A TASTE OF THE FUTURE CAREER
DISCOVERING PROFESSIONAL ROLES THROUGH ONLINE TESTS

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Scientists and engineers end up in a wide variety of professional positions. Research emphasises the need for supporting students to explore the broader work field and to enhance professional role awareness. Within the European PREFER project a professional roles model for engineers has been developed and implemented in education thanks to associated ready-to-implement tools. But what about scientists?

'Employers, education providers and youth live in parallel universes' states the European Report 'Education to employment: designing a system that works' [1]. Employers and education providers should communicate and collaborate more to increase mutual understanding and youth should be better informed to understand professions. Higher education institutions increasingly acknowledge their responsibility to guide students, both in their academic growth and in their career development. However, research indicates that, even close to graduation, many students remain uncertain about what they could do in the future [2-3]. This leads to a gap between the graduates' expectations and their actual experiences with significant negative correlations to job satisfaction. Employers also refer to this mismatch, indicating that there is still a skills gap and that they experience difficulties in finding graduates with the right set of competencies or the required competency level.

Several theories for career choice underline the importance of awareness of both personality (*e.g.*, interests, strengths and weaknesses) and future career opportunities as more congruency between personality and career leads to increased employability, greater job satisfaction and success [4]. This reasoning implies the premise that students have enough information about (a) their own competencies, preferences and personality and (b) the educational, training or job requirements.

Raising awareness and triggering reflection

In the Professional Roles Framework developed by the PREFER project (Professional Roles and Employability for Future EngineeRs), three distinct possible engineering roles are defined, each with a very specific focus: Operational Excellence (process or product optimisation and increasing efficiency), Product Leadership (radical innovation and research & development) and Customer Intimacy (tailored solutions for individual clients) [5]. The PREFER model represents three roles in a flexible way since engineers can combine two or even three of these professional roles at the same time.

Through the nominal group technique, a mixed method design closely linked to the Delphi design, 19 professional competencies were assigned to the professional roles in collaboration with industry. For example, innovation, vision and creativity were deemed more important in a Product Leadership role whereas client focus, capacity for empathy and clear communication were considered indispensable in a Customer Intimacy role [6]. Some competencies are labelled as essential in more roles. However, the meaning can be slightly different. For example, client focus in a Product Leadership role means knowledge of the market needs in order to discover gaps which can be filled with new products and processes, whereas in a Customer Intimacy role the focus is on partnership with the client in order to develop custom-made products and processes. When interpreting the overview of the professional competencies required to be successful in a professional role (Figure 1) one should be aware that in fact all engineers need all 19 competencies but the importance of the included competencies is perceived higher in the particular role. As such, the PREFER model must be interpreted as a reflective instrument and not as a matching instrument aiming a one-on-one fit.

Exploring preferences and strengths

In order to make students aware of their personal preferences, two tests have been developed. The PREFER EXPLORE is a short personal preference test that

measures to what extent engineering students prefer certain professional roles . Students get 10 cases related to engineering practice and are asked to rank three options given the case from most to least preferred. An automated detailed feedback report allows them to reflect on these choices. The tool is intentionally developed in such a way that no substantive engineering knowledge is needed to take the test and it can be used with first year students. The PREFER MATCH is a more elaborate situational judgement test. A set of professionally relevant cases is presented to the respondents who are asked to rate different possible reactions to these cases on a scale of appropriateness. In collaboration with industry leaders, academics and HR experts, several situations were identified for each role based upon the competency profiles. An example can be found in the box. The test does not provide an in-depth measurement of each individual competency. Instead, each competency serves as a steppingstone to build the case and as such, the combination of these cases represents a cross section of typical situations in a particular role. The feedback report gives insight in role alignment and triggers reflection on one's strengths or weaknesses.

Preparing future engineers through university-industry interaction

The PREFER model and tools are designed and validated in strong interaction with industry, guaranteeing an engineering discipline-independent, future-proof framework that is ready to implement in the engineering curriculum. Universities can provide their students with these online instruments to highlight the career opportunities and requirements, since the importance of specific professional competencies might vary across jobs or work contexts.

What about future scientists?

One can wonder whether and how this framework should be adapted when focusing on scientists instead of engineers. Indeed, also scientists end up in a wide variety of professional positions, both inside and outside academia. However, in contrast to the engineering technology students for which the PREFER model and tools were developed originally, science students typically have a very strong "taste for science" [7]. On average 20 % of the recently graduated Science students start a PhD at the University of Leuven, compared to 3% of the Engineering Technology students (University of Leuven, Data Management Centre). Although PhD holders in science are highly employable mainly outside academia, also for them industrial positions vary greatly depending on their scientific research orientation. These jobs in industry seem, however, much less familiar for graduating science students and initiatives to make them aware of their personal preference would be very welcome.

In addition, for basic science graduates, becoming a science teacher is also a typical role in Belgium. The PREFER research indicated that in the case of engineers, teachers were recognized in a customer intimacy role. Pupils or students could be perceived as clients and it seemed that similar • • •

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▲ **FIG. 1:** Professional competencies required to be successful in a professional role.

competencies were deemed essential: clear communication, capacity for empathy, aiming for learning results, building relations with students *etc.* Given the societal relevance of high-quality science education, further research is required to investigate whether scientists also perceive the customer intimacy role as such or whether the role should be included more explicitly as a fourth role.

Overall, the PREFER model seems to have potential beyond engineering. We suggest further research to (1) finetune and validate the model for early career scientists and (2) translate the EXPLORE and MATCH tests to more scientist tailored contexts. The instruments could support future scientists in their career choices by giving them a taste of their future career. ■

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Greet Langie teaches physics to first-year engineering students and focuses on Engineering Education Research, more specifically transitions from secondary education to higher education and from higher education to professionals life.

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