



## Project summary and guidelines

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<http://www.ingdivsproject.eu>

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*Gender bias is undermining our social fabric and devalues all of us. It is not just a human rights issue; it is a tremendous waste of the world's human potential. By denying women equal rights, we deny half the population a chance to live life at its fullest. Political, economic and social equality for women will benefit all the world's citizens. Together we can eradicate prejudice and work for equal rights and respect for all.*

*- Global goal #5*

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## Executive summary

### Project objectives

The general objectives for the entire project were: *increasing the number of graduates by attracting a broader cross-section of society into higher education and reducing the number of students who drop out without completing their course.* The operationalisation objective was transformed as follows: *The project **contributes to** increasing the number of graduates by attracting a broader cross-section of society into higher education and reducing the number of students who drop out without completing their course and to widen the **vision of how can becoming an engineer.***

The output of the project is an online filtering tool that uses multiple dimensions to match prospective students to current students and successful graduates. The tool was developed to provide intuitive and easy-to-understand feedback to aid prospective students in making a more informed choice by broadening their understanding of engineering as a career and encouraging them to reflect on their fears and prejudices regarding the field. The ANNA tool at [www.projectanna.eu](http://www.projectanna.eu) represents the final output of the project.

### Project partners

#### CLUSTER

The Consortium Linking Universities of Science and Technology for Education and Research (CLUSTER) includes 12 elite European universities in science, engineering and architecture and associate members from around the world. CLUSTER represents a multi-location European University of Science and Technology, with approximately 3,000 professors, 11,000 academic staff, 14,000 PhD students and more than 140,000 students.

In a world that is facing unprecedented challenges, technology and engineering and play central roles. The wellbeing of our society depends on our answers to such challenges, and they cannot be found by a single nation or engineering discipline. Instead, they call for truly international, multi-disciplinary collaboration and a new mindset. It is thus largely in our hands to breed a new generation of engineers with leadership and entrepreneurial skills. CLUSTER is an active platform in the promotion and creation of frameworks that aim to tackle these societal issues.

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## Partners

This project has been a collaboration between universities and secondary schools from six European countries: Karlsruher Institut für Technologie (Germany), KTH Royal Institute of Technology (Sweden), Politecnico di Torino (Italy), KU Leuven (Belgium), Trinity

College Dublin (Ireland) and Técnico Lisboa (Portugal). The following secondary school partners have been involved: Vallauri (Italy), Our Lady's School (Ireland) and Heilig-Hartinstituut Heverlee (Belgium).



**POLITECNICO  
DI TORINO**



## Acknowledgement

This document is the final report on work that was conducted for the 'Increasing gender diversity in STEM' (INGDIVS) project within the EU strategic partnership – subprogramme KA1 Policy Cooperation and Innovation.

The project is a collaboration between numerous individuals in each of the universities and schools that participated.

We wish to thank them for their contributions and assistance.

We also want to thank all current students and alumni that have contributed to building the database in the ANNA tool as well as the high school students who gave us invaluable feedback for the tool's development.

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## Structure of the report

This report summarises the work that was conducted in the ERASMUS+ initiative *Increasing gender diversity in STEM* as well as offers helpful ideas for using the final product of the project—the ANNA tool.

More information is available on the project's webpage:  
<https://www.ingdivsproject.eu/>

The ANNA tool is available on:  
<https://www.projectanna.eu/>

### Equality in engineering education

To increase equality in engineering education, many different approaches need to be implemented at different levels and towards different target groups. Cultural change requires working in different ways among different stakeholders.

To increase gender equality, potential students of all genders must feel that engineering education has something to offer them. Engineering education and future careers must be open to and inclusive of all types of people and all types of engineers.

### INGDIVS and gender diversity

In what way does the INGDIVS project contribute to increasing gender diversity in engineering education?

The understanding within INGDIVS is that no single activity can solve inequality in engineering education. INGDIVS can only succeed as one solution among other initiatives that contribute to change.

How will we know that a resource, such as ANNA tool, support a fruitful and successful result and contribution to equality in engineering education?

Creating change is a long-term endeavour. The work of the INGDIVS project aims to address that long-term need. So, the question to ask is this: How do we measure cultural change on this topic and how can we relate it to one particular activity?

Within the project, we perceive the initiative and the tool as a long-term project. Therefore, we cannot currently measure its success. However, all feedback from the tests that were conducted with high school students is considered an indicator that the tool may potentially contribute to more gender equality in engineering education.

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## INGDIVS project summary

INGDIVS is a 34-month project that aims to develop a filtering tool using multiple dimensions for prospective students (i.e. at the high school level) to help them gain a broader view of engineering. The user will be able to find information about current students and successful graduates. The tool will be developed to provide intuitive and easy-to-understand

feedback to help prospective students make a more conscious career choice. The ANNA tool represents the final output of the project.

The project was organised into work packages that somewhat overlap in time. The textbox below shows a summary of the work that was conducted within the project.

### The work of INGDIVS in five steps

#### 1. Definition of key inputs for the profiling tool: WHAT should the tool include?

*The first work package defined what kinds of questions should be included in the filtering tool. Furthermore, gender-specific issues and strategies regarding the questions' styles and data collection methods were defined. Cultural, social and educational nuances that were relevant to each of the participant's locations were considered.*

*It was determined that the tool should focus on supporting high school students by suggesting that the user explore engineering as a possible future career. Therefore, it does not include tests of abilities or a form of selection. Furthermore, a strategic decision was made to focus the content on apprehension and to respond to possible stereotypes instead of focusing on psychometric data, such as different thinking and personality styles and aptitude testing.*

#### 2. Resource development: Building the first prototype of the tool and gathering data

*During the development of the ANNA tool, it was decided that it should search a database of alumni **and not** match prospective students' ideas and thoughts with those of engineers to clarify who fits the engineer profile. The project is clear that **no such correlations should be made**. The tool's main point is to provide an opportunity for students to explore the feelings and uncertainties that current engineers and engineering students had before starting their university careers.*

*To collect data from current engineering students and alumni, a software tool was created in parallel while working on a model of the ANNA tool. The prototype was developed while considering that prospective university students are still in high school. The filtering tool and the visualisation of data were developed to allow high school students to match their views and ideas about an engineering career to current students and graduates.*



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### 3. Pilot testing

*The prototype of the tool was tested on groups of high school students to gain valuable knowledge about both their attitude about the tool and the interface and visualisation of the tool. The high school students gave the following feedback:*

- *It challenges you to think about your stereotypes and perceptions.*
- *It makes a career in STEM more relatable when you can compare other people's experiences.*
- *It makes you think of engineering as a career track, which is not highlighted often in school.*

*The pilot testing also revealed some faults:*

- *It was only focused on engineering and not the entire STEM area.*
- *It was too focused on gender. The students wanted to be recognised and given advice based on merit versus gender.*
- *It lacked sufficient profiles to do a proper search.*

### 4. Final development of the tool

*Insights from the pilot testing laid the foundation for finalisation of the tool. Some modifications were made to the interface, and more profiles were added to the database. The final version of the tool consists of the following:*

- *A starting page, where a user can choose which language he/she wants to use. All pieces of information in the tool are available in Portuguese, Swedish, English, Italian, German and Flemish.*
- *An introduction video in English with subtitles in different languages*
- *Information for users and parents*
- *A search guide and illustrative presentation of data*
- *A short evaluation for the user after finalising the search in the database*

*Each part of the tool was intended to be user-friendly and to meet the target groups' needs. The final modifications were made from the feedback from high school students.*

### 5. Dissemination and implementation

*Each partner university has been responsible for disseminating the ANNA tool locally. The project hosted a one-week training event in Lisbon in April 2019.*

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## THE ANNA TOOL

*‘What should we call it? It can’t be INGDIVS. No one, especially high school students, will have a clue as to what it is’. From there, ANNA was born.*

The ANNA tool is the main product of the INGDIVS project. The tool is aimed at high school students who are curious about engineering as a possible future career. The ANNA tool is a filter that allows high school students to search a database of engineers to gain insight about what an engineer is today and information about what kind of work an engineer does. By using the ANNA tool, the user also has an opportunity to reflect on common prejudices and preconceived notions regarding engineers.

### A short user manual

The presentation of the ANNA tool in this report is focused on its main functionalities. To obtain greater insight into the tool, it is recommended that you try it yourself.

[www.projectanna.eu](http://www.projectanna.eu)

The ANNA tool is free and available on any device that has access to the Internet. The tool is more user friendly on a computer, but it will work on mobile devices, such as phones and tablets, as well. The ANNA tool can be accessed from anywhere at any time.

### A brief introduction video

In the video, the user gets a short introduction to the ANNA tool in English, with subtitles in their chosen language. Users learn about the multi-faceted world of engineering via an approach that will arouse curiosity. The user is introduced to and encouraged to reflect on the engineering profession as a possible future career. The video has subtitles in the corresponding language in order to make it friendly for students.



### Choose your language

To make the ANNA tool as user friendly as possible, it was made available in all the corresponding languages of the inbound partners. By choosing the language, the user can also choose a university from which to review past student feedback.

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### More info

Before entering the filtering tool, the user can gain more information about the project not only from the introduction video but from the parental information (see the textbox).

### Filtering

When entering the tool, the user can initially search the entire database or specifically search either only graduates or only present students.

Furthermore, the user can choose what aspects to include when filtering the database. It is mandatory to filter self-perception\*. The user can also choose to include thinking styles and personality type.

Users are asked to give opinions about different statements. Each user is free to either be truthful or to indicate a response that is not at all consistent with his/her own opinion. When the user has completed all answers on the desired modules, he/she can filter. It is possible to go back and forth between the result and the modules.

### About the self-perception module in the tool

Previous studies have shown that many individuals, even when well informed about engineering and technology, have difficulty seeing themselves as engineers. Sometimes, potential students are concerned that their classmates will be more intelligent or more highly skilled than they are or they are worried about identity and course difficulty.

To collect data for the database, we designed questions for graduates and current students so that the tool's users could understand what previous students were thinking when in their position.

### Parental information

Anna is neither a psychometric instrument nor a diagnostic tool; therefore, it should not be used for this purpose. Although some questions may have similarities to some instruments of psychological evaluation, the Anna tool has no psychometric validity. It is not intended to guide, define or trace the vocational profiles of its users. The final results do not exclude or substitute any psychologist or student counsellor with whom the student or his/her family may consult to explore vocational competences or profiles. It is a search tool that allows users to browse an anonymised database of current students and graduates. We recommend that any student and/or his/her parent/guardian should only use this tool as part of a more general information gathering process when making decisions about where and what to study. Please note that our database was built on the responses of students/graduates of the universities who partook in this project. The characteristics of students/graduates from other institutions that offer engineering/technology degrees may vary.

We provide links to some external websites for information purposes only. We neither endorse nor take responsibility for the content there.

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### About the additional filtering modules

Many people believe that certain personality types or traits are more suited to certain careers or courses of study than others. Some companies or organisations will use tools to try to identify traits in their employees to improve working conditions or collaboration. We asked current students and graduates from our universities to answer a number of questions that were inspired by some of these tools.

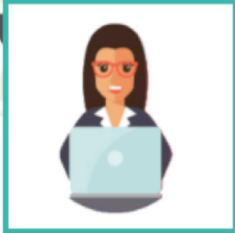
### Finding a match

Depending on a user's answers in the filtering modules, five engineers or engineering students will be visible. The user will get information about people from the database, including their field of study, age, interests and university, as well as some information about their personal interests and ideas about an engineering career and their opinion of the university that they attend(ed).


### The final (optional) evaluation


After finalising the filtering and finishing with the tool, the user can go on to an optional evaluation. The evaluation not only gives users of the INGDIVS project feedback but also gives them an opportunity to think about their future careers.


#5




Jill

23

Mechanical and  
Manufacturing Engineering

Trinity College Dublin



1. Formula 1

2. Swimming

3. Painting

My name is Jill, I'm 22 years old and I will graduate from Trinity College Dublin in 2020. I believe a degree in engineering will allow me to work on some incredible projects with very experienced engineers. Before I started university I had some fears that that I did not have enough hands on experience. The most surprising thing about engineering is that the other students are a lot more like me than thought they would be. The thing I like the most about studying engineering at Trinity College Dublin is the other students I meet.

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## Strength and opportunities with the ANNA tool

This part of the report is for those who want deeper knowledge about the ANNA tool. It gives more information about the use of the tool as well as offers topics to consider when either using or introducing the tool.

### Strengths

This tool offers the opportunity for self-identification and the exploration of alternative perspectives of engineering. The database contains profiles of real engineers and engineering students. Its design purposely aimed for visibility and neutrality to attract both males and females. In addition, the tool offers a proxy for family influence. Research has shown that family influence is quite important for females when choosing an engineering career. We argue that the ANNA tool allows high school students to 'have an engineer in their pocket' and a quick and easy way to receive responses regarding their thoughts and questions.

### Threats

The questions in the tool are not evidence-based because the answers to a series of questions cannot predetermine whether a person will succeed in engineering. The tool, which is a database that includes both engineers and engineering students, allows searches based on given parameters. Subsequently, it matches the answers of users with those in the database.

By using ANNA, stereotypes about engineers are enhanced and be visible, users must be aware that this tool is merely a source of information.

### Opportunities

Some advantages of the tool are that it is free to use, and no login is required. Through its design, we have tried to make it suitable for both males and females. The tool can support gender equality not only in engineering education but also in non-academic topics.

The interactive design makes it possible to use the tool by merely giving the answers and by reviewing varied, personal answers from different people.

### Weaknesses

If the number of filtering questions is overwhelming, it is best to focus on only one module. However, the advantage of gathering opinions to all questions in all three modules is that the profiles that are obtained via filtering are more reliable because they are well matched with the user.

Another identified weakness within the tool is that it only refers to engineers and engineering students in the database. Therefore, the tool does not claim to increase equality in all STEM areas. Furthermore, while the tool offers insights into engineering, they are not sorted by specific fields. The tool does allow the user to see different perspectives of engineering and who engineers are. It does not give the user any advice regarding engineering studies being a suitable career for him/her. The tool should be used to reflect on possible interests and a future career. If the user needs advice and/or support, it is recommended that he/she talk to a student counsellor or equivalent. Contact information for each of the partner universities in this project can be found at <https://www.ingdivsproject.eu/partners/>.

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## Tips and ideas...

### ... for introducing the ANNA tool to high school students

- Create a space where students can talk about their experience.
- Encourage each student to imagine himself/herself as an engineer in the database (or a mix of them) within ten years. What will that look like?
- Give advice on where to find more information or someone else with whom to speak.
- Support the students in their reflections afterwards.

### ... for using the ANNA tool

Try it, but do not take its output for granted. See if you can discover something new. Do you find it interesting? You will find more information on the university webpage.





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**[www.projectanna.eu](http://www.projectanna.eu)**  
**[www.ingdivsproject.eu](http://www.ingdivsproject.eu)**