Eindhoven Region, South-east Netherlands

Top Technology

Crossing borders, moving frontiers
The Horizon Programme is a strategic action plan to strengthen the economic structure of the Eindhoven Region over the medium term. It is initiated by the Eindhoven Regional Government (SRE) and the programme management is executed by NV REDE, the Economic Development Agency for the Eindhoven Region.

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The South-east Netherlands is a centre of gravity in top technology. The economic identity of the region is defined by high-tech research and development and production activities. The region is one of the “technology and innovative hotspots” in Europe, with strongly developed private R&D activities, the highest patent density in Europe and a strong knowledge infrastructure of top quality.

This booklet provides an overview to the “top technology landscape” in the South-east Netherlands with the Eindhoven region as a nucleus. The economic clusters in the region - mechatronics, automotive, medical technology and IT- have developed prosperously. New technology areas, such as embedded systems\(^1\), nanotechnology\(^2\) and life-sciences are explored, developed and applied. There is also a rapidly growing number of design activities and a strong development of the creative industry. These clusters flourish, not only through cooperation between companies, but they take advantage of the solid knowledge base that has broadened and deepened over the last decade with

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1) Systems in which the architecture for hardware and software is integrated in one function.
2) Technology based on the control and manipulation of individual atoms and molecules.
the growth of the Eindhoven University of Technology (TU/e) and the growing number of research institutes. The Eindhoven region, South-east Netherlands, is part of a larger area in which activities to develop business and scientific technology, in relation to the knowledge intensive manufacturing industry, have become intertwined in a tight international network of business and scientific relationships.

To create effective and efficient Research & Development and to speed up innovation processes leading companies adopt ‘open innovation’. The region offers such an environment e.g. on the Philips High Tech Campus, a business park with state-of-the-art facilities for business development and the acceleration of innovation by prototyping, design and technical support.

The region’s unique position is acknowledged by the Ministry of Economic Affairs in the concept GEP* paper. Hence the goal is to strengthen the business climate for top technology companies and to enhance the technological know-how to provide companies and institutions with the conditions to strengthen their knowledge and supply chains, so new relations between technologies and industries can flourish. The permanent search for improving competitiveness provides a base for new networks and alliances and means they cross borders and move frontiers on a geographical, scientific and technical scale. The close cooperation between the private sector, knowledge institutions and the government fuels the drive to excel as a top technology region. The economic agenda has been agreed and is understood by all parties: competitiveness through TOP TECHNOLOGY.

* The GEP paper addresses the differences in regional economic perspectives in the Netherlands and focuses on the support and/or allocation of projects of national economic interest.
The South-east Netherlands is an area spread across two southern Dutch provinces: the eastern part of the province of Noord Brabant and the whole province of Limburg. In statistical terms the provinces are indicated as EU-NUTS2 regions.

The South-east-Netherlands is an economically coherent area that consists of five statistical regions (EU-NUTS3 level or Dutch COROP Regions):

- North-east Brabant (625,836 inhabitants)
- South-east Brabant, referred to as the Eindhoven region (719,158 inhabitants)
- Northern Limburg (276,488 inhabitants)
- Central Limburg (220,725 inhabitants)
- Southern Limburg (646,083 inhabitants)

The statistics in this publication focus on gross domestic product (GDP), labour force, manufacturing industry, technology, R&D, innovation, scientific performance & patents, business start-ups, creative industry and four important industry clusters: medical technology, ICT, automotive and mechatronics.

Statistics are presented in different ways:
- NUTS2 levels,
- NUTS3 levels
- aggregated and combined NUTS2 and NUTS3 levels
- the regions of the South-east Netherlands as a whole.
- facts and figures are compared with Dutch national statistics and/or European benchmarks.
The graphics and statistics, obtained from various independent sources, illustrate and underline the technology profile of the South-east Netherlands in general and point out the special position and importance of the Eindhoven region as a centre of gravity in technology.

In the Eindhoven region the considerable presence of the electro-technical industry in particular and the related high concentration of research and development activities contribute positively to the development of business services and the transport-and-distribution sector. Design activities thrive as well. The large number of international businesses with offices here attests to Eindhoven’s attractiveness as a place to establish international premises.

Industry provides over 20% of the available jobs, making the region the manufacturing industry centre of the Netherlands. Key industrial clusters include mechatronics and the automotive industry.

New sectors are medical technology and information technology (ICT). Research-and-development activities are particularly prevalent in the region. Of the total amount spent annually on research and development in the Netherlands, some 45% originates in the South-east Netherlands.

The region focuses on and wants to increase its leading position in technology and knowledge. An opportunity in the global trend towards a knowledge-and-network economy is provided by the vicinity of three centres of gravity in top technology:

- Eindhoven
- Leuven
- The Meuse-Rhine Triangle (Maastricht, Liege, Aachen).
The Horizon Programme is a strategic action plan to strengthen the economic structure of the Eindhoven Region over the medium term. This region is the heart of the Southeast Netherlands economic entity. Its mission is to change from industrial mainport to top technology region, with the emphasis on people and technology. Its objectives are:

1. To reduce structural shortages in the labour market
2. To increase the return on knowledge by strengthening innovation and market competencies
3. To reduce sensitivity to market fluctuations through diversification
4. To improve the international profile of the region

These objectives have been translated into three programme themes: Environment, People, Technology. The statistics in this publication address these themes.

Twenty projects were formulated at the outset based on the programme themes. Projects are set in motion through close cooperation of the triumvirate of government, business world and knowledge institutions. Evidently connections are made with initiatives and projects of economic development cooperations in Noord Brabant and Limburg (NV BOM and NV Liof).

Some projects are already successfully in operation, e.g.:

- Incubator 3+: a concept to stimulate and facilitate technostarters by clustering new and existing facilities such as (pre)seed capital, coaching, networks, management traineeships and a progression concept in housing.
- Metal house: fostering cooperation and knowledge development in the field of commerce and technique for and by entrepreneurs in the metal and metal-electro sector.
The South-east Netherlands has an excellent geographical location in north-west Europe between the economic core regions of the Rhine-Ruhr area in Germany, the Amsterdam-Rotterdam area in the Netherlands, the Antwerp-Brussels area in Belgium and northern France.

The region offers a perfect business climate for the manufacturing industry, top technology companies and research institutes. The region focuses on and wants to increase its leading position in technology and knowledge. Close cooperation in the triple helix (business world, knowledge institutes and government) functions as a catalyst for economic development.
South-east Netherlands: a European region
South-east Netherlands: a European region
International renown knowledge and research institutes

1. Eindhoven University of Technology
   Fontys Polytechnic
   Philips High-Tech Campus
   Philips Natlab - Philips Research
   Philips Medical Systems
   ASML
   TNO Industry: Independent R&D organisation
   TNO Automotive: Independent R&D organisation
   Ceel
   BETA: Research institute for Operations Management and Logistics
   CEBRA: Centre for Electronic Business Research & Applications
   COBRA/NRC Photonics: Communication Technology Basic Research and Applications
   DPI: Dutch Polymer Institute
   ECIS: Eindhoven Centre for Innovation Studies
   ESI: Embedded Systems Institute
   Eurandom: European Unit for Research and Analysis of Non-Deterministic Operational Models
   ITEA: International Technology Education Association
   Knowledge centre for Mechatronics (Fontys)
   Kenniswijk
   Mikro Centre Netherlands
   NRSC Catalysis

2. University Maastricht
   Limburg University Centre

3. KU-Leuven, Knowledge from Genomics up to Electronics
   IMEC
   Institute for Materials Research (Diepenbeek-LUC)
   Philips Research Labs Leuven
   Philips Semiconductors and Digital Systems

University of Liège
Hogeschool Zuyd
Open University of the Netherlands
Transnational University Limburg (LUC-Univ-Maastricht)
Rheinisch-Westfälische Technische Hochschule Aachen
Fraunhofer
Fachhochschule Aachen
Forschungszentrum Juelich (KFA)
Kompetenzzentrum "Informatik/IT Aachen"
Aachener Kompetenzzentrum Medizintechnik AKM
Competence Centre Automotive Region Aachen
Kompetenzzentrum für Biowerkstoffe Aachen (bwA)
Kompetenzzentrum für Prozesssimulation der RWTH Aachen
Kunststoffinnovationszentrum Aachen
Lasertechnik in Aachen
Philips Research Aachen
Academic Hospital Maastricht
Deutsches Woll Forschungsinstitut
Helmholz Institute
DSM
The South-east region contributes considerably to the national economy with an economic growth (gross regional product) exceeding the Dutch average. At EUR 27,000/capita, the GRP/capita ratio for the Eindhoven region equals the Dutch national GDP/capita ratio.

Source: CBS, ETIN Adviseurs 2003

**Development Gross Regional Product (GRP) and Gross Domestic Product (GDP) (index 1996 = 100)**

Source: CBS, ETIN Adviseurs 2003
The presence and importance of (manufacturing) industry is clearly recognisable; providing 30% of the Dutch industrial jobs with a share over 20% in the regional employment structure.

The provinces Noord Brabant and Limburg provide over 20% of the gross domestic product of the Netherlands, 30% of Dutch industrial jobs, 40% of the added value in the manufacturing industry and 50% of Dutch industry expenditure on R&D (source: the Boston Consulting Group), making the South-east region the top technology centre of the Netherlands.
Knowledge and technology are crucial to the South-east region. This is illustrated by the employment figures in medium- and high-tech industry (see chart) and the density of knowledge-intensive jobs in industry in the south-east of the Netherlands (see map).

Source: LISA, ETIN Adviseurs
High-tech and modern industry

Relative representation knowledge-intensive industry in the Netherlands 2001
(jobs per 1000 inhabitants aged 15-65 years)

Knowledge intensity in industry (2001)
(Jobs per 1000 inhabitants aged 15-65 years)

Source: Economische Hittekaart, Ministry of Economic Affairs, 2002
International attractiveness

The region’s geographic position, its strong industrial base and highly educated workforce attract companies from abroad. Over the last ten years the South-east Netherlands has taken a share of approximately 30% (measured by number of projects, investment volumes and employment) of all new foreign investment in the Netherlands. (Source: NV BOM, NFIA)

Think global, act local: international orientation

The international business orientation is obvious given the above-average export shares of companies in industry and commercial services.

International attractiveness

The region’s geographic position, its strong industrial base and highly educated workforce attract companies from abroad. Over the last ten years the South-east Netherlands has taken a share of approximately 30% (measured by number of projects, investment volumes and employment) of all new foreign investment in the Netherlands. (Source: NV BOM, NFIA)
People

It’s peoples’ business. A highly skilled and well educated labour force provides a solid base for productivity and economic growth. Technical competences in combination with commercial skills are becoming the determining factor for economic success. That goes for entrepreneurs and for employees as well. The supply of, and demand for knowledge workers need to be adequately matched. Universities, polytechnics and researchers in the South-east Netherlands are highly regarded.

It’s important to encourage young people to choose a (research) career in technology subjects and increase the knowledge potential to meet the (future) needs of the regional labour market.
Participation in employment in the South-east region is, for four sub-regions, at or above the national average and is still increasing.

Source: CBS, 2003
Top technology demands skills and education. The region has a highly skilled labour force. This is illustrated by the fact that the Eindhoven region exceeds the national averages for intermediate and higher vocational education and university.

Source: Economisch Bureau ING Bank, MKB Nederland 2001/2002
Over average labour productivity

Technology makes sense: it creates value and productivity. The employment structure and the highly skilled labour force in the South-east region result in above-average productivity, illustrate the economic strength of the region and contribute a substantial share to the economy of the Netherlands.

Source: CBS
The South-east Netherlands invests in the future labour force stimulating the student participation in technical education. The region’s future in knowledge and technology, especially in the Eindhoven region, is ensured by the high level of student participation in technical education.

Source: CBS, Eindhoven University of Technology, Tilburg University, Maastricht University
The distribution of students over levels of technical education differs per region; it depends on the presence of polytechnics and technology universities. The strong position of the Eindhoven University of Technology is evident.

Source: CBS, Eindhoven University of Technology, Tilburg University, Maastricht University
The success of the region’s universities, Maastricht University and the Eindhoven University of Technology (TU/e), is evident from their growth rates. These are substantially higher than the average growth rate for all Dutch universities.

Source: CBS, Eindhoven University of Technology, Maastricht University
The region is one of the ‘technology and innovative hotspots’ in Europe, with a substantial share of high-tech businesses and strongly developed R&D activities. To offer a productive environment for business, promising new technology areas and sectors are explored, application of knowledge is fostered and extra attention is paid to cooperation and networks between the business world, knowledge institutions and government. Collaboration between and within clusters is encouraged and fostered. Innovation involves more than science and technology. It also includes improvements in marketing and services, making us ‘leading in technology’ as well as ‘leading through technology’.
The R&D level of Noord Brabant exceeds the Lisbon challenge (R&D = 3% of the GDP). The EU Lisbon 2000 goal is to become the most competitive and dynamic knowledge based economy in the world within a decade. Noord Brabant and Limburg are the nation’s top regions in the field of R&D; the provinces account for almost one-third of national expenditure on R&D (public, private and education research institutes). Rated according to the expenditure on R&D as a % of the gross domestic product (regional/national), the provinces Noord Brabant and Limburg rank no. 1 and no. 3.

Source: Hotspots, spatial patterns of innovation in the Netherlands, Senter 2001
R&D in the South-east Netherlands is predominantly a matter of the private sector. Approximately 45% of all business expenditure in the Netherlands is made by companies in the South-east Netherlands. Four companies (Philips, ASML, DSM and Océ) account for almost 40% of Dutch business R&D, but the share of SMEs is increasing.

Source: Technisch weekblad, march 2003
R&D: it’s a matter of business(es)

The map shows that the greatest R&D intensity, indicated by labour cost per job, is in the southern part of the country. The South-east Netherlands R&D nucleus is clearly situated in the Eindhoven region. The Dutch average R&D labour cost is € 312 per job.
Dutch R&D intensity tripled by far!

High presence South-east Netherlands regions in Dutch R&D top 10. The Eindhoven Region ranks no. 1 with a R&D level (1152). That more than triples the national index (312).

Source: Hot Spots 2002, Senter 2003
High business R&D expenditure

The major part of all R&D expenses in the South-east area are made by private companies; businesses in this area account for almost half of national business expenditure on R&D.

Business Enterprise expenditure on R&D (BERD) ratio provinces/national (2000) (in % clockwise)

Source: CBS, Etin Adviseurs
High R&D employment

Companies in the south of the Netherlands also employ most R&D workers; Noord Brabant and Limburg together account for 40% of R&D employment in the Netherlands.

Source: CBS, Etin Adviseurs
The South-east region as a whole scores high above the national average for employment in R&D-intensive industry sectors.
Employment in R&D-intensive industries

Every sub-region excels in a specific sector.

Workers in most R&D intensive industry sectors as a percentage of the active population (2002)

Source: LISA
Science is business, business is science. On a European level, the region’s research institutions (private and universities) play an important role as well, with two regional institutes appearing in the European top 20 for scientific citation scores: no.4, Philips and no.14, Eindhoven University of Technology.

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<thead>
<tr>
<th>R&amp;D Institute</th>
<th>Score</th>
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<tr>
<td>1. Res. C. for Energy and Env. Technology</td>
<td>1.99</td>
</tr>
<tr>
<td>2. Glaxo Wellcome SmithKline Beecham</td>
<td>1.93</td>
</tr>
<tr>
<td>4. Philips</td>
<td>1.84</td>
</tr>
<tr>
<td>5. France Telecom</td>
<td>1.56</td>
</tr>
<tr>
<td>6. Univ. Cambridge</td>
<td>1.55</td>
</tr>
<tr>
<td>7. Riso Natl. Lab.</td>
<td>1.53</td>
</tr>
<tr>
<td>8. Univ. Oxford</td>
<td>1.48</td>
</tr>
<tr>
<td>9. British Telecom</td>
<td>1.46</td>
</tr>
<tr>
<td>10. Rutherford Appleton Lab.</td>
<td>1.42</td>
</tr>
<tr>
<td>11. Niels Bohr Inst.</td>
<td>1.42</td>
</tr>
<tr>
<td>12. Tech. Univ. Munich</td>
<td>1.40</td>
</tr>
<tr>
<td>13. Observ. Astronomy Rome</td>
<td>1.40</td>
</tr>
<tr>
<td>14. Eindhoven University of Technology</td>
<td>1.40</td>
</tr>
<tr>
<td>15. Inst. Pasteur</td>
<td>1.39</td>
</tr>
<tr>
<td>16. AstraZeneca</td>
<td>1.36</td>
</tr>
<tr>
<td>17. Univ. Edinburgh</td>
<td>1.35</td>
</tr>
<tr>
<td>18. Uppsala Astronomical Observatory</td>
<td>1.35</td>
</tr>
<tr>
<td>19. Research Center Jülich</td>
<td>1.34</td>
</tr>
<tr>
<td>20. Univ. Freiburg</td>
<td>1.34</td>
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The province of Noord Brabant ranks third on the European Innovation Scoreboard. The European Innovation Scoreboard contains 17 main indicators, selected to summarize the main drivers and outputs of innovations. It’s used for tracking the EU’s progress towards the Lisbon goal of becoming the most competitive and dynamic knowledge based economy in the world within a decade.

And owing to its high concentration of researchers, high-tech employees, quality educators and the like, the south of the Netherlands is listed as the 1st Dutch and as the 15th European region in the World Knowledge Competitiveness Index 2003-2004. (Source: Robert Huggins Associates, 2003)

**European innovation scoreboard ranking RRSII (revealed regional summary innovation index)**

Source: European Innovation Scoreboard 2003, European Commission
In terms of European standard measures (patents per active workers), the Eindhoven Region outranks other European regions by far.

Source: CBS, Etin Adviseurs
Medical technology is one of the new high-tech sectors in the South-east region; as a result of extensive cooperation several clusters have begun to form.

Medical technology: employment ratio

Employment in Medical technology, number of jobs and ratio area/national (2002) (in % clockwise)

Source: Trade Register, LISA, Etin Adviseurs
Half of the jobs in the South-east area are concentrated in North-east Brabant; with the presence of the universities and knowledge infrastructure there is a lot of potential for growth.

Key players are e.g.:
- Philips Medical Systems
- Draeger Medical Electronics
- Stryker Cooperation

Again, industry is the engine driving the medical-technology sector in the south-east.
A substantial part of the Dutch automotive industry is concentrated in the South-east region, with hotspots in the Eindhoven region and Southern Limburg. Most of the major Dutch truck and bus manufacturers have their headquarters in the south-east.

Automotive: employment ratio
The South-east region as a whole accounts for half of the employment in the automotive sector.

![Pie chart showing employment distribution in the automotive sector in the Netherlands](chart.png)

- **2%** North-east Brabant: 687 jobs
- **21%** Eindhoven Region: 5,976 jobs
- **27%** Limburg: 7,941 jobs
- **50%** The Netherlands (remaining): 14,365 jobs

Source: Trade Register, LISA, Etin Adviseurs
Within the automotive sector each sub-region has its own specialisation.

Key players are e.g.:
- DAF Trucks (a Paccar company)
- NedCar
- VOL Bus & Chassis (Bova, Berkhof, DAF Bus)
- PD&E Automotive Solutions (Benteler Automotive)
- Siemens VDO Automotive

### Employment in Automotive, number and distribution of jobs (2002)

- **North-east Brabant**: 687
- **Eindhoven Region**: 5,976
- **Limburg**: 7,941
- **The Netherlands**: 28,969

Source: Trade Register, USA, Etin Adviseurs
The South-east region, especially the Eindhoven region, is one of the world’s top information and communication technology regions. In the Netherlands, the Eindhoven region ranks third in ICT activities.

**ICT: employment ratio**

The South-east region accounts for almost 20% of total Dutch ICT employment.

- 4% North-east Brabant, 11,020 jobs
- 7% Eindhoven Region, 20,813 jobs
- 8% Limburg, 22,464 jobs
- 81% The Netherlands (remaining), 239,744 jobs

*Source: Trade Register, USA, Etin Adviseurs*
Employment in communication technology constitutes the main part of the region’s ICT employment.

Key players are e.g.:
- Vodafone
- Simac Techniek
- KPN Telecom
- ATOS Origin

Employment in ICT, number and distribution of jobs (2002)

Source: Trade Register, USA, Etin Adviseurs
Mechatronics, the synergy between mechanics and electronics, finds a fine breeding ground in the South-east region, especially in the Eindhoven region where the university plays an important nurturing role.

**Mechatronics: employment ratio**

More than a quarter of all Dutch employees in mechatronics work in the South-east Netherlands.

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
<th>Jobs</th>
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<tbody>
<tr>
<td>North-east Brabant</td>
<td>5%</td>
<td>15,049 jobs</td>
</tr>
<tr>
<td>Eindhoven Region</td>
<td>12%</td>
<td>39,218 jobs</td>
</tr>
<tr>
<td>Limburg</td>
<td>11%</td>
<td>34,593 jobs</td>
</tr>
<tr>
<td>The Netherlands (remaining)</td>
<td>72%</td>
<td>230,455 jobs</td>
</tr>
</tbody>
</table>

Source: Trade Register, LISA, Etin Adviseurs
Employment in industrial mechatronics is above average.

**Key players are e.g.:**
- ASM Lithography
- Te Strake
- Océ
- Neways Electronics International
- FEI
- Philips
- Stark
- VDL
- KMWE
- Frencken
- Axxicon
- ODME

Source: Trade Register, USA, Etin Adviseurs
Incubator buildings: real business greenhouses

The Eindhoven Region provides an excellent business climate for business start-ups with its incubator facilities in coaching, finance and housing. The 5 incubator centres managed by NV REDE and the Eutech Park, The Eindhoven University of Technology incubator, are intended as breeding grounds for new business activities. Over the period January 1998-December 2002 163 business start-ups were established in these incubator buildings in the Eindhoven Region.

Some facts:
- 13% of the entrepreneurs in business incubators in the region are graduates of Eindhoven University of Technology or the Fontys Polytechnic. The national average is 3%.
- 57% of the start-ups are based on ICT.
- 41% of the start-ups show a growth rate higher than 10% per year. The national average is 6%.

The new entrepreneurs have a range of backgrounds:

Source: NV REDE, 2002
Over the period January 1998-December 2002 112 techno start-ups* were established in the Eindhoven Region. 75.9% of the techno start-ups is profitable and 21.6% is R&D intensive (measured by the Dutch WBSO-tax rule).

(Source: UniPartners, 2003)

* Definition techno start-ups: Technology oriented, business history less than 5 years, education level entrepreneur ≥ Higher vocational, minimum R&D level 10%
Start-ups, spin-offs, spin-outs: future giants?

The Hotspots report 2002 shows the high quality of R&D in techno start-ups in the Eindhoven region.
The creative industry in the Eindhoven region numbers approximately 8,500 companies and institutions and employs 30,000 people. The sector accounts for 8% of total employment in the region.

The turnover generated by the creative industry is estimated at €1.2 billion, which represents 3% of total regional turnover. At the heart of the creative industry are software development and automation, design and the creative arts. Together these areas account for more than 40% of the companies and institutions in the creative industry.

Major players in the Eindhoven region are: Philips Design, Design Academy Eindhoven, TU/e Industrial Design and TNO Institute of Industrial Technology. In addition, there are 1,200 design-related companies. The design part of the creative cluster can only be seen in the redirection of the manufacturing industry towards a design industry.
Sources

- Alice www.alice-eindhoven.nl
- NV BOM www.bom.nl
- Boston Consulting Group www.bcg.nl
- CBS (Statistics Netherlands) www.cbs.nl
- ERBO, Chambers of Commerce www.kvk.nl
- ETIN Adviseurs www.etin.nl
- Eindhoven University of Technology www.tue.nl
- European Commission www.cardis.lu
- Eurostat europa.eu.int/comm/eurostat
- ING Bank www.ing.nl
- LISA www.lisa.nl
- Maastricht University www.unimaas.nl
- Ministry of Economic Affairs www.ez.nl
- Royal Association MKB Nederland www.mkb.nl
- Netherlands Foreign Investment Agency www.nfia.nl
- NV REDE www.rede.nl
- Programma Horizon www.programmahorizon.nl
- SENTER www.senter.nl
- Technisch Weekblad www.technischweekblad.nl
- Tilburg University www.tilburguniversity.nl
- UniPartners Eindhoven www.stud.tue.nl/~upe/