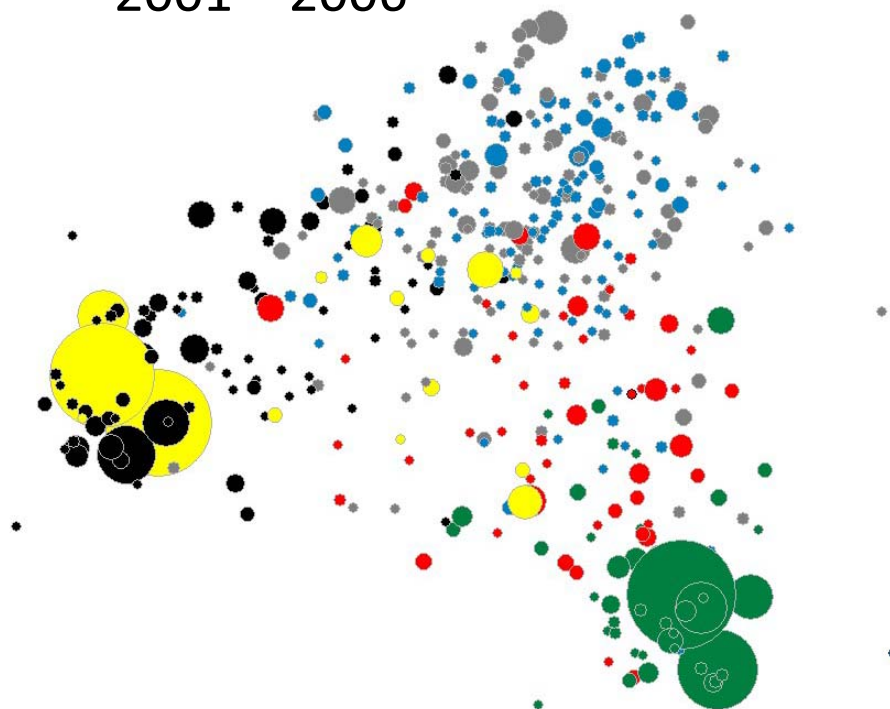
THE NA KNOWLEDGE SPACE – TECHNOLOGICAL PROXIMITY

Patents with primary inventor located in US or Canada

1996 – 2000



2001 – 2006

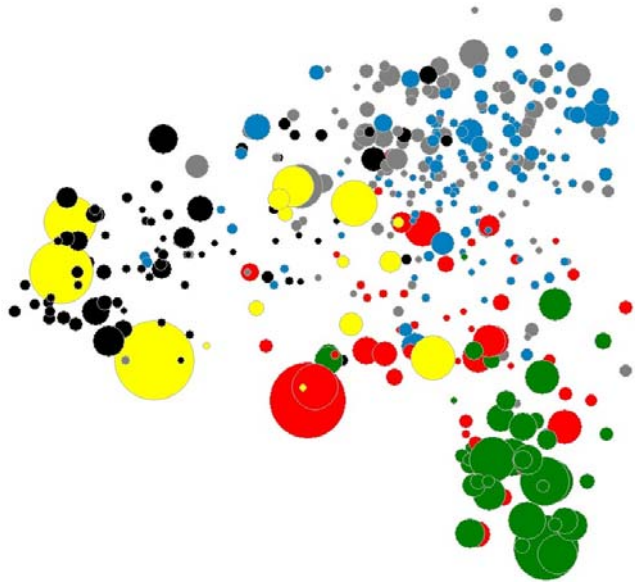


- Chemicals
- Computers & Communic.
- Drugs & Medical
- Electronics
- Mechanical
- Miscellaneous

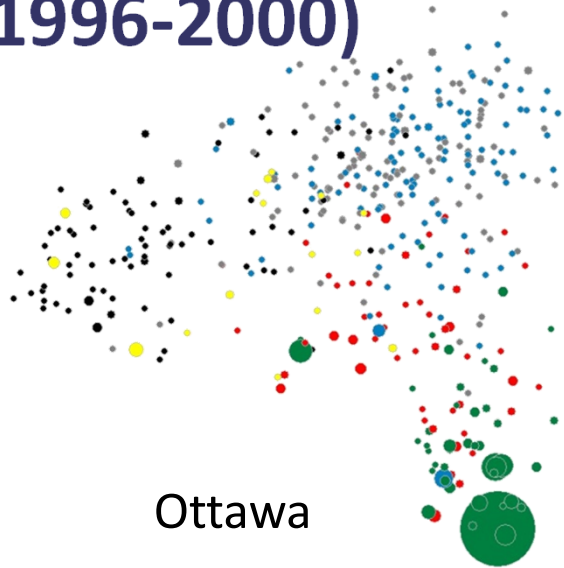


KNOWLEDGE SPACES (1996-2000)

US & Canada



Ottawa



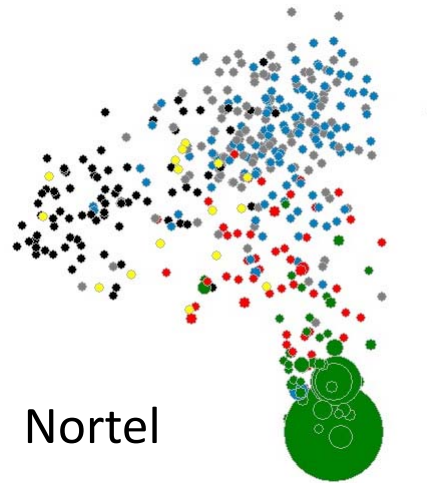
Ottawa RCA



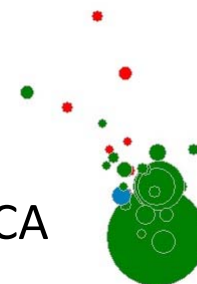
- Chemicals
- Computers & Communic.
- Drugs & Medical
- Electronics
- Mechanical
- Miscellaneous



Nortel



Nortel RCA

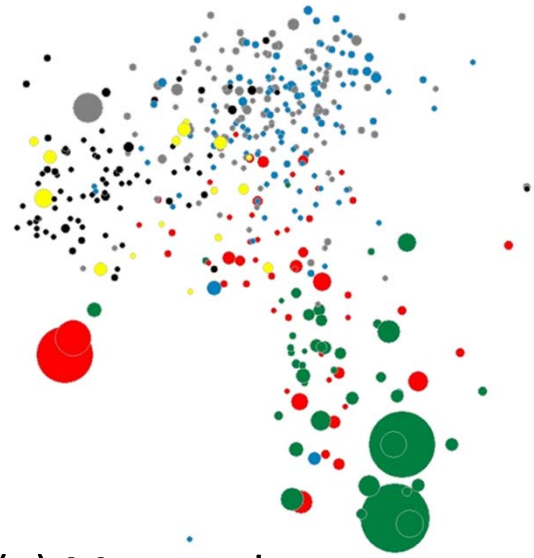


NORTEL-CBSA RELATEDNESS AND PATENTING TRENDS

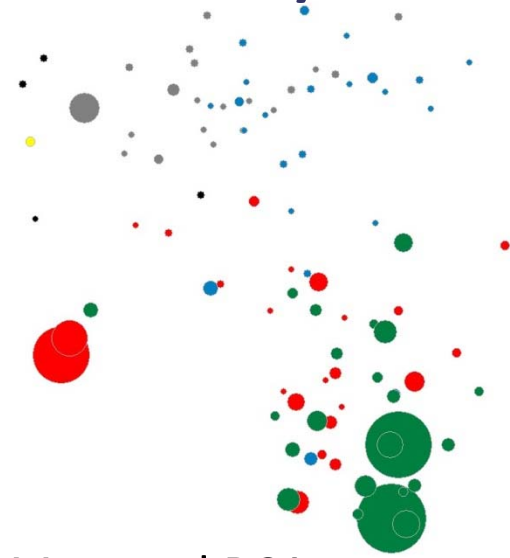
CBSA	ARS_9600	ARS_0105	Pat9600	Pat0105	DEC_9605
Ottawa	0.0423	0.0502	1105	666	-39%
Dallas	0.0238	0.0194	476	152	-68%
Boston	0.0053	0.0062	197	83	-57%
Montreal	0.0044	0.0045	85	10	-88%
SanJose	0.0248	0.0174	116	33	-71%
Raleigh	0.0188	0.0201	107	34	-68%
Toronto	0.0034	0.0044	55	11	-79%
SanFran	0.0117	0.0104	60	15	-75%
Calgary	0.0024	0.0028	55	14	-74%
Other	---	---	280	90	---
Total	---	---	2536	1109	-56%



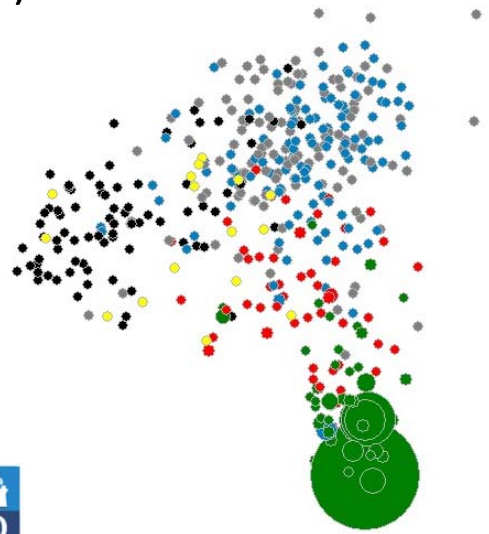
KNOWLEDGE SPACES (1996-2000)



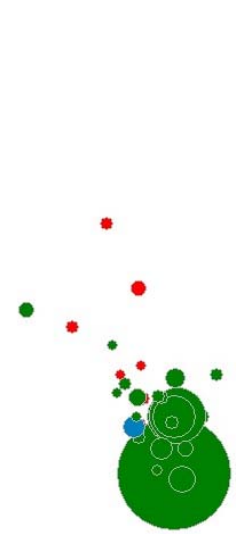
(a) Montreal



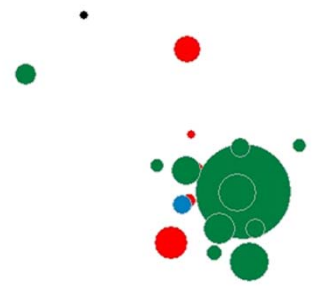
(b) Montreal RCA



(c) Nortel



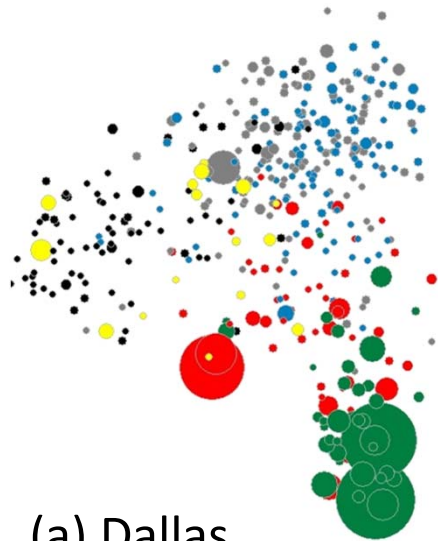
(d) Nortel RCA



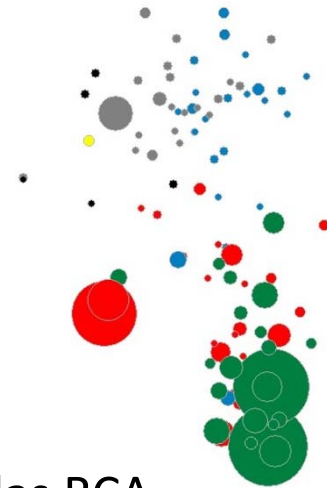
(e) Nortel RCA
in Montreal RCA

- Chemicals
- Computers & Communic.
- Drugs & Medical
- Electronics
- Mechanical
- Miscellaneous

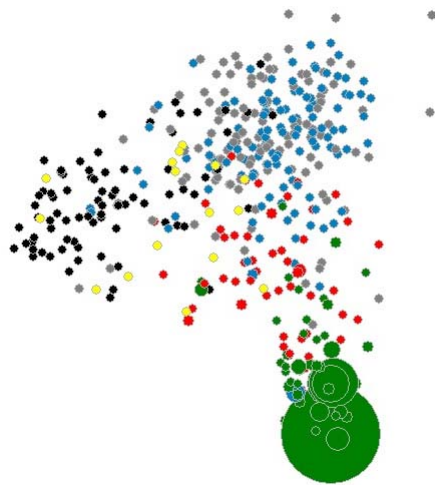
KNOWLEDGE SPACES (1996-2000)



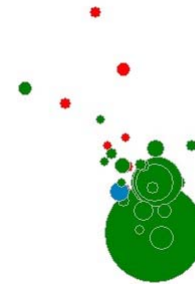
(a) Dallas



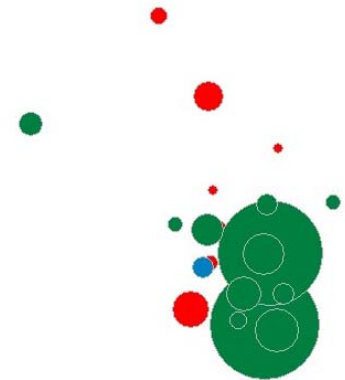
(b) Dallas RCA



(c) Nortel



(d) Nortel RCA



(e) Nortel RCA in Dallas RCA



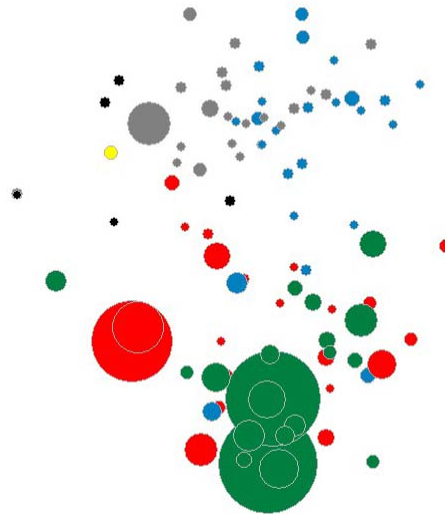
- Chemicals
- Computers & Communic.
- Drugs & Medical
- Electronics
- Mechanical
- Miscellaneous

ANTICIPATING ENTRY

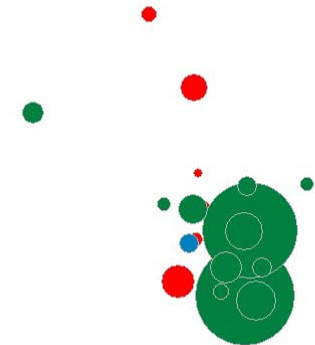
RCA of Dallas 1991-1995 matching Nortel RCA 1996-2000



(a) US & Canada



(b) Dallas 1991-1995 RCA

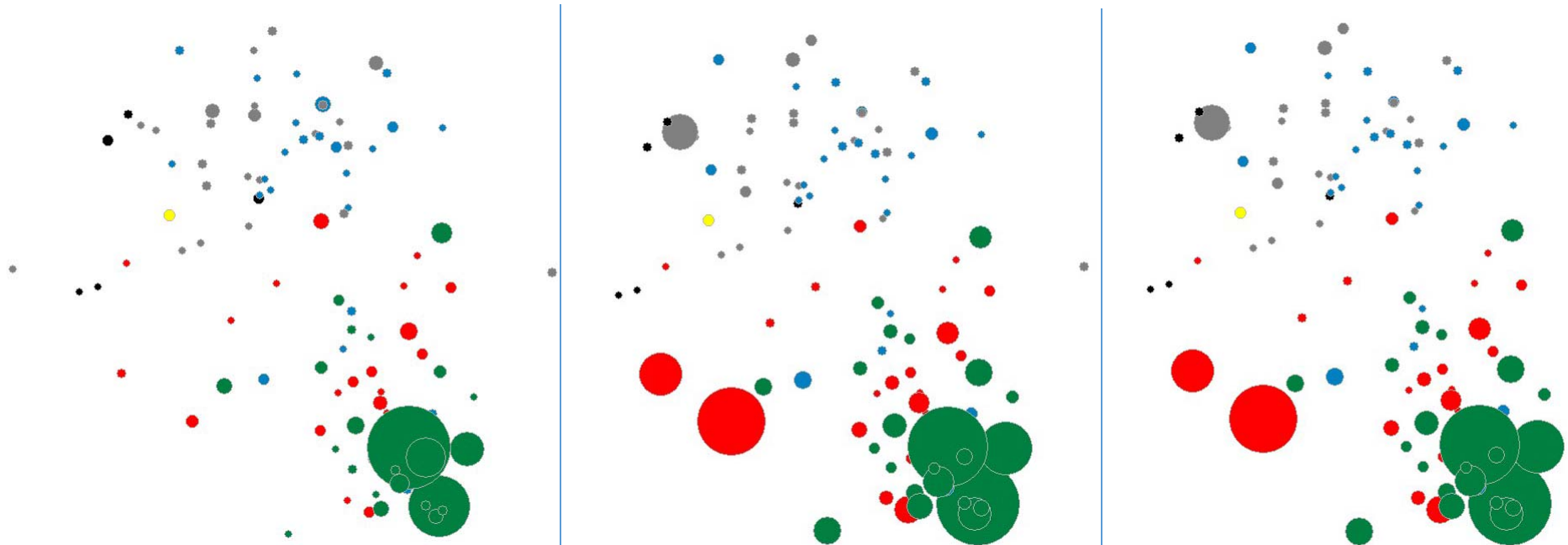


(c) Nortel RCA 1996-2000
in Dallas 1991-1995 RCA



GEOGRAPHIC VARIATIONS IN EXIT (2001-2006)

Overall patenting declines 56 percent 1996-2000 to 2001-2006



(a) Montreal
88 percent decline

(b) Nortel
56 percent decline

(c) Dallas
68 percent decline



FINDINGS...SO FAR...

- Nortel's collapse does not seem to have had a long-term negative impact on the inventive capacity of the Ottawa-Gatineau ICT cluster

- A large majority of former Nortel inventors who continued inventing in Ottawa did so for existing large companies in similar technologies

- We have found relatively few examples of successful attempts at start-ups from former Nortel inventors

- Nortel's "inventive" strategy linked firm competency with local expertise, which possibly provided a 'natural' resilience strategy for "place" (Ottawa, and elsewhere) as well as "talent" (inventors)



Technology Evolution in Regional Economies [TechEvo]

ERC StG #715631



T H A N K Y O U !

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Globalisation in Crisis? The Urban and Regional Challenges of the Great Instability

Cambridge, UK. July 13th, 2017.

NORTEL'S KNOWLEDGE SPACE IS MATCHING LOCAL EXPERTISE

Metro	Tech_Combos	Tech_Nortel	ρ
Ottawa	1,027	0.79	0.35
San Jose	1,092	0.75	0.17
Raleigh	869	0.67	0.10
Dallas	1,042	0.65	0.14
San Francisco	1,094	0.60	0.12
Boston	1,084	0.51	0.06
Toronto	871	0.51	0.29
Montreal	786	0.43	0.11
Calgary	455	0.35	0.24
London	298	0.35	0.11

Nortel's inventor population is located in places that closely match the firm's and the (sectors') knowledge and technology portfolio.

Tech_Combo = number of class to class combinations present

Tech_Nortel = % of industry to metro class to class combinations present

