



discontinuous
innovationlab

Nanotechnologies Height costly beliefs

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Aims

- What CEO can not assume about NANO?
- What must CEO start doing to profit from Nano?
 - value creation for larger firms
 - opportunities for entrepreneurial firms (small/medium/large)

outlines

- What is Nano
- To what extent is different from bio
- 8 beliefs which may reveal costly
 - Asia is still a follower
 - Nano is a science like bio
 - Nano is product like bio
 - Nano is converging technologies
 - Nano is only market
 - Nano is only global competition
 - Nano is the business of small firms
 - Nano is the new Eldorado
- Recommendation : what CEO must pay attention to?



What is Nano ?

- Ability to work at the nanometer scale based on breakthrough innovations
 - Creating radically new product or process
 - Accelerating incremental innovation
 - Generating disruptive innovations which require new business models
 - Creating new devices – nano-inside
- New opportunities for innovation
- Science based innovation
- S&T in the hype : high expectations (which cannot be met), high investments for public and private bodies, changing landscape with the entrance of new actors



To what extent is similar from bio ?

- Economics of promises : time lag between the potential and its realisation
- Role of academic bodies to produce science (as a resource)
- Role of public bodies to invest
- Start-ups & Challenge/reconfiguration of incumbents
- Role of financial market cycles & venture capital to finance the promises
- Specialized brokers (VC, business angels, IP& specialised consulting firms or department, incubators etc.) to shape the markets (for products, services, training, capital and money
- Regulation issues



To what extent is different from bio ?

- Inheriting from parents technologies (micro-electronics, bio, etc.)
- Existing firms involved in R&D
- Existing ties and patterns of collaborations
- New worldwide payers
- Role of technological platform
- Transversal technology => nano-inside

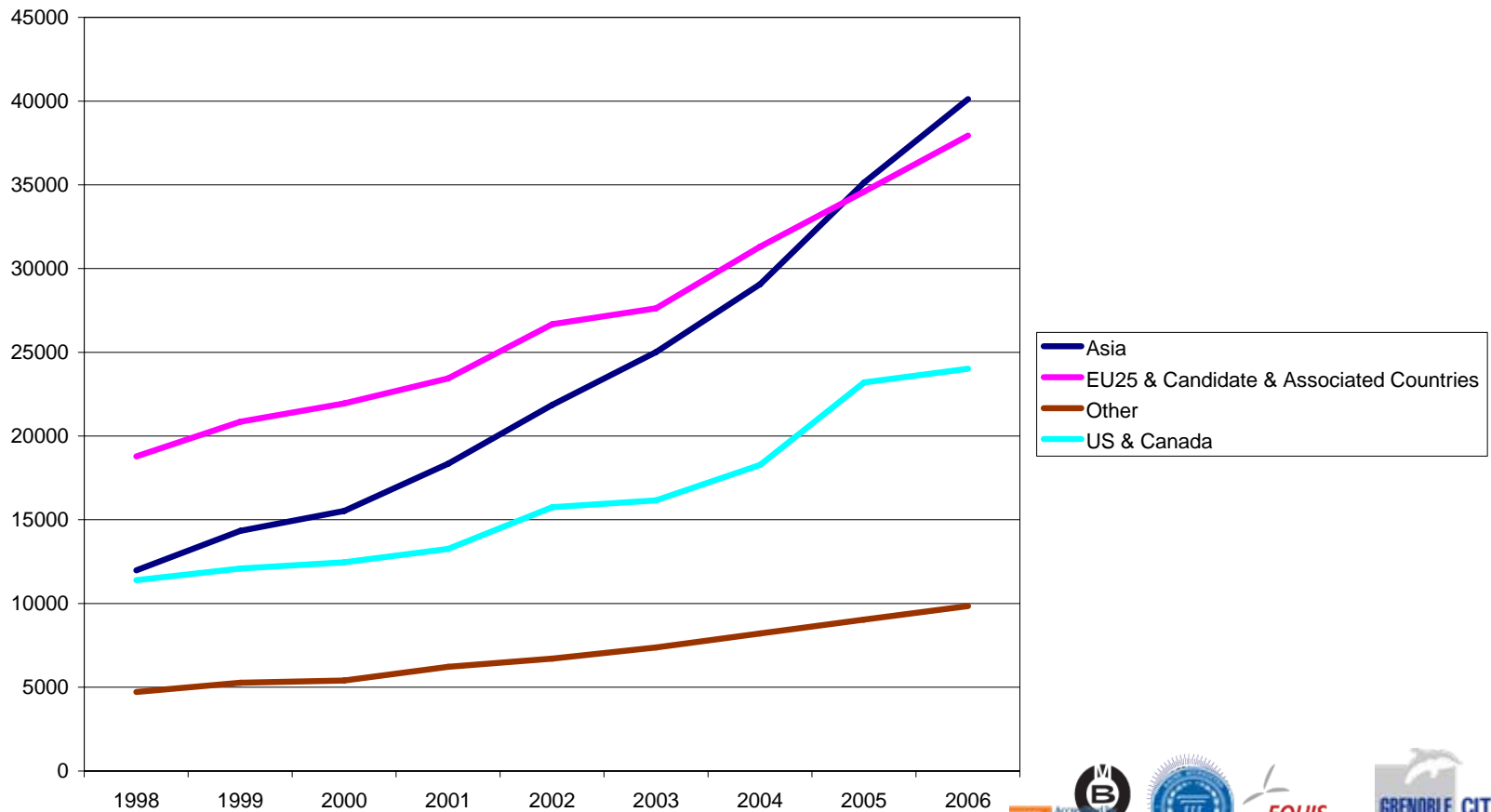
We need a different conceptual framework to understand



8 beliefs which may reveal costly

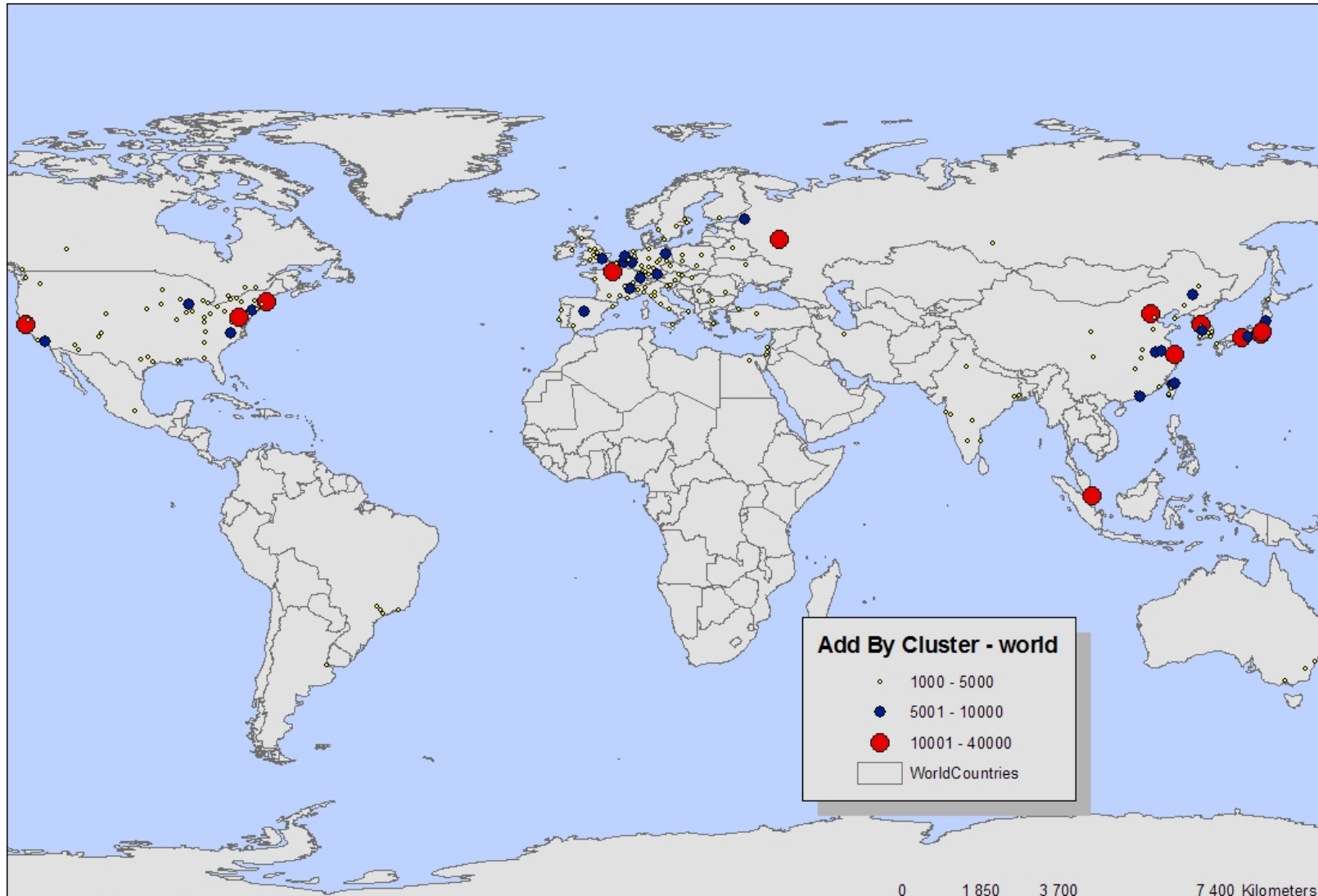
1°. Asia is a follower, imitating occidental science

Evolution of the number of publication in Nanotechnologies





1°. Asia is a follower, imitating occidental science





1°. Asia is a follower, imitating occidental science

	% of firms	% of patents
Asia	17%	60%
EU	44%	15%
US	37%	25%

- ➔ *New competitors but also new potential actors to ally with*
- ➔ *New markets to invest (patent not only PI but also markers for markets)*
- ➔ *New patterns of collaboration to invent*



2° Nano is science like bio

1- Rate of growth

- Last 10 years: very rapid growth: 14%/year (human genome is 8%, average is under 2%)
- Implications: High rate of growth requires flexible institutional setting to accommodate it
→ *Redistribution of capabilities and new entrants*



Nano S&T: new “search regime”

2- Complementarities

- New forms of inter-disciplinarity (e.g. chemistry for nano electronics) -
-> more than simply project based networks
- Facilities: ultra clean rooms + technology platforms, from 20 to 300 m
€ --> concentration witnessed but not a “big science model”
- High involvement of incumbents as nano S&T are
tool/instrumentation oriented

→ *Role of technological platforms. More capitalistic than bio. Reduce time lag as it is incorporated within existing devices*



Individual IP

- Molecules/individual process/kits
- transfer & licences
- key role of start-up firms
- blurred borders between research teams

BIOTECH MODEL

Distributed IP

- IP Blocks/Patent pools
- Demonstrations /standards
- Knowledge circulation through industry - University collaborations
- 'integration centres'
- key role of existing large players
- start-up as specialised suppliers

MICRO/NANO

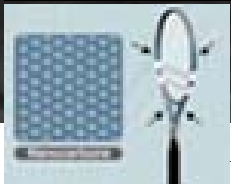
ELECTRONICS MODEL



3° Nano is product like bio

- Bio : product primarily
- Nano : primarily focus on process
- Nano inside existing products
- Nano is mainly intermediary product

Babolat® NS™ Drive Tennis Racket



Sporting Goods

Babolat® NS™ Tou

Health and Fitness > Sporting Goods

Lenovo ThinkStation Lenovo Electronics and Computers > Computer

Hardware



ket Babolat® Health and Fitness >

• Nano Antibiotic and Deodorizing Shirting Fabric Tianjin Rongze Textile Co., Ltd. Health and Fitness > Clothing Generic



l Fitness > Cosmetics

Calming Emulsion Chanel

• Nano Cold Catalyst Air Purifier Transit Electronics Co., Ltd. Health and Fitness > Filtration

st Chanel® Health and Fitness >

Coco Mademoiselle Fresh

Cosmetics



• Nano Facial Ionic Steamer Panasonic® Hong Kong Health and Fitness > Personal Care

Diorskin Forever - Extre

Fitness > Cosmetics Health and Fitness

ar Flawless Makeup FPS 25 Dior® Health and Personal Care NEW



• Nano Filter Shenzhen Become Industry & Trade Co., Ltd. Health and Fitness > Filtration

DiorSnow Pure UV Base SPF 50 Dior® Health and Fitness > Cosmetics

• Nano Plush Toys U-Right® International Holdings Limited Goods for Children > Toys and Games Generic

HYDRA FLASH® I

and Fitness > Cosmetics

Daily Face Moisturizer Lancome® Health and Fitness > Cosmetics
Nano Silver Antibacterial Powder Shenzhen Become Industry & Trade Co., Ltd. NEW Generic

Ltd. NEW Generic

3° Nano is product like bio





3° Nano is product like bio

Main consequences

- Scope of absorptive capacity is broader
- More role for specific knowledge holders in each functional area
- Org focus will be more scattered. More internal.
- Stronger integration than in bio
- Architectural innovation
- Reduced time lag to market (research and innovation capabilities more coupled than in bio)



4° Nano is convergent

- Rather transversal
 - Ability to maximise individual technologies – hybridization between nanotech and existing technologies within large firm (patent)
 - Magnifies the differences of organisation capabilities and processes
 - Abilities to combine corporate and business strategies to maximise synergies
 - Locus of convergence/divergence (scientific, technological, within products?)

➔ *R&D in nano cannot be externalised*

➔ *Couple exploration and exploitation*



5° Nano is only market

- As it is a transversal technology, market relations may be inefficient
 - Market success still rules but organizational ability to utilize nano will determine competitiveness
 - Architectural innovation rather product innovation as Nano-inside
 - Ability to hybridise existing knowledge base with nanotech
-
- ➔ Premium to large diversified firms
 - ➔ Premier to location in which diversity may be obtained



6° Nano is only a global competition

- Nano is locally produced knowledge and devices by global competitors
- Knowledge and competences flow easily within the organisation than across organisation
- Nano knowledge developed in local platforms
 - application more related to process
 - knowledge developed within lower levels of organisation
 - R&D is directed to processes
 - International large firms may have competitive advantage. More technological areas. Larger R&D budgets. Access to more diverse platforms
 - Univ transfer may change. More common organisations, less spin-out or spin-off



7° Nano is the business of small firms during the emerging phase

- The larger the diversity of KB, the larger the opportunity to hybridise
- Technology development highly connected with applications
- Ability to integrate worldwide technologies through internal processes
- Risk compartimentization : Large firms have the ability to compartimentize and specific capabilities to address risk



8° Nano is a new Eldorado

“In the gold rush the only ones that really make the money are those that sell shovels”

- In 1848 and early 49, everyone was making money--but the party didn't last forever. For most miners, it didn't last very long at all.



Anonymous gold miners
and remaining names:

Levi Strauss – from dry good business to canvas pants

NY butcher Ph. Armour whom company becomes Armour Meat packing company

John Studebaker from covered wagon building to automotive

Henry Wells and William Fargo to set up wells Fargo (secure transportation and banking)





Pay attention to

1. *Emergence of new competitors*

But competitors are also new potential actors to ally with, signals for new markets to invest, (patent not only PI but also markers for markets)

2. *New patterns of collaboration to invent*

Platforms and sharing costly installations

3. *Market is important but organization is key*

Architectural innovation

Broadening absorptive capacity

Favor to integration mechanisms



Pay attention to

1. *Local embeddedness of R&D*

Magnificence of the R&D environment key for the development of Nano

Anchoring firms to enhance nano

2. *Eldorado: much more like computer during the 80's than bio "You can see the computer age everywhere these days, except in the productivity statistics"*

3. Regulation issues: mixing different worlds and traditions of regulation (IT and Bio)