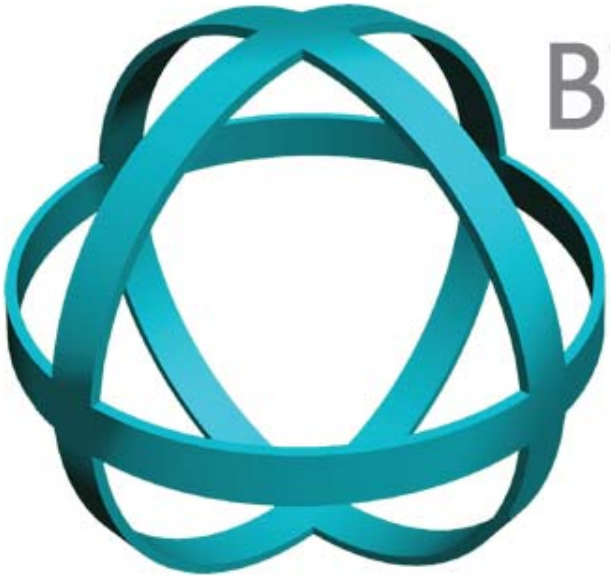
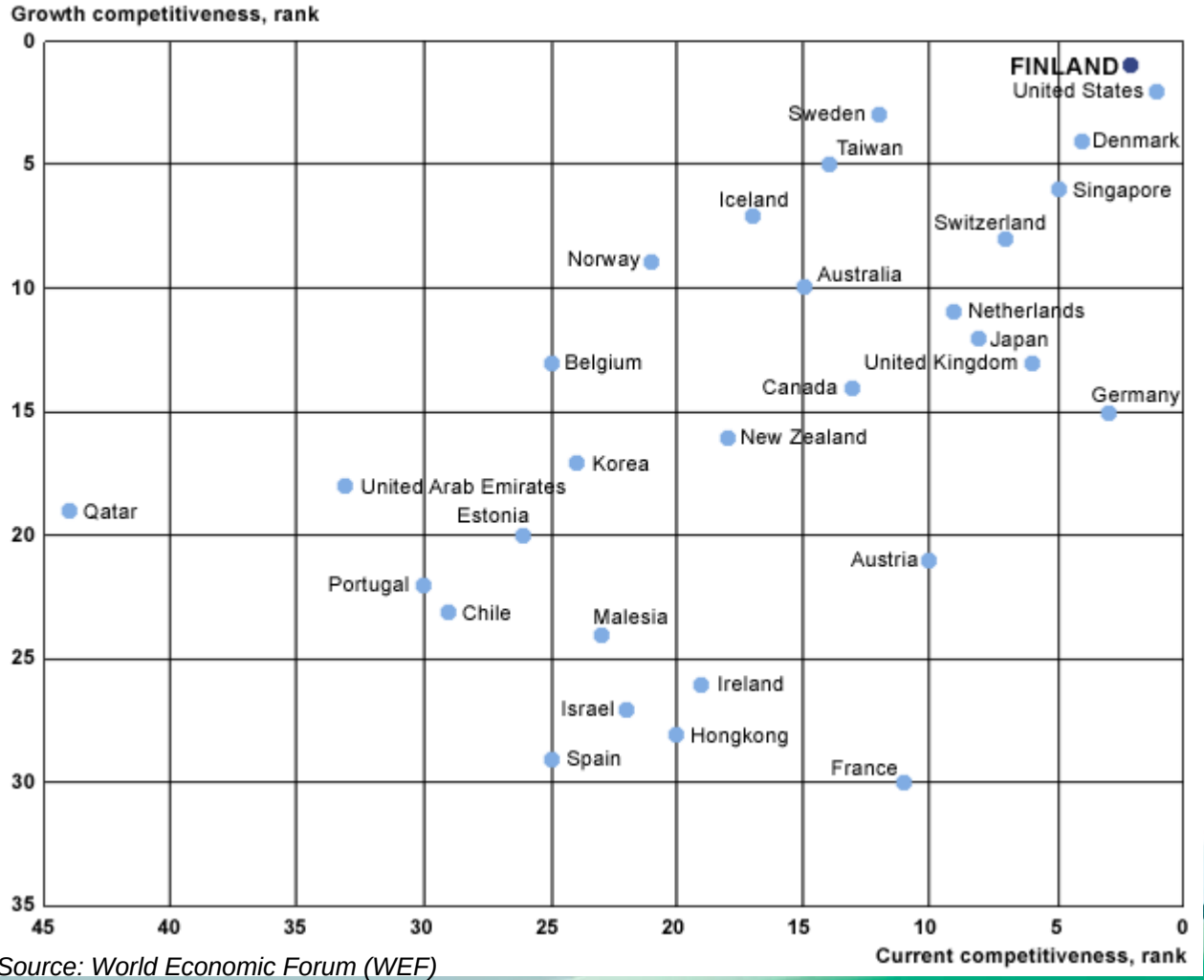


BioSA

The competitiveness of Finland



Source: World Economic Forum (WEF)

Definition of biotechnology

OECD single definition

The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services

OECD list-based definition

DNA/RNA: Genomics, pharmacogenomics, gene probes, genetic engineering, DNA/RNA sequencing/synthesis/amplification, gene expression profiling, and use of antisense technology.

Proteins and other molecules: Sequencing/synthesis/engineering of proteins and peptides (including large molecule hormones); improved delivery methods for large molecule drugs; proteomics, protein isolation and purification, signaling, identification of cell receptors.

Cell and tissue culture and engineering: Cell/tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cellular fusion, vaccine/immune stimulants, embryo manipulation.

Process biotechnology techniques: Fermentation using bioreactors, bioprocessing, bioleaching, biopulping, biobleaching, biodesulphurisation, bioremediation, biofiltration and phytoremediation.

Gene and RNA vectors: Gene therapy, viral vectors.

Bioinformatics: Construction of databases on genomes, protein sequences; modelling complex biological processes, including systems biology.

Nanobiotechnology: Applies the tools and processes of nano/microfabrication to build devices for studying biosystems and applications in drug delivery, diagnostics etc.

Biotechnology in colours

Red: health care

- Medicines
- Biomaterials
- *IVD-products*
- Functional food

Green: plant biotechnology

- Agricultural applications
- Food

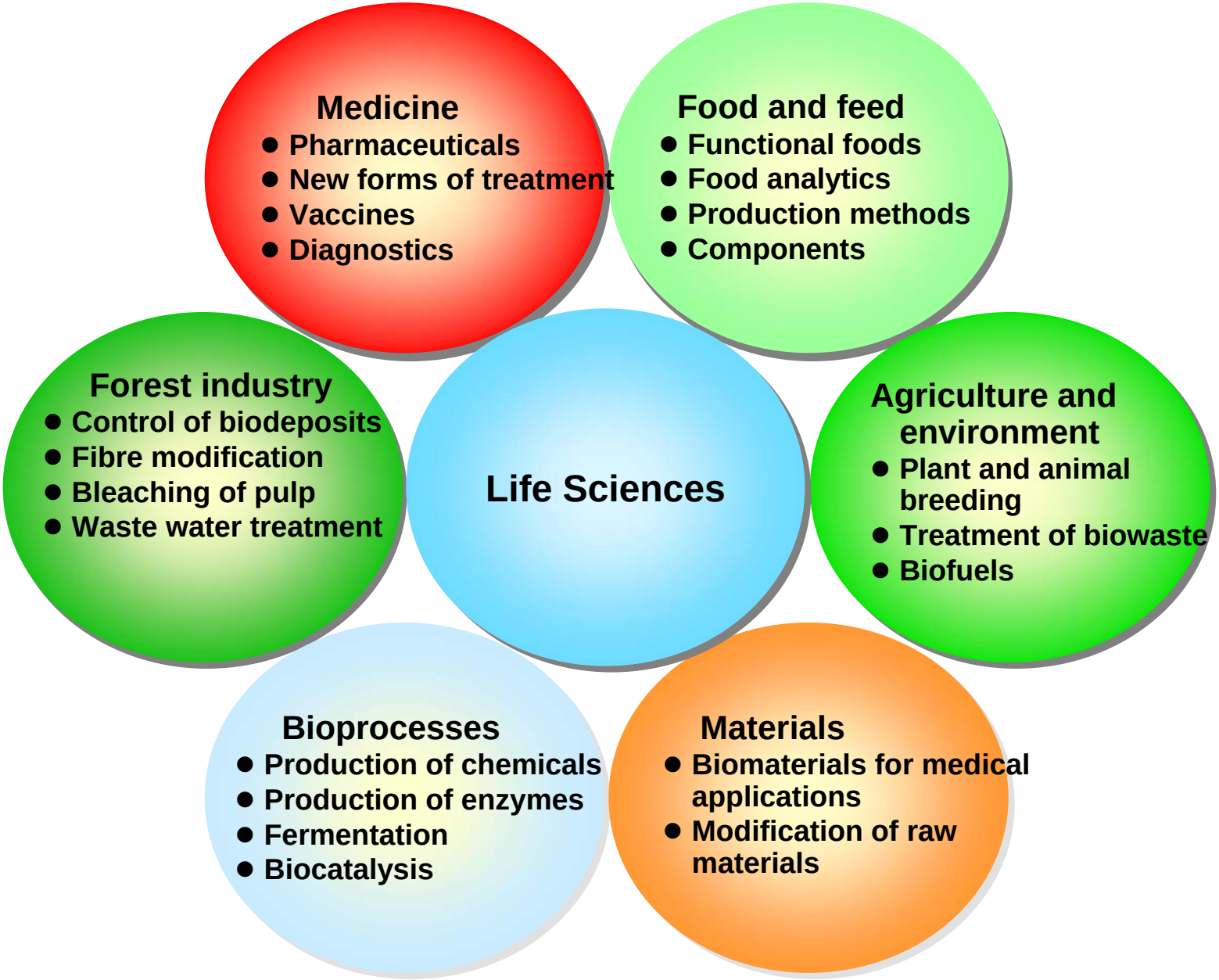
Grey: environmental applications

White: industrial biotechnology

- Bioproduction (biorefinery)
- Bioproducts
- Bioenergy
- Enzymes in products and as biocatalysts

Source: Finnish Bioindustries FIB

Biotechnology applications



National Biotechnology Strategy

GOALS

•TO DEVELOP COMPANIES, GOODS & SERVICES WHICH ADDRESS SA'S NEEDS

•TO IMPROVE THE QUALITY OF LIFE AND BOOST ECONOMIC DEVELOPMENT

•TO CREATE THE NECESSARY INFRASTRUCTURE TO ALLOW BIOTECHNOLOGY DEVELOPMENT

Biotech Advisory Committee

science & technology
Department: Science and Technology
REPUBLIC OF SOUTH AFRICA

National Biotechnology Strategy

Biotechnology Innovation Centers (regional)

Cape Biotech
Developing & Supporting Biotechnology in the Western Cape

BioPAD
Growing Biotechnology in South Africa

LIFElab
ECoBio Innovation Centre

PlantBio

<u>Human & Animal health</u> – diagnostics, h-t screening; vaccines; bioprospecting & gene mining

<u>Industrial Biotech</u> – industrial enzymes; pharmaceutical intermediates; agroprocessing; bioleaching; environmental remediation

<u>Plant biotech</u> – biosafety platform & transgenic crops; plant breeding & IV propagation; bioprospecting

Plus:

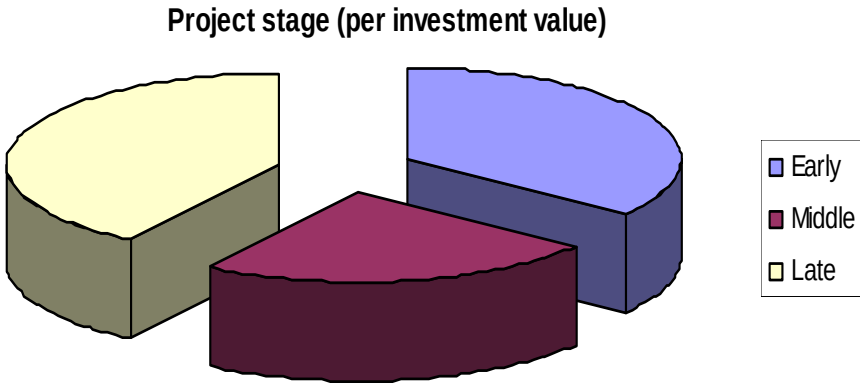
NATIONAL BIOINFORMATICS NETWORK

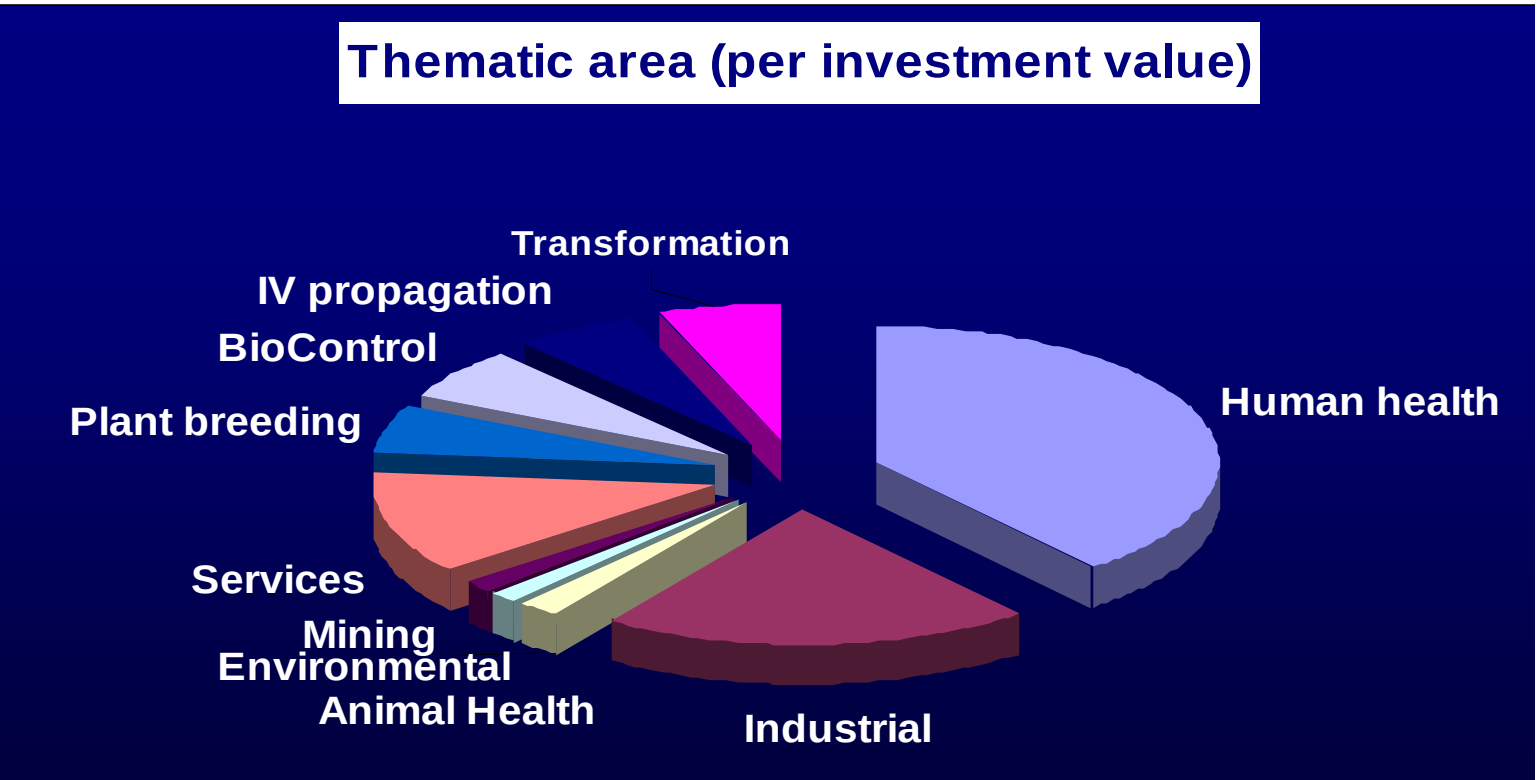
PUBLIC UNDERSTANDING OF BIOTECHNOLOGY

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

National Biotechnology Strategy

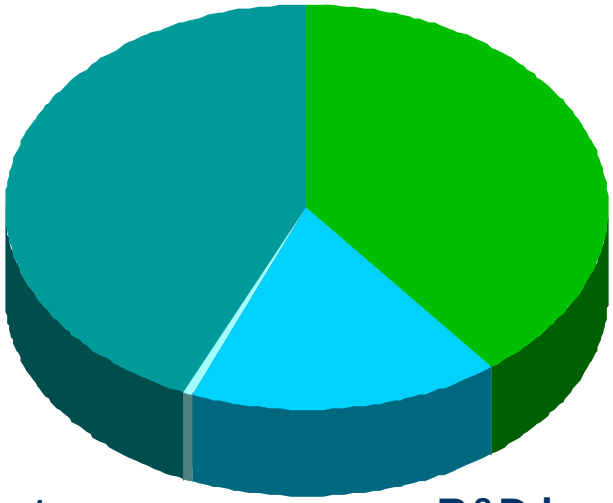
BIC portfolio investment





Tekes R&D funding in 2007

Total 469 million euros and 2,120 projects



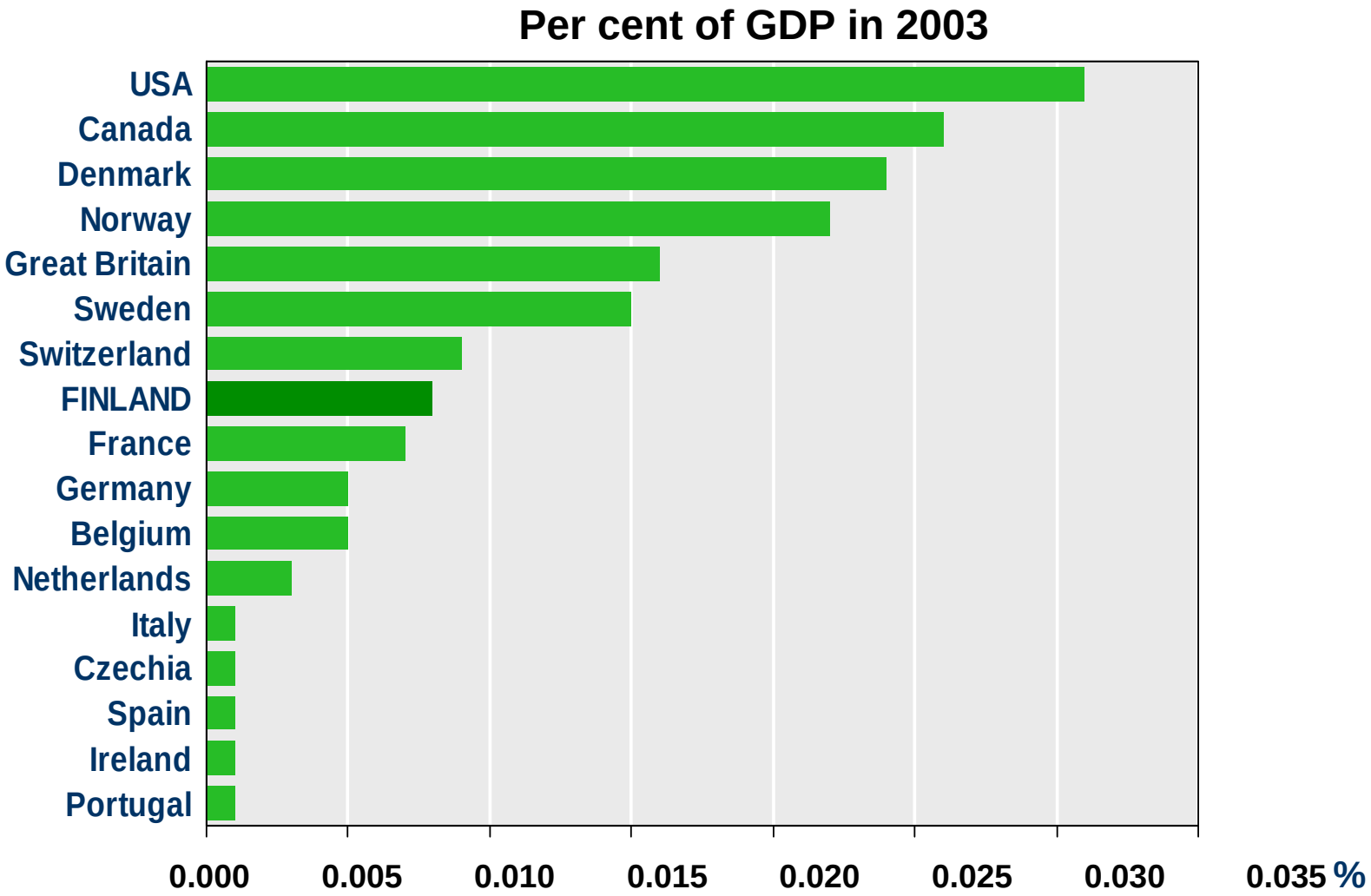
R&D grants to companies 203 million euros

Research funding for universities, research institutes and polytechnics 185 million euros

Start-up loans to new technology companies 3 million euros

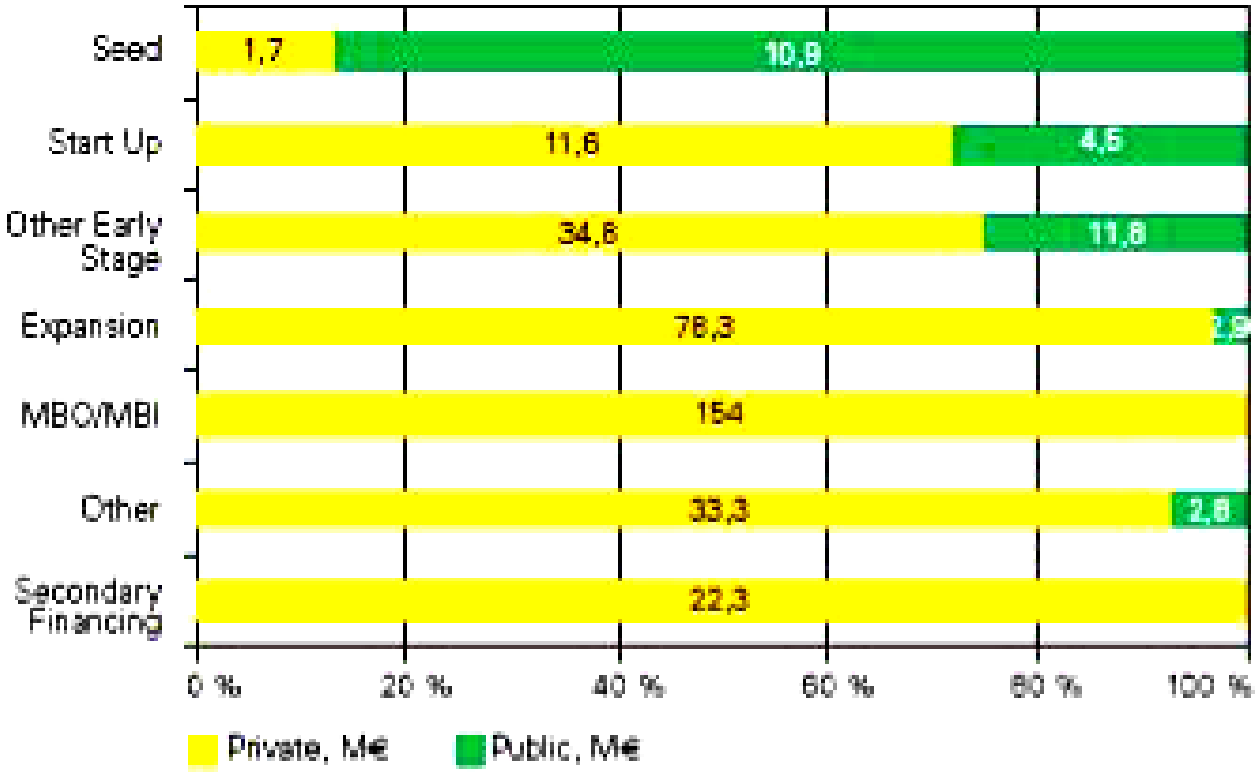
R&D loans to companies 78 million euros

Venture capital investment in biotechnology



Source: OECD Biotechnology Statistics 2006

Finnish Venture Capital: role of the public sector



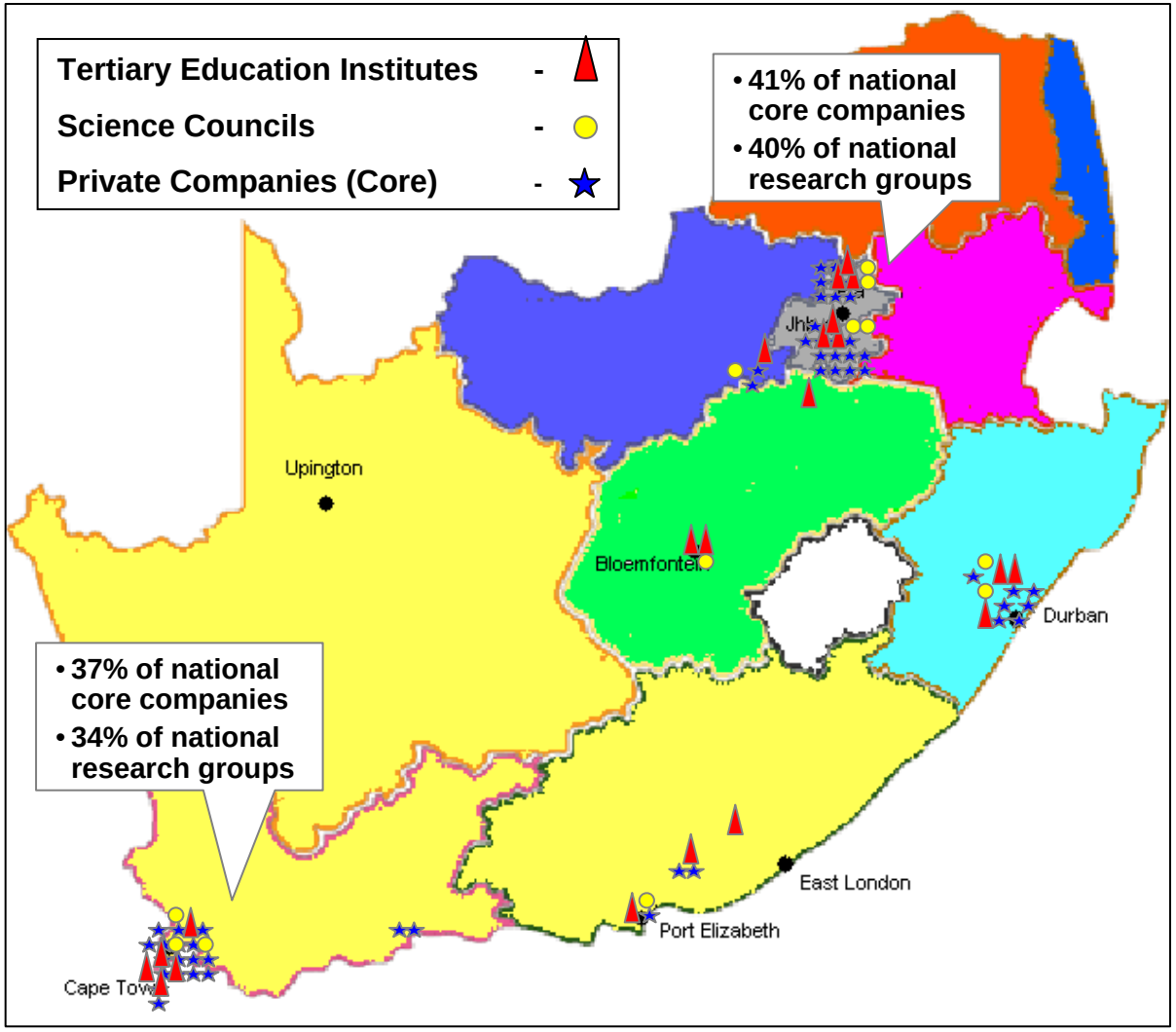
Stage Distribution by Investor Type in 2004

Source: FVCA, 2004


BOTSWANA
NAMIBIA
ZIMBABWE
MOZ.
SWAZ.
LES.
Messina
Polokwane
PRETORIA
Johannesburg
Upington
Kimberley
Bloemfontein
De Aar
Ladysmith
Njesuthi
Durban
East London
Port Elizabeth
Mossel Bay
Cape Town
Saldanha
Cape of Good Hope
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
Prince Edward Islands not shown.
0 100 200 km
0 100 200 mi
BioPAD
Growing Biotechnology in South Africa
PlantBio
LIFElab
ECoBio Innovation Centre
Cape Biotech
Developing & Supporting Biotechnology in the Western Cape

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

National Biotechnology Strategy



DST eGoliBio Biotech Survey 2003

Key biotech statistics for SA in 2003:

- 47 core biotech companies
- 59 non-core biotech-capable companies
- 622 biotech (and biotech-related) projects
- At least 3,500 employed in biotech sector
- >R 368m in annual revenues in biotech sector
- Since 1992, 2 new core biotech companies set up annually.

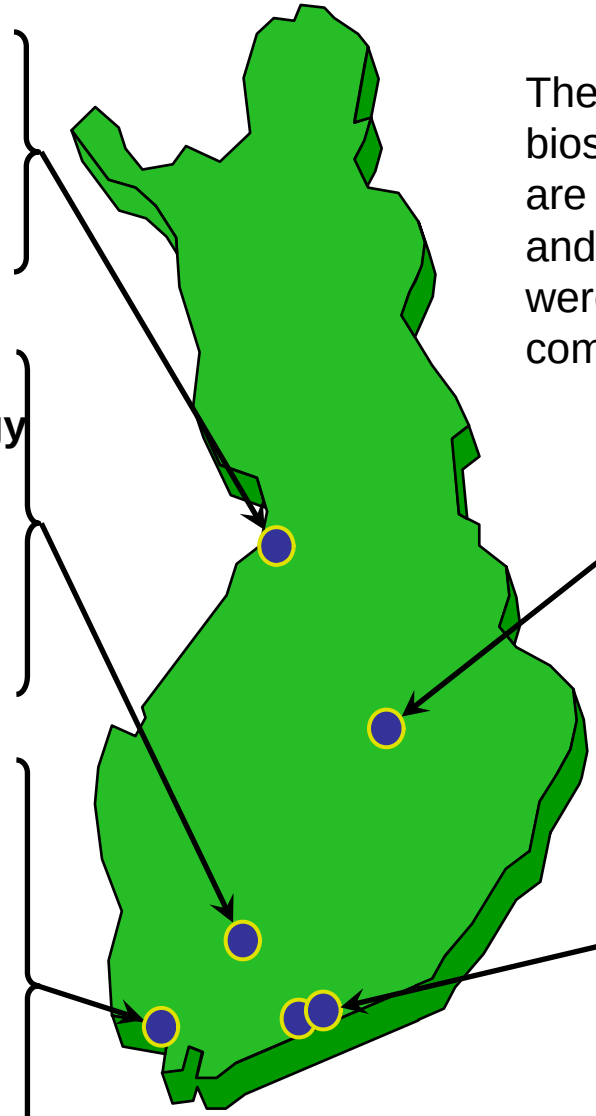
2nd Biotech Survey completed

Biosector competence centres

Oulu
- University of Oulu
- Biocenter Oulu
- Technopolis

Tampere
- University of Tampere
- Tampere Univ. Technology
- IMT
- VTT Biotechnology
- Regea
- Hermia
- FinnMedi

Turku
- University of Turku
- Åbo Akademi University
- VTT Biotechnology
- Biocity
- Turku Science Park
- Pharma City



The most significant centres for biosector business activities are the greater Helsinki area and Turku. Altogether there were approx. 150 biotechnology companies in Finland in 2005.

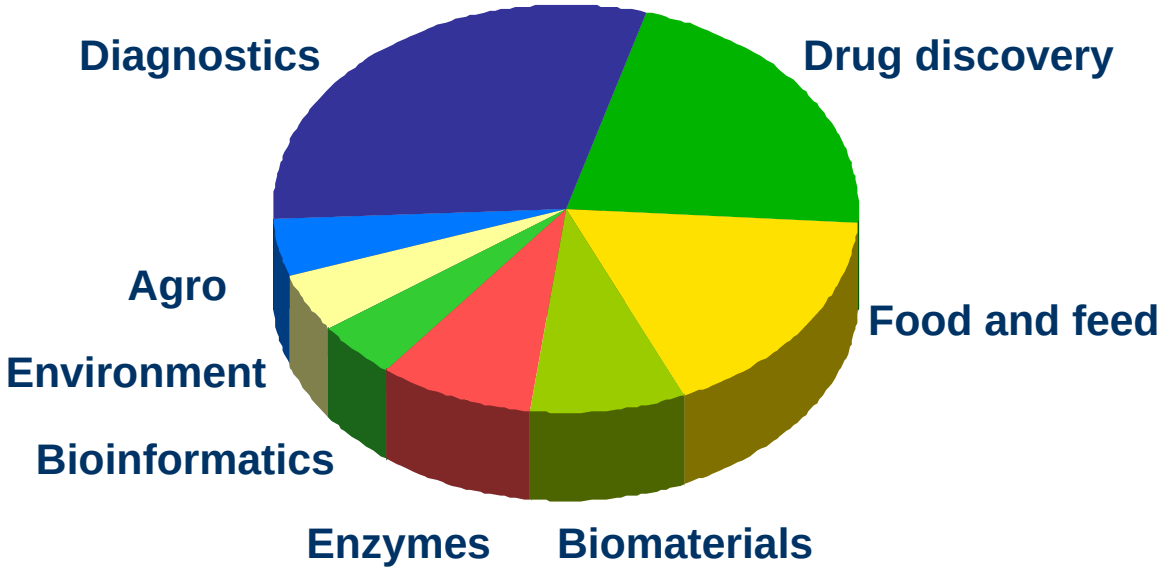
Kuopio
- University of Kuopio
- A.I. Virtanen Institute
- Teknia

Helsinki and Espoo
- University of Helsinki
- VTT Biotechnology
- Institute of Biotechnology
- Biomedicum
- Helsinki Business and Science Park
- Life Science Center

DM 84269

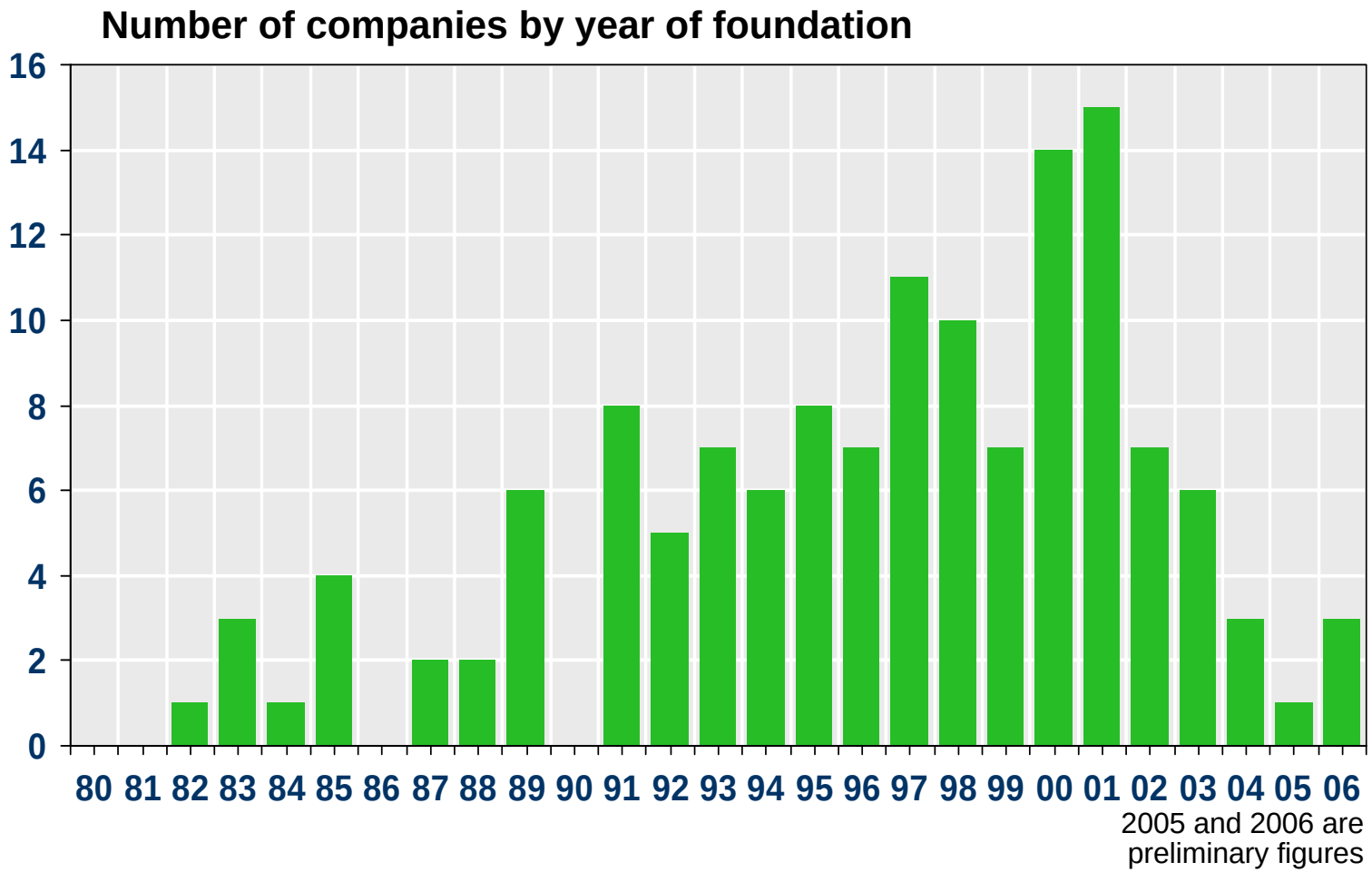
Finnish biotechnology companies by sectors

Total of 150 companies in 2005



Source: Finnish Bioindustries

Biotechnology start-ups in Finland

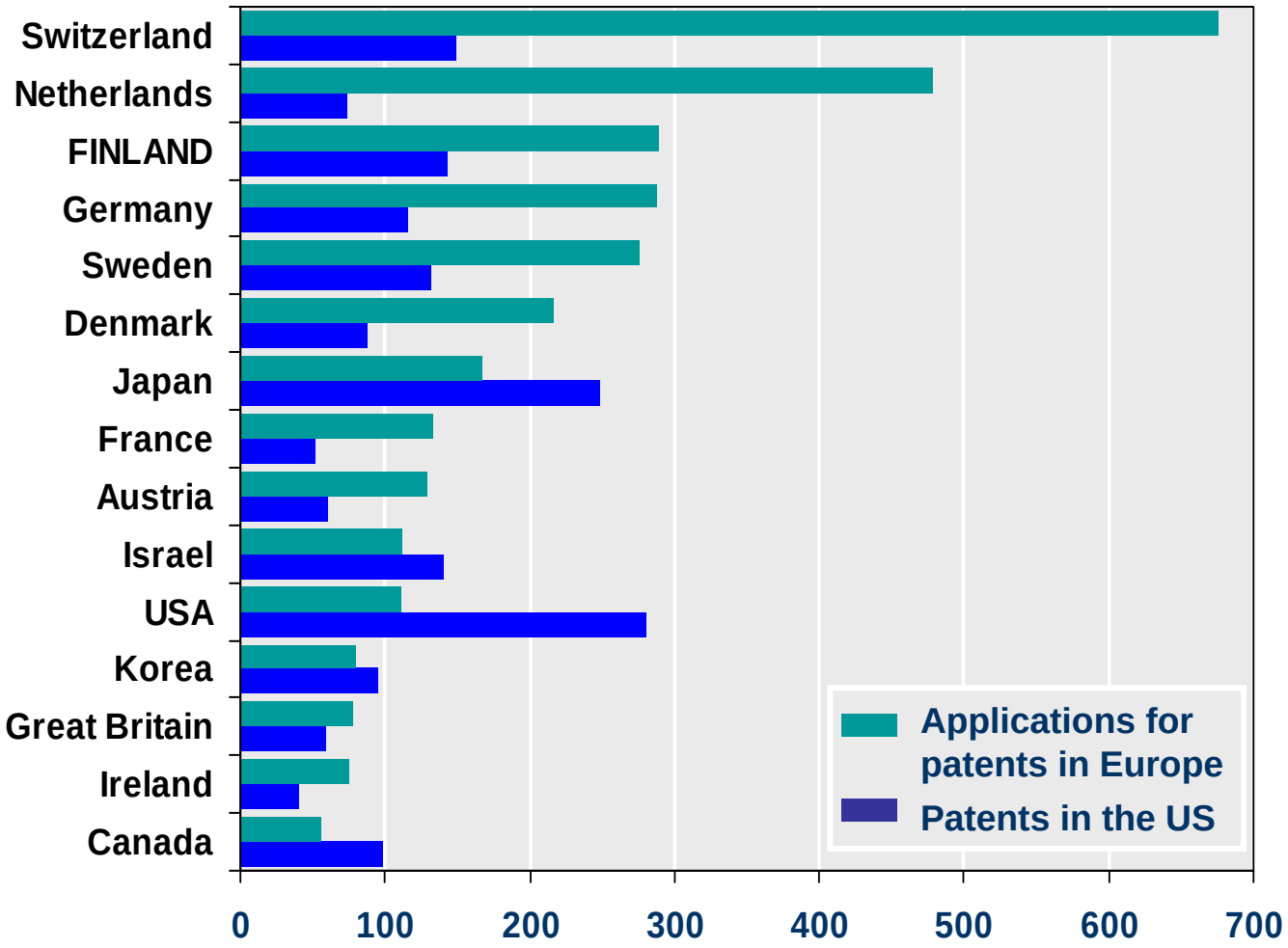


The first significant company to utilise biotechnology in Finland, Valio Oy, was founded in 1905.
By 1980, some ten other companies were established that utilise biotechnology.
At the end of 2005, there were 129 biotechnology companies, of which 116 were active.

Sources: ETLA and Etlatieto Oy, Findings of the ETLA Survey on Finnish Biotechnology Firms

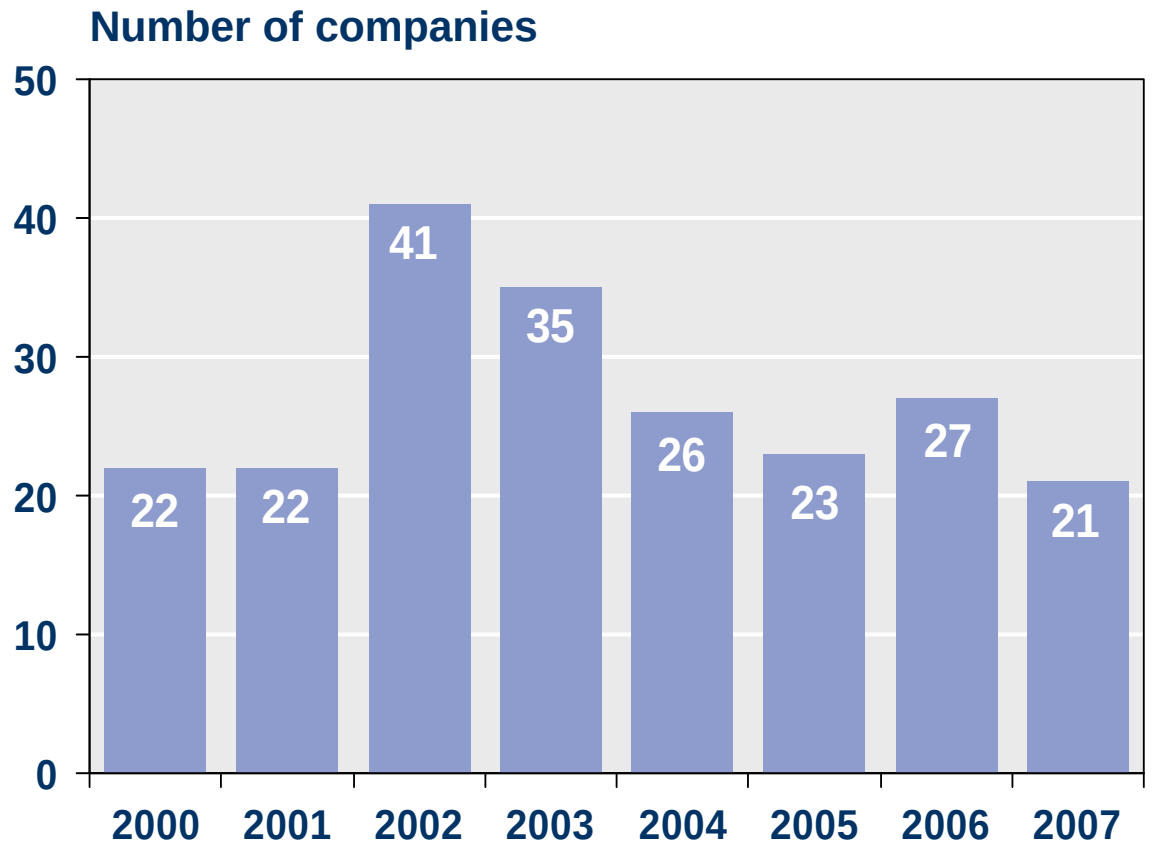
Patents in Europe and in the United States

Patents and applications for patents per million inhabitants in 2005.



Sources: Calculated from USPTO- (patents) and EPO- (applications) figures and number of inhabitants in average from Statistics Finland

Tekes customers declaring bankruptcy



Annual number of customers declared bankrupt for which Tekes has paid funding in the four years preceding bankruptcy. Of the ca. 3,000 companies funded in the last five years, approximately 1%, i.e. 20-40 companies ended up bankrupt each year.
About 1.3 percent of all Finnish companies face bankruptcy every year.

Health care in South Africa

- a large public sector (>80% of the population) and a smaller private sector (18% of the population)
- health care varies from the most basic primary health care, offered free by the state, to highly specialised hi-tech health services available in the private sector for those who can afford it
- public sector is under-resourced and over-used
- private sector, run on a commercial basis, caters for middle- and high-income earners who tend to be members of medical schemes, and to foreigners looking for top-quality surgical procedures at relatively affordable prices
- private sector attracts most of the country's health professionals

Public versus private spend

- Although the state contributes about 40% of all expenditure on health, the public health sector is under pressure to deliver services to about 80% of the population. Despite this, most resources are concentrated in the private health sector, which sees to the health needs of the remaining 20% of the population.

- Public health consumes around 11% of the government's total budget, which is allocated and spent by the nine provinces. How these resources are allocated, and the standard of health care delivered, varies from province to province.

Shortages of health professionals

- Very large "brain drain" of South African doctors to countries like Britain and Canada because of the high standard of training

- 450 foreign doctors, mainly from Cuba, have been employed. The government has also made it easier for other foreign doctors to register in SA

- Newly graduating South African doctors and pharmacists now complete a year of compulsory community service in understaffed hospitals and clinics

Poverty and unemployment

High levels of poverty (71% in rural areas and 50% overall) and unemployment (at least 38%) make it difficult for most people to pay for health services, which places immense strain on the public health sector

Infectious diseases - HIV/AIDS

- UNAIDS/WHO: 18.8% prevalence in those aged 15-49 years old at the end of 2005
- 5.5 million South Africans were living with HIV at the end of 2005, including 240,000 children under 15 years old
- Department of Health/UNAIDS/WHO: 18.34% prevalence in people aged 15-49 years old in 2006
- 5.41 million people living with HIV in 2006, including 257,000 children
- The number will exceed 6 million by 2015, by which time around 5.4 million South Africans will have died of AIDS
- Department of Health Study estimates that 29.1% of pregnant women were living with HIV in 2006

- http://www.avert.org/safricastats.htm

Infectious diseases - Tuberculosis

- The spread of HIV has been accompanied by an increase in the TB epidemic
- More than half of the country's TB cases are HIV-related
- People with HIV are far more susceptible to TB infection, and less able to fight it off
- Emergence of XDR-TB

Infectious diseases - Malaria

- The prevalence of malaria in South Africa has increased steadily from the mid-1980s. In 2000 around 62 000 South Africans contracted malaria, and 423 died of the disease
- Malaria occurs only on the fringes of the country, affecting the three north-eastern provinces: KwaZulu-Natal, Mpumalanga and Limpopo
- Malaria transmission occurs seasonally, with peak rates of infection occurring in April and declining by June
- Reasons for the spread of malaria over the past decade include drug resistance, increased cross-border travel between South Africa and Mozambique, the spread of HIV, and reductions in DDT spraying
- Government efforts to curb malaria include reintroduction of DDT spraying and distribution of bed nets

BioSA

"Tangibles"

- Business fundamentals
  (i.e. what can we learn from each other about starting and running our businesses)
- Joint R&D and commercialization initiatives
- Funding opportunities
  (attracting foreign investment)
- Understanding of and access to the global market
- Capacity / skills development
  (e.g. interns shadow CEOs)
- Facilitated access to Finnish IP
  (and SA IP when this becomes attractive)

BioSA

www.biosa.org.za