# Heerlen

## *Knowledge city and innovation engine*

Final reporting

February 2025

pwc

# About this report

## Scope

Limited Extensive

The aim of this report is to provide insight into i) the joint vision of Maastricht University, the Municipality of Heerlen and Zuyd University of Applied Sciences on the educational ecosystem to be formed in Heerlen, ii) the societal and/or broader prosperity effects of the development of this educational ecosystem in Heerlen, and iii) an outline of the development path to realise the vision.
We performed the work as agreed upon in the order confirmation. We completed our analysis on January 13, 2025. This report therefore does not include the consequences of events after that date or the impact of information that became available later.

## Availability and quality of information

Limited Extensive

Our information is based on document research, workshops, and interviews with stakeholders/experts. We refer to the relevant sources (both provided and publicly available sources) on the pages. Throughout the process, we collaborated with the University. Maastricht, the Municipality of Heerlen, and Zuyd University of Applied Sciences discussed the quantity and specificity of available information; based on these discussions, appropriate working methods were identified.

## Starting point for our work

We based our work on the information provided to us. We assumed that this information was accurate, complete, and not misleading. We did not perform an audit of this information, nor a review to determine its completeness and accuracy in accordance with international auditing or review standards.

## Access to our report

We are preparing this document solely for Maastricht University, the client, in accordance with the order confirmation. Maastricht University acts as the client, also on behalf of the Municipality of Heerlen and Zuyd University of Applied Sciences. We accept no liability or duty of care towards any other party based on the content of our document. Maastricht University indemnifies PwC at all times against any third-party claims arising from or related to work performed by us in relation to Maastricht University, except in the event of intent or deliberate recklessness on the part of PwC.

If you receive a request under the Open Government Act (hereinafter: "Woo request") regarding written statements from PwC, we request that you inform us of this in writing without delay (in any event prior to the decision to be made on the Woo request and therefore prior to any disclosure). In this context, we request that you provide us with all available background information regarding the Woo request. This gives us the opportunity to share our views on the Woo request, in anticipation of your decision on the Woo request.

## Other comments

The Report and any dispute arising out of or in connection with (the content of) the Report shall be governed exclusively by Dutch law.

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# Management summary (1/3)

**Context and research question**

- Heerlen is a city with a rich history, a strong identity and great ambition to continue developing – with the aim of being an increasingly attractive city for its residents
- The municipality of Heerlen (Heerlen) is therefore committed to strengthening the knowledge infrastructure, stimulating innovation and entrepreneurship, improving the living environment and increasing citizen participation.
- Heerlen is committed to strengthening its knowledge infrastructure by working with Maastricht University (UM) and Zuyd University of Applied Sciences (Zuyd) on the educational ecosystem
- This collaboration offers Zuyd the opportunity to increase its attractiveness, UM the opportunity to build its presence in Heerlen and Zuyd and UM the opportunity to build a leading knowledge ecosystem in Heerlen
- Over the past period, Heerlen, UM and Zuyd (partners) jointly developed the proposition for strengthening the ecosystem
- Heerlen, UM and Zuyd asked PwC:
  1. To provide process guidance in developing a joint vision/proposition
  2. To map the social costs/benefits
  3. To develop a sketch of the development path for realization

**Method**

- The vision is the result of (joint) input from partners; PwC, as an independent advisor, carried out the social cost-benefit analysis and developed the outline of the development path.

**Shared vision**

- Research and education are important drivers for further strengthening broad prosperity in a region because they attract highly educated people to an area; highly educated people have a positive effect on the economy and labor market, and as a result, economic growth, business climate, health and safety also improve.
- The vision for research and education in Heerlen is to create the Incubator for innovation in urban and regional transition; the focus is on sociotechnical systems, or how technical innovation can be applied and developed for and by society to realize socially required transitions
- This could include the transition to climate neutral, data-driven built environment, but also the transition to fewer hands at the bedside in healthcare, or to a healthier society

# Management summary (2/3)

• Knowledge institutions Zuyd and UM have the ambition to structurally increase the number of to attract additional students (Zuyd: 1,000, UM: 1,250) and 228 additional staff members to Heerlen (Zuyd: 110, UM: 118), thus reversing the projected structural decline of over 1,000 students at Zuyd; Heerlen is committed to related policies to retain students in the city and region after graduation

**Social cost-benefit analysis (SCBA)**

• The effects of the focus on research and education in Heerlen on the broader Prosperity was assessed using a social cost-benefit analysis (SCBA) prepared in accordance with the guidelines of the Netherlands Bureau for Economic Policy Analysis (CPB) and the Netherlands Environmental Assessment Agency (PBL). SCBAs are the most commonly used method to provide a comprehensive picture of the positive and negative broad welfare effects of a policy measure. Business cases such as those developed by UM and Zuyd underlie the SCBA. We have financially and technically validated the UM business case, while Zuyd's business case was essentially validated in parts and has therefore been partially financially and technically validated. Market validation is outside the scope of both business cases .

• The societal cost-benefit analysis of the educational ecosystem shows show that the costs are less than the quantified benefits. The net present value (NPV) of UM's proposition is €85 million and Zuyd's €95 million. The net present value of the educational ecosystem is therefore €168 million and creates both additional prosperity for Heerlen and social and economic value. Sensitivity analyses show that a positive result remains robust even if the target student numbers are halved.

• The benefits arise because the ecosystem is transformed over a period of ten Heerlen's population will increase annually, while simultaneously increasing labor productivity and employment. Both effects combined lead to structural GDP effects of €3.2 million per year for the UM proposition and €2.6 million per year for the Zuyd proposition, resulting in a total of €5.8 million per year for the ecosystem as a whole. Despite UM's higher structural GDP effect, its NPV is lower than Zuyd's NPV because UM needs to build a presence —including facilities, staff, and a stable student population—in Heerlen; this entails investments.

• Besides economic impact, the educational ecosystem also increases broad prosperity in Heerlen through positive effects on health, safety, and the living environment for Heerlen residents. These effects are therefore linked to the goals of the National Program Heerlen-Noord.

• Scenario calculations show that broad welfare effects can be more clearly defined as more focus is placed on the activities to be undertaken.

# Management summary (3/3)

Sensitivity analyses show that social impacts depend on related policies; for example, the share of students, graduates, and employees who choose to remain in Heerlen affects the magnitude of the social benefits. Labor market and housing market policies are crucial in this regard, as are policy areas that enhance Heerlen's attractiveness (culture, basic education, infrastructure, hospitality, etc.).

**Development path**

• Achieving maximum broad welfare effects requires close collaboration between the triple helix of education, government and businesses

• Following up on the triple helix in Heerlen requires, in the short term, further embedding of a (social) market perspective
Specifically this means:

- Operationalizing the financing of the plan

ÿ Further elaboration of specific application areas where (applied) research focuses on this, in order to stimulate the development of business activities and related policies that are needed to realize specific transitions – and, by extension, decision-making about where the ecosystem will be established

- Further elaboration of (the vision on) the development of mutual cooperation agreements between educational institutions in the short and long term, with attention to education, research, marketing, infrastructure and politics

ÿ Further elaboration and recording of commitments and responsibilities of individual parties and, in extension, intended progress

• It is strongly recommended to appoint a figurehead.
The figurehead has the task of connecting and encouraging UM, Zuyd and Heerlen (including through a permanent consultation and progress reporting structure) and simultaneously connecting other parties to the proposition.

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# This document contains the joint educational proposition for Heerlen, and provides insight into its social value

## Background

- Heerlen is a city with a rich history, a strong identity and great ambition to continue developing – with the aim of being an increasingly attractive city for its residents
- The municipality of Heerlen (Heerlen) is therefore committed to strengthening the knowledge infrastructure, stimulating innovation and entrepreneurship, improving the living environment and increasing citizen participation.
- Strengthening the knowledge infrastructure is something Heerlen is doing other by working together with Maastricht University (UM) and Zuyd University of Applied Sciences (Zuyd) to work on the educational ecosystem
- This collaboration offers Zuyd the opportunity to increase its attractiveness, and Zuyd and UM the opportunity to build a leading knowledge ecosystem in Heerlen
- Over the past period, Heerlen, UM and Zuyd (partners) jointly developed the proposition for strengthening the ecosystem

## Questioning

Heerlen, UM and Zuyd have asked PwC to: 1.

Provide process support in developing a joint vision/proposition

2. To map the social costs/benefits

3. To develop a sketch of the development path for realization

The social costs and benefits have been mapped out for the individual partners, as well as for the proposition as a whole.

The vision/proposition is the result of (joint) input from partners; PwC, as an independent advisor, carried out the social cost-benefit analysis and drew up the outline of the development path.

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# With targeted interventions, Heerlen has created the starting position for further strengthening broad prosperity

## Operation Heartbeat

Repression and prevention of crime

## Cultural Summer

Realization of an attractive cultural offering, with a raw edge

## IBA Parkstad

Facilitate innovative projects that have lasting significance

## NPHLN

Nationaal Programma Heerlen Noord

Commitment to achieving equal opportunities for all residents

## Education

ZU YD U M Heerlen

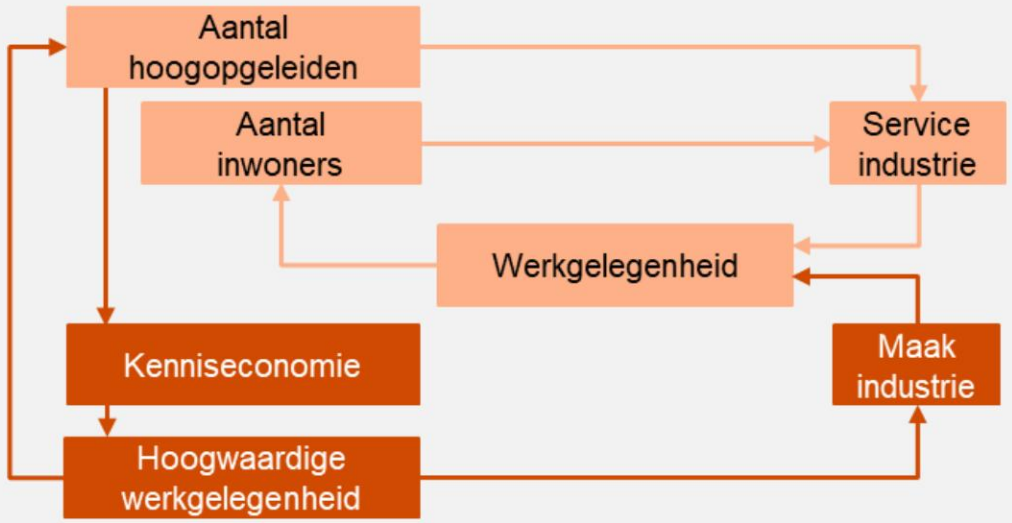
Developing a strong educational and research infrastructure with offerings that fit the context of Heerlen

**Completed/ in progress**
**Next step**

# Research and education are important drivers for further strengthening broad prosperity in a region

## Relationship between highly educated people and the economy

**Schematic representation of the relationship between highly educated people and the economy**




- Research and education attracts highly educated people to an area
  - An increase in the number of highly educated people leads 'in itself' to an improvement in broad prosperity: the increase strengthens the service industry because there is a greater need for services such as restaurants, which leads to employment.
    This increase in employment attracts residents, which leads to an increased need for services, etc.
  - If highly educated people present also contribute directly to (the development of) a knowledge economy, an additional interaction will arise, aimed at high-quality employment.
    In addition to high-quality employment, the manufacturing industry that supports the knowledge economy can also be strengthened

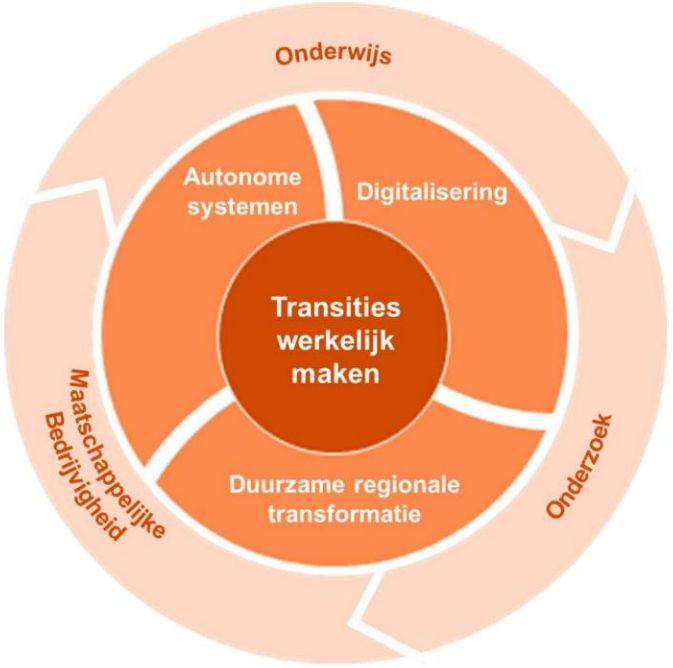
- An increase in the number of highly educated individuals in an area therefore has a positive effect on the economy and labor market. This also leads to improvements in economic growth, the business climate, health, and safety in an area.

Hamm et al. (2012). *RegTrans. Zwischenbericht I. Regionale Transfereffekte verschiedener Hochschultypes. Hochschule Niederrhein, Niederrhein Institute for Regional and Structural Research and Ruhr-Universität Bochum;* Kempton et al. (2021). *Putting Universities in their Place.* Regional Studies Policy Impact Books, 3(1); Popescu (2011). *The University as a Regional Development Catalyst.* European Economic Recovery and Regional Structural Transformations. CPB (2017). *The regional impact of universities; a literature review;* Definition and indicators of knowledge economy: see Raspe, Van Oort & De Bruijn (2004). *Knowledge on the Map. Spatial patterns in the knowledge economy.* Spatial PB.

# Vision: Heerlen is the breeding ground for innovation in urban and regional transition – driven by education and research

## Education and research in Heerlen

**Context | Heerlen: 'urban living lab', with raw space for pioneering**



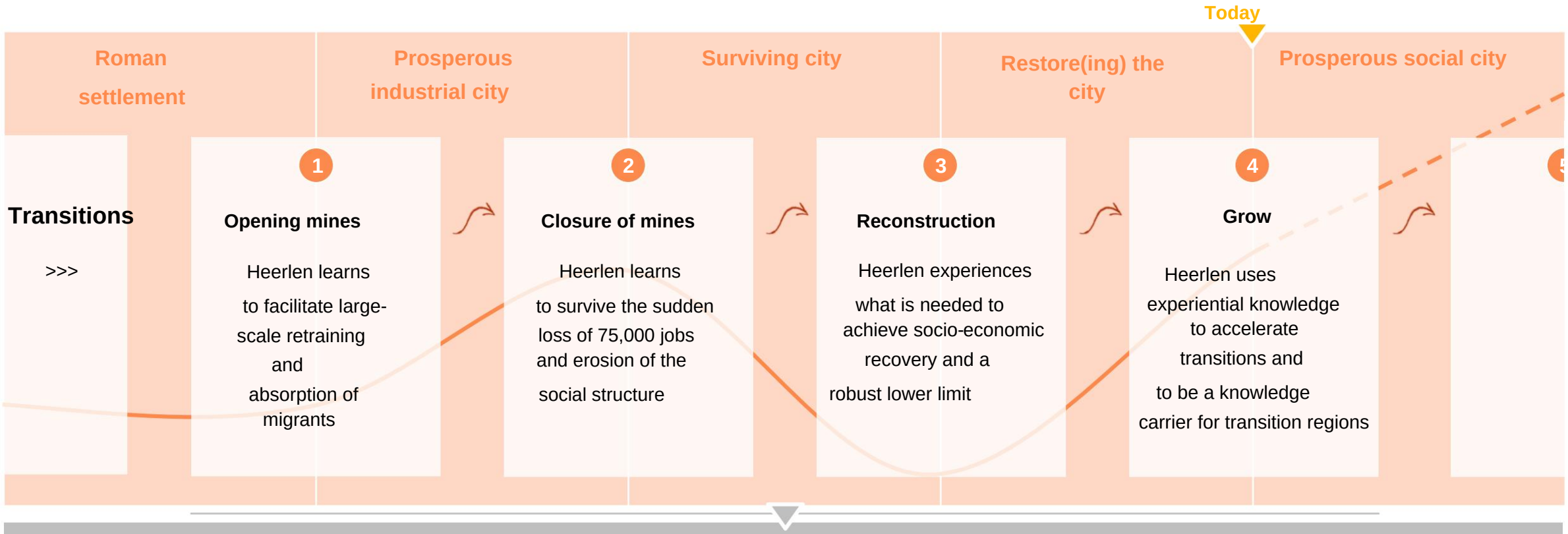

**Core Value | Social support and responsible use**

- The focus of education and research in Heerlen is sociotechnical systems, or how technical innovation can be applied and developed for and by society to realize socially required transitions
- This could include the transition to climate neutral, data-driven built environment, but also the transition to fewer hands at the bedside in healthcare or to a healthier society1
- Technical innovation and social support go hand in hand, and therefore the focus is on interdisciplinarity with lines on:
  - ÿ Digitalization/AI
  - ÿ Autonomous systems
  - ÿ Sustainable regional transformation
- Education and research are anchored in Heerlen:
  - Students and staff study/work and live in Heerlen, and are integrated into local society through 'living labs'
  - ÿ Strengthening the local economy is done proactively by supporting start-ups around promising technical innovations

1) As is also intended in the context of the healthcare transformation in Parkstad/National Program Heerlen North

# The proposition ties in with the history of Heerlen

## Development Heerlen




In the coming decades, several regions will be forced to undergo similar transformations: from abrupt retraining of the workforce to loss of local identity and from the loss of regional business models to shortages of raw materials.

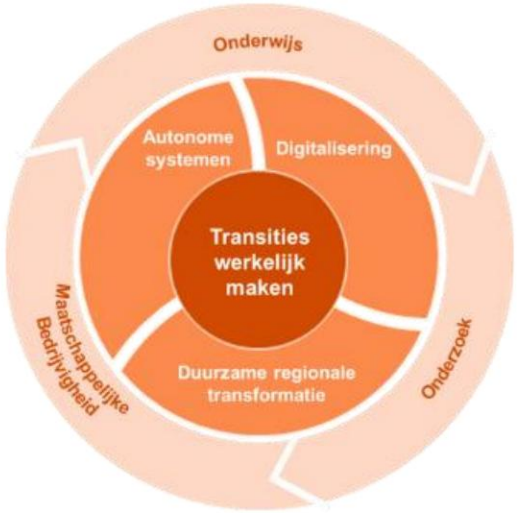
# The proposition builds on years of commitment and strengths of existing institutions

## Connection of proposition to the existing ecosystem in Heerlen

| VISTA college | ZUYD | RWTH AACHEN UNIVERSITY | Open Universiteit | Brightlands Smart Services Campus |
|---|---|---|---|---|
| Focus on technology and mechatronics<br><br>Collaboration with Zuyd and UM on the transition of shipbuilding<br><br>Commitment to bringing together the educational spectrum | Focus on technology, care and ULLs<br><br>Collaboration and strong ties in the region (including through ULLs, VISTA, UM, BSSC)<br><br>Commitment to bringing together the educational spectrum | Focus on territorial transitions, via<br><br>Master *Transforming City Regions* in Heerlen – including research in ULLs and a commitment to making students part of the local environment | Focus on broad prosperity<br><br>visible in Innovating for Resilience, focusing on *Open Societies, Broad Sustainability, Digital Transformation and Inequalities in Vulnerable Areas* | Focus on digital transformation<br><br>Entrepreneurs, researchers and students working together to develop smart digital services to improve the quality of life |

| | |
|---|---|
| Nationaal Programma Heerlen Noord | Residents, businesses, governments, and social organizations are working together to create a better future for Heerlen-Noord; a breeding ground for a transition to equal opportunities for all. |
| Heerlen | Heerlen facilitates transition with targeted interventions and wishes to continue this |
| parkstad limburg | Parkstad offers space and invests in opportunities for residents, retaining talent and attracting people who maintain the workforce – focus on a strong region of 300,000 residents |
| provincie limburg | As a shareholder of the four Brightlands Campuses, the province has been committed to transition for many years |
| UM | As a shareholder of the four Brightlands Campuses and with a presence at the campus in Heerlen with BISS, UM has been committed to regional impact for many years |

**Context | Heerlen: urban living lab , with raw space to pioneer**




**erver e | eat apple pie and use it responsibly**

# Zuyd is already present in Heerlen and is committed to strengthening its contribution to smart and sustainable urban transition

## Zuyd Proposition

- As a University of Applied Science, Zuyd has long been conducting practice-oriented research that demonstrably contributes to broad prosperity, smart and sustainable urban transformation of Heerlen/Parkstad and a healthy society

- With this proposition, Zuyd is committed to strengthening education and practice-oriented research, with the aim of improving the quality of life and well-being; Heerlen will serve as the largest open urban living lab in the world – where students live, study and actively contribute to the transformation

- The carriers for this proposition are:
  - ÿ Smart Urban Redesign Lectorate with Limburg Urban Living Labs (Univercity) and three research lines: urban transformation, energy transition, circular building technology;
  - ÿ English variant Circular Cities and Communities (in collaboration with TU Delft and RWTH Aachen);
  - ÿ Training courses and lectureships in the fields of Healthcare, Economics, Technology, European Centre for Circular Building and Transformation and the Smart Services campus, where work is being done to strengthen existing and selectively expand new variants (part-time, dual, Einstein Academy) and new content (circular cities & communities, mechatronics & embedded systems1 , data science AI), as well as strengthening practice-oriented research and developing continuous learning paths and a joint educational space for vocational education, higher professional education and university education, and focusing on Euroregional education
  - ÿ Transition themes (and expertise centres in development): valuable neighbourhoods, sustainable production, future-oriented business, healthy and just society

## Ambition 2035

+ 1,000 students2

(900 full-time, 100 part-time/LLO)

+ 110 staff members3

Source: Zuyd business case, Zuyd input 14-10-2024, Zuyd input 10-12-2024

1) Mechatronics & Embedded Systems is linked to the Einstein Academy; Zuyd also seeks to strengthen the Einstein ecosystem in general; 2) Compared to the projected structural shrinkage of over a thousand students; 3) This calculation is based on the existing student-staff ratio: on 01-01-2024, Zuyd had 1495 FTEs for 13549 students in 2023-2024 (Annual Report 2023). With 1,000 additional students, this amounts to 110 additional employees.

# UM creates new education and research with globally relevant knowledge on dealing with socially disruptive transitions

## UM Proposition

- Transformations shape Heerlen's identity. The rich history of the Parkstad region—combined with the high ambitions of a developing city and the space a city offers to develop—
  offer an exciting environment for transition-oriented research and education at all levels
- UM believes that Heerlen and the surrounding area can develop into an international knowledge center in the field of future-proof regions; knowledge partners are developing globally relevant knowledge in the field of dealing with rapid, socially disruptive transitions.
- Special attention is paid to the mutual coherence and interaction of different (Technological) solutions within a region and for their social integration, and where possible, links are sought with concrete applications in the immediate vicinity. In this way, Parkstad will become a model region for future-proof environments.
- The vehicle for the proposition is education and research on:
  - ÿ Digitalization/AI
  - ÿ Autonomous systems
  - ÿ Sustainable regional transformation

Research and education are structured in such a way that fundamental knowledge needed within various application areas to realize transitions is secured. UM's Faculty of Science and Engineering takes the lead in this, and UM's Faculty of Arts and Social Sciences also participates.

## Ambition 2035

+ 1,250 students

(1,250 full-time)

+ 118 staff members

Source: UM business case dated 19-09-2024, input UM 11-10-2024

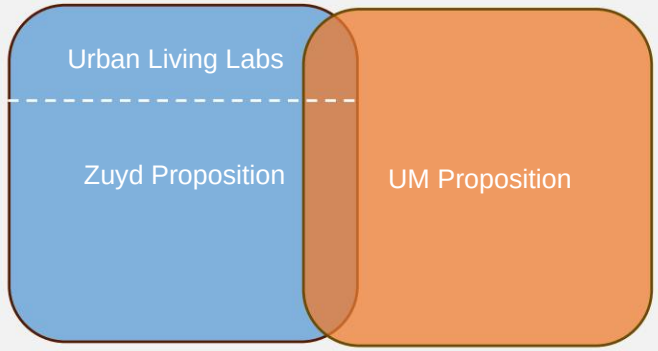
# The propositions of Zuyd and UM are complementary

## Coherence between Zuyd and UM propositions

Zuyd University of Applied Sciences has built a strong infrastructure in so-called Urban Living Labs (ULLs), where applications in the physical environment are developed in collaboration with citizens and others. UM can contribute to the knowledge base used for these ULLs through the substantive themes of digitalization/ AI, autonomous systems, and sustainable regional transformation.

- Where UM contributes to the knowledge base, Zuyd can apply this knowledge to practice-oriented research in the Urban Living Labs. The knowledge that UM develops on the various campuses can also boost the expansion of the themes currently being addressed in the Urban Living Labs (for example, to food production).
- UM and Zuyd will certainly also conduct independent research and education; it is expected that another focus is on the substantive scale to which this relates, with UM often reasoning at a more abstract regional level, while the ULLs intervene more concretely at the district level.
- To a lesser extent, UM expects to engage in participatory research, particularly where the theme of autonomous systems is addressed. Student projects within UM's problem-based learning methodology also often have a strong applied component.
- In addition to this substantive connection of research, UM and Zuyd see in the longer term opportunities to increase the number of students who remain in Heerlen, by developing continuous learning paths and close contact about possible progression and outflow of individual students

## Illustration




Source: UM business case dated 19-09-2024, input UM 11-10-2024

# Heerlen is committed to related policies to retain students in the city and region after graduation

## Proposition Heerlen

**Residential construction**

- Heerlen wants to grow to 100,000 inhabitants by 2050 and is implementing a targeted housing policy to achieve this. This includes the construction of 1,002 homes within 1.5 km of Heerlen station. In addition, there is a housing development ambition of 834 homes by 2030, 2,290 by 2040, and 874 by 2050.

**Culture**

- Heerlen invests in cultural heritage to To make the city more attractive. After investments in the Maankwartier, among others, the coming years will see investments in the Roman Museum, Cinema Royal, and the Stadsbad.

**Education**

- Heerlen wants a vibrant city centre expand by bringing education to the city center and investing in student housing
- In the former Beddenhuis there are 141 independent residential units built for students (Live & Be), new construction is being explored

**Spatial environment**

Heerlen wants to green the Cityring and other public spaces in the city center. Other ambitions include reducing vacancies and monofunctional blocks and strengthening the functions of living and working in the city center.

**Infrastructure**

- Starting in June 2024, the Three-Country Train will connect Aachen, Heerlen, Maastricht, and Liège. There is lobbying for a fast intercity train from Eindhoven to Heerlen and from Aachen. Within Heerlen, the ambition is to improve connections between the city center and Heerlen-Noord and to strengthen cycling routes.

**Poverty reduction** • In the National Program Heerlen Noord, residents, governments, companies and social organizations work on improving the quality of life

- In Parkstad, for example, a broad insulation and sustainability program is taking place, with the aim of combating energy poverty.

Sources: Municipality of Heerlen, *Implementation Agenda for Heerlen City Center. A vibrant, attractive, and vital city center for Heerlen. Phase 1: Principles,* February 2025 March 1, 2024; Municipality of Heerlen, *Council Proposal for the Realization of the Roman Museum, Cinema Royal, and the City Bath,* May 22, 2024; Municipalities of Venlo, Weert, Roermond, Sittard-Geleen, Heerlen, Maastricht, and the Province of Limburg, *Limburg Centraal. Connecting Living and Working,* April 17, 2024.

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# A CBA is used to map out the broad welfare effects of the intended strengthening of the educational ecosystem.

## Introduction to social cost-benefit analysis (SCBA)

**An CBA provides insight into the broad welfare effects of a policy measure**

We visualize the effects of research and education efforts in Heerlen on broad prosperity using a social cost-benefit analysis (SCBA). SCBAs are the most commonly used method to provide a comprehensive picture of the positive and negative broad prosperity effects of a policy measure.

Rules for preparing a CBA are included in the CBA guidelines. According to these guidelines, the CBA identifies all social and relevant effects on broad welfare. These effects include all changes that are important for individuals and that materialize as a result of the policy measure.

These effects are monetized, or expressed in monetary terms, in a CBA where possible. This way, all potential effects are brought under a single heading and are comparable. After monetization, the future benefits and costs of the proposal are discounted back to the present using a discount rate. This results in information for weighing the pros and cons of a policy measure.

The CBA compares the effects of the efforts on research and education with the most likely development without new policy, the so-called baseline situation. In the baseline situation, Heerlen faces a shrinking population and student numbers (see also page 61 of Appendix B).

**This CBA focuses on broad welfare effects of the intended strengthening of the educational ecosystem in Heerlen**

The CBA in this study must answer the question whether the intended strengthening of the educational ecosystem by Zuyd and UM is expected to have a welfare-enhancing effect3

In this study, not all effects were monetized:

1. The scientific literature does not provide reliable quantification for all effects; this applies, among other things, to the effects on safety and health (see pages 69-71 of Appendix B).
2. The educational ecosystem proposition needs to be further refined in some areas to identify and monetize its effects; this is the case, for example, with the broader economic effects related to the precise application areas where the valorization of education and research will take place in the future (see page 68 of Appendix B).

Where monetization is not possible, volume effects can also provide insight into relevant policy considerations. If the volume effect cannot be quantified, qualitative insights into the effects are presented.

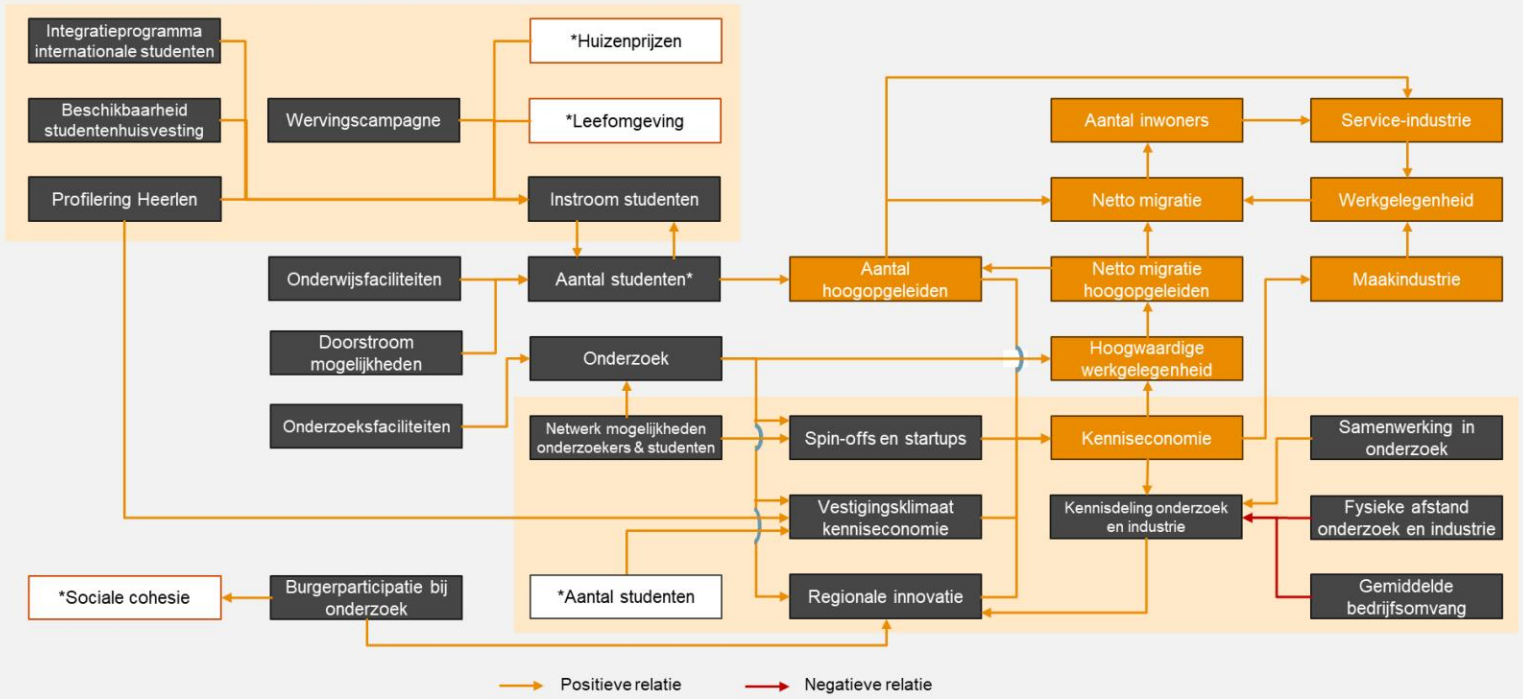


Sources: 1) Minister of Finance (2013), *Cabinet letter on the general CBA Guidelines;* 2) CPB and PBL, 2013, *General guidelines for social cost-benefit analysis* (link); 3) The Broad Prosperity Monitor can be used as a source of inspiration and a checklist for the broad prosperity effects to be examined.

# An increase in the number of students - and thus the number of highly educated people - has numerous effects

## Policy theory CBA

**Schematic representation of policy theory CBA**




The policy theory builds on known CBA relationships from existing knowledge and previous research, and provides a further elaboration of the relationship between highly educated individuals and economic dynamics as shown on page 12

The policy theory shows which effects, costs and benefits of strengthening the educational ecosystem have been taken into account in the CBA:

- Gray blocks: education and research
- Orange blocks: relationship between knowledge economy and broad prosperity
- White blocks: no quantification of effect (or input analysis in case of number of students)
- Arrows: direction of the effects

The ultimate welfare effect may involve a shift between regions; the extent to which this occurs depends on the extent to which additional students are attracted from outside the Netherlands (instead of students who would otherwise study elsewhere in the Netherlands).

Sources: Hamm et al, 2012, *RegTrans. Zwischenbericht I. Regionale Transfereffekte verschiedener Hochschultypes. Hochschule Niederrhein, Niederrhein Institute for Regional and Structural Research and Ruhr-Universität Bochum;* Kempton et al., 2021, *Putting Universities in their Place,* Regional Studies Policy Impact Books, 3(1); Popescu, 2011, *The University as a Regional Development Catalyst.* European Economic Recovery and Regional Structural Transformations; Raspe, Van Oort & De Bruijn, 2004; *Knowledge on the Map. Spatial patterns in the knowledge economy.* Spatial PB; CPB, 2017, *The regional impact of universities; a literature review*

# Zuyd The proposition will lead to an additional 1,000 students and requires an investment of €25 million in the period 2025-2034

## Number of students and staff in 2035

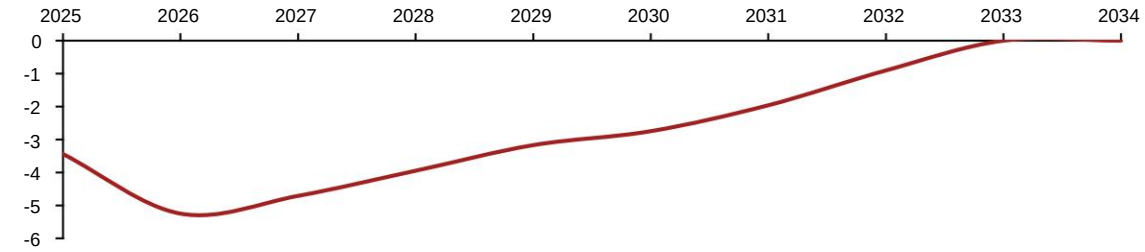
| Line | Education | Research | Students1 | Staff members2 |
|---|---|---|---|---|
| Urban Transformation | Circular Cities & Communities (with TU Delft and RWTH Aachen) | Smart Urban Lectorate Redesign with *Limburg* Urban Living Lab (University) and research lines: urban transformation, energy transition, circular building technology | 350 full-time | 39 |
| Health & Healthcare Logistics | Minors and tracks for healthcare (and technology), healthcare logistics (tracks and minors Medlands | Expanding research Lectureships under the Centre of Expertise for Innovative Care and Technology | 190 full-time 60 part-time/LLO | 28 |
| Mechatronics & Embedded systems | | Expanding research Engineering Lectorate | 180 full-time 20 part-time/LLO | 22 |
| Data science & Artificial intelligence | English speaking Bachelor of Applied Sciences Data Science & AI | Expanding Applied research Data Science & Artificial Intelligence | 180 full-time 20 part-time/LLO | 22 |
| Total | | | 900 full-time 100 part-time/LLO | 110 |

## Explanation

Zuyd has designed its Heerlen location along the lines of Urban Transformation, Health & Healthcare Logistics, Mechatronics & Embedded Systems, and Data Science & Artificial Intelligence. Zuyd expects to structurally attract an additional 900 full-time and 100 part-time students. However, substantiation of these figures is lacking. If Zuyd attracts an additional 1,000 students annually by 2035, the projected decline will be neutralized.
(see also page 61).

The proposition requires an investment of €25 million between 2025 and 2034 (see also page 56). The required investment rate is shown in the figure below. The proposition's structural revenues amount to €10.6 million per year, while the structural costs amount to €9.7 million per year.
This means that the proposition will break even in financial terms (i.e. excluding monetisation of social benefits) from 2033 onwards.

**Required investments in the period 2025-2034 (million euros)**




Sources: Zuyd business case; 1) Zuyd has not substantiated the student numbers and the distribution between full-time and part-time students. We have adopted the provided figures directly. 2) This calculation is based on the existing student-staff ratio: on January 1, 2024, Zuyd had 1,495 FTEs for 13,549 students in 2023-2024 (2023 Annual Report). With 1,000 additional students, this equates to 110 additional employees (rounding differences in the table).

# Zuyd The social impact of the proposition in terms of net present value is € 95 million +PM

## Result of CBA

| Wealth effect | | After 10 years (in 2035) Net present value | |
|---|---|---|---|
| **Ecosystem costs** | Tuition fees and funding | + €10.6 million | + €57.9 million |
| | Education and research | - €9.7 million | - €80.3 million |
| **Innovation** | Valorization | + €2.4 million | + €18.1 million |
| **Labor market** | Labor force, labor productivity | + €2.6 million | + €86.4 mln2 |
| | Additional tax and premium revenues | €3.5 million | + €13.9 million |
| **Housing market living environment** | Fewer homes available | + €12k to + €23k | + €46k to + €91k |
| | Fewer rooms for students in Heerlen | - €70k to - €210k | - €272k to - €815k |
| **Broader economic effects** | | +PM | +PM |
| **Safety and sense of safety** | | +PM | +PM |
| **Health** | | +PM | +PM |
| **Balance** | | €9.1 million + PM to €9.3 million + PM | €94.9 million + PM to €95.5 million + PM |

## Explanation

The quantified costs of the educational ecosystem are smaller than the quantified benefits. The net present value of the proposition is €95 million and creates both social and economic value.

The annual costs of the educational ecosystem in 2035, after the phase-in period, will amount to approximately €10 million per year for training 900 full-time students, 100 part-time students, and conducting research and education by 110 staff members. The costs of the educational ecosystem are 90% covered by student tuition fees and government funding for education and research. Over the ten-year investment period, investments not covered by government funding will amount to €25 million.

The annual benefits include a larger working population and higher labor productivity. Combined, this leads to additional economic growth of €2.6 million per year. The direct economic impact stems from the employment generated by the educational ecosystem, representing 110 FTEs from Zuyd University of Applied Sciences. Other additional economic growth comes from indirect effects such as consumption. In 2028, the benefits will exceed the costs; see page

The educational ecosystem theoretically stimulates the entrepreneurial climate, which can have significant positive broad-based welfare effects; specifying the scope of application is necessary to quantify this. To illustrate the potential effects, various scenarios are developed on pages 27–30.



1) The ultimate welfare effect may involve a shift between regions; the extent to which this is the case depends on PwC the extent to which additional students are attracted from outside the Netherlands (instead of students who would otherwise have gone elsewhere in the Netherlands) Joint would study); 2) The year-on-year growth effects are greater in the early years than in the later years, resulting in a high NPV.

# UM The proposition will lead to an additional 1,250 students and requires an investment of €70 million in the period 2025-2034

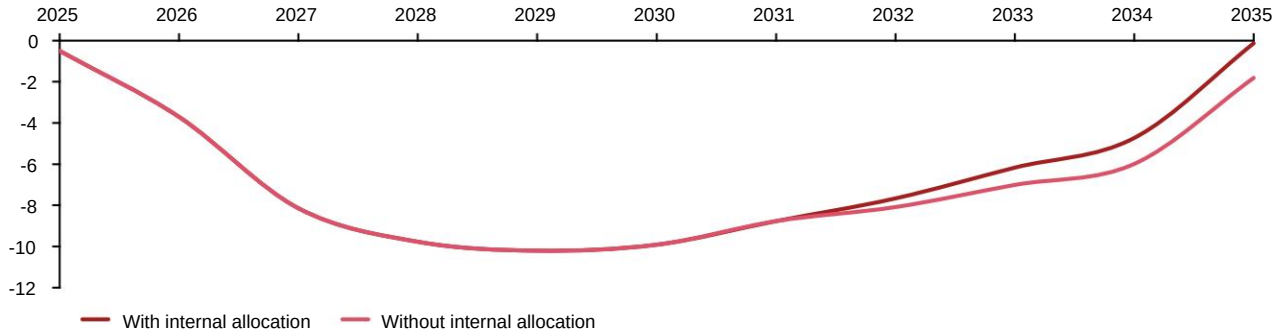
## Number of students and staff in 2035

| Line | Education | Research | Student Staff Members | |
|---|---|---|---|---|
| Digitalization MSc | | Expansion of research on BISS and DACS: focus on interdisciplinary research into ICT key technologies | 100 | 33.2 |
| Autonomous systems | MSc | Robotics Institute, research, development and implementation of robots | 100 | 53.4 |
| Sustainable regional transformation | BSc | | 350 | |
| | MSc | | 100 | |
| | Research centre(s) | Research into urban transformations from technical and political-social point of view | | 30 |
| | Urban living lab | | | 2 |
| To be determined | Technical BSc | | 600 | |
| **Total** | | | **1,250** | **118.6** |

## Explanation

UM has designed its Heerlen campus proposition along the lines of Digitalization, Autonomous Systems, and Sustainable Regional Transformation. With these lines, UM expects to structurally attract an additional 1,250 students based in Heerlen.
The proposition requires an investment of €70 million between 2025 and 2035 (see also page 59). The investment rate is shown in the figure below. The ten-year forecast includes calculations with and without an internal allocation of UM resources based on staff and student numbers. Whether such an internal allocation will be achieved cannot be guaranteed in advance. The figure below shows that without internal reallocation, the business case shows a deficit of €2 million in 2035. With internal reallocation, the business case closes in 2035. The structural costs of the proposition amount to €21.7 million per year, while the structural revenues amount to €21.81 million per year.

**Required investments in the period 2025-2034 (million euros)**




Source: UM business case dated 19-09-2024, UM input 11-10-2024; 1) This includes the internal allocation of UM resources.

# UM The societal impact of the proposition in terms of net present value is €85 million +PM

## Result of CBA

| Wealth effect | | After 10 years (in 2035) Net present value | |
|---|---|---|---|
| **Ecosystem costs** | Tuition fees, funding and contract revenues | + €21.8 mln2 | + €99.6 million |
| | Education and research | - €21.7 million | - €142.6 million |
| **Innovation** | Valorization | + €2.4 million | + €12.4 million |
| **Labor market** | Labor force, labor productivity | + €3.2 million | + €99.8 million3 |
| | Additional tax and premium revenues | + €4.4 million | + €15.6 million |
| **Housing market living environment** | Fewer homes available | + €15k to + €29k | + € 93k to + € 113k |
| | Fewer rooms for students in Heerlen | - €87k to - €263k | - € 311k to - € 445k |
| **Broader economic effects** | | +PM | +PM |
| **Safety and sense of safety** | | +PM | +PM |
| **Health** | | +PM | +PM |
| **Balance** | | €9.8 million + PM to €9.9 million + PM | €84.5 million + PM to €84.6 million + PM |

## Explanation

The quantified costs of the educational ecosystem are smaller than the quantified benefits. The net present value of the proposition is €85 million and creates both social and economic value.1

The annual costs of the educational ecosystem will amount to €21.7 million in 2035, after the phase-in period, for training 1,250 students and conducting research and education by 118 academic staff members.
The costs of the educational ecosystem are almost entirely covered by student tuition fees, government funding for education and research, and contract revenues.2 During the 10-year investment period, investments not covered by government funding amount to €70 million.

The annual benefits include a larger working population and higher labor productivity. Combined, this leads to structural additional economic growth of €3.2 million per year. The direct economic impact stems from the employment generated by the educational ecosystem, representing 118 FTEs from UM. The remaining additional economic growth stems from indirect effects such as consumption. By 2029, the benefits will exceed the costs; see page 76.

The educational ecosystem theoretically stimulates the entrepreneurial climate, which can have significant positive broad-based welfare effects; specifying the scope of application is necessary to quantify this. To illustrate the potential effects, various scenarios are developed on pages 27–30.



1) The ultimate welfare effect may involve a shift between regions; the extent to which this is the case depends on the extent to which PwC in which additional students are attracted from outside the Netherlands (instead of students who would otherwise study elsewhere in the Netherlands) 2) This is the Joint Vision of the Municipality of Heerlen, Zuyd internal allocation of UM resources included; 3) The year-on-year growth effects are greater in the early years than in later years, resulting in a high NPV.

# To provide an idea of possible more specific broad welfare effects, a number of scenarios have been developed

In terms of content, the propositions of UM and Zuyd focus on challenges that are relevant to transforming regions.

The exact areas of application that UM and Zuyd will focus on are currently only partially specified and will also depend on the precise deployment of the required personnel.

Because the concrete details are still unknown, precise and detailed elaborations of economic effects are not possible.

In order to provide an overview of the possible broad welfare effects, three scenarios have been developed that correspond to the proposition

**S enario'**

## Transition in Elderly Care

Exploring the added value of successful applications of autonomous systems/robotics


Het scenario 'transitie van ouderenzorg' maakt een mogelijk brede welvaartseffect van een toepassingsgebied zichtbaar

Scenario

Toepassingsgebied: Transitie van de ouderenzorg

Brede welvaartseffecten transitie ouderenzorg

## Built environment transition

Exploring the added value of developing alternative energy sources


Het scenario 'gebouwde omgeving' verhoogt brede welvaart door ontwikkeling en toepassing alternatieve energiebronnen

Scenario

Toepassingsgebied: gebouwde omgeving

Brede welvaartseffecten alternatieve energiebronnen

## Strengthening cybersecurity

Exploring the added value of developing cybersecurity in built spaces


Het scenario 'cybersecurity' verhoogt brede welvaart door arbeidsmarkteffect en hogere digitale veiligheid

Scenario

Toepassingsgebied: cybersecurity in gebouwde ruimte

Brede welvaartseffecten

***Elaboration on underlying pages***

# The 'elderly care transition' scenario illustrates a potential broad welfare effect of an area of application

## Scenario

ILLUSTRATIVE

### Scope: Transition of elderly care

The number of informal caregivers in Heerlen as a percentage of the population is higher than in the Netherlands (14.6% vs. 13.4%). Furthermore, the average number of hours of informal care per week is higher in Heerlen than in the rest of the Netherlands (an average of 12.3 hours per week compared to 11.8 hours per week).

Several studies indicate that the use of robots in elderly care can significantly reduce the need for informal caregivers and healthcare professionals, and improve health —partly because older people can live at home longer in relatively good health. Robots can fulfill roles in this regard, monitoring patients living at home, supporting them with physical activities, and combating loneliness.

In this scenario, we consider the possibility of the educational ecosystem focusing on further developing the application of robots/autonomous systems in elderly care to relieve the burden on healthcare professionals/informal caregivers.

In addition to the technical aspects that can be addressed through the autonomous systems, digitalization, and regional transformation program lines, it is important that the application of robotization in elderly care is socially accepted and embraced. This can be addressed by Zuyd in the living labs of applied research and by the UM FASos faculty through fundamental research.

### Broad welfare effects of elderly care transition

The educational ecosystem's specific focus on autonomous systems in elderly care, in addition to the social and economic effects, provides a concrete interpretation of the broad welfare effects. Assuming that autonomous systems in elderly care lead to a halving of the involvement of informal caregivers and healthcare professionals, and assuming that the involvement of healthcare professionals is equal to that of informal caregivers, a conservative estimate can be made:

Autonomous systems reduce the number of informal caregivers in Heerlen by 7.3 percentage points . This means that nearly 6,500 Heerlen residents regain an average of 12 hours per week, or almost 4 million hours per year. They can use this time to increase their social participation, pursue training, or perform paid or unpaid work.

Based on the leisure time valuation in the standard cost model2 represents this 4 million hours per year:

- a monetary value of €68 million for residents;
- a monetary value of €132 million for healthcare professionals

Besides these significant social benefits in Heerlen, a successful application of autonomous systems in elderly care can be marketed globally. This represents significant commercial value.



Sources: 1) CBS Health Monitor 2022; 2) MedTech Europe and Deloitte, 2020, *The socio-economic impact of AI in healthcare;* 2) E. Streefkerk, 2023, Handbook for measuring regulatory burden costs, Ministry of Economic Affairs, November 2023 (link)

# The 'built environment' scenario increases broad prosperity through the development and application of alternative energy sources

## Scenario

ILLUSTRATIVE

### Scope of application: built environment

Climate change and climate objectives place new demands on homes. For example, cooling demand is expected to increase and heating demand to decrease in the future. To ensure the built environment meets climate objectives, transition and renovation of the built environment from a circularity and energy-saving perspective are required.

In this scenario, we consider the possibility of the educational ecosystem focusing on further developing and implementing technical innovations in the built environment. This involves developing technical applications in the physical space in collaboration with citizens, and developing models to facilitate the transition to sustainable renovation.

The technical side can be addressed through the robotics and digitalization program lines; for example, this could lead to the development of a model for optimal calibration of energy systems. It is also important that the (transition to) selected alternative energy sources is socially accepted and embraced, which Zuyd University of Applied Sciences can address through its living labs of applied research and the UM Faculty of Applied Sciences and Sciences (FASos) through fundamental research.

### Broad welfare effects of alternative energy sources

Currently, more than three-quarters of the approximately 47,000 homes in Heerlen have an energy label B-G. According to the Climate Agreement, these homes must become climate-neutral by 2050. Efficiently implementing this transition in the built environment requires weighing the pros and cons of various alternatives. One possible solution for alternative energy sources is geothermal energy.

Geothermal energy is a sustainable energy source that uses the heat and cold stored underground to heat and cool buildings. The use of geothermal energy offers several advantages, such as savings on energy consumption and CO2 emissions. This also results in positive, broad-based prosperity benefits. On the other hand, there are also disadvantages, such as the investment costs for construction and potential risks to the soil.

The successful further development, application, and social acceptance of such a technology, resulting from the educational ecosystem—which will make nearly 40,000 homes in Heerlen more sustainable—could therefore lead to positive, broad-based prosperity effects. This is supported by recent empirical studies showing that the introduction of geothermal energy systems in existing buildings leads to positive social and financial impacts.



Sources: 1) Broers et al, 2019, *Decided or divided? An empirical analysis of the decision-making process of Dutch homeowners for energy renovation measures,* Energy research and Social Science, Vol 58, 101284; 2) CE Delft, 2023, *Mkba Bodemenergie*

# The 'cybersecurity' scenario increases broad prosperity through labor market effects and greater digital security

## Scenario

ILLUSTRATIVE

### Scope of application: cybersecurity in built space

Dutch local authorities use a variety of digital systems in public spaces, such as digital systems for monitoring and controlling traffic control systems, bridges, locks, pumping stations, and wastewater treatment plants.
These automation systems in public spaces are vulnerable to cyber risks. For example, in 2020, the lighting on the Erasmus Bridge in Rotterdam was hijacked by a hacker, traffic flow at an intersection in Groningen was disrupted because a hacker manipulated the traffic lights, and it turned out that outdated traffic lights in the Netherlands are easy to hack.

Besides the fact that disruptions to such infrastructure can result in social damage such as flooding, traffic jams and accessibility for emergency services, hackers can use compromised automation of local governments as part of a ransomware attack on the internal network of the municipality.2

In this scenario, we consider the possibility of the educational ecosystem focusing on developing cybersecurity solutions for the built environment. This could be achieved in an "urban pentesting playground": a physical environment where students and researchers can experiment with finding digital vulnerabilities ("pentesting") in municipal infrastructure and, based on this, develop software innovations and mitigation strategies.

By experimenting in a physical space, there is direct attention to the social experience of digital solutions.3

### Broad welfare effects

In general, the cybersecurity sector creates added value by offering services that aim to reduce cyber risks and efficiently recover from damage.4

Several studies show a substantial shortage in the cybersecurity consulting market; the Netherlands has a shortage of approximately 22,000 cybersecurity professionals, of which approximately 2,500 have been at university entry-level in the past five years.

The Digitalization pillar could train up to 100 additional cybersecurity professionals annually, filling 20% of the shortage.

The annual added value for the Netherlands, with an estimated added value of €100,000 per cybersecurity employee, amounts to €10 million per year. Based on the current distribution of vacancies across provinces, a maximum of 3% of this, or €300,000 per year, could be attributed to the educational ecosystem in Heerlen. Besides this economic impact, cybersecurity also contributes to increased digital security in society.



Sources: 1) https://nos.nl/artikel/2539694-verouderde-stoplichten-in-nederland-blijken-relatief-makkelijk-te-hacken 2) Kerpershoek and Niemann, 2024, *Securing Operational Technology by Municipalities* 3) UM document submitted on October 11, 2024; 4) SEO, 2016, *Economic opportunities for the Dutch cybersecurity sector* (link), 5) PTvT and Dialogic, 2024, *Research Report Education and Labor Market Cybersecurity* (link), 6) Dialogic, 2023, *The economic opportunities of the cybersecurity sector* (link)

# Independent growth of UM and Zuyd increases broad prosperity, but collaboration can lead to a flywheel effect

## Independent growth of UM and Zuyd increases broad prosperity

The quantified benefits of the independent growth of both UM and Zuyd University in Heerlen exceed the quantified costs. Besides the economic impact, the independent growth of either UM or Zuyd University in Heerlen increases broad prosperity through positive effects on health, safety, and the living environment for Heerlen residents. Therefore, the effects of the independent growth of either UM or Zuyd University are linked to the objectives of the National Program Heerlen North:

- Safety: scientific literature shows that a higher educated population on average leads to less crime, and thus increases safety.

- Health: Scientific literature shows that through knowledge and skills for healthier living, social networks that promote healthy lifestyles and a higher income that makes a healthier lifestyle possible

Within the broader context of Parkstad and South Limburg, various regions and policy agendas are also linked to this. Regarding the living environment, independent growth of UM or Zuyd University of Applied Sciences will result in a limited decrease in student prosperity due to a tighter housing market in the region.
The magnitude of this effect can be mitigated by flanking policies such as the development of additional student housing.

## Explanation

Both proposals only provide for more intensive collaboration between UM and Zuyd at a later date, with UM students transferring (interim) to Zuyd programs in Heerlen and vice versa. Further collaboration and student exchanges could lead to fewer dropouts.

At the same time, precise quantification of this effect is lacking in the scientific literature. To gain insight into the magnitude of this effect, the following estimate can be made.

Suppose the following exchange takes place: •
Share of dropped-out university-b students who enter first-year higher professional education-b (in Heerlen): 10%
- share of HBO-B graduates entering first-year WO-B (in Heerlen): 10%
- share of HBO-B and HBO-M graduates entering first-year WO-M (in Heerlen): 10%

This potentially leads to an increase in the number of students in Heerlen from 2,250 to 2,782 students in 2035 and an increase in the number of residents from 1,601 to 1,796.

# CBA for the education ecosystem leads to a positive outcome – further focus and related policies crucial

## Conclusion

This social cost-benefit analysis of the educational ecosystem, consisting of a growth proposition from UM and a growth proposition from Zuyd, shows that the costs are smaller than the quantified benefits. 1 The net present value of the UM proposition is €85 million and that of Zuyd €95 million. The net present value of the educational ecosystem is therefore €170 million and creates both additional prosperity for Heerlen and social and economic value. Sensitivity analyses show that a positive result remains robust even if the target student numbers are halved.

The benefits arise because the individual propositions, as well as the ecosystem as a whole, increase Heerlen's population over a ten-year period, while simultaneously boosting labor productivity and employment. Both effects combined lead to a structural GDP impact of €6 million per year, of which €2.4 million comes from the knowledge economy, €1.0 million from the service economy, and €2.4 million from the manufacturing economy.

• In addition to the economic effects, the educational ecosystem also increases broad prosperity in Heerlen through positive effects for residents of Heerlen on Health, safety, and living environment. The broad prosperity impacts of the educational ecosystem are thus linked to the objectives of the National Program Heerlen Noord. Several regions and policy agendas are also linked to this within the broader context of Parkstad and South Limburg.

The current proposition requires further elaboration regarding the precise focus of the education and research activities, on the one hand, and the precise location where the educational ecosystem will be established, on the other. Scenario calculations show that broad prosperity effects can be more clearly defined as more focus is placed on the educational ecosystem. For example, by focusing the educational ecosystem on robotization in elderly care, Heerlen residents could achieve a prosperity gain of €200 million. This scenario illustrates that focusing the proposition is recommended.

Sensitivity analyses show that social impacts depend on related policies; for example, the share of students, graduates, and employees who choose to live (or remain) in Heerlen affects the magnitude of the social benefits. Labor market and housing market policies are crucial in this regard, as are policy areas that enhance Heerlen's attractiveness (culture, basic education, infrastructure, hospitality, etc.). It is also important to ensure that the educational ecosystem aligns well with existing business activity in the region, and there must be room for new employment opportunities to ensure that productivity gains are realized regionally.



Footnote
1) We did not perform market validation of the business cases. We did a financial and technical validation of UM's business case. Zuyd's business case was broadly based and could not be validated in detail financially and technically.

# Table of contents

# A number of ingredients that are prerequisites for achieving broad prosperity effects appear to be secured in the vision

## Connecting to the context of Heerlen

- Heerlen's characteristic traditions are pioneering, learning, and meeting – based on the conviction that this is what is needed to achieve broad prosperity for everyone1

- The traditions correspond to the focus:
  - ÿ Pioneering: by focusing on the realization of transition through social acceptance of new technology, the 'raw space' in Heerlen is being used
  - ÿ Learning: education and research contribute contribute substantively to the necessary transitions in Heerlen. Citizens are actively involved. Other regions can, in turn, learn from Heerlen as a positive example of societal transformation
  - ÿ Engaging: the knowledge economy operates through interaction between citizens, knowledge institutions, and businesses, across all levels of society. Based on the conviction that this is the only way to move from support, through action, to impact.

## Connecting with students

- 'New generation of students' are familiar with digital technology from an early age and find social impact important.

  The substantive focus on transitions therefore seems attractive. The existence of a close-knit 'campus community' is considered important.

- Zuyd and RWTH Aachen are working on a project in Heerlen In such a way that students carry out projects within the context of Heerlen and in collaboration with citizens; the initial impression is that the method leads to the intended connection of the student with the region.
  UM also works institution-wide with problem- based learning as a characteristic method

- Balanced Internationalisation Act (WIB) can This could have a limiting effect on the vision's potential, as the WIB focuses on managing the influx of international students. Whether the intended target group can be attracted depends on how the assessment of regional circumstances in the assessment of non-Dutch-language education (TAO) takes shape, and whether the partners successfully complete this assessment.

## Connecting to potential markets

- Technological potential: many technological issues arise within autonomous systems and digitalization/AI where additional fundamental and applied research is needed to improve *technology readiness* to the point where technologies can potentially be marketed

Market relevance: Focusing on transition areas implies that there are different markets for the technological applications to be developed. Combining technology with human and societal developments supports the potential of market adaptation.

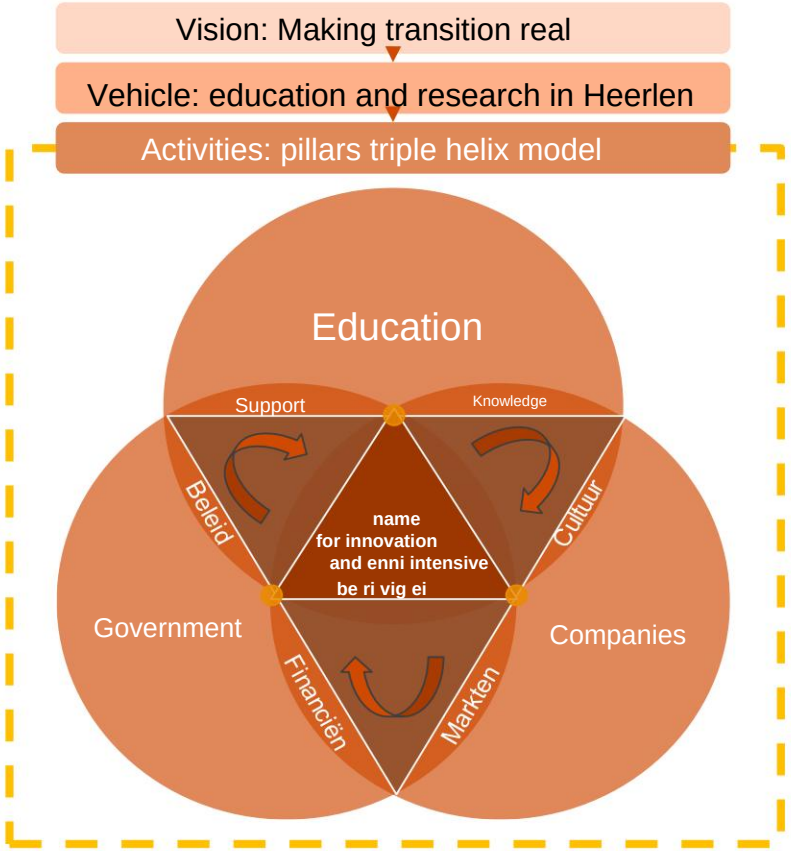
- Regional business: Regional business is concentrated in SMEs, specifically healthcare, wholesale and retail trade, and industry. Industry, financial institutions, and transport and storage are growing more strongly in Heerlen than in the rest of the Netherlands; autonomous systems/ digitization offer opportunities – for example, by contributing to solving (regional) labor market shortages.



Sources: 1) Municipality of Heerlen, *Council Information Letter: Education to the City Center,* February 20, 2024; 2) Höfrová, A., Balidemaj, V. & Small, M.A. *A systematic literature review of education for Generation Alpha.* Discov Educ 3, 125 (2024); Corey Seemiller & Meghan Grace, *Generation Z goes to college,* Jossey-Bass (2016); Conversations with five UM students, July 5, 2024.

# Achieving maximum broad prosperity effects requires close cooperation between education, government and businesses

## Triple helix collaboration as a basis for strengthening broad prosperity




Recognition is important to create a strong and visible educational ecosystem, and thus attract students and businesses.1 Broad cooperation between education, government and business supports the maximization of broad welfare effects, whereby six pillars must be organized jointly and coherently:

- **Knowledge:** Knowledge and experience that must be available within the ecosystem and relevant to the market/industry. The presence of human capital is crucial for this.
- **Support:** services and infrastructure that entrepreneurs need to develop and grow their businesses, such as networking events and start-up guidance
- **Policy:** regulations and a wide range of other policy measures or policy instruments, such as communication, subsidies, loans, etc.2
- **Finance:** access to capital and financing sources for entrepreneurs and knowledge institutions, whether or not based on a joint proposition
- **Market:** potential for access to markets where the products and services are sold
- **Culture:** shared values, norms and attitudes within the ecosystem, which enable parties to find and inspire each other



Sources: Etzkowitz & Zhou (2017) *The Triple Helix, University – Industry – Government Innovation and Entrepreneurship.* London and New York: Routledge, 181-190. Tribe (2015). *Entrepreneurial ecosystems and regional policy: a sympathetic critique.* Utrecht School of Economics. Tjalling C. Koopmans Research Institute. Discussion Paper Series 15-07. Editing PwC.
1) Romme, S. (2022) *Success of Brainport Eindhoven is unique and not easy to replicate.* ESB, 107(4811S), 64-67; Nijenhuis, H. (2018) *Brainport Eindhoven: From disadvantaged region to knowledge hub of the Netherlands.* Geografie.nl; Leiden University Weekly Mare (2020) *How a headstrong professor brought biotech to Leiden;* Leiden University Weekly Mare (2020) *From Herman the bull to a (possible) corona vaccine: how Leiden bioscience matured;* expert interviews 2) See also Belediskompas, Knowledge Centre for Policy and Regulation

# Continuing the triple helix in Heerlen requires, in particular, further embedding of a (social) market perspective

## Status of triple helix collaboration

| Element | Observation | Short term next step |
|---|---|---|
| Knowledge | • UM and Zuyd have a clear understanding of the knowledge required to complete the proposition and to initiate or strengthen education and research in Heerlen; Zuyd already has the necessary knowledge for the *built environment* education and research line. | • Further develop education and research1 Developing how to shape collaboration with other knowledge institutions |
| Support | • With the Brightlands Smart Services Campus (BSSC) there is a party that (starting) can support entrepreneurs in developing and growing their business; BSSC's focus aligns with that of the educational ecosystem | • Develop how to collaborate with to shape BSSC |
| Policy | • Heerlen is committed to attracting students and retaining students after graduation through related policies in the areas of housing and student housing, culture, infrastructure, spatial environment and poverty reduction. | • Implement existing policy and identify other needs of society, education and (graduate) students for further policy |
| Finances | • Partners have indicated their willingness to invest, and several applications are in progress that can provide a basis for the materialization of research and education aimed at realizing transitions in Heerlen | • Developing joint financing for research and education in Heerlen2 |
| Market | • The business community is currently only involved to a limited extent, but is in principle accessible via BSSC and Zuyden UM connections | • Identify potential markets and market needs and then approach and involve targeted parties |
| Culture | • Partners know each other and offer each other the space to work together from their own perspective responsibility to contribute to the realization of the intended educational ecosystem; a single 'figurehead' who consistently brings partners together and motivates them is missing | • Appointing a figurehead<br>• Develop how to further develop cooperation between triple helix parties |



1) See also page 38 2) See also page 39

# In the coming period, efforts should be made to further specify activities and cooperation agreements.

## Development path

- The first step is to operationalize the plan's financing. This requires the parties to develop and implement a joint strategy.
- Subsequently, attention should be paid to further elaboration of specific application areas on which (applied) research focuses, in order to To stimulate the development of business activity and related policies needed to realize specific transitions. The choice must be based on considerations such as i) the availability of knowledge and experience at educational institutions, ii) attractiveness to students, iii) the existence of (nascent) business clusters, iv) the impact on the social situation of Heerlen residents, and v) the expected (direct and indirect) economic impact.
- In line with this elaboration, the question also arises as to where the educational ecosystem should be located. Here too, the choice must be the result of consideration, in this case based on elements such as: i) availability of space, ii) alignment with the needs of knowledge institutions, iii) attractiveness to students (e.g., proximity to public transport, restaurants, housing), iii) proximity to (emerging) business clusters, iv) impact on the social situation of Heerlen residents (and specifically Heerlen Noord), and v) scalability.
- In addition, the vision on the development of mutual cooperation agreements between educational institutions in the short and long term should be established, with attention to education, research, marketing, infrastructure, and politics (see next paragraph for a starting point); this should take into account the individual development time that UM deems necessary to anchor fundamental education and research in Heerlen
- Commitments and responsibilities of individual parties – and by extension the intended progress – should also be recorded:
  - ÿ Heerlen: long-term commitment to identifying and realizing related education and research policies in Heerlen, including in the form of sufficient and appropriate student housing, sufficient and appropriate housing for academic and support staff, adequate accessibility of the educational ecosystem, adequate social facilities, attractiveness of the cultural offering, generation of additional third-party funding flows
  - ÿ UM/Zuyd: long-term commitment to anchoring and strengthening education and research in Heerlen, with attention to the substantive connection of education and research to specific application areas/transitions in order to stimulate the development of business activity and broad prosperity in a targeted manner.

The above points strongly recommend appointing a figurehead to oversee the process; this figurehead will be responsible for connecting and stimulating UM, Zuyd University of Applied Sciences, and Heerlen (including through a permanent consultation and progress reporting structure) while simultaneously engaging other parties in the proposal. This requires limited joint funding and joint recruitment, with approval of the selection criteria. The figurehead should be a natural fit for partners and the business community, allowing them to navigate various levels of the ecosystem with ease and stature.



1) See also page 39

# The first step (to be further developed) outlines a possible development of cooperation between partners in Heerlen

| Side | Element of cooperation | Phase: Preparatory phase (to 1st UM student station Heerlen) | Phase: Initial phase (1-5 years from first UM students) | Phase: Further development (5-10 years from the first UM students) | Phase: Continuation (10+ years) |
|---|---|---|---|---|---|
| UM and South | Education:<br>• Initially<br>• LLO | • Further introduction at content and personal level<br>• Coordination of supply to increase synergy<br>• Establishment of UM education in Heerlen | • Continuous coordination of supply<br>• Shared projects within individual higher professional education and higher education courses<br>• Investigate the most promising paths for development<br>• Start implementation & evaluation joint pilots (1st tranche), for example: collaboration between secondary vocational education (VO-MBO-HBO-WO), and connection between secondary vocational education (VO-HO) and Parkstad | • Continuous coordination of supply<br>• Shared projects within individual higher professional education and higher education courses<br>• Implementation & evaluation of joint pilots (2nd tranche), for example<br>• Stayrate approach for internationals<br>• Teacher exchange<br>• LLO approach | • Continuation & consolidation of successful pilots<br>• Recalibration of the UM & Zuyd collaboration strategy regarding activities in Heerlen: opportunities for joint action in, for example, training courses |
| | Research:<br>• Fundamental<br>• Applied | • Further introduction at content and personal level<br>• Coordination of supply to increase synergy<br>• Establishment of UM research in Heerlen | • Continuous coordination of supply<br>• Knowledge sharing at project level (customized)<br>• Collaboration at project level, for example within research consortia (customized) | • Continuous coordination of supply<br>• Knowledge sharing at project level (customized)<br>• Collaboration at project level, for example within research consortia (customized) | • Recalibration of the UM & Zuyd collaboration strategy in relation to activities in Heerlen: opportunities for joint action in, for example, an overarching research agenda |
| UM, South and Heerlen | Marketing:<br>• Staff<br>• Students | • Shared vision on (why) Heerlen including translation into materials<br>• Individual profiling within a shared vision | • Shared vision on (why) Heerlen including translation into materials<br>• Individual profiling within joint vision, including reciprocal contact moments (e.g. presence at each other's open days)<br>• Share R&D success stories together | • (All of the above, plus:)<br>• UM & Zuyd: Investigate collaboration on HR level: working together on similar vacancies | • Recalibration of collaboration strategy in relation to opportunities for joint action – for example in profiling and HR policy |
| | Infrastructure:<br>• Physical environment<br>• Knowledge network | • Mapping networks and facilities<br>• Working together to set the agenda for needs Heerlen as a student city (housing forecasts, public transport, etc.) | • Joint networking activities for students and researchers organize<br>• Working together to set the agenda for needs Heerlen as a student city (housing forecasts, public transport, etc.) | • Joint networking activities for students and researchers organize<br>• Working together to set the agenda for needs Heerlen as a student city (housing forecasts, public transport, etc.)<br>• Explore shared facilities | • Recalibration of the collaboration strategy in relation to activities in Heerlen: opportunities for closer collaboration and shared facilities in relation to the overarching research agenda |
| | Politics:<br>• Policy<br>• Subsidies<br>• Lobby | • Joint national lobby<br>• For subsidies: tailor-made/where relevant | • Joint national lobby<br>• For subsidies: tailor-made/where relevant<br>• Explore more structural forms of information-exchange, particularly at a strategic level (policy embedding of cooperation) | • Joint national lobby<br>• For subsidies: tailor-made/where relevant<br>• Explore more structural forms of information exchange, particularly at a strategic level (policy embedding of cooperation) | • Recalibration of cooperation strategy in relation to activities in Heerlen: opportunities for further integration of policy agenda |

# Various external financing options are possible, with differences in size and likelihood of success

Generally speaking, Triple Helix collaborations are funded in a wide variety of ways, but always consist of a mix of equity, subsidies, venture capital, and partner contributions (in varying proportions). For the joint proposition in Heerlen, existing, modified, or new contributions from government, knowledge institutions, and the private sector are possible. We present several options with some explanation.

| | Government | | | Knowledge institutions | Business | Theme-related (examples) | |
|---|---|---|---|---|---|---|---|
| | Regional Deal II | Existing arrangements | New regulation | First and second cash flow | Contributions from the business community | IZA | Built environment |
| **Explanation** | Boost broad prosperity Parkstad Limburg offers options or possibly additional Regional Deal funds | Where possible, transform existing schemes and specify related investments if necessary (see p. 19), | Lobby for additional customized financing. New regulations/customization can also be submitted to the Province or Municipality. | Ensure that research programs are substantively aligned with a shared vision | Added value for businesses (from a specific sector) can be used as justification for necessary investments | IZA transformation plans offer a theme-specific financing option for plans around appropriate care and to maintain quality, accessibility and affordability of care in the Netherlands. | The program Making the built environment more sustainable can offer opportunities for the necessary investments in real estate |
| **Who's in the lead?** | Municipality | Municipality, business community or knowledge institutions, depending on the scheme to be used | Municipality, possibly jointly with, for example Province | Knowledge institutions | Joint | Municipality, health insurers, care providers | Joint |
| **Process/ next step** | Developing the strategic agenda link and utilizing available resources | Inventory of regulations, such as subsidies for start-ups entrepreneurs, programs around regions at BZK, LIOF and RVO, possibilities explore customization | Organize an exploratory meeting between BZK/EZK | Develop content education/research and submitting applications, in a later phase based on a joint agenda | Business community to join, explore setting up investment fund with LIOF/Invest NL to raise risk capital | Discussion with health insurer for joint efforts, development of concrete activities (jointly or individually) | Various subsidies are available to to stimulate energy transition (e.g. MOOI), mapping out possibilities |
| **Estimate of probability** | ◕ | ◕ | ◔ | ◕ | ◑+ | ◕ | ◕ |

○ ← Not likely to happen — Promising → ◕

# Attachments

A – Context analysis for joint vision and proposition

B – Social cost-benefit analysis

C – Development Path

D – Method

# Context analysis with a joint vision and proposition

Heerlen

# With targeted interventions, Heerlen has created a solid starting position for further strengthening broad prosperity

## Operation Heartbeat

Repression and prevention of crime

## Cultural Summer

Realization of an attractive cultural offering, with a raw edge

## IBA Parkstad

Facilitate innovative projects that have lasting significance

## NPHLN

Nationaal Programma Heerlen Noord

Commitment to achieving equal opportunities for all residents

## Education

ZU YD U M Heerlen

Developing a strong educational and research infrastructure with offerings that fit the context of Heerlen

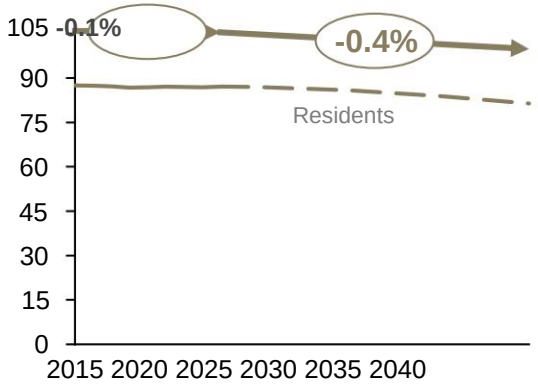
**Completed/ in progress**
**Next step**

Heerlen

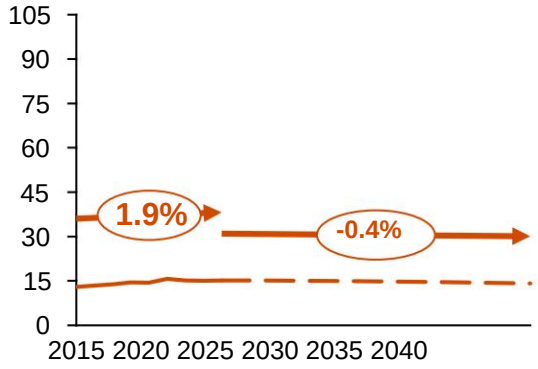
# Heerlen is still faced with an estimated shrinking population and lagging broad prosperity

## The number of residents and highly educated people in Heerlen is declining

**Forecast number of inhabitants and highly educated people in Heerlen (x 1000)**

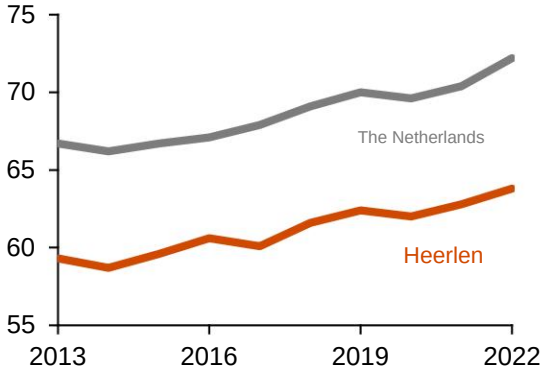



**Forecast number of highly educated people Heerlen (x 1000)**

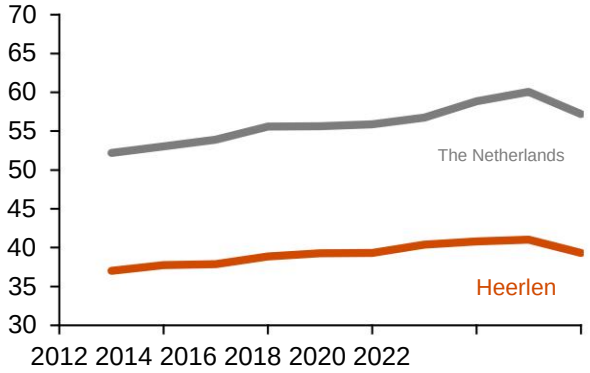



## Broad prosperity in Heerlen is lagging behind

**Net labor participation (in %)**




**Real development of disposable income per person (x €1000) (Pri level = 2022)**




- Based on estimates, the municipality of Heerlen will experience shrinkage in the period 2015-2040; the total number of inhabitants will shrink from 87,500 to 81,400, or a shrinkage of 8%
- The decline mainly concerns the age group up to 64 years1; as a result, the number of higher educated people and the number of students who go to study in Heerlen are also expected to decrease2

- Net labor participation and disposable income in Heerlen are lower the average in the rest of the Netherlands4
- There is room for growth across the breadth of the broad prosperity indicators; Heerlen has the lowest SES-WOA score in the Netherlands (-0.301)4
- Poverty is concentrated in Heerlen-Noord; this is reflected in educational disadvantages (~32% of toddlers and primary school pupils) and lower social cohesion5



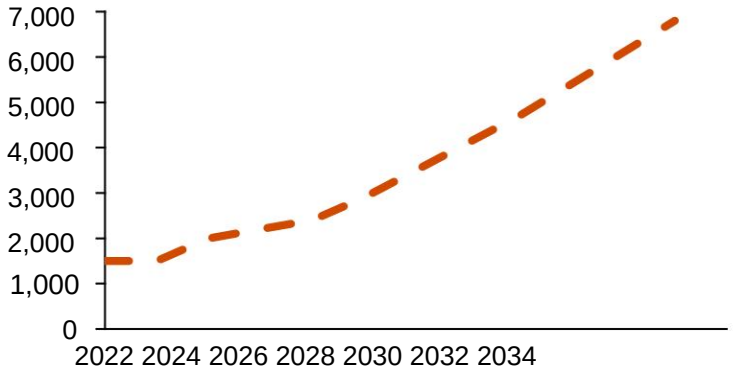
Sources: 1) ABF - Primos population forecast; 2) The estimated number of highly educated people has been equated to the expected population growth. This is a conservative estimate; due to the aging population and self-reinforcing effects, a stronger effect can be expected; 3) DUO Open Education Data; 4) Statistics Netherlands (CBS); 5) NPHLN Initial Report, Spatial Concentration of Poverty in Heerlen-Noord (link).

Heerlen

# Challenges in health, safety and the built environment require innovative solutions

## Health

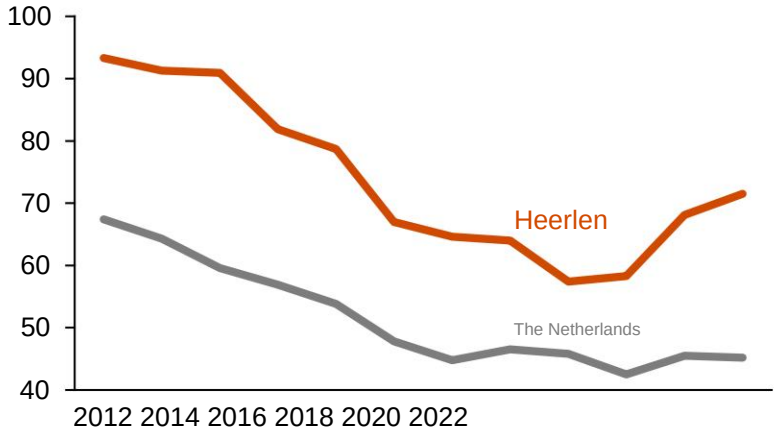
**Forecast of labor market shortage in health and welfare in South Limburg (number of employees)**




Due to an aging population, the demand for healthcare in South Limburg is expected to increase significantly, while the number of healthcare workers is also expected to decrease. This will result in an expected shortage of more than 7,000 people in 2033.

## Safety

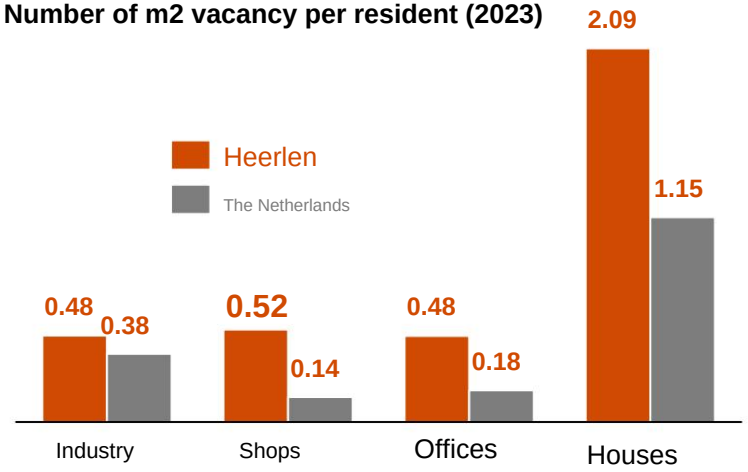
**Number of crimes per 1,000 inhabitants**




- The safety problem in Heerlen is in the Operation Heartbeat was successfully tackled with an unorthodox approach. A key feature was the municipality's coordinating role.
- Despite this improvement, crime remains Heerlen still higher than average in The Netherlands

## Built environment

**Number of m2 vacancy per resident (2023)**




- The vacancy rate per resident in Heerlen is significantly higher than the Dutch average. Combined with the expected aging population, this poses a risk to the city's livability.
- At the same time, this vacancy literally creates 'raw' space for innovation - space that is not available elsewhere in the Netherlands



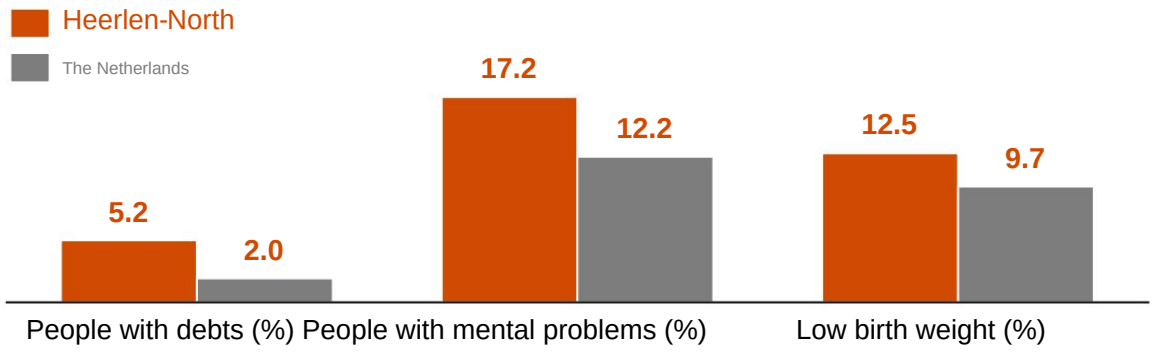
Sources: ABF Research, Forecasting Model for Healthcare and Welfare; Politie.nl; P. Tops & W. Gooren, A Pact of the Heart. Origin and Growth of Operation Heartbeat; Addressing Drug Problems in Heerlen, Police Academy, February 2009; CBS Vacancy Monitor.

Heerlen

# Specifically in Heerlen-Noord, multiple problems are at play and efforts are being made to achieve a 'social catch-up race'

## Spatial concentration of poverty in Heerlen-Noord

**Selection indicators Monitor National Programme Heerlen-Noord (2021)** [1]




- The spatial concentration of poverty in Heerlen-Noord has negative consequences for health, education, safety and social cohesion2
- There are multiple problems in the area of health. The share The number of people with mental health problems and babies with low birth weight is significantly higher, scores for perceived health and life expectancy are lower and scores for overweight and unhealthy lifestyle are higher than in the rest of the Netherlands2

## National Program Heerlen-North


- The National Programme Heerlen-Noord attempts to achieve this through a a generational approach to improve the socio-economic situation in Heerlen-Noord and bring it up to the Dutch average level;
- Themes that are being focused on are health, safety, learning, working and living3 - for example, through 'the Above-Ground Vocational School', a network organization works to connect people who want to learn a trade, job seekers, job providers and local residents

Sources: 1) CBS, *Monitor NPHLN* (link) 2) Hans Schmeets, "Low well-being in Heerlen", CBS, March 26, 2024 (link); Initial report NPHLN, Spatial concentration of poverty in Heerlen-Noord (link); 3) NPHLN, This is where our catch-up race begins. Future Plan, 2022 (link).
The Heerlen-Noord area consists of the following 14 entire Heerlen districts:

Heerlen

# (Elderly) care, admintech and medtech appear to be potentially promising ecosystems in and around Heerlen

## For each cluster, there is a need for cooperation with a common agenda1

- Dialogic and Bureau Louter state that ecosystems with potential can be identified based on three criteria:
  - Substantial size
  - Development and growth
  - ÿ Driving activity
- Based on these criteria, (elderly)-Healthcare, admintech and medtech in the Parkstad region have been identified as ecosystems with potential .
- These ecosystems have been analyzed and compared with each other within the framework of 'entrepreneurial ecosystems'.

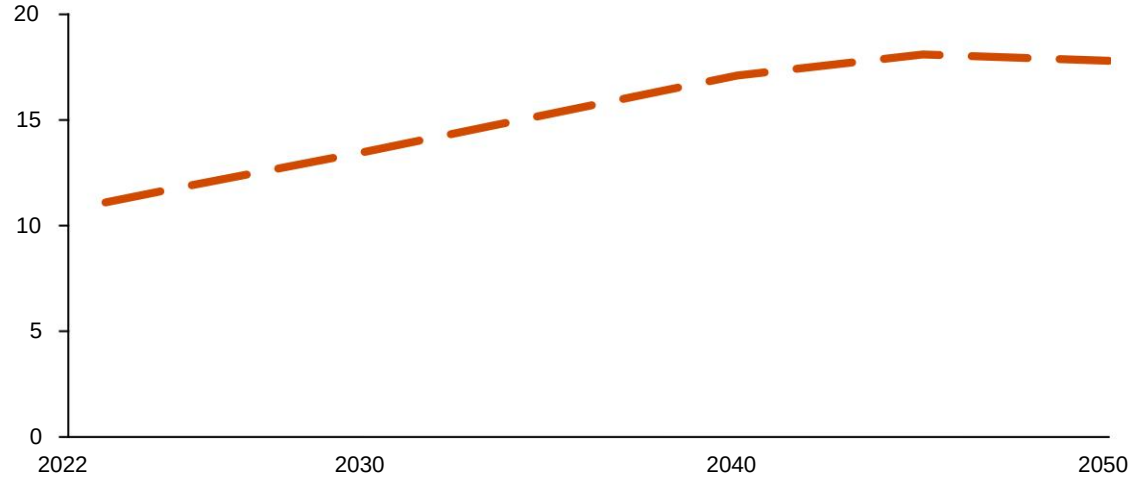
| | Chances | Challenges |
|---|---|---|
|  **(Elderly) care** | Large sector, network is present, many (expected) problems due to aging in Heerlen in combination with population composition | Major labor market shortages, few innovative startups, lack of collaboration throughout the entire chain |
|  **Admintech** | High concentration of employment, BSSC potentially a strong player | Major players operate autonomously, relatively little connection with the region, connection between products/services is lacking |
|  **Medtech** | Strong growth, driven by entrepreneurship, high willingness to invest | Limited number of scale-ups, no joint agenda yet, limited awareness |

Sources: Bureau Louter, *Economic Analysis of the Parkstad Limburg City Region,* May 17, 2023; Dialogic and Bureau Louter, *Main Report on the Economic Analysis of Parkstad Limburg,* June 30, 2023.

# The aging population and the associated expected decline in the number of students pose an urgent challenge for Zuyd

## Forecast: aging will lead to a smaller student population

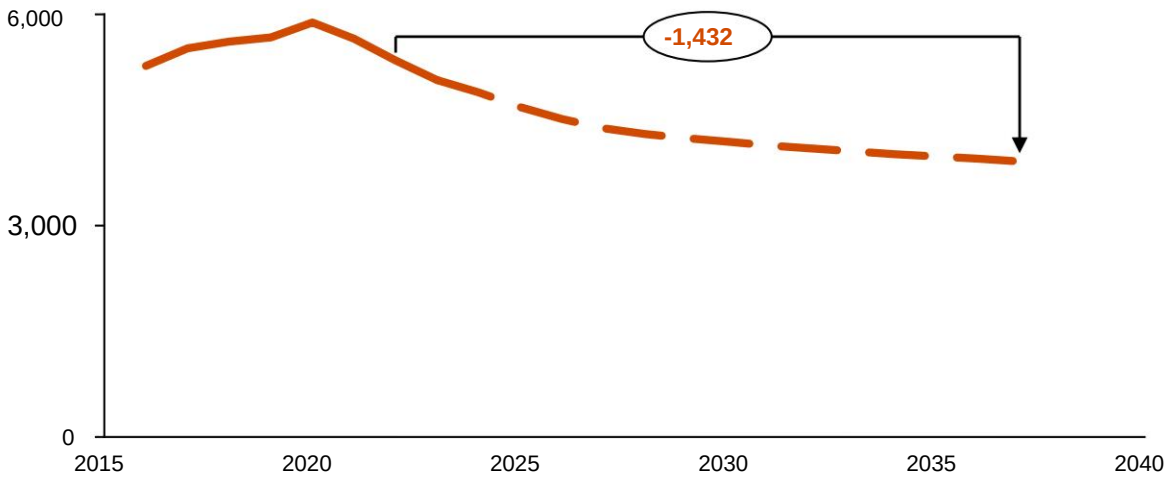
**Forecast share of 75+ in the municipality of Heerlen**




- Based on estimates, the municipality of Heerlen will experience an ageing population in the period 2015-2040; the percentage of people aged 65 and over will increase to 18%1
- In line with the aging of the population, the student population is also declining; after all, the number of young people in the region is decreasing (especially relevant for vocational and higher professional education) and thus the attractiveness of the region (especially relevant for university education)

## Forecast: number of Zuyd students in Heerlen falls sharply

**Forecast number of students at Zuyd University of Applied Sciences, Heerlen location**




- Due to the ageing population, the expected number of highly educated people in Heerlen is decreasing.
- At Zuyd University of Applied Sciences' Heerlen location, the number of students will decrease by more than 1,000 students between 2024 and 2037 (without policy initiatives)3

Sources: 1) *ABF - Primos population forecast;* 2) See page 61; 3) *DUO Open Education Data;*

# Zuyd is firmly positioned in the healthcare and urban transformation domains and is closely connected to the surrounding

## Concern

The **healthcare and welfare** domain is a key component of Zuyd University of Applied Sciences. In 2023, a total of 2,604 students were enrolled in healthcare programs at Zuyd (19% of the total student body). Zuyd University of Applied Sciences has eight professorships and six special professorships in healthcare and welfare. In line with Zuyd University of Applied Sciences' educational vision, healthcare education is **practice-oriented** with and for the professional field, and engaging and contemporary in terms of **technology.** This has given Zuyd a **large network** in the regional healthcare domain.

At the **Center of Expertise for Innovative Care and Technology (EIZT),** healthcare organizations, knowledge and educational institutions, and the business community collaborate on innovation in healthcare. For example, there's a "Living Lab for Children" and, in collaboration with German partners, a "Healthlab NRW."

In the **Social Robots in the VG Sector** project , six regional healthcare organizations, the CZ healthcare office, UM, and Zuyd collaborated in 2023-2024 to implement social robotics in disability care.
Practical cases were analyzed and implementation strategies were developed. UM and Zuyd jointly conducted practice-oriented research.

The Euregional project **Technology in Healthcare Education (THE!)** provides international education focused on healthcare of the future.

## Urban transformation

**Regional transition and innovation** are core themes at Zuyd University of Applied Sciences. Research and education on this topic are conducted, among other things, by the **Smart Urban Redesign (SURD) research group.**

In 2023-2024, a business case was developed to establish a Bachelor's degree program **in Circular Cities and Communities .** Students will be prepared for a career in a changing urban and built environment, facilitating the transition to circularity. The target number of students after eight years is 124.

The **Limburg Univercity** project is a knowledge platform that stimulates urban transformation in Limburg. Urban living labs have been launched in various partner cities, including Heerlen, where urban transformation is being worked on from the bottom up and in a participatory manner. This is part of the "City Deal Kennis Maken" (Knowledge Making City Deal), a network of 20 knowledge cities.

Limburg University is involved in the **ELSA Lab** in Heerlen-Noord, together with BISS. This project aims to use data science/AI to reduce (energy) poverty and problematic debt.

Another example is the **'WOOW' project,** in which Zuyd is working to reduce building vacancies, the unemployment rate, and labor market shortages in the construction sector through a work-study program for refugees with refugee status.

Zuyd is focusing on strengthening practice-oriented research and developing continuous learning paths and a joint educational space for vocational education, higher professional education and university education, and on Euregional education.



Sources: Association of Universities of Applied Sciences, *Dashboard inflow, registrations and diplomas;* www.zuyd.nl/opleidingen; www.zuyd.nl/onderzoek; www.zuyd.nl/landingspaginas/transitie; https://www.zuyd.nl/onderzoek/lectoraten/technologie-in-de-zorg/sociale-robots-in-de-gehandicaptensector; https://healthlab.nrw; https://surd.nl/en/project/limburguniversity; https://surd.nl/en/project/woow; *The Zuyd vision on contemporary higher vocational education* (February 2021).

# Despite new government policy, UM wants to continue to focus on strengthening its impact in the region

## Government policy and impact on UM

Several national policy developments have potentially major negative consequences for UM (as well as for Zuyd):

• The Schoof cabinet is making structural cuts of approximately €0.5 billion scientific education and research1 :

ÿ More than €80 million due to discontinuation of starter grants

ÿ Approximately €175 million due to discontinuation of incentive grants

ÿ Target of €180 million for international students

- Reduction of NWO funding by more than €60 million

The Internationalization in Balance Act aims to better regulate the influx of international students into Dutch higher education, including through numerus fixus measures and an efficiency assessment of non-Dutch-language education. This has potentially significant consequences for Maastricht University, which has the largest proportion of international students in the Netherlands and also a highly international staff population.

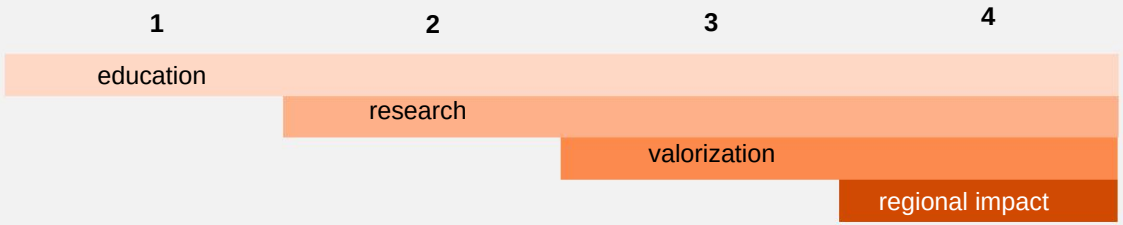
## Perspective UM

UM has chosen to continue its focus **on regional impact;** for example, UM is investing in research and development related to healthy and sustainable food with the municipality of Venlo, with partners each investing €8 million over the next four years.

We prefer to focus our excellent education and research in locations in Limburg where it makes sense. For technology in sustainable food, that's Venlo. Investing in innovation demonstrably pays off. Plans from The Hague currently make it incredibly difficult for universities to contribute to this, but we are deeply convinced that this is precisely how we can contribute to prosperity and well-being in Limburg and elsewhere.

Rianne Letschert – Chair of the UM Executive Board

This strategy aimed at regional socio-economic impact fits the so-called **'fourth generation' university.** 3






Sources: 1) Adoption of the budget of the Ministry of Education, Culture and Science (VIII) for the year 2025, explanatory memorandum, budget 36 600 VIII, no. 2 (link); 2) www.maastrichtuniversity.nl/nl/nieuws/gemeente-venlo-en-universiteit-maastricht-investeren-extra-hoger-onderwijs; 3) Zuti, Bence; Lukovics, Miklós (2015), *"Fourth Generation" Universities and Regional Development,* Stünings Medien, Krefeld, pp. 14-31; Lukovics, Miklos; Zuti, Bence (2015): *New Functions of Universities in Century XXI Towards "Fourth Generation" Universities,* Transition Studies Review, Springer, Berlin, Vol. 22, Iss. 2, pp. 33-48; Elsevier & TU/e, *Towards the 4th generation university. The transformative role of TU/e in delivering innovation and impact in the Eindhoven region,* 2024. Edited by PwC/Strategy&

# The UM boasts a strong technical faculty that has recently completed several major projects

## Growth of FSE

In 2018, the Faculty of Humanities and Sciences was transformed into the **Faculty of Science and Engineering (FSE).** Since then, FSE has grown rapidly:

**3700** students
**460** employees
**4** cities

**7** bachelor's programs
**5** master's programs
**3** liberal arts & sciences programs

- **Integrated education** is characteristic of the technical faculty **research,** with a problem-oriented approach as well as a presence on all four Brightlands campuses in Limburg

The interfaculty research institute **Brightlands Institute for Smart Society (BISS)** is located at the BSSC in Heerlen. BISS's mission is to use technology to address societal and business challenges in a socially responsible manner. Knowledge of data science and technology is combined with legal, ethical, and social expertise.

- The intention is to initiate **closer collaboration between the Faculty of Arts and Social Sciences (FASoS) and FSE ,** so that technical and societal aspects can be further linked in education and research.

## Successful projects

A **high-tech research greenhouse** has been built in Venlo at the Brightland Campus Greenport Venlo. The greenhouse utilizes the latest climate, irrigation, and energy technologies. For example, the greenhouse is completely gas-free and features several fully separated compartments. Research into the agriculture and horticulture of the future is being conducted in the research greenhouse.

South Limburg is in the running to host the **Einstein Telescope ,** along with Belgium and Germany. This will be the most advanced gravitational wave observatory. A feasibility study is underway with funding from the National Growth Fund. The ETpathfinder has already been established at FSE. This is a testing ground for developing the necessary technology for future gravitational wave detectors, which will continue to operate in synergy with the Einstein Telescope for decades to come .

**KE@Work** is part of the Department of Advanced Computing Sciences . This two-year honors program places top data science and AI students part-time at regional companies and organizations during their second and third years. Under the guidance of academics and practitioners, they tackle complex problems, and top students from the Netherlands and abroad gain local work experience during their studies.


Sources: www.maastrichtuniversity.nl/nl/over-de-um/faculteiten/faculty-science-and-engineering; www.einsteintelescope-emr.eu; www.maastrichtuniversity.nl/nl/nieuws/universiteit-maastricht-opent-high-tech-kas-venlo; https://strongaya.eu/;

# B

# Social cost-benefit analysis

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**Method**

## Inputs CBA

Effects, costs and benefits • Zero scenario • Input •

Costs •
Effects •

Sensitivity

analyses

Overall picture, conclusions and recommendations

# The CBA guideline forms the basis for calculating the broad welfare effects of the intended educational ecosystem

## The analysis builds as much as possible on existing knowledge and research

### Method

We visualize the effects of research and education efforts in Heerlen on broad prosperity using a social cost-benefit analysis (SCBA). SCBAs are the most commonly used method to provide a comprehensive picture of the positive and negative broad prosperity effects of a policy measure.

A CBA expresses the social costs and benefits in monetary terms based on market prices. This study follows the CBA guidelines of the Netherlands Bureau for Economic Policy Analysis (CPB) and the Netherlands Environmental Assessment Agency (PBL).

In this study, not all effects were monetized:

1. The scientific literature does not provide reliable quantification for all effects; this applies, among other things, to the effects on safety and health (see pages 69 and 70 of this appendix).
2. The educational ecosystem proposition needs to be further refined in some areas to identify and monetize its effects; this is the case, for example, with the broader economic effects related to the precise application areas where the valorization of education and research will take place in the future (see page 68 of this appendix).

Where monetization is not possible, volume effects can also provide insight into relevant policy considerations. If the volume effect cannot be quantified, qualitative insights into the effects are presented.

The CBA compares the effects of the focus on research and education with the most likely development without new policy, the so-called baseline situation.2 Page 61 describes the baseline situation with which this CBA compares the effects of the focus on research and education in Heerlen. In the baseline situation, Heerlen faces a shrinking population and student numbers.

### Sources used

**Data sources**

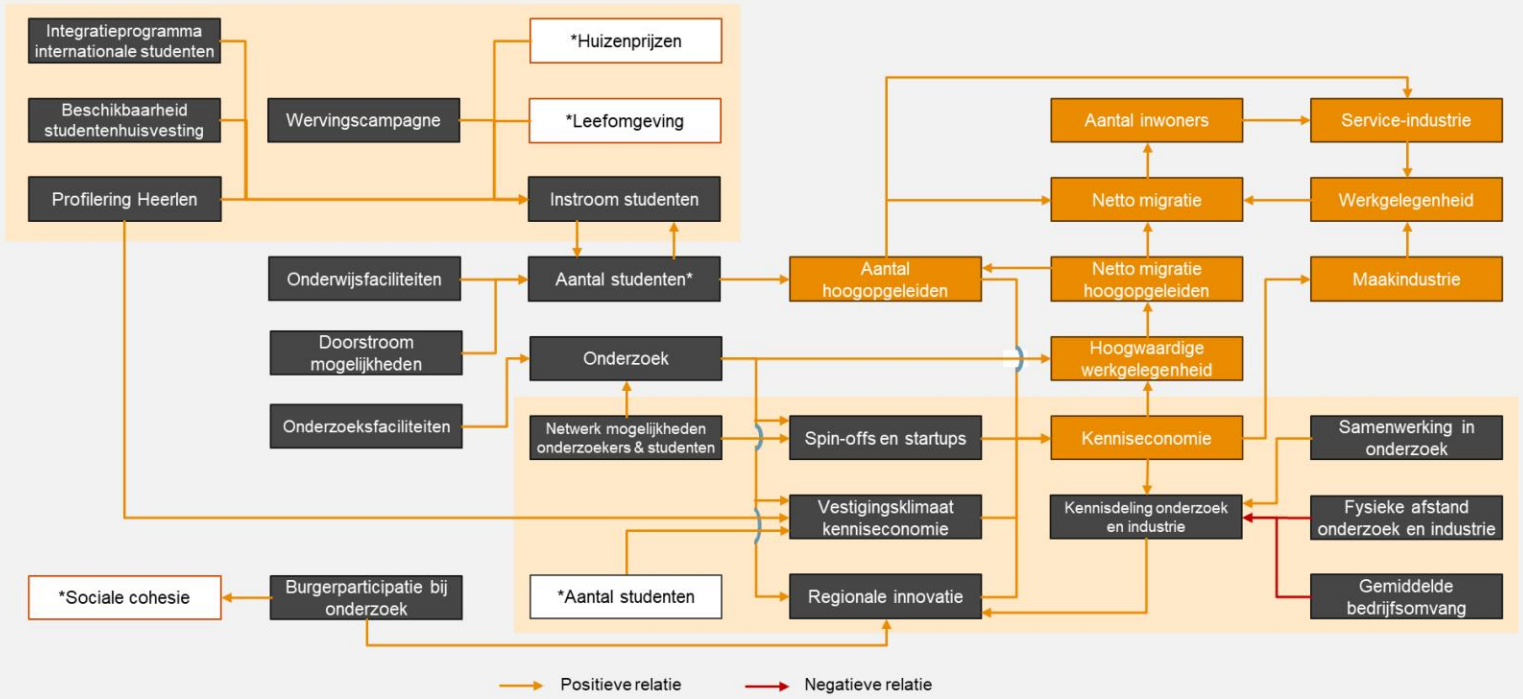

**Reports and scientific literature**


Sources: 1) CPB and PBL, 2013, *General guidelines for social cost-benefit analysis, The Hague: Central Planning Bureau/ Netherlands Environmental Assessment Agency (link); 2) T. Faber and E. Mulders, 2012, An introduction to social cost-benefit analysis (SCBA): A guide for policymakers (link)*

# An increase in the number of students - and thus the number of highly educated people - has numerous effects

## Policy theory CBA

**Schematic representation of policy theory CBA**




The policy theory builds on well-known CBA relationships from existing knowledge and previous research, and offers a further elaboration of the relationship between highly educated individuals and economic dynamics as shown on page 12.

The policy theory shows which effects, costs and benefits of strengthening the educational ecosystem have been taken into account in the CBA:

- Gray blocks: education and research
- Orange blocks: relationship between knowledge economy and broad prosperity
- White blocks: no quantification of effect (or input analysis in case of number of students)
- Arrows: direction of the effects

The ultimate welfare effect may involve a shift between regions; the extent to which this occurs depends on the extent to which additional students are attracted from outside the Netherlands (instead of students who would otherwise study elsewhere in the Netherlands).

Sources: Hamm et al, 2012, *RegTrans. Zwischenbericht I. Regionale Transfereffekte verschiedener Hochschultypes. Hochschule Niederrhein, Niederrhein Institute for Regional and Structural Research and Ruhr-Universität Bochum;* Kempton et al., 2021, *Putting Universities in their Place,* Regional Studies Policy Impact Books, 3(1); Popescu, 2011, *The University as a Regional Development Catalyst.* European Economic Recovery and Regional Structural Transformations; Raspe, Van Oort & De Bruijn, 2004; *Knowledge on the Map. Spatial patterns in the knowledge economy.* Spatial PB; CPB, 2017, *The regional impact of universities; a literature review*

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# Zuyd | Structural increase of 1,000 students and 110 staff members was taken as the starting point for the CBA

## Starting point of the Zuyd CBA

### Number of students and staff in 2035

| Line | Education | Research | Students1 | Staff members2 |
|---|---|---|---|---|
| Urban Transformation | Circular Cities & Communities (with TU Delft and RWTH Aachen) | Smart Urban Lectorate Redesign with *Limburg* Urban Living Lab (University) and research lines: urban transformation, energy transition, circular building technology | 350 full-time | 39 |
| Health & Healthcare Logistics | Minors and tracks for healthcare (and technology), healthcare logistics (tracks and minors Medlands | Expanding research Lectureships under the Centre of Expertise for Innovative Care and Technology | 190 full-time 60 part-time/LLO | 28 |
| Mechatronics & Embedded systems | | Expanding research Engineering Lectorate | 180 full-time 20 part-time/LLO | 22 |
| Data science & Artificial intelligence | English speaking Bachelor of Applied Sciences Data Science & AI | Expanding Applied research Data Science & Artificial Intelligence | 180 full-time 20 part-time/LLO | 22 |
| Total | | | 900 full-time 100 part-time/LLO | 110 |

Starting point of CBA

### Explanation

Zuyd has designed the propositions for students and staff based in Heerlen along the lines of Urban Transformation, Health & Care Logistics, Mechatronics & Embedded Systems, and Data Science & Artificial Intelligence.

With these three initiatives, Zuyd expects to structurally attract an additional 900 full-time students and 100 part-time/LLO students. If Zuyd actually attracts an additional 1,000 students annually by 2035, the number of students in 2035 is expected to equal the number of students in 2023, thus reversing the projected decline (see also page 61).

3



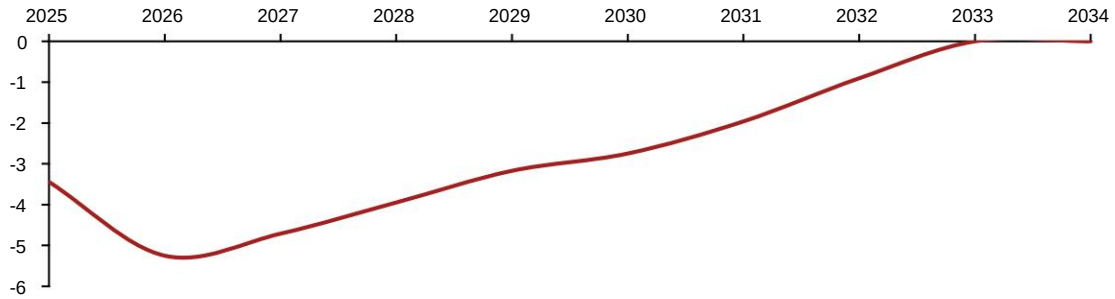
Sources: Zuyd business case; 1) Zuyd has qualitatively substantiated the student numbers and the distribution between full-time and part-time students. We have adopted the provided figures directly. 2) This calculation is based on the existing student-staff ratio: on January 1, 2024, Zuyd had 1,495 FTEs for 13,549 students in 2023-2024 (Annual Report 2023). With 1,000 additional students, this equates to 110 additional staff members. The difference in total is due to rounding. 3) DUO open data.

# Zuyd | The proposition requires an investment of €25 million in the period 2025-2035

## Explanation

Zuyd's business case assumes an investment of €25 million and a ten-year phase-in and investment period. The annual investments are derived from the difference between annual revenues (tuition fees and government subsidies) and costs (staff, housing, and support). These are shown in the figure below and the table on the right. The structural costs of the proposition amount to €10.6 million per year, while the structural revenues amount to €10.6 million per year. From 2033 onwards, the proposition will require no investments.

**Required investments in the period 2025-2034 (million euros)**




## Overview of revenues, costs and investments

| Description | 2025 | 2030 | 2035 and beyond | Total investment |
|---|---|---|---|---|
| Urban Transformation | Revenue 0.1 million<br>Costs 1.3 million<br>Investment: 1.2 million | Revenues 2.0 million<br>Costs 3.1 million<br>Investment: 1.1 million | Revenue 3.7 million<br>Costs 3.4 million<br>Investment: 0.3 million | €8.8 million |
| Health & Healthcare Logistics | Revenue 0.0 mln<br>Costs 0.9 million<br>Investment: 0.9 million | Revenue 1.4 million<br>Costs 2.2 million<br>Investment: 0.8 million | Revenues 2.6 million<br>Costs 2.4 million<br>Investment: -0.2 million | €6.2 million |
| Mechatronics & Embedded systems | Revenue 0.0 mln<br>Costs 0.7 million<br>Investment: 0.7 million | Revenue 1.2 million<br>Costs 1.8 million<br>Investment: 0.6 million | Revenues 2.1 million<br>Costs 1.9 million<br>Investment: -0.2 million | €5.0 million |
| Data science & Artificial intelligence | Revenue 0.0 mln<br>Costs 0.7 million<br>Investment: 0.7 million | Revenue 1.2 million<br>Costs 1.8 million<br>Investment: 0.6 million | Revenues 2.1 million<br>Costs 1.9 million<br>Investment: -0.2 million | €5.0 million |
| Total | Revenue 0.2 million<br>Costs 3.6 million<br>Investment: 3.4 million | Revenues 5.8 million<br>Costs 8.9 million<br>Investment: 3.1 million | Revenue 10.6 million<br>Costs 9.7 million<br>Investment: -0.9 million | € **25.0 million** |

# UM | Structural increase of 1,250 students and 118 staff members was taken as the starting point for the CBA

## Starting point for CBA UM

### Number of students and staff in 2035

| Line | Education | Research | Students1 | Staff members |
|---|---|---|---|---|
| Digitalization MSc | | Expansion of research on BISS and DACS: focus interdisciplinary research into ICT key technologies | 100 | 33.2 |
| Autonomous systems | MSc | Robotics Institute, research, development and implementation of robots | 100 | 53.4 |
| Sustainable regional transformation | BSc | | 350 | |
| | MSc | | 100 | |
| | Research centre(s) | Research into urban transformations from a technical and political-social perspective | | 30 |
| | Urban living lab | | | 2 |
| General | Technical BSc | | 600 | |
| **Total** | | | **1,250** | **118.6** |

**Starting point of CBA**

### Explanation

UM has designed its propositions for students and staff based in Heerlen along the lines of Digitalization, Autonomous Systems, and Sustainable Regional Transformation. With these four lines, UM expects to structurally attract an additional 1,250 students based in Heerlen. The structural costs of the proposition amount to €21.7 million per year, while the structural revenues amount to €21.82 million per year.

Sources: UM business case dated 19-09-2024 and Input 10-11-2024

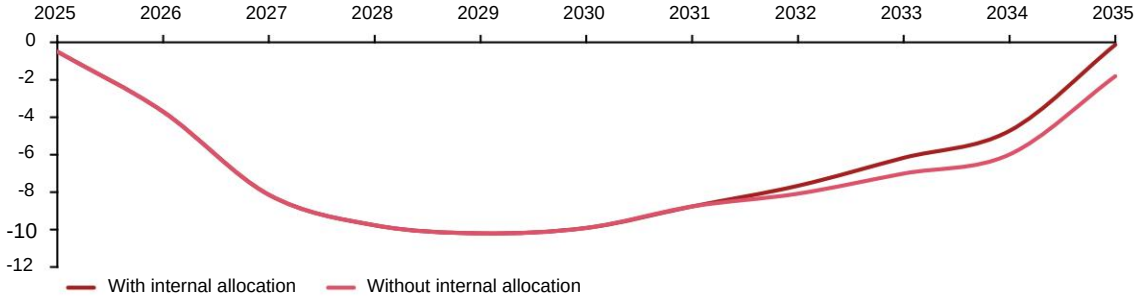
1) For UM, this concerns students and staff based in Heerlen and a horizon of approximately 10 years from the start of educational development. Project-based activities from other campuses in Heerlen are not included in this process. 2) The internal allocation of UM resources is included in the revenues.

# UM | The proposition requires an investment of €70 million in the period 2025-2035

## Explanation

UM's business case assumes an investment of €70 million and a ten-year phase-in and investment period. The required annual investments are derived from the difference between annual revenues (tuition fees, government contributions, and contract revenues) and costs (staff, materials, housing, and support). The ten-year forecast includes and excludes an internal allocation of UM resources based on staff and student numbers. Whether such an internal allocation will be realized cannot be guaranteed in advance. For the unspecified investments for the Research Center and the UM part of the ULL, it has been assumed that they will develop over time in a similar manner to the other investments. The figure below shows that without internal reallocation, the business case shows a deficit of €2 million in 2035. With internal reallocation, the business case closes in 2035.

**Required investments in the period 2025-2034 (million euros)**




## Overview of revenues, costs and investment1

| Description | 2025 | 2030 | 2035 and beyond | Total investment |
|---|---|---|---|---|
| Digitalization | Revenue 0.4 million<br>Costs 0.2 million<br>Investment: -0.2 million | Revenue 3.4 million<br>Costs 4.7 million<br>Investment: 1.3 million | Revenues 5.4 million<br>Costs 5.6 million<br>Investment: 0.2 million | €10.6 million |
| Autonomous systems | Revenue 0.0 mln<br>Costs 0.2 million<br>Investment: 0.2 million | Revenues 5.2 million<br>Costs 9.1 million<br>Investment: 3.9 million | Revenues 6.9 million<br>Costs 8.7 million<br>Investment: 1.8 million | €28.6 million |
| Sustainable regional transformation: BSc & MSc | Revenue 0.2 million<br>Costs 0.4 million<br>Investment: 0.2 million | Revenue 1.4 million<br>Costs 2.3 million<br>Investment: 0.9 million | Revenues 4.0 million<br>Costs 3.3 million<br>Investment: -0.7 million | €3.7 million |
| Sustainable regional transformation: Research center & Urban living lab | Not specified in the business case provided | | | €24.5 million |
| General:Technical BSc | Revenue 0.0 mln<br>Costs 0.2 million<br>Investment: 0.2 million | Revenue 1.9 million<br>Costs 2.7 million<br>Investment: 0.8 million | Revenues 5.2 million<br>Costs 4.2 million<br>Investment: -1.2 million | €2.3 million |
| Total | Revenue 0.6 million<br>Costs 0.9 million<br>Investment: €0.3 million | Revenue 11.9 million<br>Costs 18.7 million<br>Investment: 6.8 million | Revenues 21.8 million<br>Costs 21.7 million<br>Investment: -0.1 million | € **69.7 million** |



Sources: UM business case dated 19-09-2024 and input 10-11-2024

1) The revenues in this table include the assumed internal reallocation of UM resources based on staff and student numbers.

# The education ecosystem requires an investment of €95 million in the period 2025-2035

## Revenues covered by internal UM allocation

The development of education and research by UM and Zuyd University of Applied Sciences will take approximately 10 years. After the phase-in period, the annual structural costs of the educational ecosystem will amount to €22 million per year for UM and almost €10 million per year for Zuyd University of Applied Sciences. Assuming internal allocation of UM resources based on staff and student numbers, the structural costs and revenues are balanced for each institution. If internal allocation of UM resources does not occur, the structural revenues of the UM business case will be insufficient to cover the structural costs, with the exception of €2 million.

The total investment for UM in the period 2025-2035 amounts to €69.7 million, and for Zuyd this amounts to €25.0 million, bringing the total required investment to €94.7 million. The higher required investment for UM compared to Zuyd is due to the fact that UM is barely established in Heerlen yet, resulting in high start-up costs.

## Costs, revenues and required investment1,2

| Setting Line | | Investment 2025-2035 | Structural costs | Structural returns |
|---|---|---|---|---|
| UM | Digitalization | €10.6 million | €5.6 million | €5.4 million |
| | Autonomous systems | €28.6 million | €8.7 million | €6.9 million |
| | Sustainable regional transformation | €28.2 million | €3.3 million | €4.2 million |
| | Technical BSc | €2.3 million | €4.1 million | €5.2 million |
| | **Total** | **€69.7 million** | **€21.7 million** | **€21.83 million** |

| Setting Line | | Investment 2025-2035 | Structural costs | Structural returns |
|---|---|---|---|---|
| ZUYD | Urban Transformation | €8.8 million | €3.4 million | €3.7 million |
| | Health and care logistics | €6.2 million | €2.4 million | €2.6 million |
| | Mechatronics & Embedded systems | €5.0 million | €1.9 million | €2.1 million |
| | Data science & artificial intelligence | €5.0 million | €1.9 million | €2.1 million |
| | **Total** | **€25.0 million** | **€9.6 million** | **€10.5 million** |

1) We did not perform market validation of the business cases. We did a financial and technical validation of UM's business case. Zuyd's business case was broadly based and could not be validated in detail financially. A detailed business case from Zuyd was not received. The costs and revenues were calculated based on ratios from UM's business case and a received business case from Zuyd for the Bachelor's program in Circular Cities and Communities, assuming 1,000 additional students for Zuyd. 2) The revenues in this table include the assumed internal reallocation of UM resources based on staff and student numbers. 3) Rounding differences explain an inexact total.

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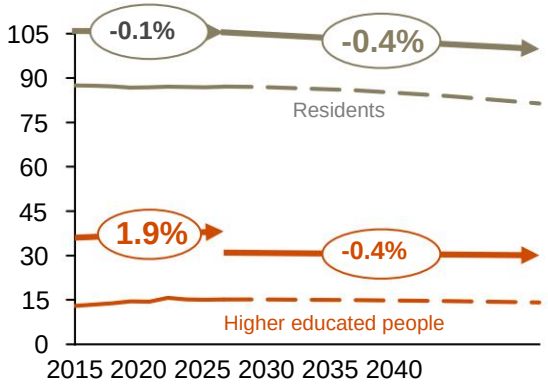
# In the zero situation, Heerlen is confronted with a shrinking population

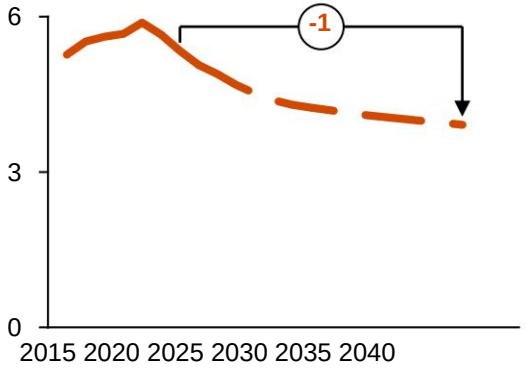
## Zero scenario

### The number of residents and highly educated people in Heerlen is declining

**Forecast number of inhabitants and highly educated people in Heerlen (x 1000)**




**Forecast number of students (x 1000) Zuyd University of Applied Sciences, Heerlen branch**

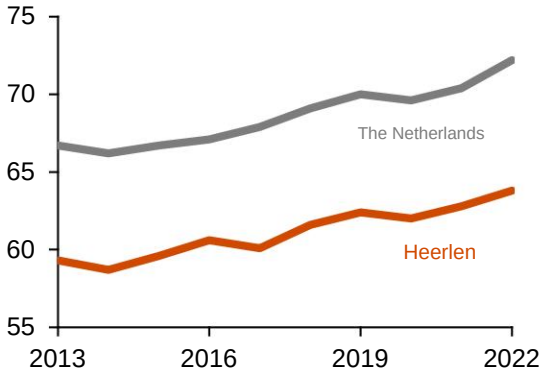



In the baseline scenario, the municipality of Heerlen will experience population decline and an aging population between 2015 and 2040. The total number of residents will decrease from 87,500 to 81,400, or an 8% decrease. This decline primarily affects the age group under 64, while the number of people aged 65 and over will increase (aging).

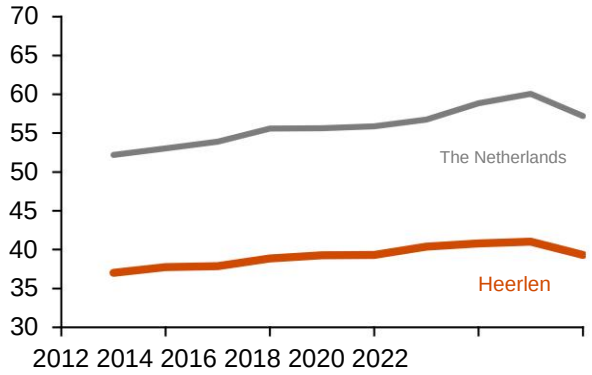
- Due to the aging population, the number of highly educated people in Heerlen is also increasing Expected return.2 The number of students studying in Heerlen is also expected to decline. At Zuyd University of Applied Sciences' Heerlen campus, the number of students will decrease by more than a thousand between now and 2037.3

### Broad prosperity lags behind compared to the Netherlands

**Net labor participation (in %)**




**Real development of disposable income per person (x €1000) (Pri level = 2022)**




- Net labor participation and disposable income in Heerlen continue to lag behind the rest of the Netherlands4
- Heerlen scores low across the broad prosperity indicators. For example, Heerlen has the lowest SES-WOA score in the Netherlands (-0.301)
- Poverty is concentrated in Heerlen-Noord. This is reflected in, among other things, Educational disadvantages (estimated at 32% of preschoolers and primary school students) and low social cohesion. Heerlen is also the municipality with the highest number of suspects per 10,000 inhabitants.

Sources: 1) ABF - Primos population forecast; 2) The estimated number of highly educated people has been equated to the expected population growth. This is a conservative estimate; due to the aging population and self-reinforcing effects, a stronger effect can be expected; 3) DUO Open Education Data; 4) CBS; 5) Initial report NPHLN, *Spatial concentration of poverty in Heerlen-Noord (link).*

# Expansion of higher education offerings in Heerlen by UM and Zuyd will lead to a structural increase of 2,250 students in Heerlen

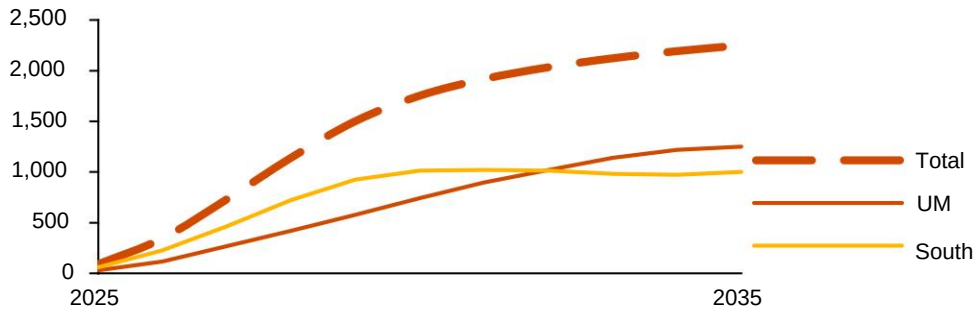
## Estimated structural increase in the number of students and residents in Heerlen

### Ecosystem education structurally attracts students

The educational ecosystem will structurally attract 1,250 new students to UM and 1,000 students to Zuyd.1 This includes students at various educational levels: HBO bachelor's, HBO master's, WO bachelor's, and WO master's. UM and Zuyd's plans assume that the intended structural increase can be achieved within a ten-year period.1 It is expected that the majority of the additional students will come from the EEA.

The actual number of additional students attracted will in practice depend largely on the policy regarding international students, the existence of transfer routes between programmes and developments at other institutions

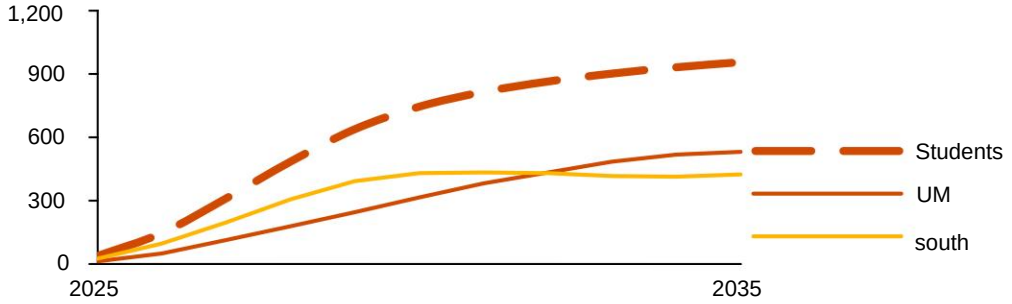
**Forecast number of students in Heerlen (additional)**




### Some students will also live (continue to live) in Heerlen

Some students will also live in Heerlen (approximately 956 in 2035, of which 531 will come from UM and 425 from Zuyd University). This includes students living at home and those living away from home. Nationally, an average of 42.5% of students live in Heerlen . , This percentage has been assumed. Whether this share is also achieved in Heerlen depends on the available student housing (see p. 65), student facilities, and the attractiveness of the student community.

**Forecast number of students living in Heerlen (additional)**




Some graduates will remain in Heerlen. Because these are often young people, this will have a mitigating effect on the aging population. The magnitude of the total effect on the population size is difficult to quantify. This depends heavily on factors such as the share of international students, the attractiveness of the residential area, and the available housing stock. These factors are not included in the submitted business cases.

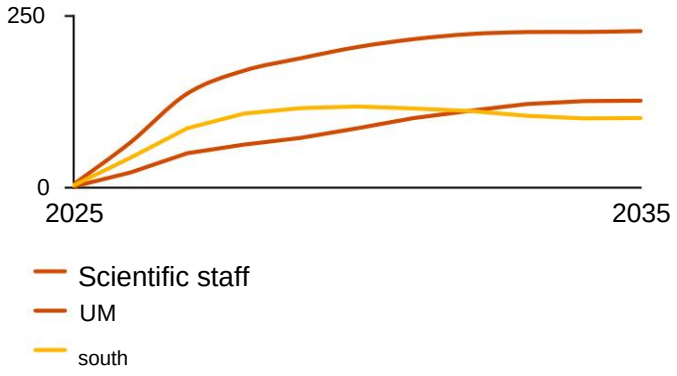
Sources: 1) Business cases provided; assumptions regarding throughput, dropout, and long-term study rates based on current figures; student number trends over time are indicative; 2) National Student Housing Monitor 2023.

# The educational ecosystem structurally attracts approximately 228 employees and provides impetus to valorization and development of start-ups

## E o teem tre t per oneel aan…

The educational ecosystem influences the workforce at UM and Zuyd University of Applied Sciences. It attracts additional academic staff: researchers and lecturers who teach, conduct research, and contribute to the development of startups.
In accordance with the business cases, it has been assumed that the ecosystem will start in 2025 with more than 40 FTE academic staff and will grow to approximately 118 FTE from UM and 110 FTE from Zuyd in 2035 and later years.

**Forecast additional #fte**




## …and stimulates applied research , valorization and development of startups

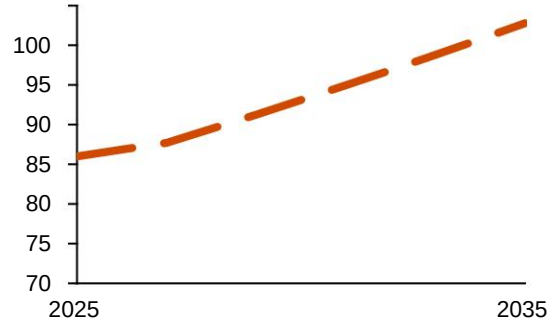
Good innovation ecosystems are a key element in increasing the economic and societal impact of scientific education and research. By eventually generating approximately 105 innovations annually

By training 2,250 additional students and developing knowledge and technology through scientific and applied research, the ecosystem will lay a solid foundation for developing and establishing new businesses in the Heerlen region, while also enabling societal transitions with newly developed scientifically applicable knowledge in the field of transforming regions. The value of the economic and societal impact can be estimated based on research expenditure – the added value of the valorization multiplier.

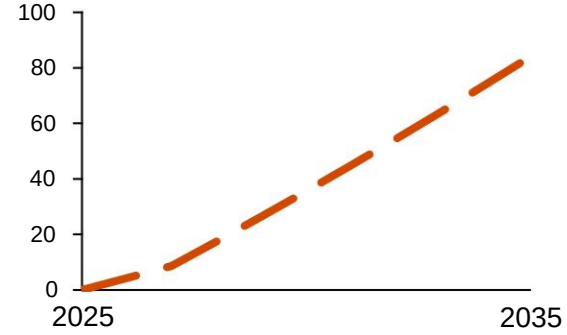
With a multiplier of 5.6 and additional research expenditure from the educational ecosystem, the societal value of research, valorisation and start-up is estimated at €4.7 million per year.
Of this, based on approximately equal expenditure on research, €2.3 million can be allocated to UM and €2.3 million to Zuyd.

The number of innovative start-ups and scale-ups in Heerlen will be 86 in 2023.2
The educational ecosystem will boost the innovation landscape, allowing the number of start-ups and scale-ups to increase to almost 100 within a ten-year period. Assuming approximately 5 FTEs per start-up/scale-up, this will lead to approximately 80 additional FTEs in 2035.

**Forecast number of innovative start-ups and scale-ups**




**Forecast number of additional #FTE start-ups and scale-ups**






Sources: 1) Biggar Economics, 2022, Investing in Valorisation: The Economic Opportunity (link); 2) Waarstaatjegemeente.nl; Assumed number of FTE academic and support staff based on submitted business cases. Developments over time are not included in the submitted business cases and are indicative. The assumed growth rate for start-ups is 4% and a closure rate of 2% (CBS, 2024). 2% growth is assumed for 2023 and 2024, and 3% for 2025 and 2026.

# The educational ecosystem will create approximately 805 additional jobs in Heerlen by 2035

## Labor market effects

### Direct employment

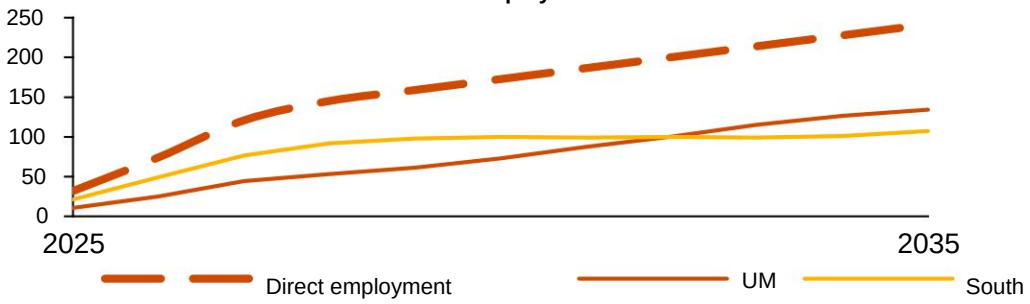
The educational ecosystem primarily creates employment opportunities itself. To carry out its activities, in addition to labor (academic and support staff) and capital (e.g., buildings, laboratories, computers, and servers), services from other companies are also required. This includes catering, maintenance, security, network services, and so on. For 2022, the direct effect of UM on external employment is estimated at 947 people in the Netherlands, Germany, and Belgium.1 Assuming that the ratio of internal to external staff (direct effect) remains the same at 0.22, the direct effect of the educational ecosystem on external employment will amount to approximately 50 FTEs. Part of this will be employment in Heerlen (assumption: approximately 13.5 FTEs). Combined with the anticipated internal staff (see previous page, approximately 228 FTEs), direct employment will thus grow to **approximately 241 additional FTEs** in 2035, of which 134 will be from UM and 107 from Zuyd.

### Total impact on employment

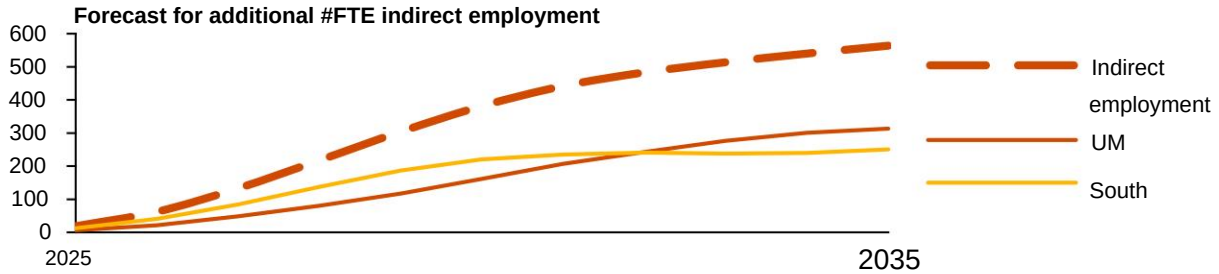
The total impact on employment is greater due to the consumer spending of students and staff in the educational ecosystem. The consumer spending of students, graduates, and staff living in Heerlen as a result of the educational ecosystem (total: approximately 1,601 people in 2035, of which 956 students and 645 staff/graduates) will result in **approximately 564 additional FTEs in 2035,** of which 313 from UM and 250 from Zuyd University.2 In addition, there is an effect on employment due to the consumer spending of students and staff who do not live in Heerlen (approximately 904 people in 2035).

The effect of this expenditure in terms of the number of full-time equivalents (FTEs) is limited, but this consumer spending may boost the quality of life in the city center. The total structural effect on employment is **241 + 564, or approximately 805 FTEs** in 2035. It is assumed that 50% of these jobs will be filled by non-Dutch citizens. As a result, the educational ecosystem generates approximately €7.8 million annually in tax and premium revenues, of which approximately €4.4 million comes from UM and €3.5 million from Zuyd University of Applied Sciences.

**Forecast for additional #FTE direct employment**




**Forecast for additional #FTE indirect employment**




Sources: 1) Panteia, *Economic Footprint of Maastricht University,* 2023. 2) Indirect effect on employment via population is calculated based on elasticities from CPB, *Effects of Urbanization in Focus,* 2013. This is a conservative estimate, as highly educated individuals generally have higher spending patterns. Data on population growth (aging, migration) have been kept unchanged. The share of employees living in Heerlen has been set equal to the current share of workers in Heerlen who live there (27%, source: Statistics Netherlands (CBS)). The majority of graduates come from abroad. Of these, an average of 32% remain in the Netherlands after their studies, and we assume that half of them will settle in (the region of) Heerlen. 3) Changes in tax and premium costs due to increased labor supply. The 30% scheme has been taken into account.

# Increased demand for student housing in Heerlen could lead to a loss of prosperity for students

## Housing market effects for students

### Students

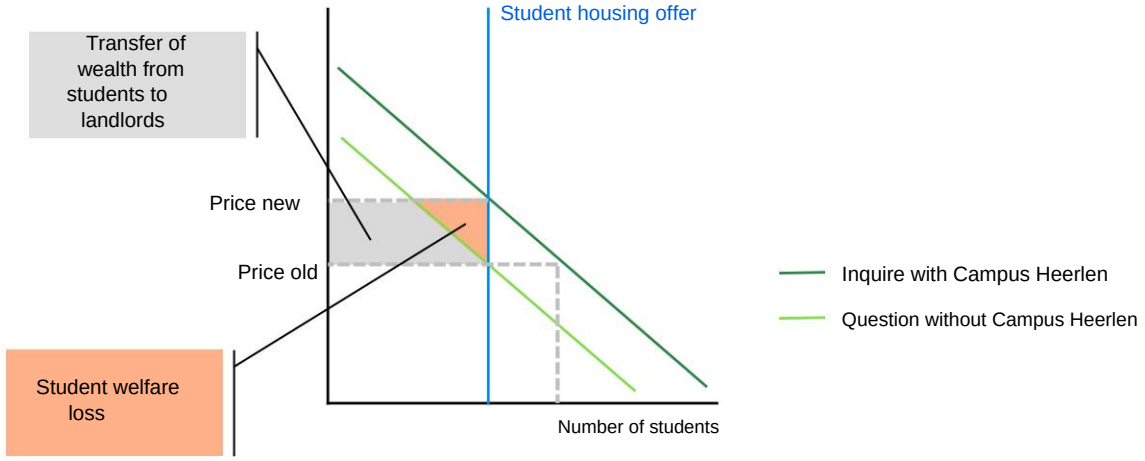
The student housing market is a separate market, in addition to the general housing market, and generally has shorter waiting times than the social housing market.1 Some student housing concerns living space in the so-called flexible supply, which can also accommodate other target groups, such as single people and first-time buyers.

The housing supply in the Netherlands is mainly determined by regulation, which means that the supply elasticity is very low and in fact it hardly responds to demand.2,3 This means that an increase in the demand for student housing in Heerlen as a result of an increase in the number of students living away from home in Heerlen can lead to a situation in which students in Heerlen have more difficulty finding accommodation and pay a higher price for that accommodation.

The higher price is an advantage for Dutch landlords (or sellers) of student housing, and on balance, a welfare shift. Higher search costs for students to find housing result in a welfare loss for students in Heerlen. The magnitude of this welfare loss depends on the slope of the supply and demand curves (green lines in the figure on the right). These factors are currently so uncertain that a precise calculation of the impact on welfare is currently impossible.

### Tentative estimate of welfare losses for students

The increase in demand for student housing in Heerlen is 956. Currently, students pay a monthly rent of €555, or €6,660 per year. In line with previous studies, we tentatively estimate the price increase due to the growing number of students to be between 5 and 15% of this.1 In the figure below, this is the height of the triangle "student welfare loss." The estimated welfare loss is the area of the triangle and can be calculated as: number of students (956) * 5% to 15% of €6,660 * 0.5 = €158k – €473k per year






Sources: 1) ABF, 2023, *National Student Housing Monitor 2023.* Utrecht: Kences (link); 2) Groot, S., 2022, *Measured housing shortage says little about actual housing shortage.* ESB, 107 (4805) (link); 3) Michielsen, T., S. Groot, and R. van Maarseveen, 2017, *Price Elasticity of Housing Supply.* CPB Note (link)

# Increased demand for housing in Heerlen could lead to welfare gains for Dutch sellers

## Housing market effects for alumni and employees

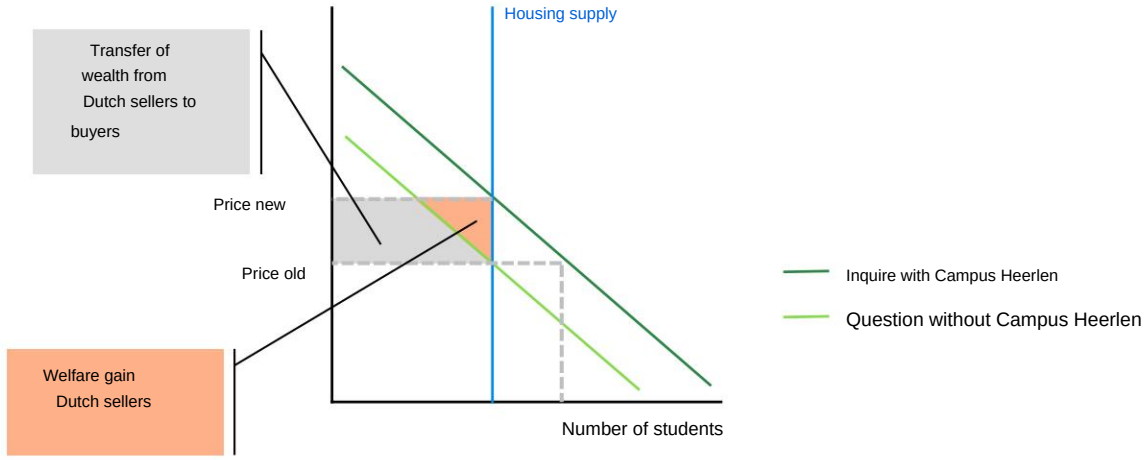
### Alumni and employees

An increase in the number of alumni/graduates and employees of the educational ecosystem can lead to a higher demand for housing in (the region) Heerlen. Because employees of the educational ecosystem and graduates who remain in Heerlen (and the region) generally have high incomes,1 demand for owner-occupied and rental properties in the private sector can be expected to increase. This effect will initially be limited and will build up over a period of 10-15 years, as more and more cohorts of graduates enter the (regular) housing market in Heerlen (and the region).

A tentative calculation shows how many homes this could involve. We assume that approximately 641 additional graduates and staff will be in (the region) by 2035. Heerlen has established itself.2 Assuming an average of 1.5-2.1 people per household, the additional demand for housing will increase to 305-427 homes within ten years. This represents 0.65% - 0.91% of the current housing stock in Heerlen (46,697 in 2023). Given a supply elasticity close to zero, an increase in demand will hardly translate into a higher housing supply, but mainly into higher prices.3,4

### Tentative estimate of welfare gains for Dutch sellers

A social welfare effect only occurs when a Dutch homeowner sells a house to a foreign buyer. This is the case (in the long run) for 307-430 homes. These homes are then sold by Dutch homeowners at a higher price than they would have originally sold them for. Their welfare gain is, on average, half of the price decrease (triangle in the figure below). With a price elasticity of -0.5, an average house price of €247,000, and an annual rent of 5.4% per year, the estimated welfare gain is between €27,000 and €52,750 per year. With an elasticity of -1, these effects are halved, and with an elasticity of -0.25, they are doubled.




Sources: 1) CPB, 2011, *Education policy in the Netherlands: the quantification of effects* (link); 2) See p. 63; 3) Groot, S. (2022). *Measured housing shortage says little about actual housing shortage.* ESB, 107 (4805) (link); 3) Michielsen, T., S. Groot, and R. van Maarseveen, 2017, *Price Elasticity of Housing Supply.* CPB Note (link); 4) CBS, 2024, *Dashboard* Heerlen as a knowledge city and innovation engine *Economy – Housing market* (link), accessed on 16 September 2024; 5) Because annual effects are to be calculated, owner-occupied homes are treated as if they were rental properties that the PwC The owner rents to himself at a market-based price, which is 5.4% of the average property value. See CPB, 2016, *Estimate of Market-Based Rent.* CPB Background Document (link).

# Impact of educational ecosystem on labor productivity, business climate and competitive position

## Broader economic effects

### Business climate and competitive position of Heerlen

The literature shows that the availability of talent plays a role in the entrepreneurial climate, but also that this role is modest. In other words, the additional highly educated talent made available through the educational ecosystem in the Heerlen region will have an upward but modest effect on the entrepreneurial climate. This effect cannot be easily quantified without extensive insight into the connection between education and the labor market of the intended programs.

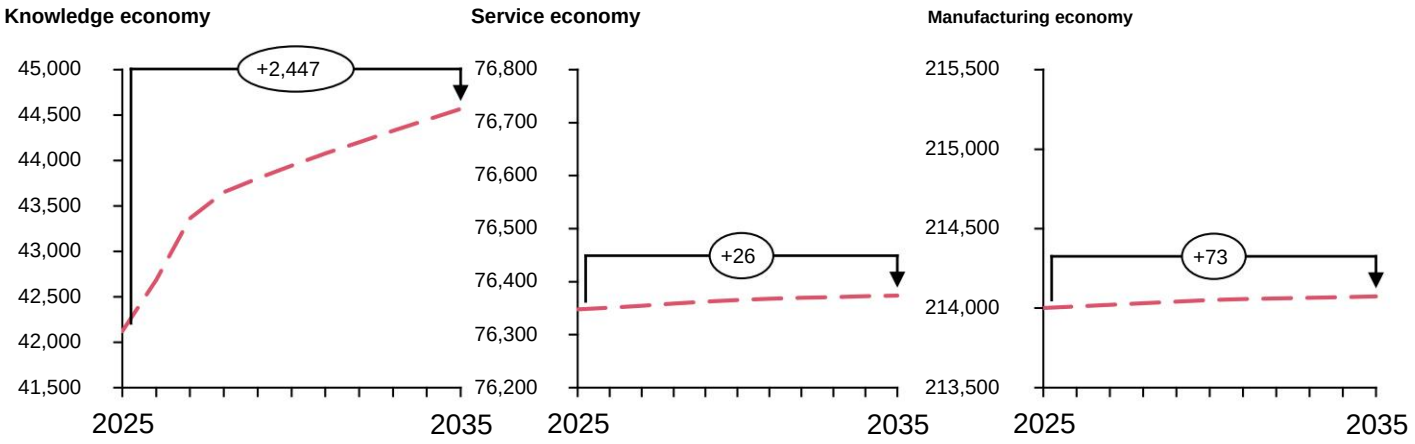
In addition, higher education influences the international competitive position, as it is an important component in international rankings of the competitiveness of higher education.1 For example, the World Economic Forum ranking is determined by knowledge and skills for over 8%.2 Although literature does not provide quantitative evidence for the effect of higher education on the international competitive position of a region, it is plausible that this effect will indeed occur in Heerlen, especially given the location of this region.

### Effect on labor productivity

The presence of students and academic staff and employment growth have a limited effect on labor productivity. The CPB (Netherlands Bureau for Economic Policy Analysis) has calculated this at 0.0003% (students), 0.0425% (academic staff), and 0.0001% (jobs), respectively.

We determine the macro effect on labor productivity by calculating the added value and the number of jobs per sub-sector (see figures below) and then aggregating the partial effects.4 It is important to note that students and academic staff particularly have an effect on the labor productivity of the knowledge economy.

**Labor productivity forecast in Heerlen (added value/FTE in euros)**




Sources: 1) HY Keser, 2015, *Effects of higher education on global competitiveness: reviews in relation with European countries and the middle east countries.* Annals of Constantin Brancusi University of Targu-Jiu. Economy Series, 1(1); 2) World Economic Forum, 2019, *The global competitiveness report 2019* (link); 3) CPB, *The regional impact of universities,* 2017; 4) waarstaatjegemeente.nl; Assumption: knowledge economy = sector K (financial services), MN (business services), OQ (government and healthcare); service economy = sector GI (trade, transport, and hospitality), RU (culture, recreation, other services); manufacturing economy = other sectors. The added value per sector is only available at the level of South Limburg; this has been extrapolated to Heerlen via the size of the working population.

# The impact of the education ecosystem on added value and GDP cannot be easily quantified.

## Broader economic effects

### Value added and GDP

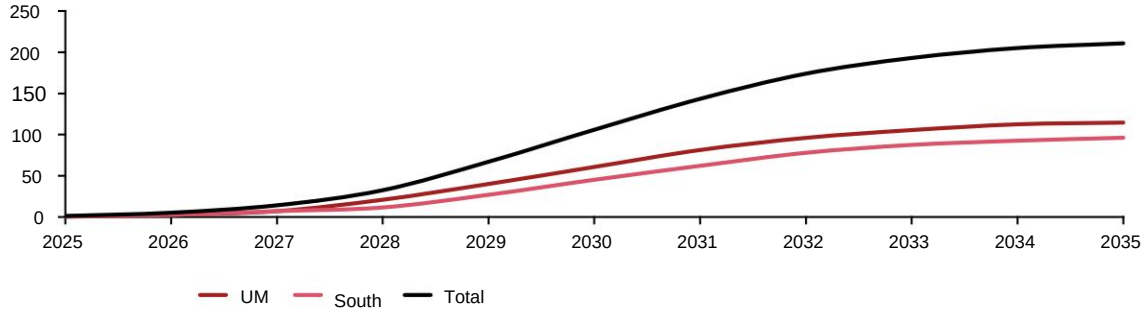
Various studies show that the presence of a university has a substantial economic impact. The added value of the University of Groningen (including the UMC) has been estimated at €2.5 billion and 30,000 jobs, and for Leiden University (including the LUMC) it has been estimated at €2 billion and approximately 20,000 jobs. However, these impact figures do not represent net benefits, because this added value is achieved through the deployment of labor and capital. Only "excess profits" resulting from deducting the costs of labor and capital constitute net economic benefits. These excess profits are often realized through market power stemming from successful innovations. In other words, net benefits arise from increased productivity resulting from technological innovations. The academic literature primarily focuses on the social return on investment of R&D by businesses (estimated at 120%), but much less on the social return on investment of public R&D.

The educational ecosystem focuses on local value creation and local GDP growth. This shifts some of the campus's impact from other areas to the municipalities of Heerlen, Parkstad Limburg, and Limburg. However, the distribution of GDP growth cannot be quantified in advance. The extent to which higher education impacts GDP also depends on the content of research: the focus on regional transformation and the problem-oriented, participatory approach may enhance the GDP effect, but cannot be quantified in advance.

### GDP growth due to population growth and labor productivity growth

Heerlen's GDP is expected to rise by €211 million by 2035, of which €89 million can be attributed to the knowledge economy, €38 million to the service economy, and €84 million to the manufacturing economy. Of the €211 million GDP increase, €115 million is attributable to Maastricht University and €96 million to Zuyd (see figure). After 2035, the economy will grow structurally by €5.8 million per year, of which €2.4 million will be due to the knowledge economy, €1.0 million to the service economy, and €2.4 million to the manufacturing economy. This is quantified based on labor productivity growth (see previous page), the growth in the number of students and residents, and the associated growth in economic activity and the number of jobs. This estimate uses historical migration rates, birth rates, and death rates. This means that the GDP effects, ceteris paribus, can only be attributed to the propositions of UM and Zuyd and not to other effects such as population ageing.2

**GDP forecast for the municipality of Heerlen (in millions of euros)**




Sources: 1) CPB, *The regional impact of universities: a literature review,* April 4, 2017; OECD, *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development,* 2015; 2) CPB, *Effecten van verurbanisering in beeld,* 2013; CBS; GDP Heerlen in 2024 is based on GDP South Limburg in proportion to the number of inhabitants.

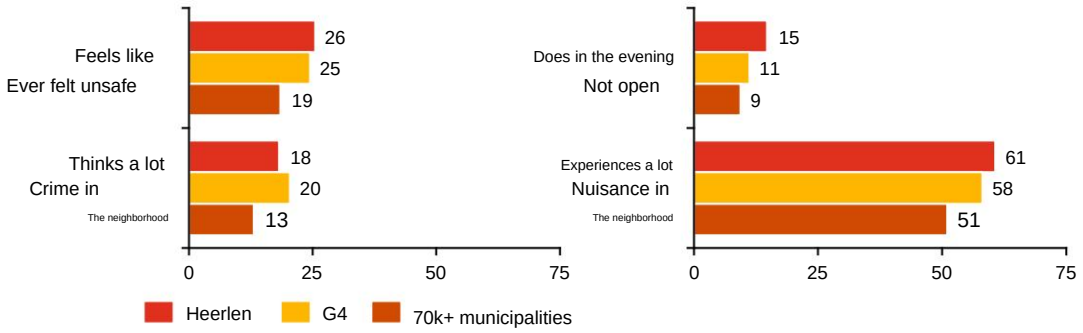
# The proposition can reduce (perceived) crime in Heerlen and increase the sense of security

## Effects on safety and perception of safety

### Safety (perception) among Heerlen residents

Research by Statistics Netherlands (CBS) shows that residents of Heerlen give their neighborhoods low ratings for perceived safety and that Heerlen residents more often exhibit avoidance behavior—such as not answering the door at night—than residents of the G4 or other large cities.1 Over a quarter of Heerlen residents (26 percent) sometimes feel unsafe in their own neighborhood—a share comparable to that in the G4 but higher than in other large municipalities. The same pattern is visible when it comes to the proportion of people who often feel unsafe. For those who feel unsafe in the evening on the streets in their neighborhood and alone at home, the percentages in Heerlen are higher than those in the G4 and other large municipalities. Heerlen residents are not more often victims of crime such as violence, theft, and burglary than residents of other large cities.

**Safety perception in the municipality of Heerlen in 2022 (in %)**




### Causal effect of education on crime difficult to quantify

An increase in the number of highly educated individuals, and thus the proportion of highly educated individuals in Heerlen's population, could lead to increased (perceived) safety among the population. The consensus in academic literature is that a highly educated population , on average, engages in less criminal activity.1 The campus ensures that the number of highly educated individuals in Heerlen can structurally increase, which can lead to a decrease in (perceived) crime and an increase in the sense of safety.2 This increases the attractiveness of studying in Heerlen for students.3

Several mechanisms, which can also occur simultaneously, underlie this causal relationship. Education can:

1. lead to better career opportunities, meaning there is less to gain and more to lose from criminal behavior,
2. Develop qualities such as patience and a focus on the future, 3.
Influence who young people associate with during school/study and during working life, which can influence participation in criminal activities,
4. work preventively by keeping adolescents in school (longer).

Although the causal effect of education on crime has been convincingly demonstrated, the scientific literature does not provide definitive answers regarding the precise influence of each of these mechanisms. This makes it impossible to quantify the contribution of the educational ecosystem to (perceived) crime.



Sources: 1) CBS, 2022, *De Heitjes and neighbourhood cohesion, liveability and safety in Heerlen* (link); 2) Oppelaar, J. and K. Wittebrood (2006). *Anxious citizens? The determinants of feelings of insecurity investigated.* The Hague: Social and Cultural Planning Office (link); 3) Interviews with UM students

# Possible upward effect of proposition on health Heerlen residents, but the effect is not causal

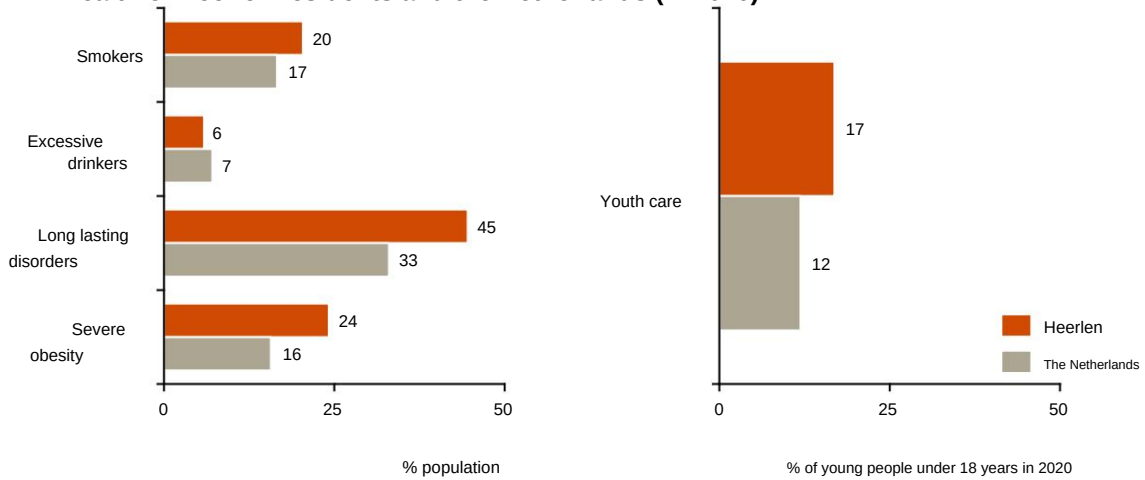
## Effects on health

### Heerlen resident has worse health than average Dutch person

Health is one of the underlying values of broad prosperity. Research by Statistics Netherlands (CBS) shows that residents of Heerlen score low on perceived health and that Heerlen has health disadvantages compared to the Netherlands.

The poorer health of Heerlen residents can be explained in part by severe obesity, chronic illness, and smoking cessation. This is reflected in the high level of healthcare use compared to the Netherlands. Furthermore, young people in Heerlen also receive relatively more youth care.

**Health of Heerlen residents and the Netherlands (in 2020)**




### Causal effect of education on health is unclear

In recent scientific literature, there is no consensus on the extent to which the association between education and health can be attributed to a causal effect of education on health. The causal evidence from various studies is inconsistent.3 Some studies find beneficial effects of education on health, while many others report null effects.4 These effects vary substantially not only for the most commonly studied outcome (life expectancy), but also for other outcomes, such as smoking, obesity, and mental health.4 Moreover, third-party factors (including personal characteristics, living environment, and cultural background) play a significant role in this relationship, making the effect of education on health smaller than the strong association between the two suggests.

To the extent that education has a causal effect on health, the increase in education among the population in (the region of) Heerlen could lead to health effects due to the educational ecosystem. Several underlying mechanisms are possible for this. For example, education can impart useful knowledge and skills for a healthier life, provide access to a social network that promotes a healthy lifestyle, and, through higher income, enable increased health spending. Quantifying these effects is not possible based on the scientific literature.



Sources: 1) CBS, 2024, *Low well-being in Heerlen,* Statistics Netherlands, March 26, 2024 (link); 2) Regional Image South Limburg, *The five most important challenges in focus,* July 1, 2023 (link); CBS Youth Policy Information 3) CPB, 2023, *Broad welfare effects of education* (link); 4) LlerasÿMuney, A., 2022, *Education and income gradients in longevity: The role of policy,* Canadian Journal of Economics/Revue canadienne d'économique, vol 55(1): 5-37 (link),

# Potential broader effects through Heerlen's mentality and campus community social involvement

## Effects on broad prosperity

### Campus community social involvement

An example of broader social impact is the social engagement of students and organizations located on campus. For example, student participation in volunteer work, part-time jobs, and internships can lead to increased prosperity and greater social cohesion. The magnitude of this effect depends on the extent to which displacement occurs. After all, a part-time job providing homework assistance in Heerlen-Noord has a greater social impact than a job in the hospitality industry, where an existing job for a low-skilled worker disappears. Quantifying this effect is not possible.

Existing examples illustrate how Urban Living Labs, through the campus community, can make an additional contribution to the broader prosperity of Heerlen. A recent example is the Aurora Challenge, in which student teams worked intensively with residents and housing corporations on a renovation of the square in front of the Aurora apartment building in Heerlen. The renovated square demonstrably promotes the physical and social development of children in the building. Another effect of the process is that discussions on sustainability themes—circular economy, climate adaptation—are being held that were previously unaddressed. This demonstrates that it is possible to incorporate sustainability themes into the process of creating a place with residents and connect them to their lives.

### Population development and ageing

The impact of the educational ecosystem on population growth in Heerlen, and particularly the aging population, cannot be quantified. A positive effect is possible through the following channels:

- The share of workers in Heerlen who also live there is increasing. This share is currently relatively low (27%) and may increase due to the Campus's impact on the attractiveness of the living environment.

The share of Heerlen residents staying in Heerlen for the long term is increasing. Over the past 10 years, 59,000 people have moved to Heerlen and 56,000 have left, primarily in Heerlen-Noord. The campus's positive impact on Heerlen's attractiveness can improve the likelihood of *residents staying* . This also has a positive effect on social cohesion.

- Graduates who stay in Heerlen are younger than the average population in Heerlen. The birth rate may increase in the long term.

The magnitude of these effects cannot be quantified. This CBA assumes a direct additional population of approximately 1,601 people in 2035 (students, employees, graduates), without factoring in the indirect effects mentioned above.



Sources: 1) Municipality of Heerlen, *RIB Education to the city center;* 2) CBS; 3) Zuyd University of Applied Sciences, *Lectorate Smart Urban Redesign, 2024, Aurora opening June 4,* (link) accessed on September 19, 2024.

# Table of contents



# The social benefits of the intended educational ecosystem are greater than the social costs

## Result of CBA

| Wealth effect | | After 10 years (in 2035) Net present value | |
|---|---|---|---|
| **Ecosystem revenues and costs** | Tuition fees, funding and contract revenues | + €32.3 million | + €158 million |
| | Education and research | - €31.4 million | - €223 million |
| **Innovation** | Valorization | + €4.7 million | + €27 million |
| **Labor market** | Working population, labor productivity | +€5.8 million | + €180 million |
| | Additional tax and premium revenues | €7.8 million | €28 million |
| **Housing market living environment** | Fewer homes available | + €27k to + €52.8k | + € 95k to + € 188k |
| | Fewer rooms for students in Heerlen | - €158k to - €473k | - €560k to - €1.7 mln |
| **Broader economic effects** | | +PM | |
| **Safety and sense of safety** | | +PM | |
| **Health** | | +PM | |
| **Balance** | | +€22.8 million + PM to +€23.1 million + PM | +€168 million +PM to +€169 million + PM |

## Explanation

The quantified costs of the educational ecosystem are smaller than the quantified benefits. The net present value of the proposition is €168 million to €169 million and creates both social and economic value.

The annual costs of the educational ecosystem will amount to €31 million in 2035, after the phase-in period. Of this, over €21 million will be incurred by UM and €10 million by Zuyd University. The costs of the educational ecosystem are almost entirely covered by student tuition fees and government funding for education and research.

The annual benefits include a larger working population and higher labor productivity. Combined, this leads to additional structural economic growth of €6 million per year. The direct economic impact stems from the employment generated by the educational ecosystem, representing 118 FTEs from UM and 110 FTEs from Zuyd University of Applied Sciences. The remaining additional economic growth stems from indirect effects such as consumption.

The educational ecosystem stimulates the strengthening of the entrepreneurial climate, which can have significant positive broad-based welfare effects; specification of the scope is needed to quantify this.



1) The ultimate prosperity effect may involve a shift between regions; the extent to which this occurs depends on the extent to which additional students are attracted from outside the Netherlands (instead of students who would otherwise study elsewhere in the Netherlands).

# The educational ecosystem increases broad prosperity in line with the goals of the National Program Heerlen North

## Result of CBA

| Prosperity effect in 2035 | | Rich | UM | South | Students | Alumni | Residents Heerlen |
|---|---|---|---|---|---|---|---|
| **Ecosystem costs** | Tuition fees, funding and contract revenues | €21.6 million | | | €10.7 million | | |
| | Education and research | | - €21.7 million | - €9.7 million | | | |
| **Innovation** | Valorization | | €2.3 million | €2.3 million | | | |
| **Labor market** | Labor force, labor productivity | | | | | | + €5.8 million |
| | Tax and premium income | €7.8 million | | | | | |
| **Housing market living environment** | Fewer homes available | | | | | | + €27k to + €52.8k |
| | Fewer rooms for students in Heerlen | | | | - € 158k to - € 473k | | |
| **Broader economic effects** | | P.M | P.M | P.M | P.M | P.M | P.M |
| **Safety, sense of safety** | | | | | P.M | P.M | P.M |
| **Health** | | | | | P.M | P.M | P.M |
| **Balance** | | €29.4m +PM - €19.4m + P.M | | - €7.4 million + PM | €10.2 to €10.5 million + PM | P.M | €5.8 to €5.9 million +PM |

## Explanation

In addition to the economic effects, the educational ecosystem also increases broad prosperity in Heerlen along positive effects for residents of Heerlen on health, safety and living environment; the effects of the educational ecosystem are therefore linked to the objectives of the National Program Heerlen North:

- Safety: scientific literature shows that attending education for a longer period generally leads to less crime, and thus increases safety.

- Health: Scientific literature shows that a healthier lifestyle is made possible through knowledge and skills for healthier living, social networks that promote a healthy lifestyle and a higher income.

With regard to the living environment, the educational ecosystem ensures a limited reduction in prosperity for students due to a tighter housing market in the region, and increases the prosperity of homeowners who sell their homes.

# Zuyd's independent growth also leads to higher social benefits than costs

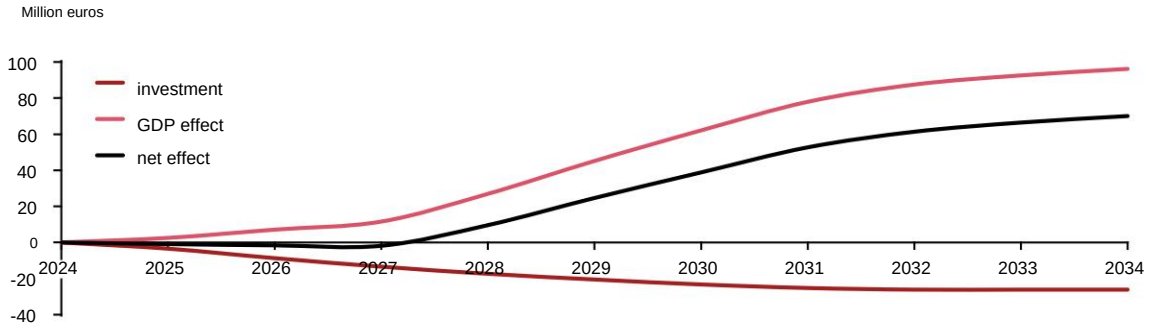
## Result of CBA

| Wealth effect | | After 10 years (in 2035) Net present value | |
|---|---|---|---|
| **Ecosystem costs** | Tuition fees and funding | + €10.6 million | + €57.9 million |
| | Education and research | - €9.7 million | - €80.3 million |
| **Innovation** | Valorization | + €2.4 million | + €18.1 million |
| **Labor market** | Labor force, labor productivity | + €2.6 million | + €86.4 million |
| | Additional tax and premium revenues | €3.5 million | + €13.9 million |
| **Housing market living environment** | Fewer homes available | + €12k to + €23k | + €46k to + €91k |
| | Fewer rooms for students in Heerlen | - €70k to - €210k | - €272k to - €815k |
| **Broader economic effects** | | +PM | +PM |
| **Safety and sense of safety** | | +PM | +PM |
| **Health** | | +PM | +PM |
| **Balance** | | €9.1 million + PM to €9.3 million + PM | €94.9 million + PM to €95.5 million + PM |

### Explanation

The quantified costs of the educational ecosystem are smaller than the quantified benefits. The net present value of the proposition is €95 million and creates both social and economic value.1 The The annual costs of the educational ecosystem will amount to approximately €10 million per year in 2035, after the phase-in period, for training 900 full-time students, 100 part-time students, and conducting research and teaching by 110 staff members. The annual benefits include a larger workforce and higher labor productivity, which combined will lead to additional economic growth of €3.6 million per year.

The figure below illustrates the cumulative effect of the required investment, the GDP effects, and the difference between the two (net effect) over time. A positive net effect is expected from 2028 onward, and the investments will structurally result in additional prosperity.






1) The ultimate welfare effect may involve a shift between regions; the extent to which this is the case depends on PwC the extent to which additional students are attracted from outside the Netherlands (instead of students who would otherwise have gone elsewhere in the Netherlands) Joint would study); 2) Compared to the zero scenario in which the number of students in Zuyd shrinks.

# UM's independent growth also leads to higher social benefits than costs

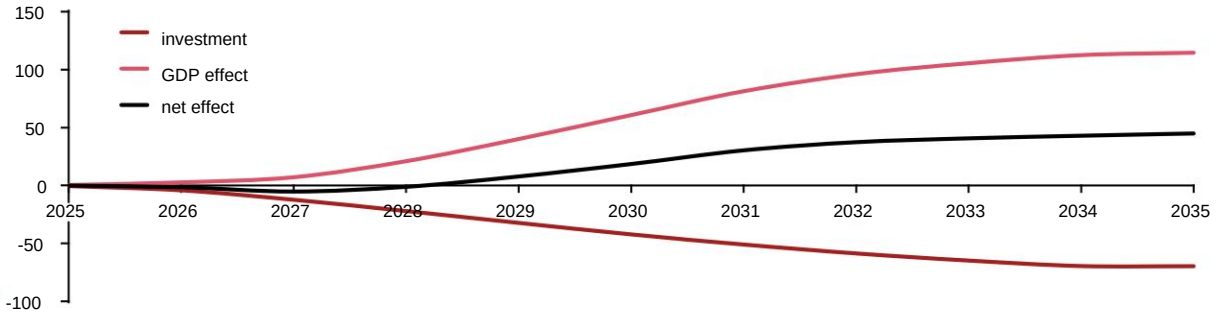
## Result of CBA

| Wealth effect | | After 10 years (in 2035) Net present value | |
|---|---|---|---|
| **Ecosystem costs** | Tuition fees, funding and contract revenues | + €21.8 mln2 | + €99.6 million |
| | Education and research | - €21.7 million | - €142.6 million |
| **Innovation** | Valorization | + €2.4 million | + €12.4 million |
| **Labor market** | Labor force, labor productivity | + €3.2 million | + €99.8 million |
| | Additional tax and premium revenues | + €4.4 million | + €15.6 million |
| **Housing market living environment** | Fewer homes available | + €15k to + €29k | + € 93k to + € 113k |
| | Fewer rooms for students in Heerlen | - €87k to - €263k | - € 311k to - € 445k |
| **Broader economic effects** | | +PM | +PM |
| **Safety and sense of safety** | | +PM | +PM |
| **Health** | | +PM | +PM |
| **Balance** | | €9.8 million + PM to €9.9 million + PM | €84.5 million + PM to €84.6 million + PM |

### Explanation

The quantified costs of the educational ecosystem are smaller than the quantified benefits. The net present value of the proposition is over €85 million and creates both social and economic value.1 The
The annual costs of the educational ecosystem will amount to €21.7 million per year in 2035, after the phase-in period, for training 1,250 students and conducting research and education by 118 academic staff members.
The annual benefits include a larger working population and higher labor productivity, which combined lead to structural additional economic growth of €3.2 million per year.

The figure below illustrates the cumulative effect of the required investment, the GDP effects, and the difference between the two (net effect) over time. A positive net effect is expected from 2029 onwards, and the investments will structurally result in additional prosperity.






1) The ultimate welfare effect may involve a shift between regions; the extent to which this is the case depends on PwC the extent to which additional students are attracted from outside the Netherlands (instead of students who would otherwise have gone elsewhere in the Netherlands) Joint would study); 2) This includes the internal allocation of UM resources.

# Sensitivity analyses show that the positive balance of costs and benefits remains under different assumptions

**Sensitivity analyses:** The assumptions in this report regarding the additional influx of students into higher education in Heerlen provide an overview of the potential effects, costs, and benefits. These are technical assumptions to calculate the effects.

The current design of the UM and Zuyd University plans does not provide for intensive collaboration with active exchange of students who drop out during the year. Therefore, the results can also be used to estimate the effects of other increases in student numbers in Heerlen. The effects, costs, and benefits in this report are proportional to the increase in student numbers; for example, if the annual student intake is halved, the effects as shown on pages 74-75 are halved. With a higher intake, the opposite is true.

Suppose the share of students living in Heerlen, the share of graduates staying in Heerlen, and the share of employed people living in Heerlen doubles, then the additional number of residents staying in Heerlen doubles. The benefits directly related to the number of residents in Heerlen, i.e., GDP and employment, scale almost 1-to-1. Costs, on the other hand, increase less rapidly, resulting in a more positive cost-benefit balance. If the share of students, graduates, and employed people staying in Heerlen halves, the benefits decrease proportionally, but the cost-benefit balance remains positive.

Sensitivity analyses show that social impacts depend on related policies. For example, the share of students, graduates, and employees who choose to remain in Heerlen affects the magnitude of the social benefits. To optimize these social benefits, not only labor market and housing market policies are crucial, but also policy areas that enhance Heerlen's attractiveness (culture, basic education, infrastructure, hospitality, etc.).

# Overview of assumptions used

## Key assumptions in this CBA

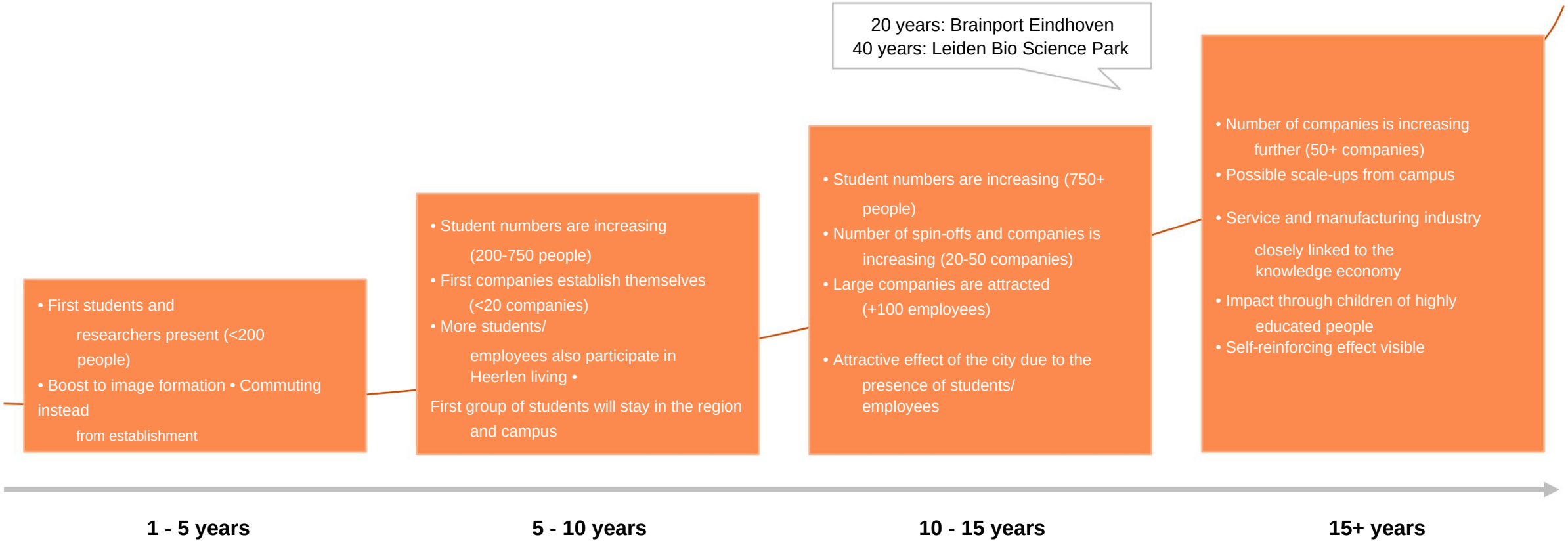
- Zuyd's business case has been constructed numerically based on historical data key figures, such as student-staff ratios.
- The UM business case has been adopted exactly. No timeline was provided for the €25 million investment in the Urban and Regional Transformations program line. The CBA assumes that the timeline for the investment in the Urban and Regional Transformations program line follows the timeline for the remaining €45 million exactly.
- The ten-year forecast in UM's business case includes calculations with and without an internal allocation of UM resources based on staff and student numbers. Whether such an internal allocation will be achieved cannot be guaranteed in advance. Without internal reallocation, the business case shows a deficit of €2 million in 2035. With internal reallocation, the business case closes in 2035.
- The GDP effect is based on labor productivity growth, and Population growth based on estimated increases in students and population. Migration, birth, and death rates are based on historical figures.
- The value of the impact of valorisation has been estimated based on research expenditure – added multiplier.
- It is assumed that the required investment will be generated by public funds, which can come from within or outside the region.
- It is assumed that both proposals attract additional students compared to the student population that would have existed without either proposal. It is also assumed that the additional students come from outside the region, and that for UM, these are (also) international students.

# Development path

# Realizing impact through education and research requires long-term commitment

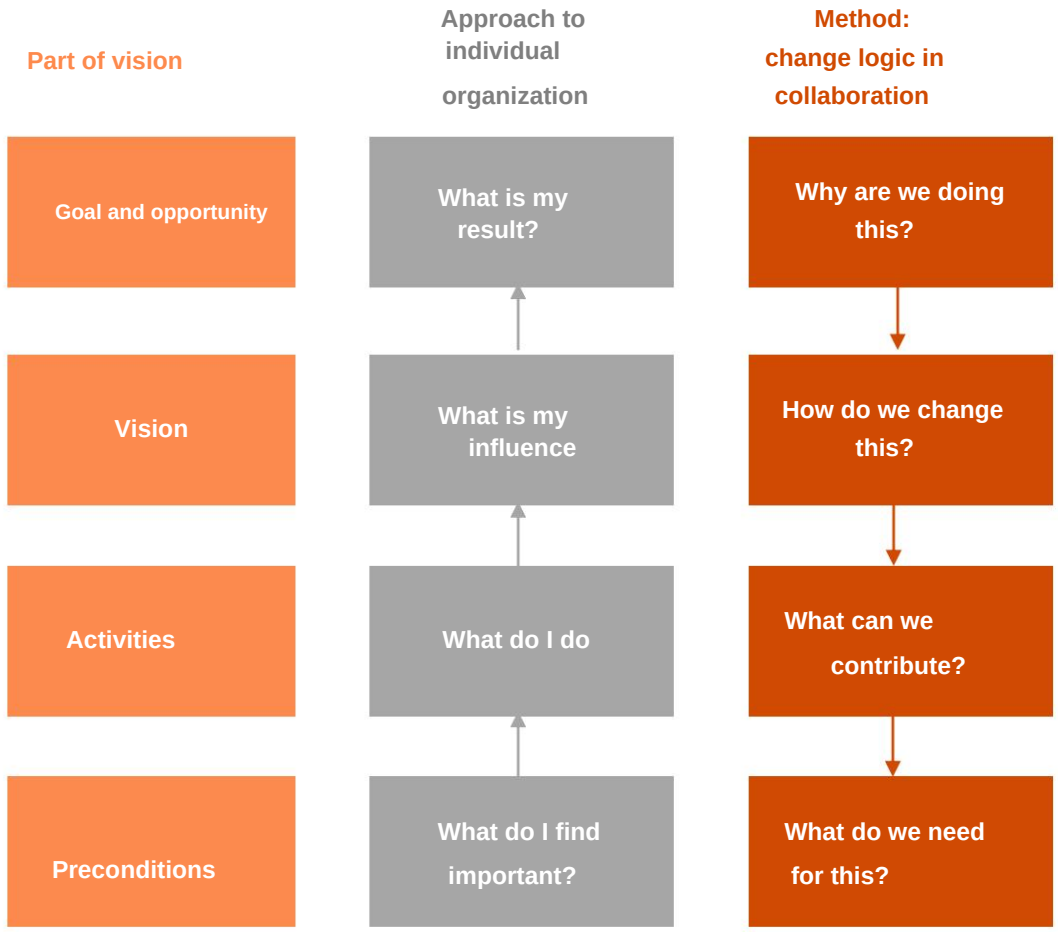
## Indicative timeline

**INDICATIVE**




Sources: Romme, S. (2022) *Brainport Eindhoven's success is unique and not easy to replicate.* ESB, 107(4811S), 64-67; Nijenhuis, H. (2018) *Brainport Eindhoven: From disadvantaged region to knowledge hub of the Netherlands.* Geografie.nl; Leiden University Weekly Mare (2020) *How a headstrong professor brought biotech to Leiden;* Leiden University Weekly Mare (2020) *From Herman the bull to a (possible) corona vaccine: how Leiden bioscience matured;* expert interviews 2) See also Belediskompas, Knowledge Center for Policy and Regulation

# Collaboration does not mean doing everything together, but rather facilitating each other in a joint movement




Choosing to collaborate doesn't necessarily mean ignoring individual goals and interests. It is, however, fundamental to start with a shared goal and build upon that goal.

Only in this way can synergy be achieved.

First and foremost, a shared vision is essential, as is a joint, long-term commitment from partners to the initiative being initiated . A shared vision provides a foundation upon which to build upon in collaboration. This report establishes this foundation.

Next, it must be clearly defined who will play which role in the collaboration, what is needed to make that role successful, and how the parties will ensure this happens. Collaboration doesn't mean doing everything together; it does mean initiating a mutually facilitating process.

After this, an inventory must be made of the preconditions for success; this concerns, on the one hand, the governance of the collaboration, and, on the other hand, the involvement of other parties where necessary and available.

# Challenges shift over time, it starts with the courage to start the movement and make it concrete

**REST**

Experience shows that long-term **stability** is the most important challenge. It's crucial to maintain focus within the ecosystem, for example, by carefully selecting new partners and maintaining policy as much as possible. A stable funding and knowledge base are also essential.

**ENERGY**

The next phase is characterized by the importance of maintaining momentum. This includes, for example, ensuring **visibility.** The Heerlen ecosystem must be distinctive and attractive. This creates a better business climate, but also ensures that students and employees stay in the city and region. It also means that the average Heerlen resident is aware of the ecosystem and, where possible, has positive experiences with it or even contributes to it.
**Expanding** the ecosystem to new stakeholder groups reduces the reliance on initiators.

**SUPPORT**

Once business cases have been concretely developed, the necessary stakeholders can be identified and engaged **(market development).** The business community is a crucial link in this process, but semi-public organizations (e.g., healthcare) or the Heerlen community itself (e.g., citizen initiatives) can also be considered. The municipality can support business cases with concrete **policy interventions.** These can be financial (guarantee, subsidy, loan), but also substantive (e.g., regulations, permits, communication). Each business case requires specific **funding** from partners and external stakeholders. Initially, this primarily involves temporary funding sources. In summary, this phase involves organizing the necessary support.

**GUTS**

To create and secure commitment, **leadership** is essential. This ensures that parties adhere to the joint agreements. A figurehead can be internal or external. The roles of the collaboration partners can be detailed in individual **business cases.** Agreements can be made on the format during these cases, ensuring quality and alignment. By facilitating **knowledge sharing** during the development of business cases , "hooks" are created for expanding the collaboration, coherence is ensured, and opportunities are identified early on. In summary, the first phase primarily requires the courage to embark on the collaborative journey and independently develop concrete plans.

# Collaboration partners see the power of the vision and are looking for further concretization to shape their role

| Collaboration partners | Perspective on vision |
|---|---|
| | **Content-related broad support**<br>• 'Making transitions real' ties in with the Heerlen context and with activities developed by various partners<br>• Specific application areas appear promising in terms of market development and social impact; the addition of a line on sustainable regional transformation is particularly striking. |
| | **Need for concretization**<br>• Due to many areas of application it is still unclear what *exactly* is meant has in mind, and whether/how this fits in with other initiatives from Heerlen<br>• Need for further (joint) concretization in order to be able to effectively shape one's own role in the realization of the knowledge economy<br>• Need for one figurehead who will 'arrange things' |
| | **Encouragement to think big**<br>• Vision is to make transitions real; solving a larger social problem in the context of Heerlen – it is important to think beyond the borders of Heerlen/the Netherlands in this context |

Sources: Interviews with representatives from VISTA, Parkstad, RWTH Aachen and Brightlands Smart Services Campus

# D Method

# Between May 2024 and January 2025, in collaboration with Heerlen, UM and Zuyd worked towards the final report

| Phase | Mapping vision | Developing a change model | Calculate CBA | Sketching development path | Drafting reports |
|---|---|---|---|---|---|
| Ask | What is the shared vision of the parties? | How can the impact of the vision be reasoned? | What impact can be expected? | How is the intended impact achieved? | What are the most important insights from the process? |
| Activities | • Mapping out the starting points per party<br>• Perform context and stakeholder analysis<br>• Draw up an initial image of a shared vision and validate it in a broad working session<br>• Develop and share interim report on joint vision | • Develop 'theory of change' in line with the vision, and based on scientific literature<br>• Share and refine 'theory of change' in work session | • Request inputs per party (e.g.: business cases UM and Zuyd, Heerlen policy)<br>• Perform technical validation of coherence business cases<br>• Calculate CBA<br>• Share findings in interim report and discuss in working session | • Gaining perspective on vision from a broader group of collaboration partners<br>• Design and implement a working session to gather input on the development path per partner<br>• Develop sketch development path<br>• Share development path in draft report | • Developing a draft report<br>• Request and process input on draft reports to arrive at the final version |
| Period | May - June | June - July | August - September | October | October - February |

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