

ET2SMEs

SWOT ANALYSIS & ET Technology Clusters

1. INTRODUCTION

This SWOT analysis is based on several sources of information or databases.

1) The main one comes from the mapping done via the ET2SMEs website and the Craft mapping tool.

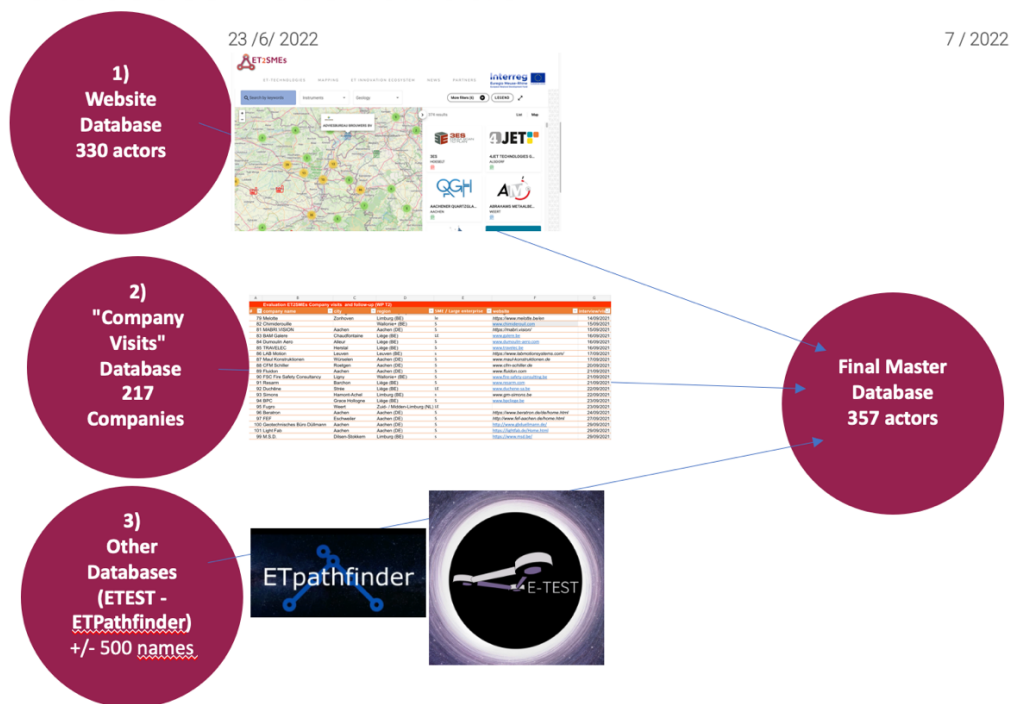
<https://et2smes.eu/mapping/>

2) The inventory of the actors' competences has also been completed by all the company visits carried out by the partners in 2021 and 2022.

3) A third database from the previous Interreg projects ETEST and ETPathfinder, gathering the industrial actors aware of the ET project, has not been fully integrated in this analysis because the information it contained (mainly email addresses and company names) did not allow a fine analysis of the adequacy of these to the future needs of the ET. Nevertheless this "address database" will be useful when creating ET Technology clusters and names and address book.

The process can be summarised as follows : (situation in July 2022)

Databases Reconciliation



2. METHODOLOGY

Technologies

In accordance with the objectives of the WP1 of the ET2SMEs project, we focused on the SWOT analysis of the different clusters of actors (industrial and scientific) related or competent in the different technologies required for the realisation of the ET.

These technologies have been grouped in 2 groups: the technologies related to the instrument and the technologies related to the geology.

For the instrument, the scientific community working on the definition of this one quickly converged towards a set of 8 easily differentiable sub-technologies:

- Cryogenics
- Vacuum,
- Precision mechanics / mechatronics
- Sensors
- Optics and optical metrology
- Mirrors coating
- Lasers
- Advanced control Algorithms.

For the needs of geology, environmental monitoring, tunnel boring technology and primarily underground construction technology, a set of 12 technologies have been identified by the scientists. For practical reasons, these 12 technologies have been reduced to 4 main groups:

- Tunnel Technology
- Geophysical imaging and remote sensing
- Simulation and modelling
- Water Technology

Finally, and after the surveys carried out via the mapping tool of the website and via the visits of companies that focused on traditional technologies for such a project, we realized that the industrial potential of the development of the Einstein Telescope must imperatively be completed by strong environmental aspects and that these could be the source of many other technological developments.

Therefore, in addition to the 12 technological aspects outlined above, we have taken into account aspects of sustainability and harmony with people and nature.

The 3 following sustainability topics are now on the technology agenda:

- Valorisation of resources and recycling
- Sustainable construction
- Carbon neutrality.

As we have not, since the beginning of the project, integrated these environmental aspects in all our communications and surveys, they will be addressed separately in the Macro economical SWOT analysis

R&D and Key Players

2 determining factors in our SWOT analysis have been taken into account:

- The R&D skills of the industrial actor

With regard to the R&D capabilities of the players, we have taken as a criterion the existence in the company of a R&D department in the targeted technology.

- Key-Players character

Regarding the Key Players” KPs” (Industry), we have based ourselves on the assessment of the representatives of the different regions to identify these KPs.

The definition we have considered is : A KP is a regional player that can claim a certain leadership at the European level. The fact of participating in research projects on a European level (H2020, Horizon Europe, etc.) also places the company in the category of “Key Players”.

3. DATABASE FOR THE SWOT ANALYSIS

the Master database used for the analysis results from the aggregation process explained contained **357** different entities divided into **272 SMEs**, **44 large companies**, **30 university departments** and **11 research centers**.

4. MACRO-ECONOMICAL SWOT ANALYSIS

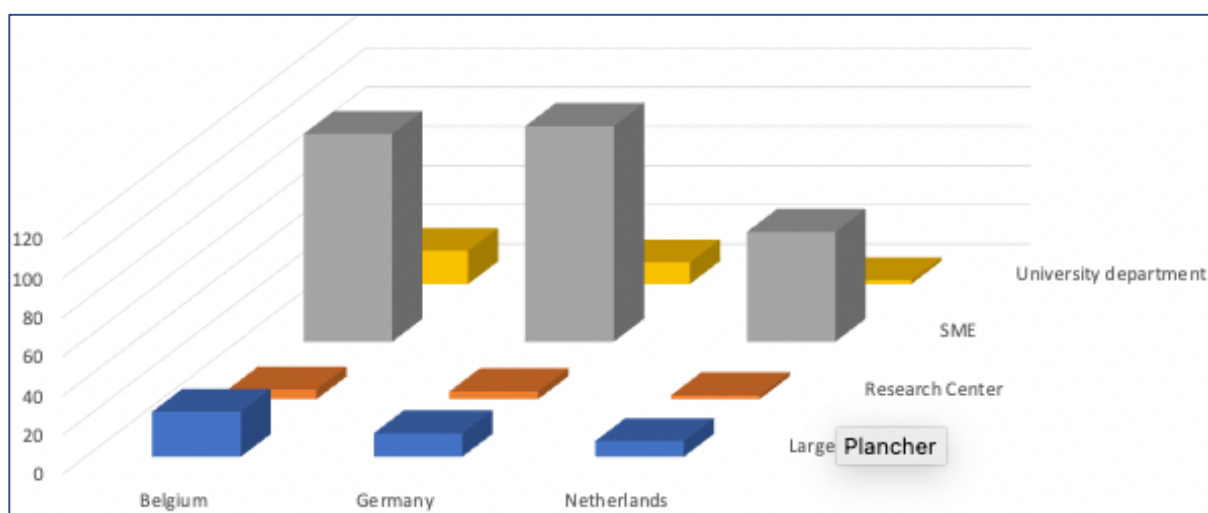
- Technology aspects

For this exercise, we will focus on the adequacy between the **technological** needs of the Einstein Telescope and the global offer (industrial and scientific) to answer them

i. Type of actors per countries, Regions and “EMR+” Regions

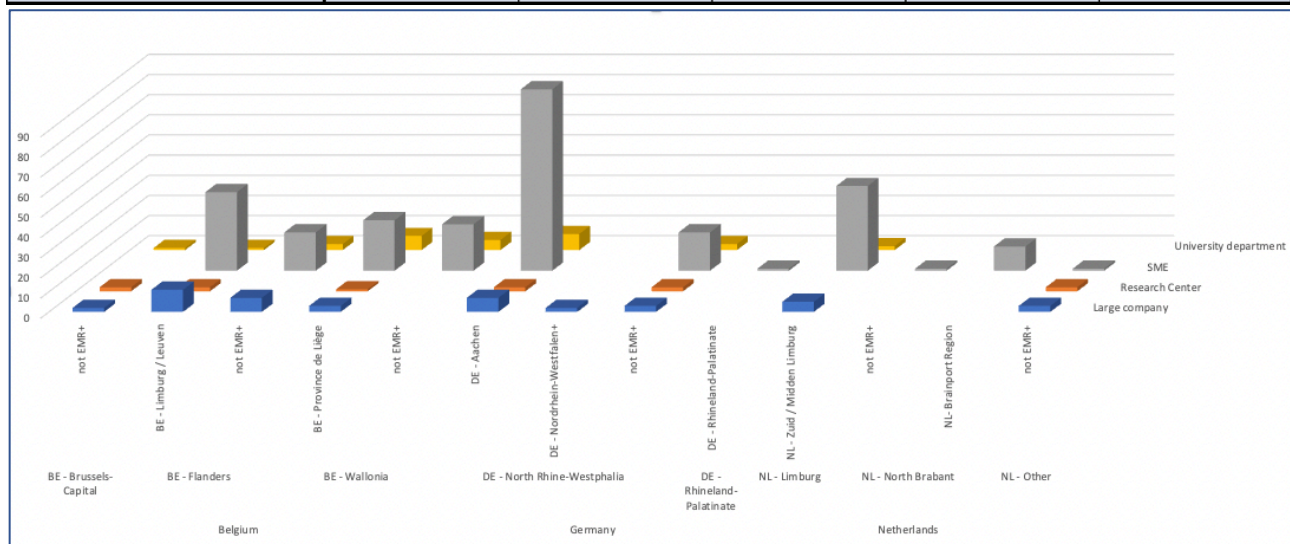
Overall distribution between types of actors (Large Companies (LC, SMEs, RC/University Department) :
(#357)

| | Large company | Research Center | SME | University department | Total |
|--------------|---------------|-----------------|------------|-----------------------|------------|
| Belgium | 24 | 5 | 106 | 17 | 152 |
| Germany | 12 | 4 | 110 | 11 | 137 |
| Netherlands | 8 | 2 | 56 | 2 | 68 |
| Total | 44 | 11 | 272 | 30 | 357 |



Repartition of the technologies skills per Region and “EMR +” Regions

| | Large company | Research Center | SME | University department | Total |
|------------------------------------|---------------|-----------------|------------|-----------------------|------------|
| Belgium | 24 | 5 | 106 | 17 | 152 |
| BE - Brussels-Capital | 2 | 2 | | 1 | 5 |
| not EMR+ | 2 | 2 | | 1 | 5 |
| BE - Flanders | 18 | 2 | 58 | 4 | 82 |
| BE - Limburg / Leuven | 11 | 2 | 39 | 1 | 53 |
| not EMR+ | 7 | | 19 | 3 | 29 |
| BE - Wallonia | 4 | 1 | 48 | 12 | 65 |
| BE - Province de Liège | 3 | 1 | 25 | 7 | 36 |
| not EMR+ | 1 | | 23 | 5 | 29 |
| Germany | 12 | 4 | 110 | 11 | 137 |
| DE - North Rhine-Westphalia | 12 | 4 | 109 | 11 | 136 |
| DE - Aachen | 7 | 2 | 90 | 8 | 107 |
| DE - Nordrhein-Westfalen+ | 2 | | | | 2 |
| not EMR+ | 3 | 2 | 19 | 3 | 27 |
| DE - Rhineland-Palatinate | | | 1 | | 1 |
| DE - Rhineland-Palatinate | | | 1 | | 1 |
| Netherlands | 8 | 2 | 56 | 2 | 68 |
| NL - Limburg | 5 | | 42 | 2 | 49 |
| NL - Zuid / Midden Limburg | 5 | | 42 | 2 | 49 |
| NL - North Brabant | | | 13 | | 13 |
| not EMR+ | | | 1 | | 1 |
| NL - Brainport Region | | | 12 | | 12 |
| NL - Other | 3 | 2 | 1 | | 6 |
| not EMR+ | 3 | 2 | 1 | | 6 |
| Total | 44 | 11 | 272 | 30 | 357 |

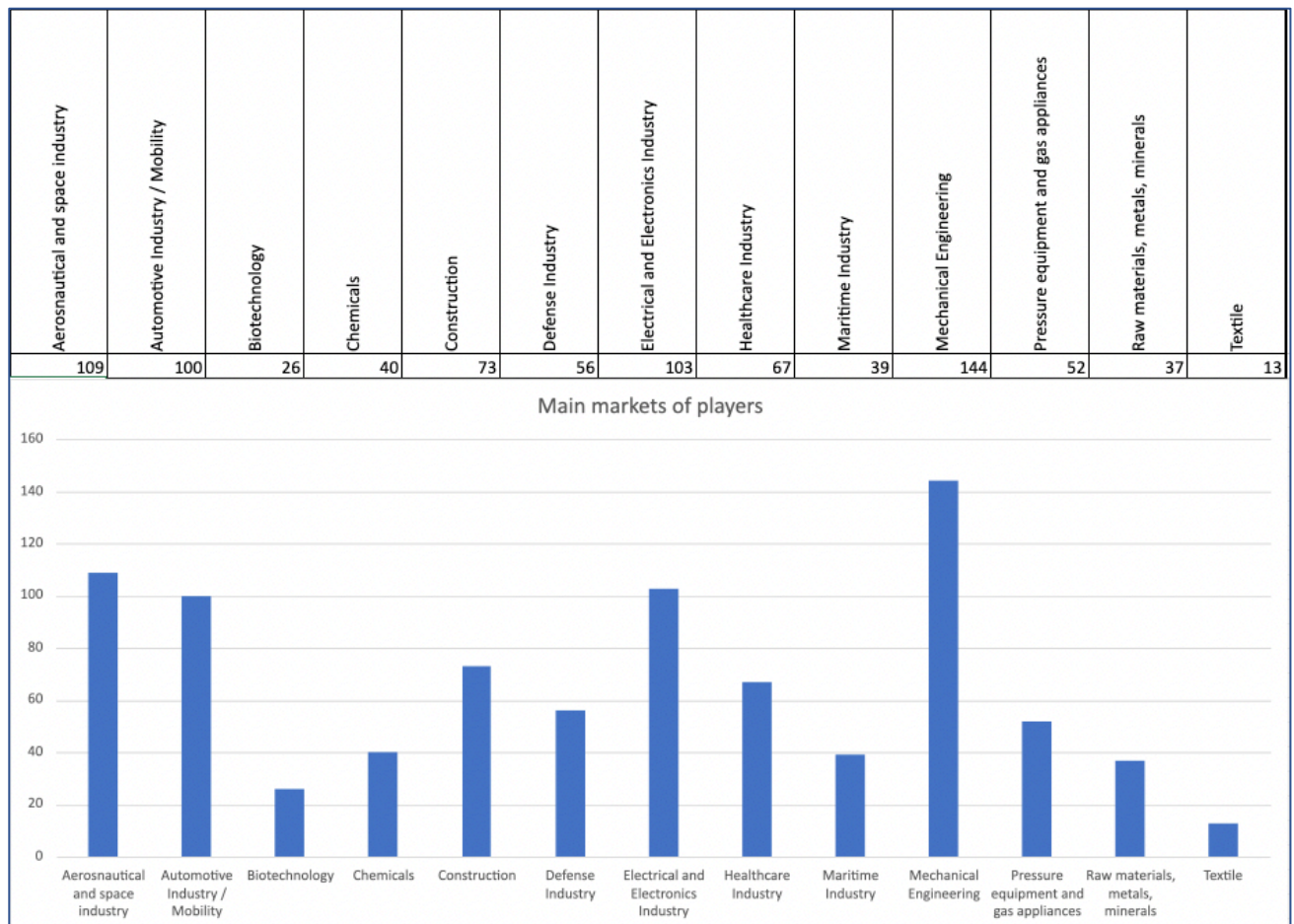


We observe that in all regions there is a significant number of SMEs that could potentially be active in the development and construction of ET.

This fact is very important since it will be necessary to have a very agile industrial network to face the technological challenges of ET

Concerning our future analysis of industrial skills, we will pay particular attention to the 272 SMEs and the 44 large companies included in our inventory, i.e. a total of 316 industrial players

ii. Sectors of origin of actors interested in ET development (SMEs & LC)



Markets distribution of the players studied : Top 5

1. Mechanical Engineering (144)
2. Aerospace (aero + space) Industry (109)
3. Electrical and electronics industry (103)
4. Automotive Industry (100)
5. Construction (73)

iii. Repartition of SME and Large Companies in Instrument / Geology technologies

ET Instrument technologies

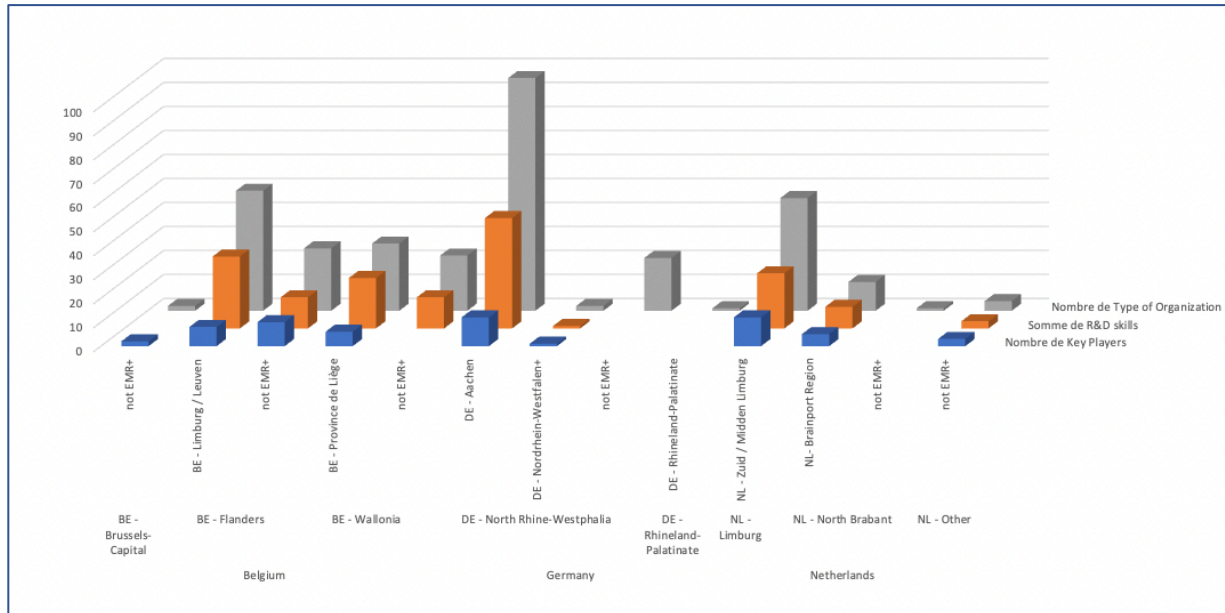
240 SMEs and Large Companies active in Instrument technologies and 207 of them have R&D skills (83%)

ET Geology technologies

85 entities active in Geology technologies and 54 of them have R&D skills (63%)

iv. R&D skills and Key Players among SMEs and Large Companies

| | Region (Element name) | EMR+ | Key Players | With R&D skills | SME+LC | % of KP | % with R&D |
|-------------------|-----------------------------------|----------------------------|-------------|-----------------|--------|---------|------------|
| Belgium | BE - Brussels-Capital | not EMR+ | 2 | | 2 | 100% | 0% |
| | Total BE - Brussels-Capital | | 2 | | 2 | 100% | 0% |
| | BE - Flanders | BE - Limburg / Leuven | 8 | 30 | 50 | 16% | 60% |
| | | not EMR+ | 10 | 13 | 26 | 38% | 50% |
| | Total BE - Flanders | | 18 | 43 | 76 | 24% | 57% |
| | BE - Wallonia | BE - Province de Liège | 6 | 21 | 28 | 21% | 75% |
| | | not EMR+ | 1 | 14 | 24 | 4% | 58% |
| | Total BE - Wallonia | | 7 | 35 | 52 | 13% | 67% |
| Total Belgium | | | 27 | 78 | 130 | 21% | 60% |
| Germany | DE - North Rhine-Westphalia | DE - Aachen | 12 | 61 | 97 | 12% | 63% |
| | | DE - Nordrhein-Westfalen+ | 1 | 1 | 2 | 50% | 50% |
| | | not EMR+ | | 1 | 22 | 0% | 5% |
| | Total DE - North Rhine-Westphalia | | 13 | 63 | 121 | 11% | 52% |
| | DE - Rhineland-Palatinate | DE - Rhineland-Palatinate | | | 1 | 0% | 0% |
| | Total DE - Rhineland-Palatinate | | | | 1 | 0% | 0% |
| Total Germany | | | 13 | 63 | 122 | 11% | 52% |
| Netherlands | NL - Limburg | NL - Zuid / Midden Limburg | 12 | 23 | 47 | 26% | 49% |
| | Total NL - Limburg | | 12 | 23 | 47 | 26% | 49% |
| | NL - North Brabant | NL- Brainport Region | 5 | 9 | 12 | 42% | 75% |
| | | not EMR+ | | | 1 | 0% | 0% |
| | Total NL - North Brabant | | 5 | 9 | 13 | 38% | 69% |
| | NL - Other | not EMR+ | 3 | 3 | 4 | 75% | 75% |
| | Total NL - Other | | 3 | 3 | 4 | 75% | 75% |
| Total Netherlands | | | 20 | 35 | 64 | 31% | 55% |
| Total | | | 60 | 176 | 316 | 19% | 56% |



R&D skills

It is important to note that the percentage of industrial actors with an internal R&D capacity is 56%.

This is quite exceptional

It should also be noted that this figure is mainly due to SMEs, then, they will have the internal capacity to address the future technological challenges of ET.

Nevertheless, different percentages can be observed between regions.

Liège Province for example with 75 percent of entities declare to have R&D skills/department internally. This result comes from the fact that the Skywin cluster has pre-selected the entities they will count (for most of the actors included in the survey, they come from the aeronautics and space sector, which requires internal R&D skills).

Key-Players

You can find the exhaustive list of the 60 industrial actors considered by the consortium as KP.

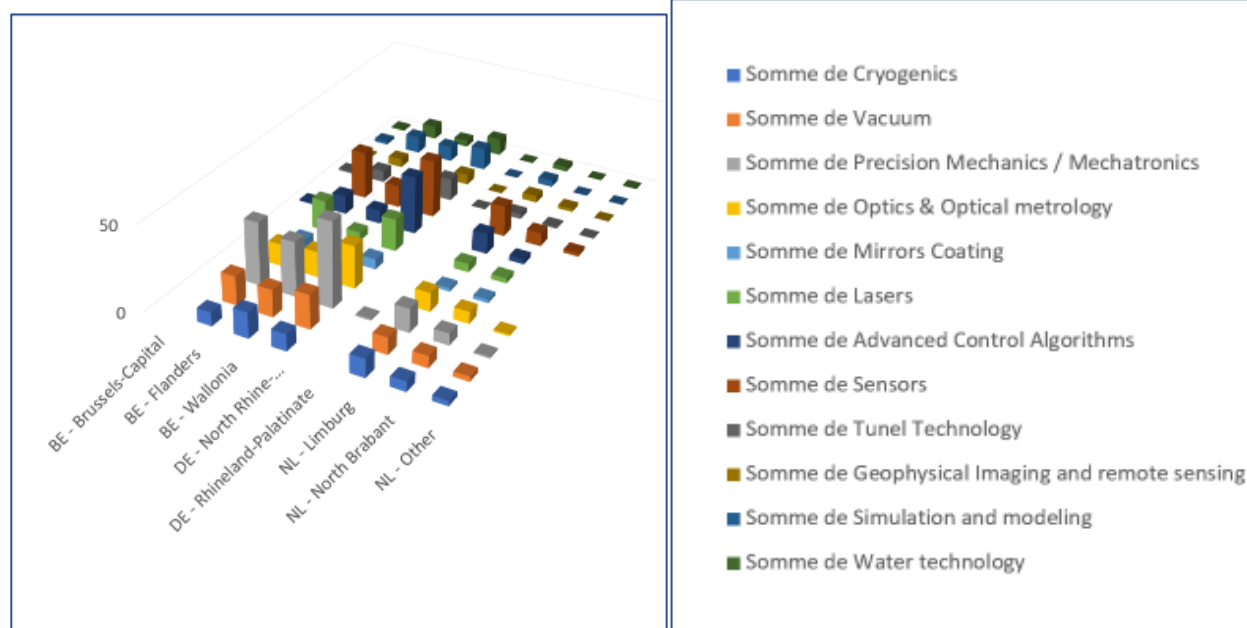
| | Name | Region | EMR+ | Country | Type of Organization | Active in instrument technologies | Active in geology field | R&D skills | Key Players |
|----|---------------------------------|-----------------------------|----------------------------|-------------|----------------------|-----------------------------------|-------------------------|------------|-------------|
| 1 | AFFILIIPS | BE - Flanders | BE - Limburg / Leuven | Belgium | Large company | X | | | x |
| 2 | AVERNA | BE - Flanders | BE - Limburg / Leuven | Belgium | Large company | X | | | 1 x |
| 3 | CEGEKA | BE - Flanders | BE - Limburg / Leuven | Belgium | Large company | X | | | 1 x |
| 4 | HAMMER IMS | BE - Flanders | BE - Limburg / Leuven | Belgium | SME | X | | | 1 x |
| 5 | INGENIUM | BE - Flanders | BE - Limburg / Leuven | Belgium | SME | | X | | x |
| 6 | MELEXIS TECHNOLOGIES | BE - Flanders | BE - Limburg / Leuven | Belgium | Large company | X | | | 1 x |
| 7 | THALES ALENIA SPACE | BE - Flanders | BE - Limburg / Leuven | Belgium | Large company | X | | | 1 x |
| 8 | XENICS | BE - Flanders | BE - Limburg / Leuven | Belgium | SME | X | | | 1 x |
| 9 | AMOS | BE - Wallonia | BE - Province de Liège | Belgium | SME | X | | | 1 x |
| 10 | BEBLUE CRYOTECH | BE - Wallonia | BE - Province de Liège | Belgium | SME | X | | | 1 x |
| 11 | BUREAU D'ETUDES GREISCH | BE - Wallonia | BE - Province de Liège | Belgium | SME | | | | 1 x |
| 12 | SAFRAN AERO BOOSTERS | BE - Wallonia | BE - Province de Liège | Belgium | Large company | X | | | 1 x |
| 13 | SIEMENS-SAMTECH | BE - Wallonia | BE - Province de Liège | Belgium | Large company | X | | | 1 x |
| 14 | SPACEBEL | BE - Wallonia | BE - Province de Liège | Belgium | SME | X | X | | 1 x |
| 15 | AIXTRON SE | DE - North Rhine-Westphalia | DE - Aachen | Germany | Large company | X | | | 1 x |
| 16 | CFM SCHILLER GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | X | | | 1 x |
| 17 | Clean-Lasersysteme GmbH | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | | | | 1 x |
| 18 | DYNA-MESS PRÜFSYSTEME GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | X | X | | 1 x |
| 19 | KIMA PROCESS CONTROL GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | X | | | 1 x |
| 20 | MaTeck GmbH | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | X | | | 1 x |
| 21 | METEOVIVA GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | | | | x |
| 22 | MÜLLER MASCHINENTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | X | | | 1 x |
| 23 | oculavis | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | | | | 1 x |
| 24 | PHD IN EUROPE GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany | Large company | X | | | 1 x |
| 25 | TUNNEL SERVICE GROUP GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | | X | | 1 x |
| 26 | WIBOTEC-SURFACES GMBH & CO.KG | DE - North Rhine-Westphalia | DE - Aachen | Germany | SME | | | | x |
| 27 | DMT Group | DE - North Rhine-Westphalia | DE - Nordrhein-Westfalen+ | Germany | Large company | | X | | 1 x |
| 28 | ADMESY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | SME | X | X | | 1 x |
| 29 | ANTEA NEDERLAND BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | Large company | | X | | 1 x |
| 30 | BOOSTING ALPHA | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | SME | X | | | 1 x |
| 31 | ENGIE LABORELEC NL | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | Large company | X | | | 1 x |
| 32 | EUROCARBON B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | SME | | | | 1 x |
| 33 | FUGRO | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | Large company | | X | | 1 x |
| 34 | GDO BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | SME | X | X | | 1 x |
| 35 | GENZAI BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | SME | X | X | | 1 x |
| 36 | JPE BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | SME | X | | | 1 x |
| 37 | MIFA ALUMINIUM B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | Large company | X | | | 1 x |
| 38 | MONTAIR ENVIRONMENTAL SOLUTIONS | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | SME | X | | | 1 x |
| 39 | SITECH Services | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands | Large company | X | | | 1 x |
| 40 | INNOVATION HANDLING | NL - North Brabant | NL - Brainport Region | Netherlands | SME | X | | | 1 x |
| 41 | MAT-TECH BV | NL - North Brabant | NL - Brainport Region | Netherlands | SME | X | | | 1 x |
| 42 | MI-PARTNERS | NL - North Brabant | NL - Brainport Region | Netherlands | SME | X | X | | 1 x |
| 43 | PHOTONFIRST | NL - North Brabant | NL - Brainport Region | Netherlands | SME | X | X | | 1 x |
| 44 | SETTELS SAVENUE | NL - North Brabant | NL - Brainport Region | Netherlands | SME | X | | | 1 x |
| 45 | AMBERG | BE - Brussels-Capital | not EMR+ | Belgium | Large company | | X | | x |
| 46 | TRACTEBEL | BE - Brussels-Capital | not EMR+ | Belgium | Large company | X | X | | x |
| 47 | AGFA-GEVAERT | BE - Flanders | not EMR+ | Belgium | Large company | X | X | | x |
| 48 | APERAM | BE - Flanders | not EMR+ | Belgium | Large company | X | | | 1 x |
| 49 | CAELESTE CVBA | BE - Flanders | not EMR+ | Belgium | SME | X | | | x |
| 50 | EDGISE | BE - Flanders | not EMR+ | Belgium | SME | X | | | 1 x |
| 51 | GIM | BE - Flanders | not EMR+ | Belgium | SME | X | X | | 1 x |
| 52 | LEUVEN AIR BEARINGS | BE - Flanders | not EMR+ | Belgium | SME | X | | | x |
| 53 | MAGICS | BE - Flanders | not EMR+ | Belgium | SME | X | | | 1 x |
| 54 | OIP | BE - Flanders | not EMR+ | Belgium | SME | X | | | 1 x |
| 55 | VERHAERT | BE - Flanders | not EMR+ | Belgium | Large company | X | X | | x |
| 56 | XERYON | BE - Flanders | not EMR+ | Belgium | SME | X | | | 1 x |
| 57 | AGC Plasma Technology Solutions | BE - Wallonia | not EMR+ | Belgium | Large company | X | | | 1 x |
| 58 | ATG EUROPE | NL - Other | not EMR+ | Netherlands | Large company | X | | | 1 x |
| 59 | DEMCON | NL - Other | not EMR+ | Netherlands | Large company | X | | | 1 x |
| 60 | SOMNI SOLUTIONS | NL - Other | not EMR+ | Netherlands | SME | X | | | 1 x |

We can notice that 17 of these KPs can claim to intervene in the challenges related to geology and that the majority of the industrial KPs (48) are active in the technologies related to the instruments

The fears of the consortium at the beginning of the project to have a very important imbalance between the actors interested in the realization of the instrument and those competent in the domains related to the flooding and the realization of cavities and tunnels disappeared as the partners identified these actors or as these actors manifested themselves following the publicity that we made around our project and its industrial opportunities

v. Distribution of the entities (SMEs & LC) between the 12 technologies and the regions

| SME + LC | Instrument | | | | | | | | Geology | | | |
|-----------------------------|------------|-----------|------------------------------------|----------------------------|-----------------|-----------|-----------------------------|------------|-------------------|--|-------------------------|------------------|
| | Cryogenics | Vacuum | Precision Mechanics / Mechatronics | Optics & Optical metrology | Mirrors Coating | Lasers | Advanced Control Algorithms | Sensors | Tunnel Technology | Geophysical Imaging and remote sensing | Simulation and modeling | Water technology |
| BE - Brussels-Capital | | | | | | | 1 | | 1 | 1 | 2 | 1 |
| BE - Flanders | 8 | 17 | 37 | 13 | 5 | 18 | 11 | 28 | 7 | 5 | 10 | 8 |
| BE - Wallonia | 15 | 16 | 32 | 15 | 6 | 5 | 8 | 13 | 7 | 4 | 9 | 4 |
| DE - North Rhine-Westphalia | 10 | 20 | 50 | 25 | 6 | 19 | 34 | 34 | 13 | 6 | 13 | 10 |
| DE - Rhineland-Palatinate | | | 1 | | | | | | 0 | 0 | 0 | 0 |
| NL - Limburg | 11 | 10 | 14 | 11 | 2 | 5 | 12 | 18 | 3 | 4 | 4 | 3 |
| NL - North Brabant | 6 | 7 | 7 | 7 | 2 | 3 | 3 | 8 | 1 | 2 | 0 | 0 |
| NL - Other | 3 | 3 | 1 | 1 | | | | 2 | 0 | 0 | 0 | 0 |
| Total | 53 | 73 | 142 | 72 | 21 | 50 | 69 | 103 | 32 | 22 | 38 | 26 |



Detail between SME and LC

| SME | Instrument | | | | | | | | Geology | | | |
|-----------------------------|------------|-----------|------------------------------------|----------------------------|-----------------|-----------|-----------------------------|-----------|-------------------|--|-------------------------|------------------|
| | Cryogenics | Vacuum | Precision Mechanics / Mechatronics | Optics & Optical metrology | Mirrors Coating | Lasers | Advanced Control Algorithms | Sensors | Tunnel Technology | Geophysical Imaging and remote sensing | Simulation and modeling | Water technology |
| BE - Flanders | 6 | 11 | 28 | 8 | 5 | 11 | 7 | 20 | 3 | 4 | 8 | 6 |
| BE - Wallonia | 13 | 14 | 31 | 13 | 5 | 5 | 6 | 12 | 6 | 4 | 9 | 4 |
| DE - North Rhine-Westphalia | 10 | 19 | 46 | 24 | 5 | 17 | 31 | 31 | 10 | 5 | 11 | 9 |
| DE - Rhineland-Palatinate | | | 1 | | | | | | 0 | 0 | 0 | 0 |
| NL - Limburg | 10 | 8 | 13 | 10 | 2 | 5 | 11 | 15 | 2 | 3 | 2 | 2 |
| NL - North Brabant | 6 | 7 | 7 | 7 | 2 | 3 | 3 | 8 | 1 | 2 | 0 | 0 |
| NL - Other | 1 | 1 | | | | | | 1 | 0 | 0 | 0 | 0 |
| Total | 46 | 60 | 126 | 62 | 19 | 41 | 58 | 87 | 22 | 18 | 30 | 21 |

| LC | Instrument | | | | | | | | Geology | | | |
|-----------------------------|------------|-----------|------------------------------------|----------------------------|-----------------|----------|-----------------------------|-----------|-------------------|--|-------------------------|------------------|
| | Cryogenics | Vacuum | Precision Mechanics / Mechatronics | Optics & Optical metrology | Mirrors Coating | Lasers | Advanced Control Algorithms | Sensors | Tunnel Technology | Geophysical Imaging and remote sensing | Simulation and modeling | Water technology |
| BE - Brussels-Capital | | | | | | | 1 | | 1 | 1 | 2 | 1 |
| BE - Flanders | 2 | 6 | 9 | 5 | | 7 | 4 | 8 | 4 | 1 | 2 | 2 |
| BE - Wallonia | 2 | 2 | 1 | 2 | 1 | | 2 | 1 | 1 | 0 | 0 | 0 |
| DE - North Rhine-Westphalia | | 1 | 4 | 1 | 1 | 2 | 3 | 3 | 3 | 1 | 2 | 1 |
| NL - Limburg | 1 | 2 | 1 | 1 | | | 1 | 3 | 1 | 1 | 2 | 1 |
| NL - Other | 2 | 2 | 1 | 1 | | | | 1 | 0 | 0 | 0 | 0 |
| Total | 7 | 13 | 16 | 10 | 2 | 9 | 11 | 16 | 10 | 4 | 8 | 5 |

Top 5 of the ET technologies (Instrument and Geology)

- Precision Mechanics and Mechatronics (#142)
- Sensors (#103)
- Vacuum (#73)
- Optics and Optical metrology (#72)
- Advance Control Algorithms (#69)

As far as technologies related to geology are concerned, we find mainly simulation and modeling technologies (#38) as well as technologies related to tunneling (#32)

For almost all technologies, the DE - North Rhine-Westphalia region has the largest number of actors in the technologies required for the development of ET.

Nevertheless, we can observe some technological specificities of the other regions such as cryogenics in Wallonia (contribution of the aerospace sector), sensors / mechanics and mechatronics in Flanders, ...)

vi. R&D skills among Universities and Research Centers

The main objective of the ET2SMEs project focuses on companies and more specifically on SMEs. Nevertheless, during our inventory of relevant actors for the future challenges of the Einstein Telescope, we met and interviewed different research centers and university departments.

These, although 41 in number (see page 6), are not included in the SWOT analysis.

These 41 entries were most often made by a proactive approach of the universities wishing to enter the circle of actors of the future ET.

A specific inventory at the university and RC level should be conducted to ensure completeness.

Nevertheless and based on this first draft of scientific inventory, we can say that all these 41 entities cover all 12 key technologies of the future telescope:

| RC and Universities | Instrument | | | | | | | | Geology | | | |
|-----------------------------|------------|----------|------------------------------------|----------------------------|-----------------|----------|-----------------------------|-----------|-------------------|--|-------------------------|------------------|
| | Cryogenics | Vacuum | Precision Mechanics / Mechatronics | Optics & Optical metrology | Mirrors Coating | Lasers | Advanced Control Algorithms | Sensors | Tunnel Technology | Geophysical Imaging and remote sensing | Simulation and modeling | Water technology |
| BE - Brussels-Capital | | | | 1 | | | | | 0 | 0 | 0 | 0 |
| BE - Flanders | | | 1 | | 1 | 1 | | 2 | 1 | 1 | 1 | 1 |
| BE - Wallonia | 1 | 1 | 3 | 3 | 2 | 1 | 2 | 4 | 2 | 1 | 3 | 1 |
| DE - North Rhine-Westphalia | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 5 | 4 | 3 | 3 | 4 |
| NL - Limburg | | | | | | | | | 0 | 0 | 0 | 0 |
| NL - Other | | | | | | | | | 0 | 0 | 0 | 0 |
| Total | 5 | 4 | 7 | 8 | 7 | 5 | 5 | 11 | 7 | 5 | 7 | 6 |

vii. Focus on Large Companies (L.C.)

In our analysis, and although we focus on SMEs, we have already identified 44 large companies active in the 12 technologies of ET.

23 of them are considered as European Key players in their respective fields and will be certainly the seeds of future consortia.

It is obvious that the EMR Region and even more our 3 countries, have a much larger number of large companies that will be able to participate in the development and implementation of ET.

Indeed, as soon as the ET infrastructure is officially launched, we will see, as in all large scientific projects, the creation of international consortia around these L.C. that will submit bids for the realization of important parts of the instrument, buildings, caves and tunnels.

For this reason, the ET2SMEs project leaders believe that it would be interesting, following the project and based on the mapping tools already in place, to continue this inventory by including more and more large companies.

In this way, this tool, originally oriented to SMEs, will be more complete and will become the reference database for all initiatives related to ET.

A dialogue between these L.C. and the SMEs we have identified will have to be set up quickly to ensure a very high level of integration of these SMEs in the future industrial developments and in consortia.

It is also the role of the ET Industrial Advisory Board.

b. Other Macro economical aspects

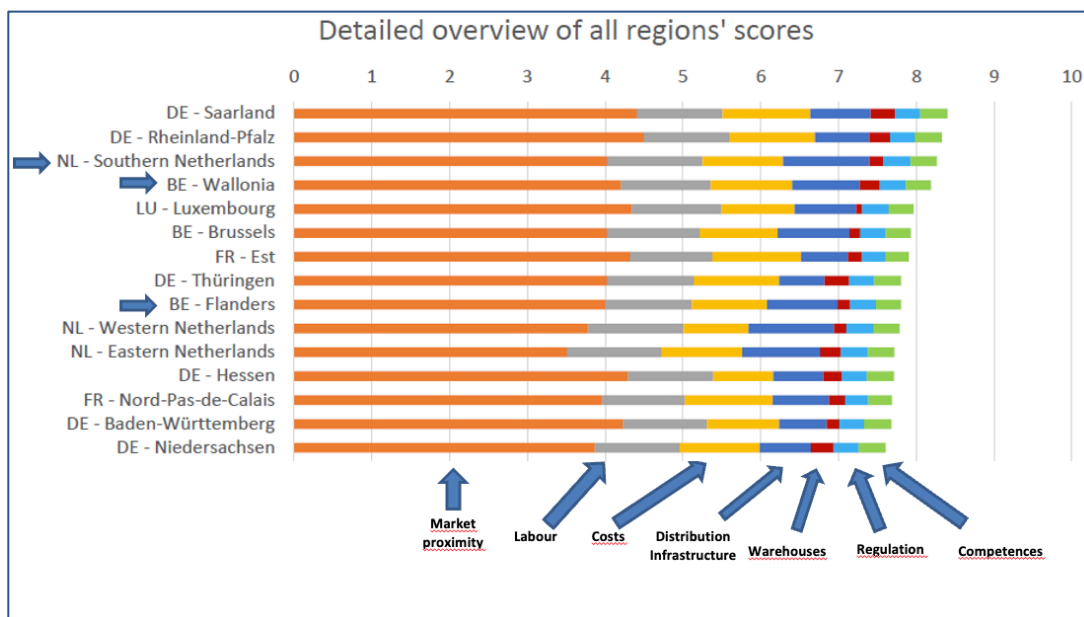
• Logistics

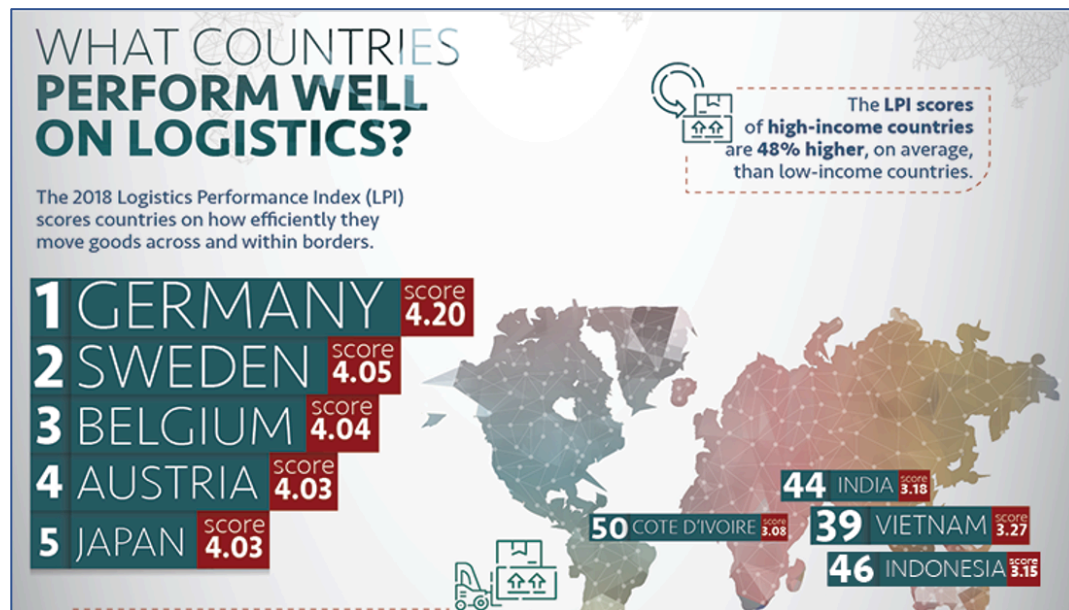
For this, we will focus on the adequacy of this offer with the logistics in terms of goods, services and people which will also be an essential element to the success of the ET project.

As mentioned above, the industrial and scientific competencies offered by the actors of the EMR+ regions will only be fully manifested, if the logistical constraints are low or in other words that the logistical environment is efficient and affordable in financial terms for:

- scientific exchanges,
- communications and meetings between industrial actors
- transport of materials for the construction of the ET
- transport, use and regional valorisation of the materials that will be excavated from the underground
-

With regard to all these points, it is important to note that the EMR+ Region is exactly in the center of gravity of what European logisticians call the "logistics banana" representing 60% of European purchasing power





- Sustainability aspects and circular Economy

Sustainability

The transformation of the energy system in Western Europe is an important challenge in order to use and integrate sustainable energy sources. Industry based on fossil energy sources will have to find new ways to use renewable resources.

That is why hydrogen plays a key role in the energy transformation. Also the EMR region with regional strong points (infrastructure in the Netherlands and application at Chemelot / research & development in Germany / infrastructure and industrial application in Belgium) plays a key role for the distribution and use of hydrogen.

That is why the euregional initiative EMR H2 Booster (<https://www.emrh2booster.eu/>) brings these players together in order to foster the EMR future perspective in this field. With this strong background the ET should also fit in this topic and represent a use case of sustainable energy systems supplying this kind of big-scale research infrastructure.

Circular Economy

The development of large underground infrastructures (for transport, storage, energy harvest) in NWE has the potential to preserve a high density of green infrastructures & minimize environmental impact while promoting an efficient use of resources & space.

To do this, we need :

- Digital twins of the underground
- infrastructure integrated within the natural environment,
- Using all excavated materials in local and circular loops within a Net or Low Carbon Strategy economical approach.
- Harvest geothermal energy at the scale of a unique pilot study (delivering a tremendous opportunity with a unique database).
- Scale-up of the current circular ecosystem in (underground) construction.
- Implement ecoproducts & ecomaterials in a circular way to preview the deconstruction of infrastructure.
- ...

- Presence of sectorial associations present in EMR regions

(List of sectorial associations or Clusters present in the regions and which address technologies necessary for the Einstein Telescope)

The fact of having regional technology clusters relevant for ET is a plus for:

- the rapid identification of industrial and scientific partners who can collaborate.
- the implementation of joint actions (events, search for funding sources) is facilitated by the presence of these technological Clusters

BE – Flanders

- VRI Cluster – Flanders Space (Space)
- FLAG Cluster (Aero)
- AGORIA
- Sirris
- Buildwise
- SIM Flanders
- Waterstof.net
- Flanders Make
- Vito
- Flux 50
- VIL
- Smart Building
- Groen Licht Vlaanderen
- Embuild Limburg
- Embuild Vlaanderen
- Air Cargo Belgium
- Energyville

BE – Wallonia

- MECATECH Cluster: <https://www.polemecatech.be/en/>
- SKYWIN Cluster (Aero & Space): <https://www.skywin.be/en#no-back>
- GREENWIN Cluster (Environment): <https://www.greenwin.be/en/>
- Logistics in Wallonia Cluster (Logistics) : <https://www.logisticsinwallonia.be/en>
- TWEED Cluster (Renewable energy) : <https://clusters.wallonie.be/tweed/en>
- H2O Cluster (Water management) : <https://clusters.wallonie.be/h2o/en>
- Infopole Cluster Digital.) : <https://clusters.wallonie.be/infopole/en>
- AGORIA

DE - North Rhine-Westphalia & DE - Rhineland-Palatinate

- Aachen Building Experts (A.B.E.), see: <https://aachenbuildingexperts.de/>
- Competence center automotive region aachen: <https://www.car-aachen.de/de/startseite>
- DigitalHUB Aachen, see: <https://aachen.digital/en/>
- Hydrogen Hub Aachen, see: <https://hydrogenhubaachen.de/>
- Industrie-Dialog (ID) Aachen, see: <https://industrie-dialog.de/>
- LASER.region.AACHEN, see: <https://laserregionaachen.de>
- PROTECA: <https://www.iop.rwth-aachen.de/cms/Produktionstechnik/Wirtschaft/~mwha/PROTECA-Produktionstechnik-im-Dialog/?lidx=1>
- REGINA e.V., see: <https://regina.ac/english/>
- IN4climate.NRW (<https://www.energy4climate.nrw/industrie-produktion/in4climatenrw>)
- Produktion.NRW (<https://produktionnrw.org/>)
- Logistik.NRW (<https://www.logit-club.de/>)
- Kompetenznetzwerk Umweltwirtschaft.NRW (<https://www.knuw.nrw/>)
- KI.NRW (<https://www.ki.nrw/>)
- NMWP.NRW

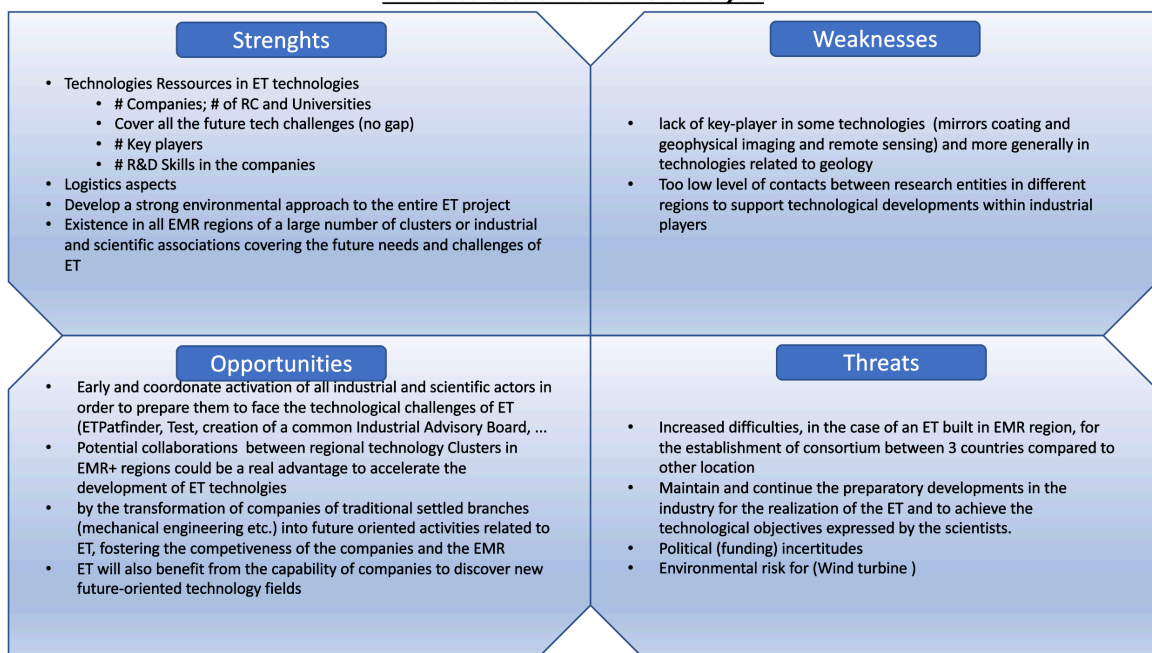
NL – Limburg

NL - North Brabant



c. Macro economical SWOT analysis

ET Marco-economical SWOT analysis



• MICRO-ECONOMICAL SWOT ANALYSIS for the 12 Technology Clusters

Before analyzing separately the adequacy of the 12 technological clusters to the needs of the future ET, we can, with regard to the collaborative projects selected in the framework of the ET2SMEs project, see already some strong/weak points of these clusters.




As a reminder, in the framework of ET2SMEs, we have set up 9 calls intended to select collaborative projects between SMEs located in the Euregio Meuse Rhine. These projects must, as much as possible, address technological challenges related to the instrument or to the geology of the ET expressed by scientists.

11 projects were selected.

By comparing the content and the industrial objectives of these 11 selected projects with the 12 technological challenges expressed by the scientists, we observe that:

| "ET Technologies Map" of ET2SMEs Innovation projects ¹ | | | | | | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------------------|
| | 01-FIO | 03-FEF | 07-NIR | 08-INN | 09-AGR | 10-MAT | 11-SEI | 12-SAC | 14-ING | 15-ISA | 16-INT | No. of contributions |
| Instruments technologies | | | | | | | | | | | | |
| Cryogenics | | | | | X | | | | | | | 1 |
| Vacuum | | X | | | | | | X | | | | 2 |
| Precision Mechanics / Mechatronics | | X | | | | | | | | | | 1 |
| Sensors | X | | | X | X | | | | | | | 3 |
| Optics & Optical Metrology | X | | | | | X | | | | | | 2 |
| Mirrors Coating | | | | | | X | | X | | | | 2 |
| Lasers | | | | | | | | | | | | |
| Advanced Control Algorithms | | | | | | | | | | | | |
| Geology technologies | | | | | | | | | | | | |
| Tunneling | | | | | | | | | | | X | 1 |
| Geophysical Imaging & Remote Sensing | | | | | | | X | | | | | 1 |
| Simulation & Modeling | | | X | | | | | | | | | 1 |
| Water | | | | | | | | | | | | |
| Carbon-neutrality technologies | | | | | | | | | | | | |
| Energy | | | | | | | X | | X | X | | 3 |

Explanation

-  Project provides a technological contribution not only to ET, but also other high-demanding application fields.
-  Project provides a direct technological contribution to development needs addressed by ET researchers.
-  No projects in the ET technology domains Lasers, Advanced Control Algorithms and Water.

- Only 3 ET technologies were not covered by a project submitted to ET2SMEs (Lasers, Advanced Algorithms, Water Technologies)
- 5 important ET technologies were covered by project (Vacuum, Precision Mechanics, Optics & Optical Metrology, Mirrors Coating, Simulation and modeling in Geology field)
- Nevertheless, by analyzing more precisely the content of the projects submitted to "ET2SMEs" and by comparing them to the very precise and complex demands of the

scientists, we have to admit that there is indeed an important gap between what our SMEs can offer quickly and what the scientists expect. It is also clear that the amounts allocated (Vouchers) to our projects only allowed to the SMEs to “open deeper technological reflections”.

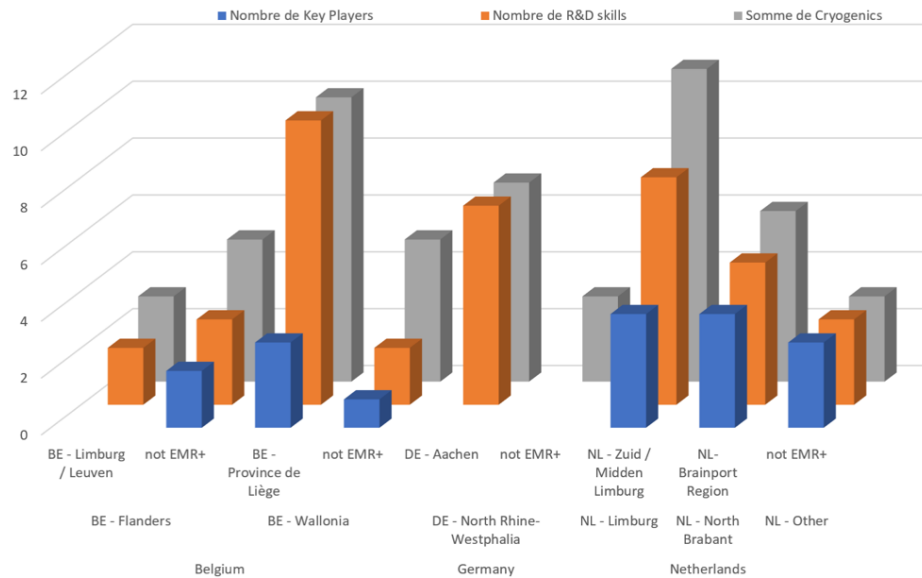
- It will be necessary, and this will be the subject of the recommendations, to provide support tools for SMEs that will combine larger financial support and complementary external technological support

• Instrument

- Cryogenic

1. SMEs and LC

| Cryo | Key Players | R&D skills | actors | %R&D | % KP |
|-----------------------------|-------------|------------|--------|------|------|
| Belgium | 6 | 17 | 23 | 74% | |
| BE - Flanders | 2 | 5 | 8 | 63% | |
| BE - Limburg / Leuven | | 2 | 3 | 67% | |
| not EMR+ | 2 | 3 | 5 | | |
| BE - Wallonia | 4 | 12 | 15 | 80% | |
| BE - Province de Liège | 3 | 10 | 10 | 100% | |
| not EMR+ | 1 | 2 | 5 | | |
| Germany | | 7 | 10 | 70% | |
| DE - North Rhine-Westphalia | | 7 | 10 | 70% | |
| DE - Aachen | | 7 | 7 | | |
| not EMR+ | | | 3 | | |
| Netherlands | 11 | 16 | 20 | 80% | |
| NL - Limburg | 4 | 8 | 11 | 73% | |
| NL - Zuid / Midden Limburg | 4 | 8 | 11 | | |
| NL - North Brabant | 4 | 5 | 6 | 83% | |
| NL- Brainport Region | 4 | 5 | 6 | | |
| NL - Other | 3 | 3 | 3 | | |
| not EMR+ | 3 | 3 | 3 | | |
| Total | 17 | 40 | 53 | 75% | 32% |



2. Research skills and Key players

53 SMEs and LC

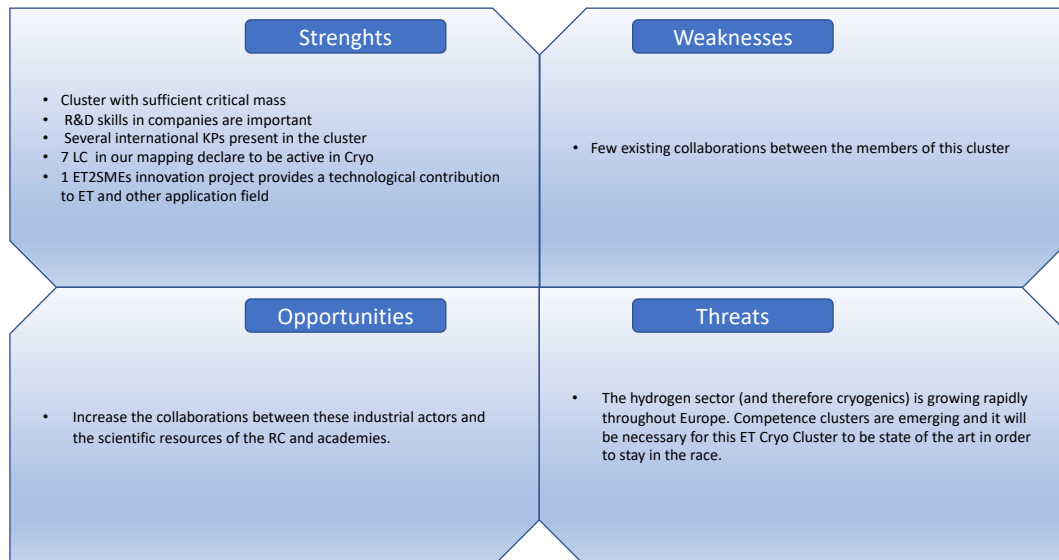
75% of the actors (industry) of the “Cryo Cluster” have in-house R&D skills, making it a particularly well-prepared cluster to face the technological challenges of the Einstein Telescope.

According to regional representatives, the percentage of key players is estimated at 32%, one of the highest cluster’s rates.

Bringing all these players together in the same ET Cryo Cluster should also make it easier for them to position themselves in markets other than ET. Within the framework of future developments in energy (hydrogen sector), this inter-regional cluster should be able to develop easily.

3. SWOT

ET instrument -Cryo Cluster SWOT analysis



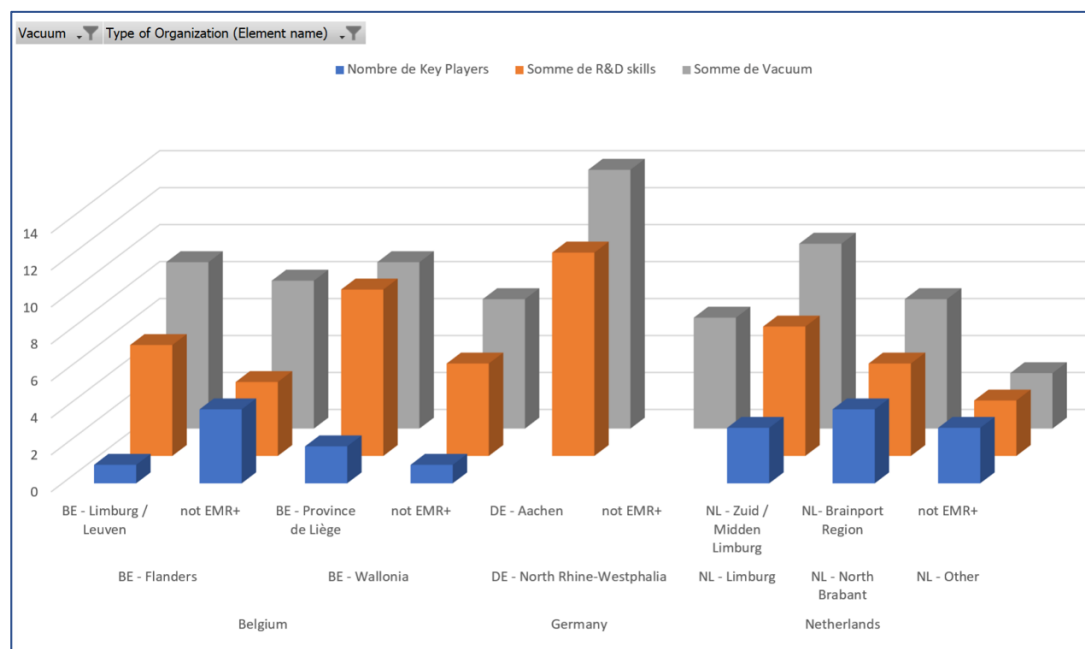
4. Cryogenic Cluster members (#53)

| List | Region (Element name) | EMR+ | Country (Element name) |
|---------------------------------------|-----------------------------|----------------------------|------------------------|
| ACE ENGINEERING & DEVELOPMENT | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AGC Plasma Technology Solutions | BE - Wallonia | not EMR+ | Belgium |
| ALTIFORT BOART | BE - Wallonia | not EMR+ | Belgium |
| AMOS | BE - Wallonia | BE - Province de Liège | Belgium |
| ANATECH BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| ANTONIUS | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| APERAM | BE - Flanders | not EMR+ | Belgium |
| ATG EUROPE | NL - Other | not EMR+ | Netherlands |
| ATIMA-TPIM | BE - Wallonia | BE - Province de Liège | Belgium |
| AXILON AG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| B&B-AGEMA GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BEBLUE CRYOTECH | BE - Wallonia | BE - Province de Liège | Belgium |
| BENVITEC | BE - Flanders | BE - Limburg / Leuven | Belgium |
| CAELESTE CVBA | BE - Flanders | not EMR+ | Belgium |
| COEXPAIR | BE - Wallonia | not EMR+ | Belgium |
| COMATE | BE - Flanders | not EMR+ | Belgium |
| DEDECKER PRECISION MECHANICS | BE - Wallonia | not EMR+ | Belgium |
| DEMCON | NL - Other | not EMR+ | Netherlands |
| FLUIDON GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GDO BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| ILCO CHEMIKALIEN GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INNOVATION HANDLING | NL - North Brabant | NL - Brainport Region | Netherlands |
| INSPYRO | BE - Flanders | not EMR+ | Belgium |
| IPS TECHNOLOGY | NL - North Brabant | NL - Brainport Region | Netherlands |
| ISATEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| JANSEN ELECTRO TECHNIEK | BE - Flanders | BE - Limburg / Leuven | Belgium |
| JPE BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| KARL HUGO | BE - Wallonia | BE - Province de Liège | Belgium |
| MAP - MICROSTRUCTURE AND PORES | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAT-TECH BV | NL - North Brabant | NL - Brainport Region | Netherlands |
| MATERIALZ | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| MI-PARTNERS | NL - North Brabant | NL - Brainport Region | Netherlands |
| MONTAIR ENVIRONMENTAL SOLUTIONS B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| NEUTRONSTAR SYSTEMS UG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| OPEN ENGINEERING | BE - Wallonia | BE - Province de Liège | Belgium |
| RESARM ENGINEERING PLASTICS | BE - Wallonia | BE - Province de Liège | Belgium |
| RI - RESEARCH INSTRUMENTS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| ROARTIS | BE - Flanders | not EMR+ | Belgium |
| SAFRAN AERO BOOSTERS | BE - Wallonia | BE - Province de Liège | Belgium |
| SBE | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SCHIFFER METALL- & VAKUUMTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SCOUP | BE - Wallonia | BE - Province de Liège | Belgium |
| SETTELS SAVENIJE | NL - North Brabant | NL - Brainport Region | Netherlands |
| SITECH Services | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SOMNI SOLUTIONS | NL - Other | not EMR+ | Netherlands |
| STIRLING CRYOGENICS BV | NL - North Brabant | NL - Brainport Region | Netherlands |
| STORK ASSET MANAGEMENT TECHNOLOGY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| TECNOLON WORKS | BE - Wallonia | not EMR+ | Belgium |
| TLK ENERGY GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| TRAVELEC | BE - Wallonia | BE - Province de Liège | Belgium |
| V2I | BE - Wallonia | BE - Province de Liège | Belgium |
| VENNE ELECTRONICS BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VERMEULEN METAAL | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |

- Vacuum

1. SMEs and LC

| Vacuum | Key Players | R&D skills | Vacuum actors | % R&D | % Key Players |
|-----------------------------|-------------|------------|---------------|------------|---------------|
| Belgium | 8 | 24 | 33 | 73% | |
| BE - Flanders | 5 | 10 | 17 | 59% | |
| BE - Limburg / Leuven | 1 | 6 | 9 | | |
| not EMR+ | 4 | 4 | 8 | | |
| BE - Wallonia | 3 | 14 | 16 | 88% | |
| BE - Province de Liège | 2 | 9 | 9 | 100% | |
| not EMR+ | 1 | 5 | 7 | | |
| Germany | | 11 | 20 | 55% | |
| DE - North Rhine-Westphalia | | 11 | 20 | 55% | |
| DE - Aachen | | 11 | 14 | | |
| not EMR+ | | | 6 | | |
| Netherlands | 10 | 15 | 20 | 75% | |
| NL - Limburg | 3 | 7 | 10 | 70% | |
| NL - Zuid / Midden Limburg | 3 | 7 | 10 | | |
| NL - North Brabant | 4 | 5 | 7 | 71% | |
| NL- Brainport Region | 4 | 5 | 7 | | |
| NL - Other | 3 | 3 | 3 | | |
| not EMR+ | 3 | 3 | 3 | | |
| Total | 18 | 50 | 73 | 68% | 25% |



2. Research skills and Key players

73 SMEs and LC

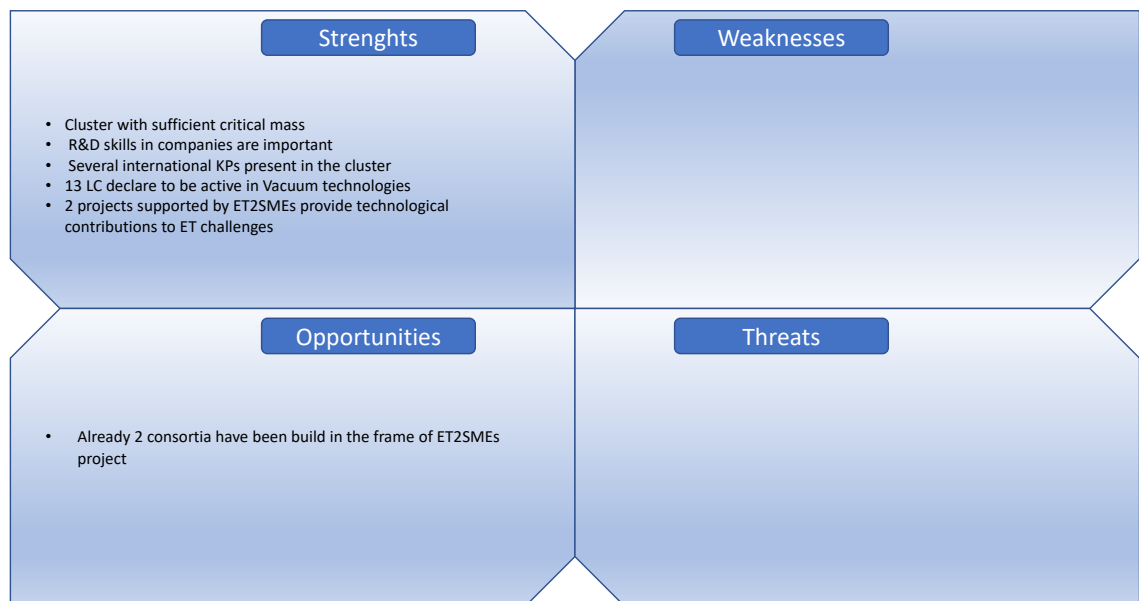
68% of the actors (industry) of the “Vacuum Cluster” have in-house R&D skills, making it a particularly well-prepared cluster to face the technological challenges of the Einstein Telescope.

According to regional representatives, the percentage of key players is estimated at 25%, which strengthens the competitive position of this Vacuum technology cluster

Following the pre-selection for this study of actors of the space sector in the Province of Liège, we naturally find an important percentage (100%) of these actors having an internal R&D capacity in the field of the Vacuum. This is therefore due to a bias in the analysed sample.

3. SWOT

ET instrument -Vacuum Cluster SWOT analysis



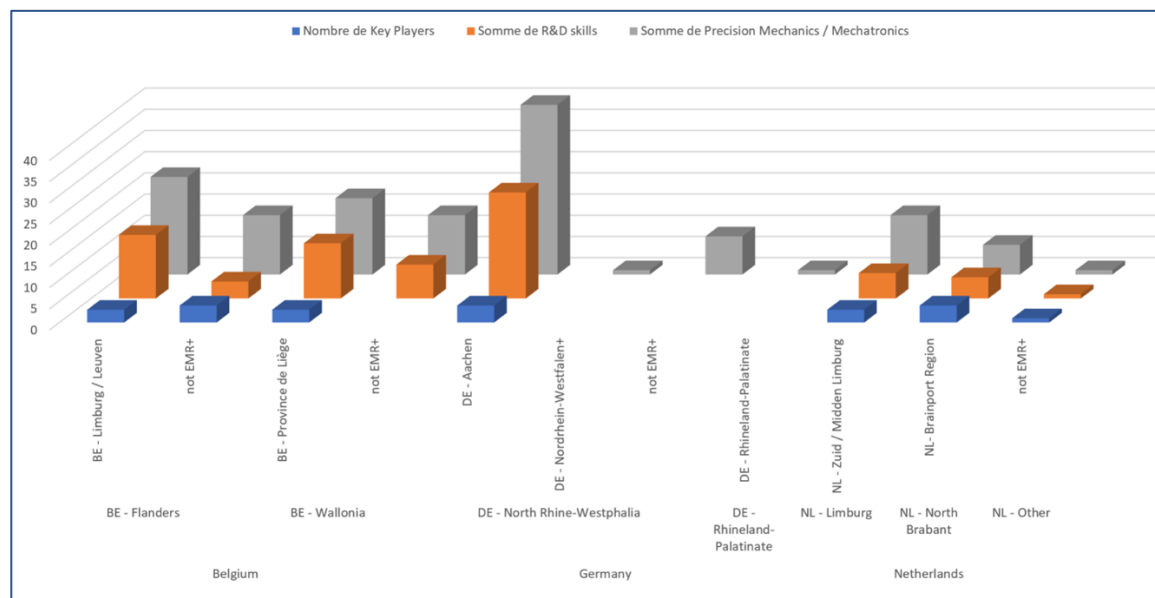
4. Vacuum Cluster (#73)

| | | | |
|---|-----------------------------|----------------------------|-------------|
| ACE ENGINEERING & DEVELOPMENT | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AFFILIPS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AGC Plasma Technology Solutions | BE - Wallonia | not EMR+ | Belgium |
| AGFA-GEVAERT | BE - Flanders | not EMR+ | Belgium |
| AGRIPPA CLEANTECH | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AMOS | BE - Wallonia | BE - Province de Liège | Belgium |
| ANTONIUS | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| APERAM | BE - Flanders | not EMR+ | Belgium |
| ATG EUROPE | NL - Other | not EMR+ | Netherlands |
| ATIMA-TPIM | BE - Wallonia | BE - Province de Liège | Belgium |
| AXILON AG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| B&B-AGEMA GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BENVITEC | BE - Flanders | BE - Limburg / Leuven | Belgium |
| CALCULUS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| CHIMIDEROUIL | BE - Wallonia | not EMR+ | Belgium |
| CODE PRODUCT SOLUTIONS BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| COEXPAIR | BE - Wallonia | not EMR+ | Belgium |
| COMATE | BE - Flanders | not EMR+ | Belgium |
| DEDECKER PRECISION MECHANICS | BE - Wallonia | not EMR+ | Belgium |
| DELTATEC | BE - Wallonia | BE - Province de Liège | Belgium |
| DEMCON | NL - Other | not EMR+ | Netherlands |
| DHCAE TOOLS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| ENGIE LABORELEC NL | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| FEF FORSCHUNGS- UND ENTWICKLUNGSGESELLSCHAFT FÜGETECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FIBERPIPE GFK VERTRIEBSGESELLSCHAFT MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FLUIDON GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FMI IMPROVIA AACHEN | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GRAUX S.A. | BE - Wallonia | not EMR+ | Belgium |
| IBS PRECISION ENGINEERING | NL - North Brabant | NL - Brainport Region | Netherlands |
| INGENIEURBÜRO CLERMONT + PARTNER | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INNOVATION HANDLING | NL - North Brabant | NL - Brainport Region | Netherlands |
| INSPYRO | BE - Flanders | not EMR+ | Belgium |
| IPS TECHNOLOGY | NL - North Brabant | NL - Brainport Region | Netherlands |
| ISATEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| JANSEN ELECTRO TECHNIK | BE - Flanders | BE - Limburg / Leuven | Belgium |
| JPE BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| KARL HUGO | BE - Wallonia | BE - Province de Liège | Belgium |
| KOM E+A BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| LAMBDA-X | BE - Wallonia | not EMR+ | Belgium |
| LASER CLADDING VENTURE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| LAVA-X GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LSA - LASER ANALYTICAL SYSTEMS & AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAEX - UMP TEC | BE - Flanders | not EMR+ | Belgium |
| MARX AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAT-TECH BV | NL - North Brabant | NL - Brainport Region | Netherlands |
| MATERIALZ | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| MI-PARTNERS | NL - North Brabant | NL - Brainport Region | Netherlands |
| MPP | BE - Wallonia | BE - Province de Liège | Belgium |
| NEUTRONSTAR SYSTEMS UG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| OIP | BE - Flanders | not EMR+ | Belgium |
| PH-MECHANIK GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| RESARM ENGINEERING PLASTICS | BE - Wallonia | BE - Province de Liège | Belgium |
| RI - RESEARCH INSTRUMENTS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| ROARTIS | BE - Flanders | not EMR+ | Belgium |
| SAFRAN AERO BOOSTERS | BE - Wallonia | BE - Province de Liège | Belgium |
| SBE | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SCHIFFER METALL- & VAKUUMTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SCOUP | BE - Wallonia | BE - Province de Liège | Belgium |
| SETTELS SAVENIJE | NL - North Brabant | NL - Brainport Region | Netherlands |
| SIEPMANN-WERKE GMBH & CO. KG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| SITECH Services | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SOMNI SOLUTIONS | NL - Other | not EMR+ | Netherlands |
| STIRLING CRYOGENICS BV | NL - North Brabant | NL - Brainport Region | Netherlands |
| STORK ASSET MANAGEMENT TECHNOLOGY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SV STEUERUNGSTECHNIK GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| TECNOLON WORKS | BE - Wallonia | not EMR+ | Belgium |
| TLK ENERGY GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| TRAVELEC | BE - Wallonia | BE - Province de Liège | Belgium |
| TRIKS ENGINEERING | BE - Flanders | BE - Limburg / Leuven | Belgium |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| VERMEULEN METAAL | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |

• Precision Mechanics / Mechatronics

1. SMEs and LC

| | Key Players | R&D skills | Precision Mechanics actors | % R&D | % KP |
|-----------------------------|-------------|------------|----------------------------|------------|------------|
| Belgium | 10 | 40 | 69 | 58% | |
| BE - Flanders | 7 | 19 | 37 | 51% | |
| BE - Limburg / Leuven | 3 | 15 | 23 | 65% | |
| not EMR+ | 4 | 4 | 14 | | |
| BE - Wallonia | 3 | 21 | 32 | 66% | |
| BE - Province de Liège | 3 | 13 | 18 | 72% | |
| not EMR+ | | 8 | 14 | | |
| Germany | 4 | 25 | 51 | 49% | |
| DE - North Rhine-Westphalia | 4 | 25 | 50 | 50% | |
| DE - Aachen | 4 | 25 | 40 | 63% | |
| DE - Nordrhein-Westfalen+ | | | 1 | | |
| not EMR+ | | | 9 | | |
| DE - Rhineland-Palatinate | | | 1 | | |
| DE - Rhineland-Palatinate | | | 1 | | |
| Netherlands | 8 | 12 | 22 | 55% | |
| NL - Limburg | 3 | 6 | 14 | 43% | |
| NL - Zuid / Midden Limburg | 3 | 6 | 14 | | |
| NL - North Brabant | 4 | 5 | 7 | 71% | |
| NL - Brainport Region | 4 | 5 | 7 | | |
| NL - Other | 1 | 1 | 1 | | |
| not EMR+ | 1 | 1 | 1 | | |
| Total | 22 | 77 | 142 | 54% | 15% |



2. Research skills

142 actors in our database declare to be active in Precision Mechanics and Mechatronics, which makes it the most important technological cluster in our survey. (including 16 LC)

54% of the actors (industry) of the “Mechanics & Mechatronics Cluster” have in-house R&D skills, making it a particularly well-prepared cluster to face the technological challenges of the Einstein Telescope.

According to regional representatives, the percentage of key players among these 142 is estimated at 15%

Structural reasons for this lower rate of key players: in contrast to niches like cryogenics, vacuum, high number of players in this field with a lot of competitors.

R&D activities often based on customer related demands. Nevertheless this branch is quite innovative and flexible in developing new solutions

3. SWOT

ET instrument -Meca Cluster SWOT analysis



4. Mechanics and Mechatronics Cluster (#142)

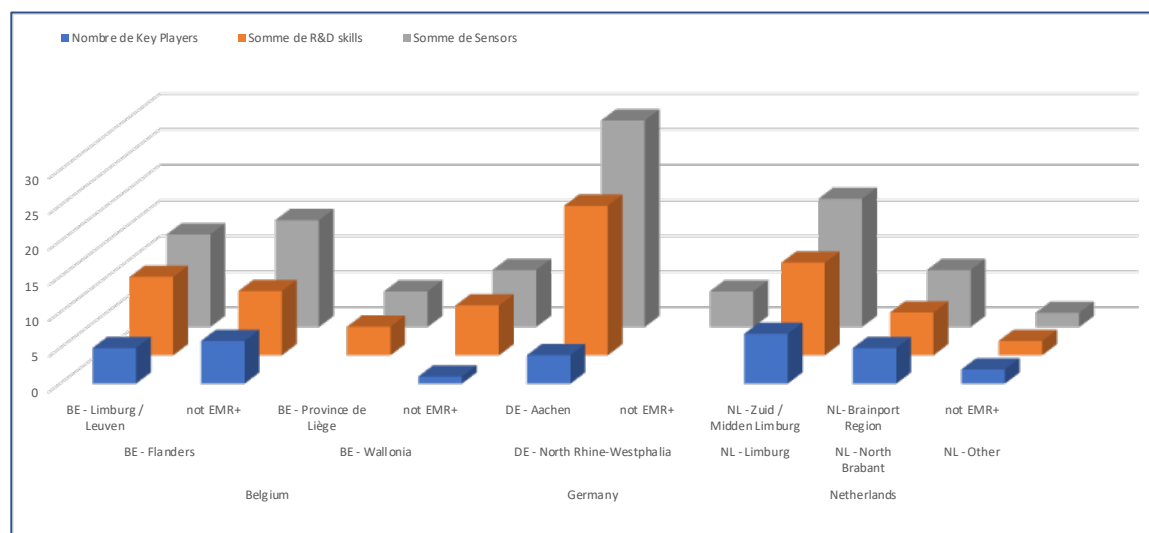
| Name | Region (Element name) | EMR+ | Country (Element name) |
|----------------------------------|-----------------------|------------------------|------------------------|
| ACE ENGINEERING & DEVELOPMENT | BE - Flanders | BE - Limburg / Leuven | Belgium |
| WERKHUIZEN HENGELHOEF | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AFFILIPS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| TRIKS ENGINEERING | BE - Flanders | BE - Limburg / Leuven | Belgium |
| SURTECHNO | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AVERNA | BE - Flanders | BE - Limburg / Leuven | Belgium |
| BENVITEC | BE - Flanders | BE - Limburg / Leuven | Belgium |
| POLLERS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| PLASMAJET | BE - Flanders | BE - Limburg / Leuven | Belgium |
| C. VANGOMPEL | BE - Flanders | BE - Limburg / Leuven | Belgium |
| P-LASER | BE - Flanders | BE - Limburg / Leuven | Belgium |
| OERLIKON BALZERS COATING BENELUX | BE - Flanders | BE - Limburg / Leuven | Belgium |
| MSD METAL WORKING | BE - Flanders | BE - Limburg / Leuven | Belgium |
| MELOTTE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| ES Tooling | BE - Flanders | BE - Limburg / Leuven | Belgium |
| LASER CLADDING VENTURE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| FIJN MEKANIEK NELISSEN | BE - Flanders | BE - Limburg / Leuven | Belgium |
| LAB Motion | BE - Flanders | BE - Limburg / Leuven | Belgium |
| FREPA | BE - Flanders | BE - Limburg / Leuven | Belgium |
| JANSEN ELECTRO TECHNIK | BE - Flanders | BE - Limburg / Leuven | Belgium |
| HAMMER IMS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| HEGGE TOELEVERING | BE - Flanders | BE - Limburg / Leuven | Belgium |
| HEYARU | BE - Flanders | BE - Limburg / Leuven | Belgium |
| XERYON | BE - Flanders | not EMR+ | Belgium |
| ABSOLEM | BE - Flanders | not EMR+ | Belgium |
| VINTIV | BE - Flanders | not EMR+ | Belgium |
| AGFA-GEVAERT | BE - Flanders | not EMR+ | Belgium |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| Verenfabriek Hermans | BE - Flanders | not EMR+ | Belgium |
| VACOM | BE - Flanders | not EMR+ | Belgium |
| SIMONS GEREEDSCHAPMAKERIJ | BE - Flanders | not EMR+ | Belgium |
| ROARTIS | BE - Flanders | not EMR+ | Belgium |
| COMATE | BE - Flanders | not EMR+ | Belgium |
| MAEX - UMP TEC | BE - Flanders | not EMR+ | Belgium |
| ESMA | BE - Flanders | not EMR+ | Belgium |
| LEUVEN AIR BEARINGS | BE - Flanders | not EMR+ | Belgium |
| INSPYRO | BE - Flanders | not EMR+ | Belgium |
| WIELANDTS | BE - Wallonia | BE - Province de Liège | Belgium |
| AMOS | BE - Wallonia | BE - Province de Liège | Belgium |
| TRAVELEC | BE - Wallonia | BE - Province de Liège | Belgium |
| TKM INDUSTRIES | BE - Wallonia | BE - Province de Liège | Belgium |
| ANY-SHAPE | BE - Wallonia | BE - Province de Liège | Belgium |
| SMP | BE - Wallonia | BE - Province de Liège | Belgium |
| ATIMA-TPIM | BE - Wallonia | BE - Province de Liège | Belgium |
| SCOUP | BE - Wallonia | BE - Province de Liège | Belgium |
| SAFRAN AERO BOOSTERS | BE - Wallonia | BE - Province de Liège | Belgium |
| BEBLUE CRYOTECH | BE - Wallonia | BE - Province de Liège | Belgium |
| RESARM ENGINEERING PLASTICS | BE - Wallonia | BE - Province de Liège | Belgium |
| ORTMANS | BE - Wallonia | BE - Province de Liège | Belgium |
| OPEN ENGINEERING | BE - Wallonia | BE - Province de Liège | Belgium |
| MPP | BE - Wallonia | BE - Province de Liège | Belgium |
| MOCKEL | BE - Wallonia | BE - Province de Liège | Belgium |
| DUMOULIN AERO | BE - Wallonia | BE - Province de Liège | Belgium |
| KARL HUGO | BE - Wallonia | BE - Province de Liège | Belgium |
| GDTECH Engineering | BE - Wallonia | BE - Province de Liège | Belgium |
| ALTFORT BOART | BE - Wallonia | not EMR+ | Belgium |
| TECNOLON WORKS | BE - Wallonia | not EMR+ | Belgium |
| CAP Innov | BE - Wallonia | not EMR+ | Belgium |
| MTU | BE - Wallonia | not EMR+ | Belgium |
| CHIMIDEROUIL | BE - Wallonia | not EMR+ | Belgium |
| COEXPAIR | BE - Wallonia | not EMR+ | Belgium |
| MICROMEGA DYNAMICS | BE - Wallonia | not EMR+ | Belgium |
| DEDECKER PRECISION MECHANICS | BE - Wallonia | not EMR+ | Belgium |
| METHODES ET TECHNIQUES D'USINAGE | BE - Wallonia | not EMR+ | Belgium |
| MECASOFT | BE - Wallonia | not EMR+ | Belgium |
| FERONYL | BE - Wallonia | not EMR+ | Belgium |
| LAMBDA-X | BE - Wallonia | not EMR+ | Belgium |
| GRAUX S.A. | BE - Wallonia | not EMR+ | Belgium |

| | | | |
|---|-----------------------------|----------------------------|-------------|
| GRIMONPREZ TRANSMISSION GEARS | BE - Wallonia | not EMR+ | Belgium |
| 4JET TECHNOLOGIES GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXEMTEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXONTEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXPROCESS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXTEC INGENIEURGESELLSCHAFT MBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| VEMAC GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| TORQUEWERK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SPERING MICRO-SYSTEMS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SON-X | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AS TECH INDUSTRIE- UND SPANNHYDRAULIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SCHIFFER METALL- & VAKUUMTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| RODRIGUEZ GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PULSAR PHOTONICS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PHD IN EUROPE GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PH-MECHANIK GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MÜLLER MASCHINENTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| CFM SCHILLER GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| CYTEC ZYLINDERTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DFS DREH- UND FRÄSTECHNIK WERNER SCHNEIDER | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAUL KONSTRUKTIONEN GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DIRKRA SONDERMASCHINENBAU GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DSA DATEN- UND SYSTEMTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DYNA-MESS PRÜFSYSTEME GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MABRI.VISION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| EPCOTEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LSA - LASER ANALYTICAL SYSTEMS & AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LIGHTFAB GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LAVA-X GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FIBERPIPE GFK VERTRIEBSGESELLSCHAFT MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FIONEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FMI IMPROVIA AACHEN | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| KLOCKE NANOTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| K-L PRÄZISION FALK LANGE GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ISP-AACHEN | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ISATEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GEVA AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INNOCAMP GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| HECKER & KROSCHE GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INGENIEURBÜRO CLERMONT + PARTNER | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ILA5150 GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| WKW Group | DE - North Rhine-Westphalia | DE - Nordrhein-Westfalen | Germany |
| WBT-INDUSTRIE ELEKTROMECHANISCHE PRODUKTE GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| SIEPMANN-WERKE GMBH & CO. KG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| AXILON AG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| SCIENCENTRIC® AG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| RI - RESEARCH INSTRUMENTS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| DHCAE TOOLS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| LIOP-TEC GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| FIVEMOREMINUTES | DE - North Rhine-Westphalia | not EMR+ | Germany |
| GED- GESELLSCHAFT FÜR ELEKTRONIK UND DATENTECHNIK MBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| APRA-NORM ELEKTROMECHANIK GMBH | DE - Rheinland-Palatinate | DE - Rheinland-Palatinate | Germany |
| VERMEULEN METAAL | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VENNE ELECTRONICS BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| AM&M | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VECTIONEER BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| STORK ASSET MANAGEMENT TECHNOLOGY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| BLOCKHEATING BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| CODE PRODUCT SOLUTIONS BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| MMI BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| MIFA ALUMINIUM B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| MATERIALZ | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| FMI DE BERK | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| KEYTEC NETHERLANDS | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GDO BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| JPE BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SETTELS SAVENIJE | NL - North Brabant | NL - Brainport Region | Netherlands |
| MI-PARTNERS | NL - North Brabant | NL - Brainport Region | Netherlands |
| MAT-TECH BV | NL - North Brabant | NL - Brainport Region | Netherlands |
| FAULHABER DRIVE SYSTEMS | NL - North Brabant | NL - Brainport Region | Netherlands |
| IPS TECHNOLOGY | NL - North Brabant | NL - Brainport Region | Netherlands |
| INNOVATION HANDLING | NL - North Brabant | NL - Brainport Region | Netherlands |
| IBS PRECISION ENGINEERING | NL - North Brabant | NL - Brainport Region | Netherlands |
| DEMCON | NL - Other | not EMR+ | Netherlands |

- Sensors

1. SMEs and LC

| | Key Players | R&D skills | Sensors actors | %R&D | KP |
|-----------------------------|-------------|------------|----------------|------------|------------|
| Belgium | 12 | 31 | 41 | 76% | |
| BE - Flanders | 11 | 20 | 28 | 71% | |
| BE - Limburg / Leuven | 5 | 11 | 13 | 85% | |
| not EMR+ | 6 | 9 | 15 | | |
| BE - Wallonia | 1 | 11 | 13 | 85% | |
| BE - Province de Liège | | 4 | 5 | 80% | |
| not EMR+ | 1 | 7 | 8 | | |
| Germany | 4 | 21 | 34 | 62% | |
| DE - North Rhine-Westphalia | 4 | 21 | 34 | 62% | |
| DE - Aachen | 4 | 21 | 29 | 72% | |
| not EMR+ | | | 5 | | |
| Netherlands | 14 | 21 | 28 | 75% | |
| NL - Limburg | 7 | 13 | 18 | 72% | |
| NL - Zuid / Midden Limburg | 7 | 13 | 18 | 72% | |
| NL - North Brabant | 5 | 6 | 8 | 75% | |
| NL - Brainport Region | 5 | 6 | 8 | 75% | |
| NL - Other | 2 | 2 | 2 | | |
| not EMR+ | 2 | 2 | 2 | | |
| Total | 30 | 73 | 103 | 71% | 29% |



2. Research skills

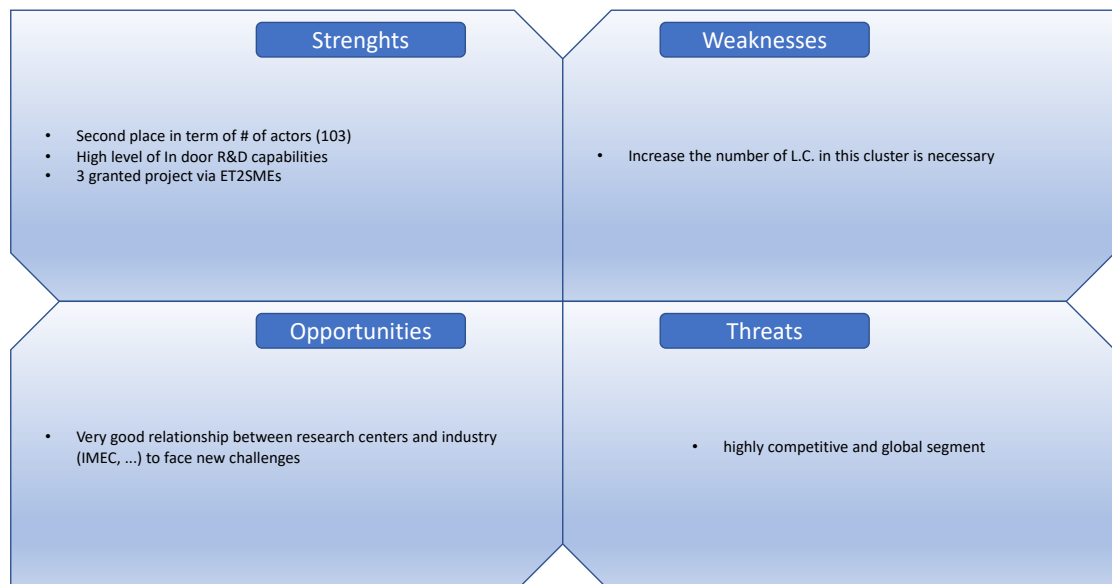
With 103 members, this cluster is the second largest in our inventory. (including 16 LC)

71% of the industrial actors of the “Sensors Cluster” have in-house R&D skills, making it a very good “equipped” cluster to face the technological challenges of the Einstein Telescope.

According to regional representatives, the percentage of key players among these 103 is estimated at 29%

3. SWOT

ET instrument -Sensors Cluster SWOT analysis



4. Sensors Cluster (#103)

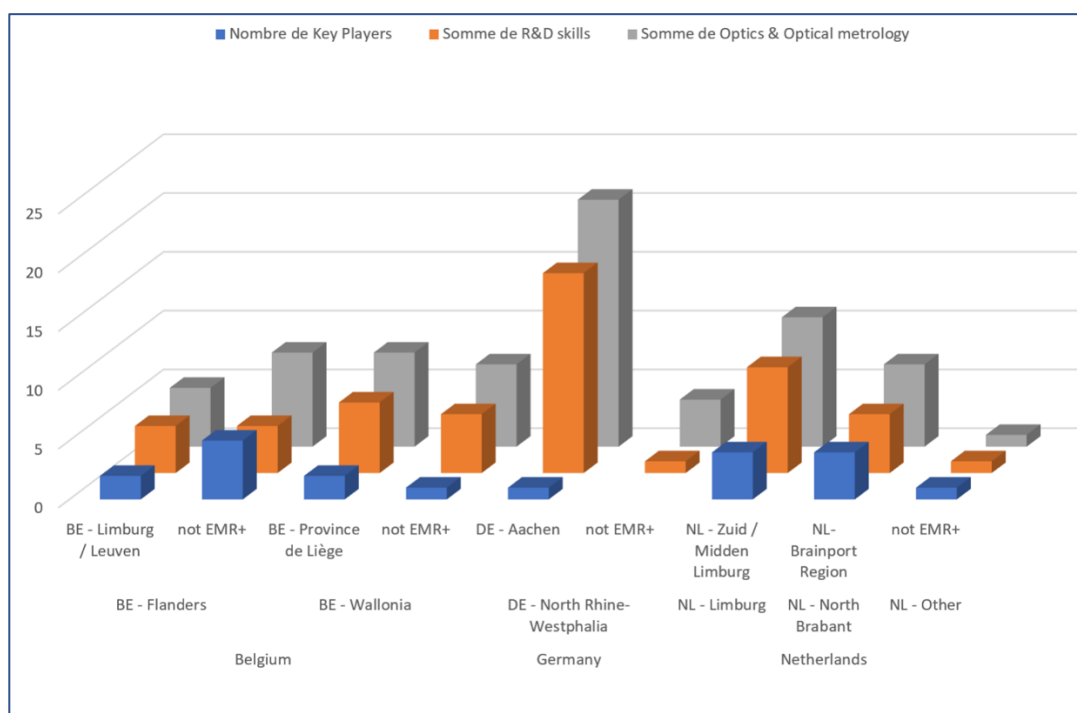
| Name | Region (Element name) | EMR+ | Country (Element name) |
|------------------------------------|-----------------------------|----------------------------|------------------------|
| ABSOLEM | BE - Flanders | not EMR+ | Belgium |
| ACE ENGINEERING & DEVELOPMENT | BE - Flanders | BE - Limburg / Leuven | Belgium |
| ADMESY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| AGC Plasma Technology Solutions | BE - Wallonia | not EMR+ | Belgium |
| AGRIPPA CLEANTECH | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AIXTRON SE | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ALTIFORT BOART | BE - Wallonia | not EMR+ | Belgium |
| AMO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ANATECH BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| APERAM | BE - Flanders | not EMR+ | Belgium |
| AS TECH INDUSTRIE- UND SPANNHYDRAL | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AVERNA | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AXILON AG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| BERATRON GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BLACK SEMICONDUCTOR | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BLOCKHEATING BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| BOM-BE | BE - Flanders | not EMR+ | Belgium |
| CAELESTE CVBA | BE - Flanders | not EMR+ | Belgium |
| CALCULUS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| CAP Innov | BE - Wallonia | not EMR+ | Belgium |
| CFM SCHILLER GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| CODEWORX GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| COEXPAIR | BE - Wallonia | not EMR+ | Belgium |
| COMATE | BE - Flanders | not EMR+ | Belgium |
| DDQ B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| DeltaRay | BE - Flanders | BE - Limburg / Leuven | Belgium |
| DELTA TEC | BE - Wallonia | BE - Province de Liège | Belgium |
| DEMCON | NL - Other | not EMR+ | Netherlands |
| DILLEN TECHNOLOGIES | BE - Flanders | BE - Limburg / Leuven | Belgium |
| DSA DATEN- UND SYSTEMTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DYNA-MESS PRÜFSYSTEME GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ENGIE LABORELEC NL | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| FEF FORSCHUNGS- UND ENTWICKLUNGS | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FIONEK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| G.O.E.T.H.E | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GDO BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GENZAI BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GOOFRA QUALITY PRODUCTS | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| HAMMER IMS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| HEUERMANN HF-TECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| I-CARE | BE - Wallonia | not EMR+ | Belgium |
| IBS PRECISION ENGINEERING | NL - North Brabant | NL - Brainport Region | Netherlands |
| ICON PRO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INCORTEX GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INNOVATION HANDLING | NL - North Brabant | NL - Brainport Region | Netherlands |
| INNOVATIVE COATING SOLUTIONS (ICS) | BE - Wallonia | not EMR+ | Belgium |
| IPS TECHNOLOGY | NL - North Brabant | NL - Brainport Region | Netherlands |
| ISP-AACHEN | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| JANSEN ELECTRO TECHNIK | BE - Flanders | BE - Limburg / Leuven | Belgium |
| JPE BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| KIMA PROCESS CONTROL GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| KLOCKE NANOTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LIGHTFAB GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MABRI.VISION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAEX - UMP TEC | BE - Flanders | not EMR+ | Belgium |
| MAGICS | BE - Flanders | not EMR+ | Belgium |
| MARIS ENGINEERING | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MARX AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAT-TECH BV | NL - North Brabant | NL - Brainport Region | Netherlands |
| MEDRES - MEDICAL RESEARCH GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| MELEXIS TECHNOLOGIES | BE - Flanders | BE - Limburg / Leuven | Belgium |
| MI-PARTNERS | NL - North Brabant | NL - Brainport Region | Netherlands |
| MICROMEGA DYNAMICS | BE - Wallonia | not EMR+ | Belgium |
| MIFA ALUMINIUM B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| NEUTRONSTAR SYSTEMS UG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| NOKRA OPTISCHE PRÜFTECHNIK UND AU | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| OIP | BE - Flanders | not EMR+ | Belgium |
| OPEN ENGINEERING | BE - Wallonia | BE - Province de Liège | Belgium |

| | | | |
|-------------------------------------|-----------------------------|----------------------------|-------------|
| OSCARS | BE - Wallonia | not EMR+ | Belgium |
| P&V PANELS | BE - Flanders | not EMR+ | Belgium |
| PEDAK MEETTECHNIEK BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| PHOENIX CONTACT | BE - Flanders | not EMR+ | Belgium |
| PHOTONFIRST | NL - North Brabant | NL - Brainport Region | Netherlands |
| PICOLAS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PROTEMICS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PYROSCIENCE GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| RI - RESEARCH INSTRUMENTS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| ROARTIS | BE - Flanders | not EMR+ | Belgium |
| SAC NEDERLAND | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SCIENCENTRIC® AG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| SETTELS SAVENIJE | NL - North Brabant | NL - Brainport Region | Netherlands |
| SIMONS GEREEDSCHAPSMAKERIJ | BE - Flanders | not EMR+ | Belgium |
| SITECH Services | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SOMNI SOLUTIONS | NL - Other | not EMR+ | Netherlands |
| SPERING MICRO-SYSTEMS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| STORK ASSET MANAGEMENT TECHNOLOGIES | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| STRAIN 2 DATA | BE - Flanders | not EMR+ | Belgium |
| TEMPCO | BE - Wallonia | BE - Province de Liège | Belgium |
| THALES ALENIA SPACE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| TOPIC EMBEDDED PROJECTS | NL - North Brabant | NL - Brainport Region | Netherlands |
| TRAVELEC | BE - Wallonia | BE - Province de Liège | Belgium |
| TRIKS ENGINEERING | BE - Flanders | BE - Limburg / Leuven | Belgium |
| V2I | BE - Wallonia | BE - Province de Liège | Belgium |
| VECTIONEER BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VEMAC GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| VENNE ELECTRONICS BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| VERMEULEN METAAL | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VI TECHNOLOGIES | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| XENICS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| XERYON | BE - Flanders | not EMR+ | Belgium |
| XTONOMY GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| YPTF | BE - Flanders | BE - Limburg / Leuven | Belgium |

• Optics & Optical Metrology

1. SMEs and LC

| | Key Players | R&D skills | Optics & Optical metrology actors | % R&D | % KP |
|-----------------------------|-------------|------------|-----------------------------------|-------|------|
| Belgium | 10 | 19 | 28 | 68% | |
| BE - Flanders | 7 | 8 | 13 | 62% | |
| BE - Limburg / Leuven | 2 | 4 | 5 | 80% | |
| not EMR+ | 5 | 4 | 8 | | |
| BE - Wallonia | 3 | 11 | 15 | 73% | |
| BE - Province de Liège | 2 | 6 | 8 | 75% | |
| not EMR+ | 1 | 5 | 7 | | |
| Germany | 1 | 18 | 25 | 72% | |
| DE - North Rhine-Westphalia | 1 | 18 | 25 | 72% | |
| DE - Aachen | 1 | 17 | 21 | 81% | |
| not EMR+ | | 1 | 4 | | |
| Netherlands | 9 | 15 | 19 | 79% | |
| NL - Limburg | 4 | 9 | 11 | 82% | |
| NL - Zuid / Midden Limburg | 4 | 9 | 11 | 82% | |
| NL - North Brabant | 4 | 5 | 7 | 71% | |
| NL - Brainport Region | 4 | 5 | 7 | 71% | |
| NL - Other | 1 | 1 | 1 | | |
| not EMR+ | 1 | 1 | 1 | | |
| Total | 20 | 52 | 72 | 72% | 28% |



2. Research skills

72 actors in our database declare to be active in Optics and Optical Metrology (including 10 LC)

72% of the actors (industry) in this Cluster have in-house R&D skills, making it a particularly well-prepared cluster to face the technological challenges of the Einstein Telescope.

According to regional representatives, the percentage of key players among these 72 is estimated at 28%

3. SWOT

ET instrument -Optics Cluster SWOT analysis



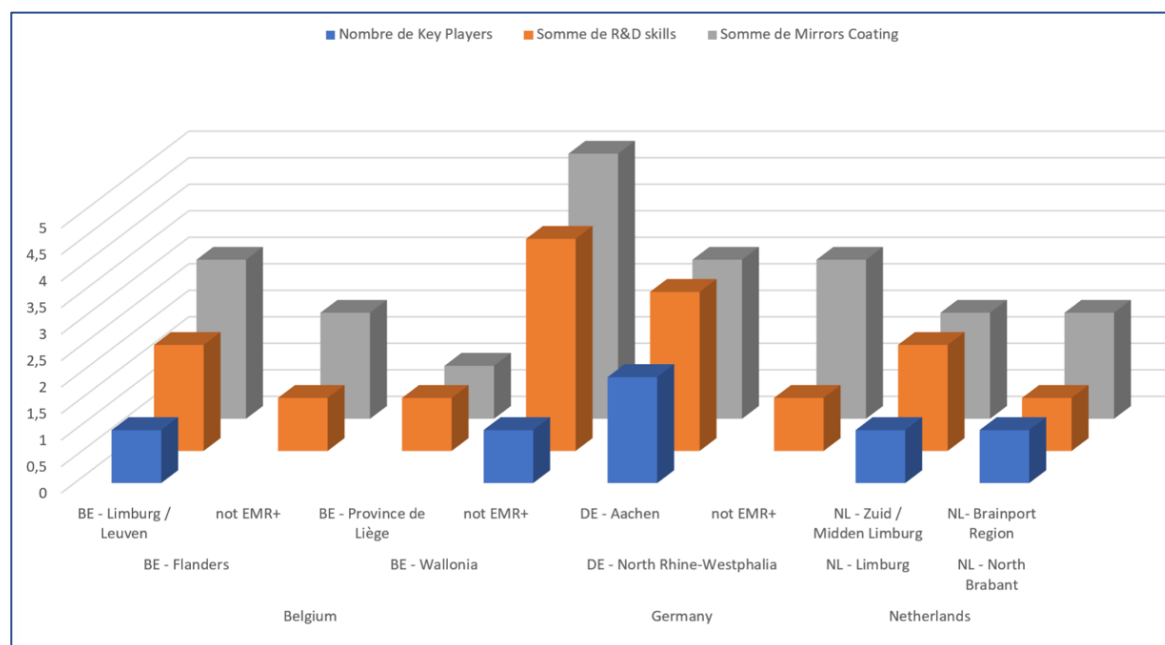
4. Optical and Optical Metrology Cluster (#72)

| Name | Region (Element name) | EMR+ | Country (Element name) |
|---|-----------------------------|----------------------------|------------------------|
| ABSOLEM | BE - Flanders | not EMR+ | Belgium |
| ADMESY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| AGC Plasma Technology Solutions | BE - Wallonia | not EMR+ | Belgium |
| AGFA-GEVAERT | BE - Flanders | not EMR+ | Belgium |
| AIXEMTEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ALTIFORT BOART | BE - Wallonia | not EMR+ | Belgium |
| AMO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AMOS | BE - Wallonia | BE - Province de Liège | Belgium |
| AMOTRONICS | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ANATECH BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| AVERNA | BE - Flanders | BE - Limburg / Leuven | Belgium |
| BLACK SEMICONDUCTOR | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BLOCKHEATING BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| COMATE | BE - Flanders | not EMR+ | Belgium |
| DDQ B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| DEMCON | NL - Other | not EMR+ | Netherlands |
| FASTMICRO | NL - North Brabant | NL - Brainport Region | Netherlands |
| FIONEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GDO BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GDTECH Engineering | BE - Wallonia | BE - Province de Liège | Belgium |
| GED- GESELLSCHAFT FÜR ELEKTRONIK UND DATENTECHNIK MBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| GOOFRA QUALITY PRODUCTS | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| HEYARU | BE - Flanders | BE - Limburg / Leuven | Belgium |
| IBS PRECISION ENGINEERING | NL - North Brabant | NL - Brainport Region | Netherlands |
| ICON PRO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ILAS150 GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| IMPEX HIGHTECH GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| INGENIEURBÜRO CLERMONT + PARTNER | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INNOVATION HANDLING | NL - North Brabant | NL - Brainport Region | Netherlands |
| INNOVATIVE COATING SOLUTIONS (ICS) | BE - Wallonia | not EMR+ | Belgium |
| IPS TECHNOLOGY | NL - North Brabant | NL - Brainport Region | Netherlands |
| JANSEN ELECTRO TECHNIK | BE - Flanders | BE - Limburg / Leuven | Belgium |
| JPE BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| LAMBDA-X | BE - Wallonia | not EMR+ | Belgium |
| LAVA-X GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LEUVEN AIR BEARINGS | BE - Flanders | not EMR+ | Belgium |
| LSA - LASER ANALYTICAL SYSTEMS & AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MABRI.VISION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAP - MICROSTRUCTURE AND PORES | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MaTeck GmbH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MECASOFT | BE - Wallonia | not EMR+ | Belgium |
| MEDRES - MEDICAL RESEARCH GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| METHODES ET TECHNIQUES D'USINAGE | BE - Wallonia | not EMR+ | Belgium |
| MI-PARTNERS | NL - North Brabant | NL - Brainport Region | Netherlands |
| MIFA ALUMINIUM B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| MTU | BE - Wallonia | not EMR+ | Belgium |
| NOKRA OPTISCHE PRÜFTECHNIK UND AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| OIP | BE - Flanders | not EMR+ | Belgium |
| OPEN ENGINEERING | BE - Wallonia | BE - Province de Liège | Belgium |
| PH-MECHANIK GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PHOTONFIRST | NL - North Brabant | NL - Brainport Region | Netherlands |
| PROTEMICS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PULSAR PHOTONICS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| Quarzglas Heinrich | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| RI - RESEARCH INSTRUMENTS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| ROARTIS | BE - Flanders | not EMR+ | Belgium |
| RODRIGUEZ GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SAC NEDERLAND | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SETTELS SAVENIJE | NL - North Brabant | NL - Brainport Region | Netherlands |
| SIEMENS-SAMTECH | BE - Wallonia | BE - Province de Liège | Belgium |
| SMP | BE - Wallonia | BE - Province de Liège | Belgium |
| SON-X | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SPERING MICRO-SYSTEMS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SURTECHNO | BE - Flanders | BE - Limburg / Leuven | Belgium |
| TEMPCO | BE - Wallonia | BE - Province de Liège | Belgium |
| THALES ALENIA SPACE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| V2I | BE - Wallonia | BE - Province de Liège | Belgium |
| VENNE ELECTRONICS BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| VI TECHNOLOGIES | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| WIELANDTS | BE - Wallonia | BE - Province de Liège | Belgium |
| XERVON | BE - Flanders | not EMR+ | Belgium |

- Mirrors Coating

1. SMEs and LC

| | Key Players | R&D skills | Mirrors Coating actors | % R&D | % KP |
|-----------------------------|-------------|------------|------------------------|-------|------|
| Belgium | 2 | 8 | 11 | 73% | |
| BE - Flanders | 1 | 3 | 5 | 60% | |
| BE - Limburg / Leuven | 1 | 2 | 3 | 67% | |
| not EMR+ | | 1 | 2 | | |
| BE - Wallonia | 1 | 5 | 6 | 83% | |
| BE - Province de Liège | | 1 | 1 | 100% | |
| not EMR+ | 1 | 4 | 5 | | |
| Germany | 2 | 4 | 6 | 67% | |
| DE - North Rhine-Westphalia | 2 | 4 | 6 | 67% | |
| DE - Aachen | 2 | 3 | 3 | 100% | |
| not EMR+ | | 1 | 3 | | |
| Netherlands | 2 | 3 | 4 | 75% | |
| NL - Limburg | 1 | 2 | 2 | 100% | |
| NL - Zuid / Midden Limburg | 1 | 2 | 2 | 100% | |
| NL - North Brabant | 1 | 1 | 2 | | |
| NL- Brainport Region | 1 | 1 | 2 | | |
| Total | 6 | 15 | 21 | 71% | 29% |



2. Research skills

With 21 members, this cluster is the smaller in our inventory. (including 2 LC)

Nevertheless, 71% of the industrial actors of the “Mirrors coating” Cluster have in-house R&D skills, making it a very good “equipped” cluster to face the technological challenges of the Einstein Telescope.

According to regional representatives, the percentage of key players among these 21 is estimated at 29%

3. SWOT

ET instrument -Mirrors coating Cluster SWOT analysis



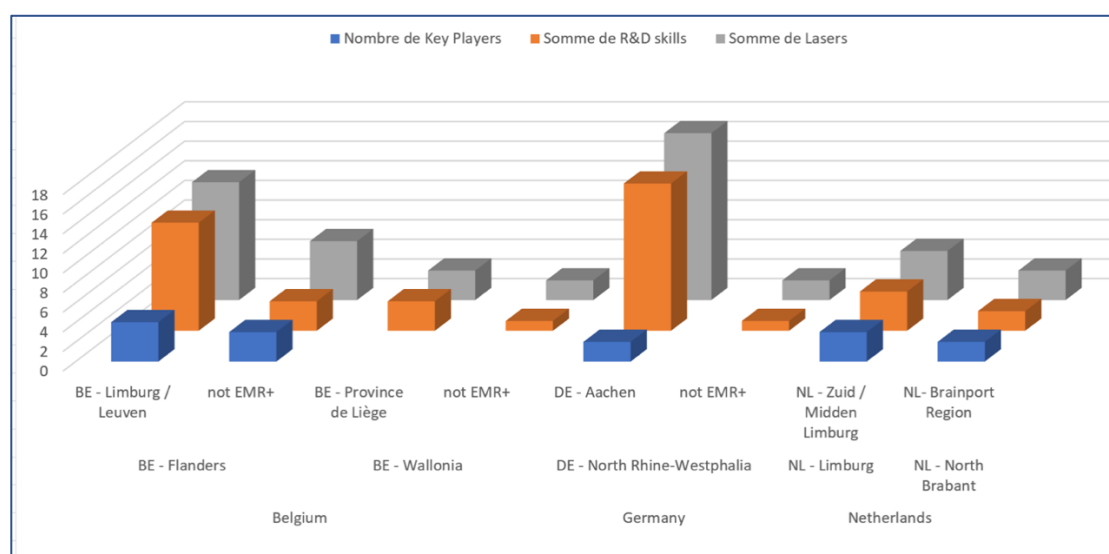
4. Mirrors Coating Cluster (#21)

| Name | Region (Element name) | EMR+ | Country (Element name) |
|---|-----------------------------|----------------------------|------------------------|
| ABSOLEM | BE - Flanders | not EMR+ | Belgium |
| ADMESY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| AGC Plasma Technology Solutions | BE - Wallonia | not EMR+ | Belgium |
| AIXTRON SE | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GED- GESELLSCHAFT FÜR ELEKTRONIK UND DATENTECHNIK MBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| GOOFRA QUALITY PRODUCTS | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| HAMMER IMS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| IMPEX HIGHTECH GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| INNOVATIVE COATING SOLUTIONS (ICS) | BE - Wallonia | not EMR+ | Belgium |
| IPS TECHNOLOGY | NL - North Brabant | NL - Brainport Region | Netherlands |
| JANSEN ELECTRO TECHNIEK | BE - Flanders | BE - Limburg / Leuven | Belgium |
| MaTeck GmbH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MECASOFT | BE - Wallonia | not EMR+ | Belgium |
| METHODES ET TECHNIQUES D'USINAGE | BE - Wallonia | not EMR+ | Belgium |
| MTU | BE - Wallonia | not EMR+ | Belgium |
| NEUTRONSTAR SYSTEMS UG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| Quarzglas Heinrich | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ROARTIS | BE - Flanders | not EMR+ | Belgium |
| SETTELS SAVENIJE | NL - North Brabant | NL - Brainport Region | Netherlands |
| SURTECHNO | BE - Flanders | BE - Limburg / Leuven | Belgium |
| WIELANDTS | BE - Wallonia | BE - Province de Liège | Belgium |

- Lasers

1. SMEs and LC

| | Key Players | R&D skills | Lasers actors | % R&D | % KP |
|-----------------------------|-------------|------------|---------------|------------|------------|
| Belgium | 7 | 18 | 23 | 78% | |
| BE - Flanders | 7 | 14 | 18 | 78% | |
| BE - Limburg / Leuven | 4 | 11 | 12 | 92% | |
| not EMR+ | 3 | 3 | 6 | | |
| BE - Wallonia | | 4 | 5 | 80% | |
| BE - Province de Liège | | 3 | 3 | 100% | |
| not EMR+ | | 1 | 2 | | |
| Germany | 2 | 16 | 19 | 84% | |
| DE - North Rhine-Westphalia | 2 | 16 | 19 | 84% | |
| DE - Aachen | 2 | 15 | 17 | 88% | |
| not EMR+ | | 1 | 2 | | |
| Netherlands | 5 | 6 | 8 | 75% | |
| NL - Limburg | 3 | 4 | 5 | 80% | |
| NL - Zuid / Midden Limburg | 3 | 4 | 5 | | |
| NL - North Brabant | 2 | 2 | 3 | 67% | |
| NL - Brainport Region | 2 | 2 | 3 | | |
| Total | 14 | 40 | 50 | 80% | 28% |



2. Research skills

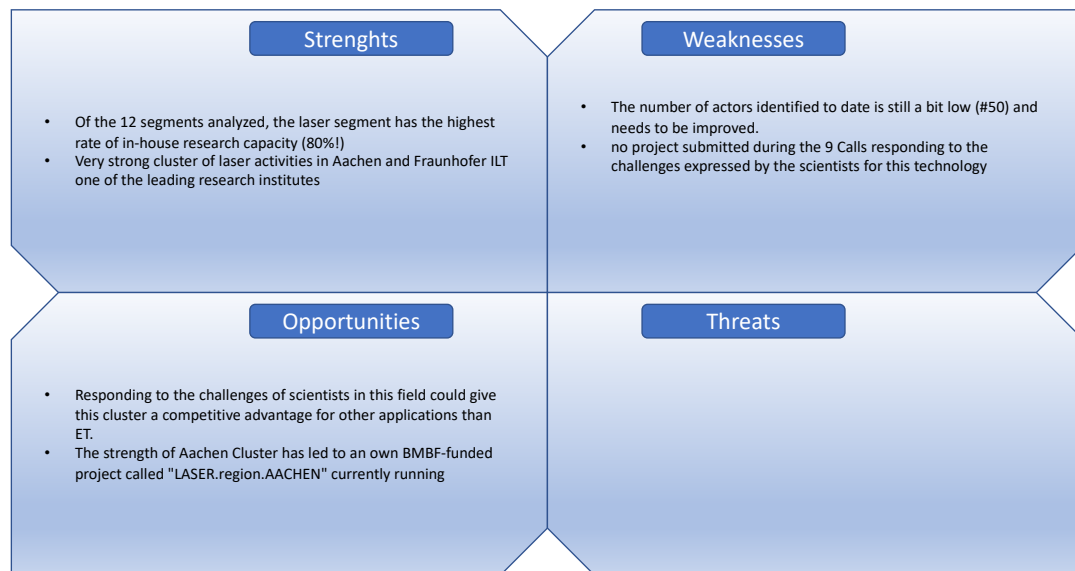
With 50 members, this cluster is the second smaller “instrument Cluster” in our inventory. (including 9 LC)

Nevertheless, 80 % of the industrial actors of the “Laser” Cluster have in-house R&D skills, making it a the best “equipped” cluster to face the technological challenges of the Einstein Telescope.

According to regional representatives, the percentage of key players among these 50 is estimated at 28%

3. SWOT

ET instrument -Lasers Cluster SWOT analysis



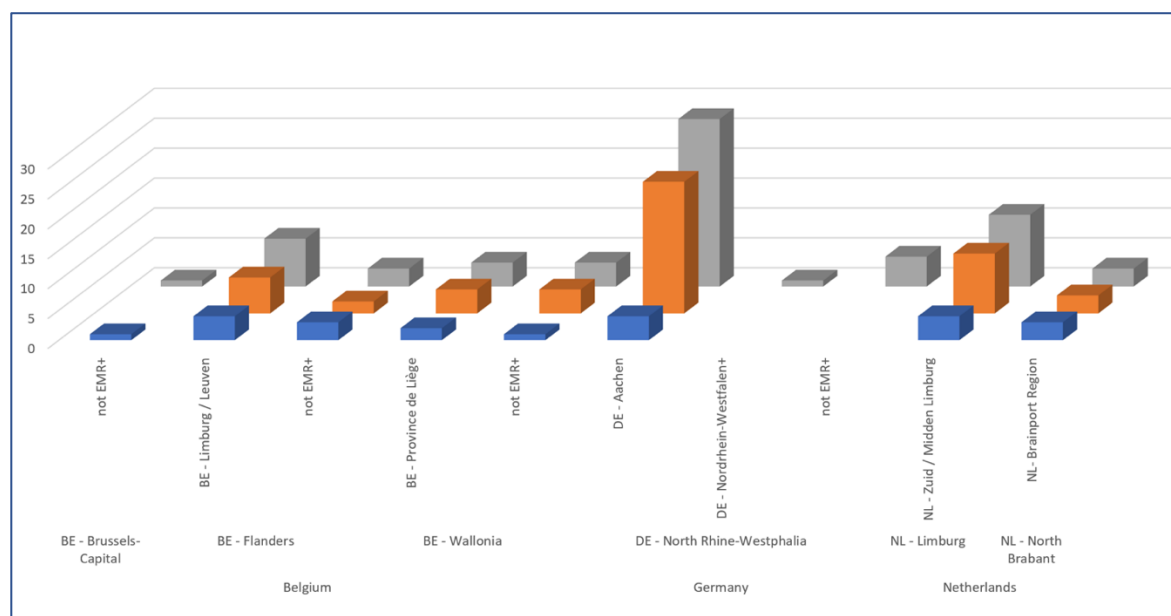
4. Lasers Cluster (#50)

| Name | Region (Element name) | EMR+ | Country (Element name) |
|---|-----------------------------|----------------------------|------------------------|
| YPTF | BE - Flanders | BE - Limburg / Leuven | Belgium |
| THALES ALENIA SPACE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| PLASMAJET | BE - Flanders | BE - Limburg / Leuven | Belgium |
| P-LASER | BE - Flanders | BE - Limburg / Leuven | Belgium |
| LASER CLADDING VENTURE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| LAB Motion | BE - Flanders | BE - Limburg / Leuven | Belgium |
| JANSEN ELECTRO TECHNIK | BE - Flanders | BE - Limburg / Leuven | Belgium |
| HEYARU | BE - Flanders | BE - Limburg / Leuven | Belgium |
| HAMMER IMS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| GEOTEC | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AVERNA | BE - Flanders | BE - Limburg / Leuven | Belgium |
| CEGEKA | BE - Flanders | BE - Limburg / Leuven | Belgium |
| OPEN ENGINEERING | BE - Wallonia | BE - Province de Liège | Belgium |
| GDTECH Engineering | BE - Wallonia | BE - Province de Liège | Belgium |
| DELTATEC | BE - Wallonia | BE - Province de Liège | Belgium |
| 4JET TECHNOLOGIES GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| RODRIGUEZ GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PULSAR PHOTONICS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PICOLAS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PH-MECHANIK GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXTRON SE | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| NOKRA OPTISCHE PRÜFTECHNIK UND AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MaTeck GmbH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MARX AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LSA - LASER ANALYTICAL SYSTEMS & AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LIGHTFAB GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LAVA-X GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INGENIEURBÜRO CLERMONT + PARTNER | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ILAS150 GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FEF FORSCHUNGS- UND ENTWICKLUNGSGESELLSCHAFT FÜGETECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BARTHEL HF-TECHNIK | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BERATRON GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| VI TECHNOLOGIES | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VENNE ELECTRONICS BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| ADMESY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| JPE BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GDO BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| ABSOLEM | BE - Flanders | not EMR+ | Belgium |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| ROARTIS | BE - Flanders | not EMR+ | Belgium |
| AGFA-GEVAERT | BE - Flanders | not EMR+ | Belgium |
| OIP | BE - Flanders | not EMR+ | Belgium |
| COMATE | BE - Flanders | not EMR+ | Belgium |
| MTU | BE - Wallonia | not EMR+ | Belgium |
| METHODES ET TECHNIQUES D'USINAGE | BE - Wallonia | not EMR+ | Belgium |
| LIOP-TEC GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| IMPEX HIGHTECH GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| SETTELS SAVENUE | NL - North Brabant | NL- Brainport Region | Netherlands |
| IPS TECHNOLOGY | NL - North Brabant | NL- Brainport Region | Netherlands |
| INNOVATION HANDLING | NL - North Brabant | NL- Brainport Region | Netherlands |

- Advanced Control Algorithms

1. SMEs and LC

| | Key Players | R&D skills | Advanced Control Algorithms actors | %R&D | % KP |
|-----------------------------|-------------|------------|------------------------------------|------------|------------|
| Belgium | 11 | 16 | 20 | 80% | |
| BE - Brussels-Capital | 1 | | 1 | | |
| not EMR+ | 1 | | 1 | | |
| BE - Flanders | 7 | 8 | 11 | 73% | |
| BE - Limburg / Leuven | 4 | 6 | 8 | 75% | |
| not EMR+ | 3 | 2 | 3 | | |
| BE - Wallonia | 3 | 8 | 8 | 100% | |
| BE - Province de Liège | 2 | 4 | 4 | 100% | |
| not EMR+ | 1 | 4 | 4 | | |
| Germany | 4 | 22 | 34 | 65% | |
| DE - North Rhine-Westphalia | 4 | 22 | 34 | 65% | |
| DE - Aachen | 4 | 22 | 28 | 79% | |
| DE - Nordrhein-Westfalen+ | | | 1 | | |
| not EMR+ | | | 5 | | |
| Netherlands | 7 | 13 | 15 | 87% | |
| NL - Limburg | 4 | 10 | 12 | 83% | |
| NL - Zuid / Midden Limburg | 4 | 10 | 12 | 83% | |
| NL - North Brabant | 3 | 3 | 3 | | |
| NL - Brainport Region | 3 | 3 | 3 | | |
| Total | 22 | 51 | 69 | 74% | 32% |



2. Research skills

69 SMEs and LC

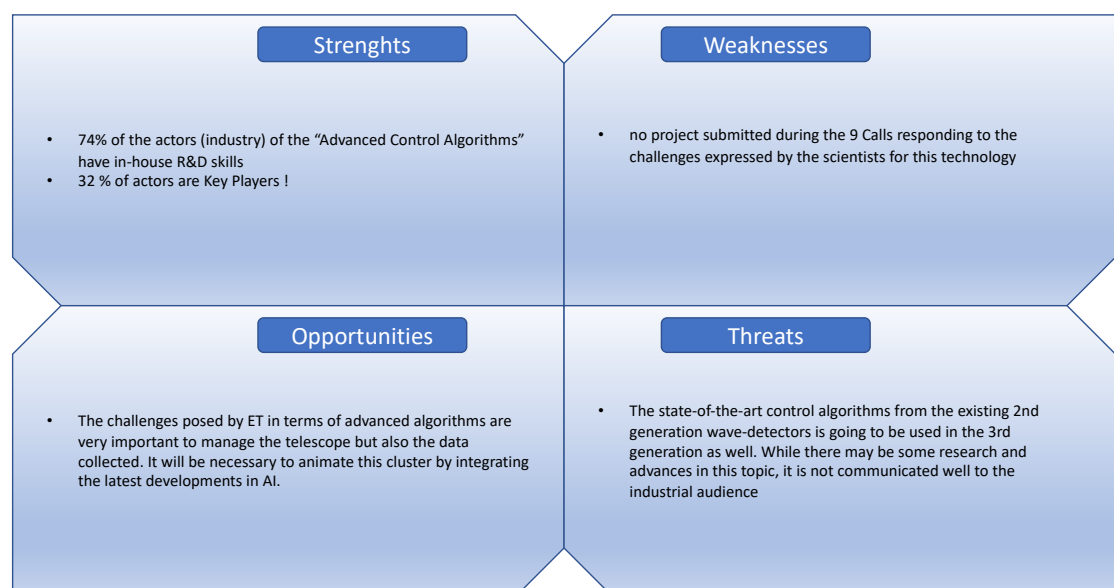
74% of the actors (industry) of the “Advanced Control Algorithms” have in-house R&D skills, making it a particularly well-prepared cluster to face the technological challenges of the Einstein Telescope.

According to regional representatives, the percentage of key players is estimated at 32%, which strengthens the competitive position of this Algorithms cluster

Based upon feedback from companies the topic algorithm is less interesting for them as very little development is visible in this topic. The state-of-the-art control algorithms from the existing 2nd generation wave-detectors is going to be used in the 3rd generation as well. While there may be some research and advances in this topic, it is not communicated well to the industrial audience. Or it is not interesting to build upon the existing algorithms for the industrial actors.

3. SWOT

ET instrument -Algo Cluster SWOT analysis



4. Advanced Control Algorithms Cluster (#69)

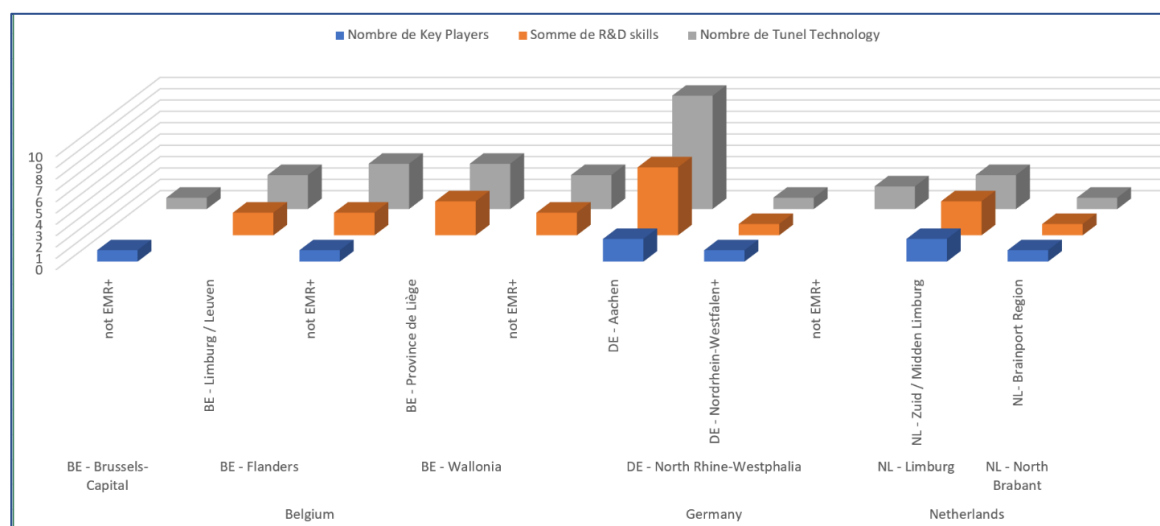
| Name | Region (Element name) | EMR+ | Country (Element name) |
|---|-----------------------------|----------------------------|------------------------|
| AGC Plasma Technology Solutions | BE - Wallonia | not EMR+ | Belgium |
| AIXCON POWERSYSTEMS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXITEM | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXPROCESS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXTEC INGENIEURGESELLSCHAFT MBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AMOTRONICS | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ANATECH BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| APPWISE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AS TECH INDUSTRIE- UND SPANNHYDRAULIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AVERNA | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AXXTEQ SERVICE GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BERATRON GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| BLOCKHEATING BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| BOOSTING ALPHA | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| CALCULUS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| CAP Innov | BE - Wallonia | not EMR+ | Belgium |
| CEGEKA | BE - Flanders | BE - Limburg / Leuven | Belgium |
| CFM SCHILLER GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| CODEWORX GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DDQ B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| DeltaRay | BE - Flanders | BE - Limburg / Leuven | Belgium |
| DELTATEC | BE - Wallonia | BE - Province de Liège | Belgium |
| DILLEN TECHNOLOGIES | BE - Flanders | BE - Limburg / Leuven | Belgium |
| DSA DATEN- UND SYSTEMTECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DYNA-MESS PRÜFSYSTEME GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| EDGISE | BE - Flanders | not EMR+ | Belgium |
| FIONEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| G.O.E.T.H.E | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GDO BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GED- GESELLSCHAFT FÜR ELEKTRONIK UND DATENTECHNIK MBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| GENZAI BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GEVA AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GIM | BE - Flanders | not EMR+ | Belgium |
| HAMMER IMS | BE - Flanders | BE - Limburg / Leuven | Belgium |
| ICON PRO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INCORTEX GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INNOVATION HANDLING | NL - North Brabant | NL - Brainport Region | Netherlands |
| INVENIO TECHNICAL SIMULATIONS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| ISP-AACHEN | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| KABISA B.V. | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| KIMA PROCESS CONTROL GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LSA - LASER ANALYTICAL SYSTEMS & AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MABRI.VISION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MI-PARTNERS | NL - North Brabant | NL - Brainport Region | Netherlands |
| MINDMOTIV GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| NEUTRONSTAR SYSTEMS UG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| OSCARs | BE - Wallonia | not EMR+ | Belgium |
| PHD IN EUROPE GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PICOLAS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PULSAR PHOTONICS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| RI - RESEARCH INSTRUMENTS GMBH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| SAC NEDERLAND | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SAGACIFY | BE - Wallonia | not EMR+ | Belgium |
| SCIENCENTRIC® AG | DE - North Rhine-Westphalia | not EMR+ | Germany |
| SETTELS SAVENIJE | NL - North Brabant | NL - Brainport Region | Netherlands |
| SIEMENS-SAMTECH | BE - Wallonia | BE - Province de Liège | Belgium |
| SITECH Services | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| SPACEBEL | BE - Wallonia | BE - Province de Liège | Belgium |
| STORK ASSET MANAGEMENT TECHNOLOGY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| THALES ALENIA SPACE | BE - Flanders | BE - Limburg / Leuven | Belgium |
| TLK ENERGY GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| TRACTEBEL | BE - Brussels-Capital | not EMR+ | Belgium |
| V2I | BE - Wallonia | BE - Province de Liège | Belgium |
| VECTIONEER BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| VEMAC GMBH & CO. KG | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| VI TECHNOLOGIES | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| WKW Group | DE - North Rhine-Westphalia | DE - Nordrhein-Westfalen+ | Germany |
| XTONOMY GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |

• Geology

• Tunnel Technology

1. SMEs and LC

| | Key Players | R&D skills | Tunnel Technology actors | % R&D | % KP |
|-----------------------------|-------------|------------|--------------------------|------------|------------|
| Belgium | 2 | 9 | 15 | 60% | |
| BE - Brussels-Capital | 1 | | 1 | | |
| not EMR+ | 1 | | 1 | | |
| BE - Flanders | 1 | 4 | 7 | 57% | |
| BE - Limburg / Leuven | | 2 | 3 | 67% | |
| not EMR+ | 1 | 2 | 4 | | |
| BE - Wallonia | | 5 | 7 | 71% | |
| BE - Province de Liège | | 3 | 4 | 75% | |
| not EMR+ | | 2 | 3 | | |
| Germany | 3 | 7 | 13 | 54% | |
| DE - North Rhine-Westphalia | 3 | 7 | 13 | 54% | |
| DE - Aachen | 2 | 6 | 10 | 60% | |
| DE - Nordrhein-Westfalen+ | 1 | 1 | 1 | | |
| not EMR+ | | | 2 | | |
| Netherlands | 3 | 4 | 4 | 100% | |
| NL - Limburg | 2 | 3 | 3 | 100% | |
| NL - Zuid / Midden Limburg | 2 | 3 | 3 | | |
| NL - North Brabant | 1 | 1 | 1 | | |
| NL - Brainport Region | 1 | 1 | 1 | | |
| Total | 8 | 20 | 32 | 63% | 25% |



2. Research skills

32 SMEs and LC are present in this Cluster

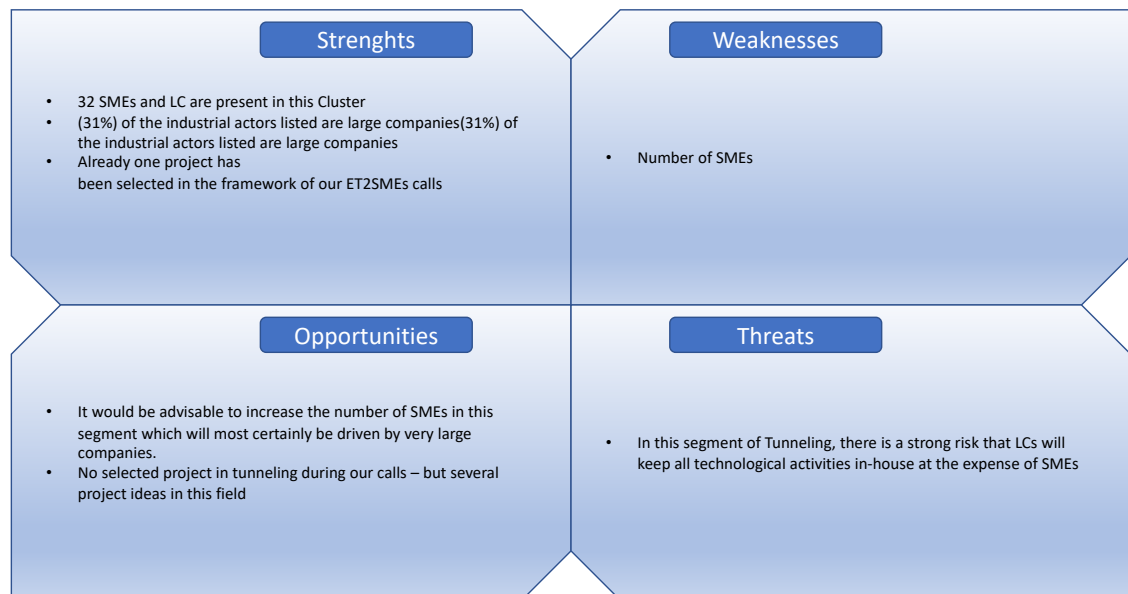
It is important to note that 10/32 (31%) of the industrial actors listed are large companies. Given the specificity of this cluster, this is quite normal.

63% of the actors of the “Tunnel Cluster” have in-house R&D skills

According to regional representatives, the percentage of key players is estimated at 25%

3. SWOT

ET Geology-Tunneling Cluster SWOT analysis



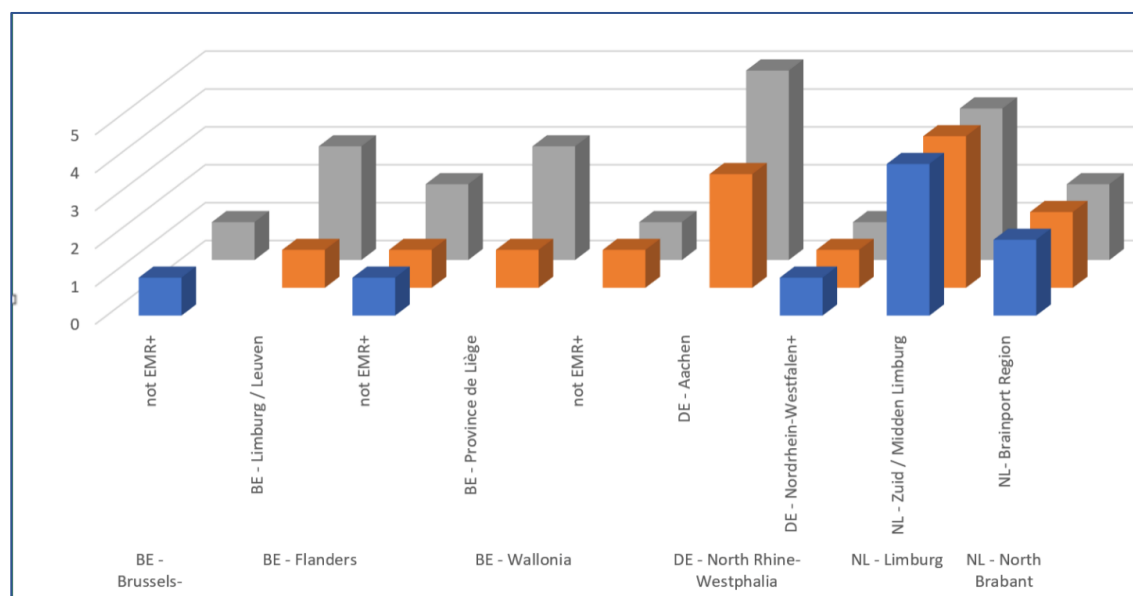
4. Tunnel tech Cluster (#32)

| Name | Region (Element name) | EMR+ | Country (Element name) |
|--|-----------------------------|------------------------|------------------------|
| AMBERG | BE - Brussels-Capital | not EMR+ | Belgium |
| YPTF | BE - Flanders | BE - Limburg / Leuven | Belgium |
| K-BORINGEN | BE - Flanders | BE - Limburg / Leuven | Belgium |
| GEOTEC | BE - Flanders | BE - Limburg / Leuven | Belgium |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| STRAIN 2 DATA | BE - Flanders | not EMR+ | Belgium |
| PHOENIX CONTACT | BE - Flanders | not EMR+ | Belgium |
| P&V PANELS | BE - Flanders | not EMR+ | Belgium |
| DUCHENE S.A. | BE - Wallonia | BE - Province de Liège | Belgium |
| DELTATEC | BE - Wallonia | BE - Province de Liège | Belgium |
| BPC WALLONIE | BE - Wallonia | BE - Province de Liège | Belgium |
| BAM GALÈRE | BE - Wallonia | BE - Province de Liège | Belgium |
| MICROMEGA DYNAMICS | BE - Wallonia | not EMR+ | Belgium |
| I-CARE | BE - Wallonia | not EMR+ | Belgium |
| FIRE SAFETY CONSULTING | BE - Wallonia | not EMR+ | Belgium |
| VERMESSUNGSBÜRO FRANKEN UND WÜLLER | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| TUNNEL SERVICE GROUP GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SST PROF. DR.-ING. STOLL & PARTNER INGENIEURGESELLSCHAFT MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SPERING MICRO-SYSTEMS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAP - MICROSTRUCTURE AND PORES | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| LSA - LASER ANALYTICAL SYSTEMS & AUTOMATION GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ICON PRO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| FMI IMPROVIA AACHEN | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DYNA-MESS PRÜFSYSTEME GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AMOTRONICS | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DMT Group | DE - North Rhine-Westphalia | Westfalen+ | Germany |
| FIVEMOREMINUTES | DE - North Rhine-Westphalia | not EMR+ | Germany |
| CDM SMITH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| VI TECHNOLOGIES | NL - Limburg | Limburg | Netherlands |
| GDO BV | NL - Limburg | Limburg | Netherlands |
| FUGRO | NL - Limburg | Limburg | Netherlands |
| PHOTONFIRST | NL - North Brabant | NL- Brainport Region | Netherlands |

- Geophysical Imaging and remote sensing

1. SMEs and LC

| | Key Players | R&D skills | Geophysical Imaging and remote sensing actors | % R&D | % KP |
|-----------------------------|-------------|------------|---|------------|------------|
| Belgium | 2 | 4 | 10 | 40% | |
| BE - Brussels-Capital | 1 | | 1 | | |
| not EMR+ | 1 | | 1 | | |
| BE - Flanders | 1 | 2 | 5 | 40% | |
| BE - Limburg / Leuven | | 1 | 3 | | |
| not EMR+ | 1 | 1 | 2 | | |
| BE - Wallonia | | 2 | 4 | 50% | |
| BE - Province de Liège | | 1 | 3 | | |
| not EMR+ | | 1 | 1 | | |
| Germany | 1 | 4 | 6 | 67% | |
| DE - North Rhine-Westphalia | 1 | 4 | 6 | | |
| DE - Aachen | | 3 | 5 | 60% | |
| DE - Nordrhein-Westfalen+ | 1 | 1 | 1 | | |
| Netherlands | 6 | 6 | 6 | 100% | |
| NL - Limburg | 4 | 4 | 4 | | |
| NL - Zuid / Midden Limburg | 4 | 4 | 4 | 100% | |
| NL - North Brabant | 2 | 2 | 2 | | |
| NL - Brainport Region | 2 | 2 | 2 | | |
| Total | 9 | 14 | 22 | 64% | 41% |



2. Research skills

Only 22 SMEs and LC are present in this Cluster

it is important to note that according to the regional partners, 41 of these players are “key players” in their field, which is a definite advantage for this Cluster

64% of the actors of the “Imaging and remote sensing” Cluster have in-house R&D skills

3. SWOT

ET Geology-imaging Cluster SWOT analysis



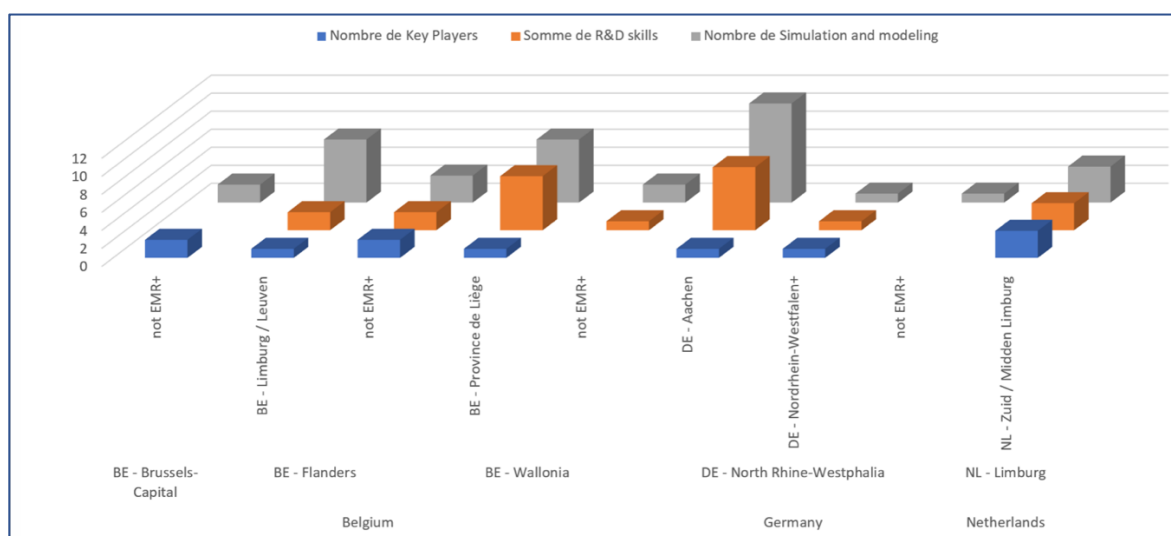
4. Geophysical Cluster (#22)

| Name | Region (Element name) | EMR+ | Country (Element name) |
|--|-----------------------------|----------------------------|------------------------|
| AMBERG | BE - Brussels-Capital | not EMR+ | Belgium |
| 3ES | BE - Flanders | BE - Limburg / Leuven | Belgium |
| GEOS LABORATORIES | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AVISUM | BE - Flanders | BE - Limburg / Leuven | Belgium |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| BOM-BE | BE - Flanders | not EMR+ | Belgium |
| SMP | BE - Wallonia | BE - Province de Liège | Belgium |
| BPC WALLONIE | BE - Wallonia | BE - Province de Liège | Belgium |
| BAM GALÈRE | BE - Wallonia | BE - Province de Liège | Belgium |
| OSCARS | BE - Wallonia | not EMR+ | Belgium |
| SST PROF. DR.-ING. STOLL & PARTNER INGENIEURGESELLSCHAFT MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SPERING MICRO-SYSTEMS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ICON PRO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| HEUERMANN HF-TECHNIK GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GEOPHYSICA BERATUNGSGESELLSCHAFT MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DMT Group | DE - North Rhine-Westphalia | DE - Nordrhein-Westfalen+ | Germany |
| ADMESY | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GENZAI BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| GDO BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| FUGRO | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| PHOTONFIRST | NL - North Brabant | NL- Brainport Region | Netherlands |
| MI-PARTNERS | NL - North Brabant | NL- Brainport Region | Netherlands |

- Simulation and Modeling

1. SMEs and LC

| | Key Players | R&D skills | Simulation and modeling actors | %R&D | % KP |
|-----------------------------|-------------|------------|--------------------------------|------------|------------|
| Belgium | 6 | 11 | 21 | 52% | |
| BE - Brussels-Capital | 2 | | 2 | | |
| not EMR+ | 2 | | 2 | | |
| BE - Flanders | 3 | 4 | 10 | 40% | |
| BE - Limburg / Leuven | 1 | 2 | 7 | 29% | |
| not EMR+ | 2 | 2 | 3 | | |
| BE - Wallonia | 1 | 7 | 9 | 78% | |
| BE - Province de Liège | 1 | 6 | 7 | 86% | |
| not EMR+ | | 1 | 2 | | |
| Germany | 2 | 8 | 13 | 62% | |
| DE - North Rhine-Westphalia | 2 | 8 | 13 | 62% | |
| DE - Aachen | 1 | 7 | 11 | 64% | |
| DE - Nordrhein-Westfalen+ | 1 | 1 | 1 | | |
| not EMR+ | | | 1 | | |
| Netherlands | 3 | 3 | 4 | 75% | |
| NL - Limburg | 3 | 3 | 4 | | |
| NL - Zuid / Midden Limburg | 3 | 3 | 4 | | |
| Total général | 11 | 22 | 38 | 58% | 29% |



2. Research skills

38 SMEs and LC are present in this Cluster making it the largest cluster for geology-related technologies

58% of the actors of the “Simulation and Modeling” Cluster have in-house R&D skills and 29% of them are considered as Key-Players

3. SWOT

ET Geology-Simulation and modeling Cluster SWOT analysis



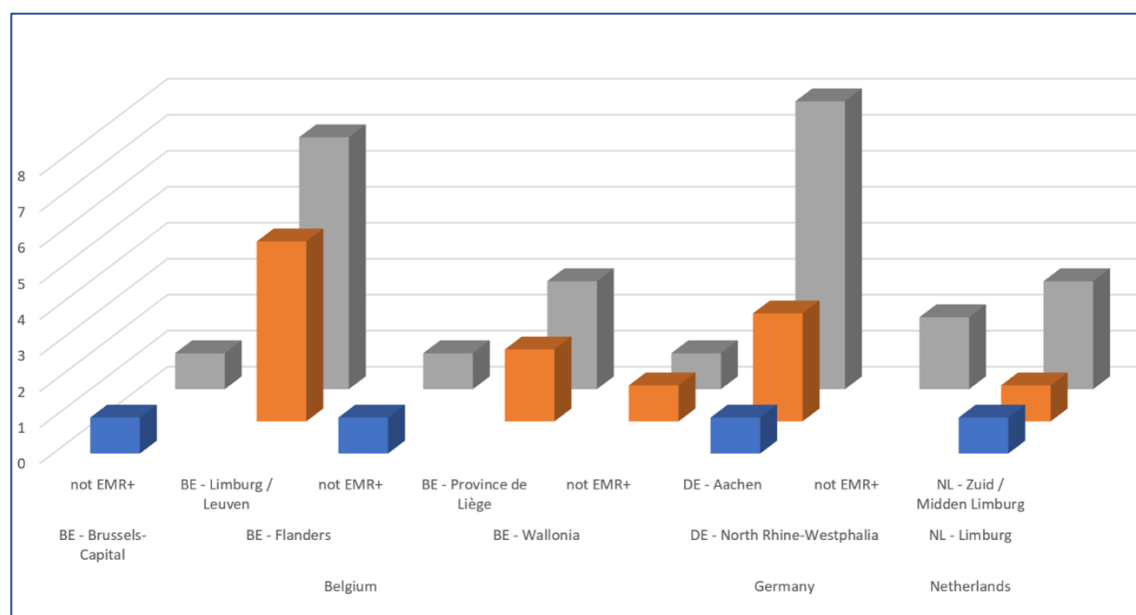
4. Simulation and Modeling Cluster (#38)

| Name | Region (Element name) | EMR+ | name) |
|---|-----------------------------|----------------------------|-------------|
| TRACTEBEL | BE - Brussels-Capital | not EMR+ | Belgium |
| AMBERG | BE - Brussels-Capital | not EMR+ | Belgium |
| 3ES | BE - Flanders | BE - Limburg / Leuven | Belgium |
| INGENIUM | BE - Flanders | BE - Limburg / Leuven | Belgium |
| IFLUX | BE - Flanders | BE - Limburg / Leuven | Belgium |
| GEOTEC | BE - Flanders | BE - Limburg / Leuven | Belgium |
| DIDEX | BE - Flanders | BE - Limburg / Leuven | Belgium |
| APK | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AVISUM | BE - Flanders | BE - Limburg / Leuven | Belgium |
| VERHAERT | BE - Flanders | not EMR+ | Belgium |
| HITA | BE - Flanders | not EMR+ | Belgium |
| GIM | BE - Flanders | not EMR+ | Belgium |
| VZI | BE - Wallonia | BE - Province de Liège | Belgium |
| SPACEBEL | BE - Wallonia | BE - Province de Liège | Belgium |
| NIRLI | BE - Wallonia | BE - Province de Liège | Belgium |
| GDTECH Engineering | BE - Wallonia | BE - Province de Liège | Belgium |
| DELTATEC | BE - Wallonia | BE - Province de Liège | Belgium |
| BPC WALLONIE | BE - Wallonia | BE - Province de Liège | Belgium |
| BAM GALÈRE | BE - Wallonia | BE - Province de Liège | Belgium |
| OSCARs | BE - Wallonia | not EMR+ | Belgium |
| FIRE SAFETY CONSULTING | BE - Wallonia | not EMR+ | Belgium |
| XTONOMY GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| TERRANIGMA SOLUTIONS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SST PROF. DR.-ING. STOLL & PARTNER INGENIEURGESELLSCHAFT MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| SDA ENGINEERING GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| PROAQUA INGENIEURGESELLSCHAFT FÜR WASSER- UND UMWELTTECHNIK MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAP - MICROSTRUCTURE AND PORES | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INGENIEURBÜRO HEITFELD-SCHETELIG (IHS) | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ICON PRO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| AIXPROCESS GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GEOPHYSICA BERATUNGSGESELLSCHAFT MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DYNA-MESS PRÜFSYSTEME GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DMT Group | DE - North Rhine-Westphalia | DE - Nordrhein-Westfalen+ | Germany |
| CDM SMITH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| GENZAI BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| FUGRO | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| ANTEA NEDERLAND BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| BLUETEA BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |

- Water Technology

1. SMEs and LC

| | Key Players | R&D skills | Water technology actors | %R&D | % KP |
|-----------------------------|-------------|------------|-------------------------|------|------|
| Belgium | 2 | 8 | 13 | 62% | |
| BE - Brussels-Capital | 1 | | 1 | | |
| not EMR+ | 1 | | 1 | | |
| BE - Flanders | 1 | 5 | 8 | 63% | |
| BE - Limburg / Leuven | | 5 | 7 | | |
| not EMR+ | 1 | | 1 | | |
| BE - Wallonia | | 3 | 4 | 75% | |
| BE - Province de Liège | | 2 | 3 | | |
| not EMR+ | | 1 | 1 | | |
| Germany | 1 | 3 | 10 | 30% | |
| DE - North Rhine-Westphalia | 1 | 3 | 10 | | |
| DE - Aachen | 1 | 3 | 8 | 38% | |
| not EMR+ | | | 2 | | |
| Netherlands | 1 | 1 | 3 | 33% | |
| NL - Limburg | 1 | 1 | 3 | | |
| NL - Zuid / Midden Limburg | 1 | 1 | 3 | | |
| Total | 4 | 12 | 26 | 46% | 15% |



2. Research skills

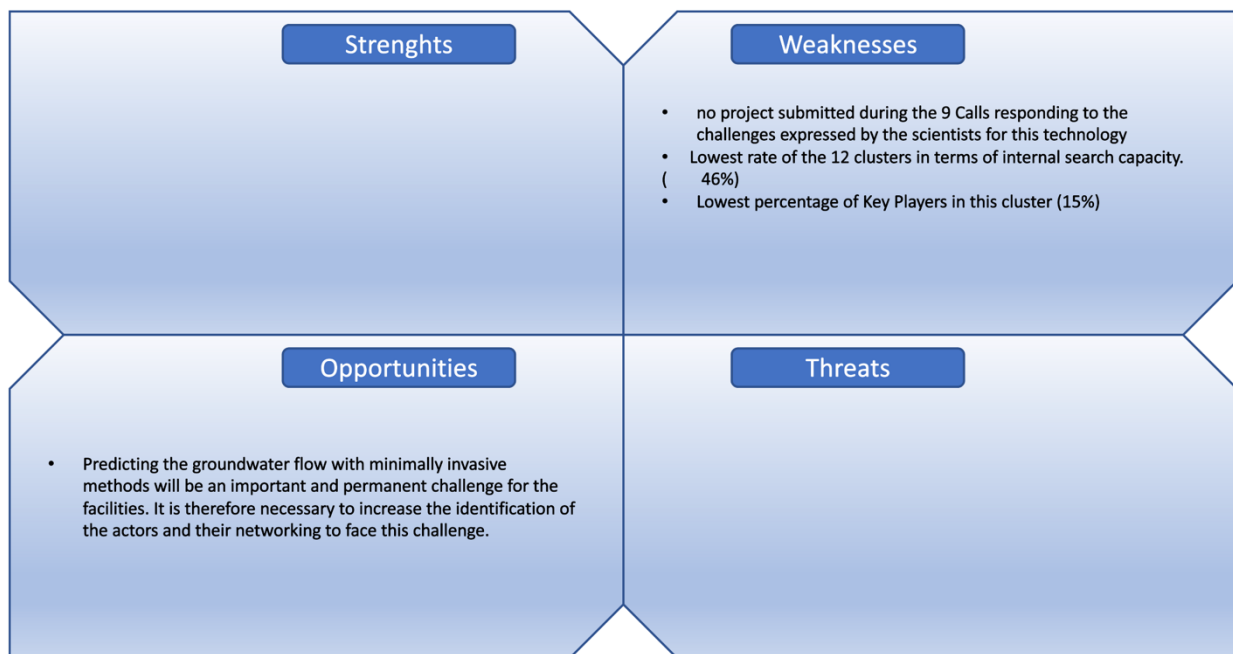
26 actors in our database declare to be active in Water Technologies

46% of the actors (industry) of the “Water Technology Cluster” have in-house R&D skills, making it the “less” well-prepared cluster to face the technological challenges of the Einstein Telescope (in comparison with the other 11 clusters).

Only 15% of them are considered as Key-Players.

3. SWOT

ET Geology-Water Tech Cluster SWOT analysis



4. Water tech Cluster (#26)

| Name | Region (Element name) | EMR+ | Country (Element name) |
|---|-----------------------------|----------------------------|------------------------|
| TRACTEBEL | BE - Brussels-Capital | not EMR+ | Belgium |
| TUBOBEL | BE - Flanders | BE - Limburg / Leuven | Belgium |
| STEINZEUG - KERAMO | BE - Flanders | BE - Limburg / Leuven | Belgium |
| RDL | BE - Flanders | BE - Limburg / Leuven | Belgium |
| ADVANCED GROUNDWATER TECHNIQUES - A.G.T. | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AGRIPPA CLEANTECH | BE - Flanders | BE - Limburg / Leuven | Belgium |
| IFTECH | BE - Flanders | BE - Limburg / Leuven | Belgium |
| IFLUX | BE - Flanders | BE - Limburg / Leuven | Belgium |
| AGFA-GEVAERT | BE - Flanders | not EMR+ | Belgium |
| GDTECH Engineering | BE - Wallonia | BE - Province de Liège | Belgium |
| BPC WALLONIE | BE - Wallonia | BE - Province de Liège | Belgium |
| BAM GALÈRE | BE - Wallonia | BE - Province de Liège | Belgium |
| TRAQUA | BE - Wallonia | not EMR+ | Belgium |
| PROAQUA INGENIEURGESELLSCHAFT FÜR WASSER- UND UMWELTTECHNIK MBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| MAP - MICROSTRUCTURE AND PORES | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| INGENIEURBÜRO HEITFELD-SCHETELIG (IHS) | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ILA5150 GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| ICON PRO GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| GEOTECHNISCHES BÜRO | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| EPCOTEC GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DYNA-MESS PRÜFSYSTEME GMBH | DE - North Rhine-Westphalia | DE - Aachen | Germany |
| DAHLEM BERATENDE INGENIEURE | DE - North Rhine-Westphalia | not EMR+ | Germany |
| CDM SMITH | DE - North Rhine-Westphalia | not EMR+ | Germany |
| KOM E+A BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| COMPUTD BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |
| ANTEA NEDERLAND BV | NL - Limburg | NL - Zuid / Midden Limburg | Netherlands |

- Summary

| Clusters | # | Large Companies (LC) | % of LC | R&D internal Skills (%) | Considered as KP (%) |
|---------------------|-----|----------------------|---------|-------------------------|----------------------|
| Cryogenics | 53 | 7 | 13% | 75% | 32% |
| Vacuum | 73 | 13 | 18% | 68% | 25% |
| Precision Mechanics | 142 | 16 | 17% | 54% | 15% |
| Sensors | 103 | 16 | 15% | 71% | 29% |
| Opticals | 72 | 10 | 14% | 72% | 28% |
| Mirrors | 21 | 2 | 9% | 71% | 29% |
| Lasers | 50 | 9 | 18% | 80% | 28% |
| Algorithms | 69 | 11 | 16% | 74% | 32% |
| Tunneling | 32 | 10 | 31% | 63% | 25% |
| Geo- Imaging | 22 | 4 | 18% | 64% | 41% |
| Modelling | 38 | 8 | 21% | 58% | 29% |
| Water technology | 26 | 5 | 19% | 46% | 15% |

- Number of entities:

The 3 bigger Cluster are Precision mechanics, Sensors and Vacuum.

Remembering that the main technological challenges for the ET instrument are in Optics, Lasers and Cryogenics, then the number of actors actually listed in the Cryo (53), Optical metrology (72), lasers (50) and Mirrors coatings (21) clusters has to be improved by a reinforcing identification of relevant players. We could supposed that more research lead at 25% to an improvement of the situation. If not, then the right strategy would be to close cooperations with other regions having the required competencies.

- Large Companies
 - As mentioned above, the LC inventory was not the primary goal of the ET2SMEs project. Nevertheless, 44 of them spontaneously expressed their interest in ET in the various meetings and surveys.

- While knowing that they will play a very important role in the future realization of the telescope, it will be appropriate in the future to make an exhaustive inventory of the LC in EMR Region who could add their skills to the ET.
- We can already note that these LC are more numerous to have shown interest in the fields related to geology and civil engineering.
- R&D Skills in house:
 - In a rather predictable way, the actors active in the technologies related to the instrument have on average more important competencies in R&D than for the Geology and the structural works of the telescope.
 - It is worth noting the very high level of in-house R&D skills among the players active in the field of lasers.
- Key-Players:
 - As a reminder, the qualification of "Key-Players" is more subjective. The percentage of these key players in Europe is fairly well distributed between the clusters and is around 30% of KP for each cluster
 - Concerning the relative low score obtained for the "Precision Mechanics and Mechatronics" cluster (15%), the reason could be: due to the large number of players, often in combination with customer-based solutions and not own developed solutions, a lot of competitors and thus a lower rate of key players.