



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Acquiring, promoting, creating momentum

*Early career researchers –
the strategy at TU Darmstadt*



Creating momentum

TU Darmstadt is characterised in a particular way by its early career researchers. With their creativity and pioneer spirit, early career researchers create new momentum in research and teaching. They drive developments and innovations forward, and contribute to the continual renewal of the institution. By playing their part in dynamic change in academia, society and technology, they make crucial contributions to answering pressing future questions.

Talented, motivated academics should find an outstanding environment with attractive working conditions and career prospects that will help them to reach their full scientific potential. Through their involvement in the agile structures in the departments and through interaction between subject-specific and University-wide services, TU Darmstadt creates optimum conditions and scope for early career researchers.

TU Darmstadt thus offers its early career researchers the ideal conditions for successful integration into the academic and higher education system in all qualification phases.

In an even broader context, early career researchers benefit from TU Darmstadt's regional and international networks. The university is part of the Rhine-Main Universities (RMU) together with Frankfurt and Mainz, and strong cooperation on early career support rounds off the ideal conditions. As a member of the European University alliance Unite!, TU Darmstadt creates unique new opportunities for its researchers as the alliance connects nine entrepreneurial, innovative European regions.

The regional, international and intersectoral network of the University is continuously developed due to the high mobility of its early career researchers. That way, the researcher is actively involved in increasing the institution's international visibility and reputation as well as its close global links. The intersectoral collaboration with business and industrial partners that is characteristic of a technical university is also put in practice intensively by junior researchers. Through openness and tolerance, the early career researchers maintain the institution's culture of diversity and contribute to diversity at various levels.

TU Darmstadt is aware of the importance of its early career researchers as well as the responsibility that it bears for this group. Accordingly, it qualifies early career researchers for challenging activities in academia, business and society and supports their independence and development into open-minded, responsible and reflective personalities.

Acquiring and promoting talents

The University pursues an integrated support approach oriented towards multiple career options in order to ideally prepare the early career researchers for the requirements of the academic and non-academic job market. It assists with the individual career planning and career development of its talents by means of targeted, customised support. The increase in equal opportunities and the compatibility of work and family are institutional fields of action with a high level of relevance for early career researchers. They are systematically anchored into processes and structures.

A core task of TU Darmstadt is to set paths in academia and acquire the best talented individuals for research and teaching. It promotes diverse career paths in academia up to a professorship and qualifies its early career researchers for positions at or outside of TU Darmstadt. It offers long-term career prospects to outstanding academics and provides predictable career paths.

As a technical university with close contact to companies, it sees a central task in qualifying excellent early career researchers as future management personalities.

The University intentionally contributes to the early development of entrepreneurial spirit among its junior academics, thus supporting their path towards independence.

TU Darmstadt would like to increasingly recruit international early career researchers by offering attractive career prospects and supportive framework conditions. It sees this as a particular opportunity to increasingly acquire women in subjects where they are underrepresented.

Characteristic for a technical university, it places great importance on permeability between academic and non-academic career paths and would like to offer promising junior staff from industry an early connection to the University and thus facilitate access to an academic career.

Qualification phases of early career researchers at TU Darmstadt

At TU Darmstadt, ‘early career researchers’ refers to doctoral candidates and researchers who already have a doctorate and seek a further academic qualification. Early career researchers are assigned to the qualification phases described below, which build on each other. The University uses the European Union phase model as a reference to describe these phases. Four phases – R1 to R4 – are distinguished based on the criteria research achievement, reputation and degree of scientific independence.

TU Darmstadt adopts this model and describes the phases as follows:



R1 — DOCTORAL PHASE

In the doctoral phase, doctoral candidates work on their theses, which should be completed in a suitable period of time. The doctorate is understood as the first stage of a professional career in which the doctoral candidates complete their doctoral degree and gain qualifications for various career aspirations.



R3 — QUALIFICATION PHASE FOR A PROFESSORSHIP OR EQUIVALENT

In this phase, researchers with a doctoral degree independently lead a research project and acquire additional competencies for their career in science. They aim at a permanent professorship or equivalent.

PROFESSORS WORKING IN THE R4 PHASE have been tenured or given a permanent position via a successful tenure procedure. R4 thus does not represent a qualification phase for early career researchers.

R2 — POSTDOCTORAL PHASE

In the first years after the doctorate, postdocs become qualified for a broader academic field, gain international experience and develop their academic independence and professional profile by preparing their own research project and/or career path. They generally pursue career aspirations in academia or academic management.

Structuring qualification phases – refining career aspirations

TU Darmstadt accompanies and promotes its early career researchers in all phases of academic qualification and structures its services along the doctoral phase (R1), the postdoctoral phase (R2) and the qualification phase for a professorship or equivalent (R3) (see Figure 1). It understands the individual qualification phases as periods that have been intentionally chosen. They are to be shaped, and are limited in terms of time. In the qualification phases both professional and personal skills are acquired and developed. A holistic, consistent approach to promoting early career researchers has been pursued with this strategy, which forms the University-wide foundation for needs- and career-appropriate support for junior academics.

Creating transparency

TU Darmstadt conveys possible career paths transparently in all qualification phases and supports its researchers with early decisions about their individual career aspiration. The entry requirements, the intended skills development and the qualification goal are set down clearly and conveyed transparently for every qualification phase. Taking into account various career goals, this results in specific requirements for providing the best possible, individual support to early career researchers in the qualification phases.

Shaping phases

With a successful doctorate attractive and adequate positions in academia, industry and society open up to young researchers. TU Darmstadt bears in mind that the majority of doctoral candidates aim for a career outside the University. A survey of doctoral candidates at TU Darmstadt from 2023 shows that only 14% of respondents are planning an academic career at a university. The vast majority of doctoral candidates pursue career aspirations in industry and business, which reflects the University's orientation towards engineering. Support in the doctoral phase is thus ori-

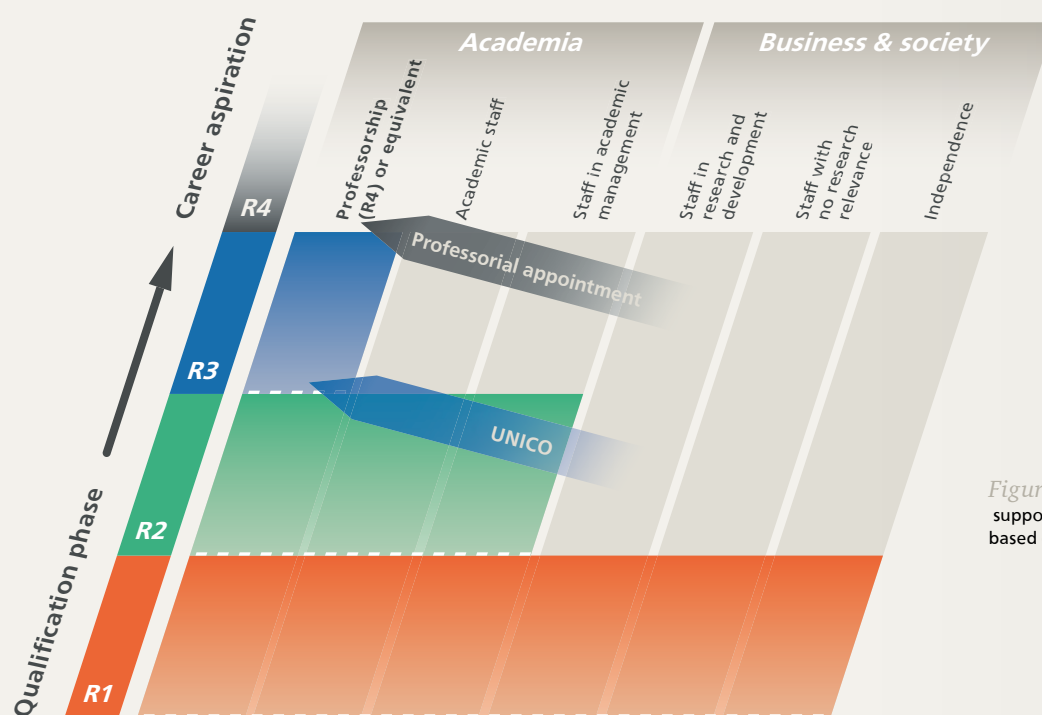


Figure 1: Structuring of support for early career researchers based on career aspiration.

ented towards the requirements of a diverse and dynamic job market and takes academic and non-academic career aspirations equally into consideration. The University offers corresponding comprehensive services that allow doctoral candidates to develop optimally for their individual career goal.

In the qualification phases following the doctorate, the early career researcher is prepared in a targeted way for roles in a scientific field or academic management. Even though there is permeability between the career paths in the postdoctoral phase that allows for a subsequent change to a different – non-academic – career, the services are focused on career aspirations in an academic field. The postdoctoral phase is particularly characterised by a

high level of mobility among researchers. TU Darmstadt supports international and intersectoral mobility of early career researchers with corresponding services.

In the subsequent qualification phase, the focus lies on accompanying early career researchers on their path towards a professorship. The aim is the appointment of the early career researcher to a permanent professorship or equivalent position at or outside TU Darmstadt. Targeted measures enable independent academic work and active involvement in teaching. A key element is the provision of internationally competitive career paths, which offer the early career researcher long-term career prospects leading towards a professorship or equivalent position.





Promoting permeability

Permeability between non-academic and academic careers is particularly encouraged for junior staff in engineering. With specific programmes such as ‘UNICO – University Industry Collaborative Young Investigators’ (see *Figure 1*), early career researchers working in research and development within the private sector are offered early involvement with the University to open up the career path towards professorship.

Developing skills

In order to specifically prepare for the individual career goal and develop the skills required by the job market, TU Darmstadt has defined eight skills dimensions: Academic expertise, didactic skills, leadership skills, international expertise, interdisciplinary skills, intersectoral skills, academic management skills and key competences (see *Figure 2*). The early career researchers should acquire knowledge, skills, abilities and attitudes in these skills dimensions, thus developing an individual skills profile.

In all phases, the development of academic expertise is the central element of the skills profile, which is complemented by the acquisition of other transferable skills. Over the course of academic qualification, the relevance of the transferable skills dimensions changes. While the increase in international experience and the acquisition of key competences is given great importance at every qualification phase, the development of didactic skills, for instance, is above all relevant for early career researchers who are pursuing the career goal of professorship upon entering the R3 phase. This results in specific skills profiles that qualify the early career researchers for a further academic qualification or the transition to jobs outside academia.

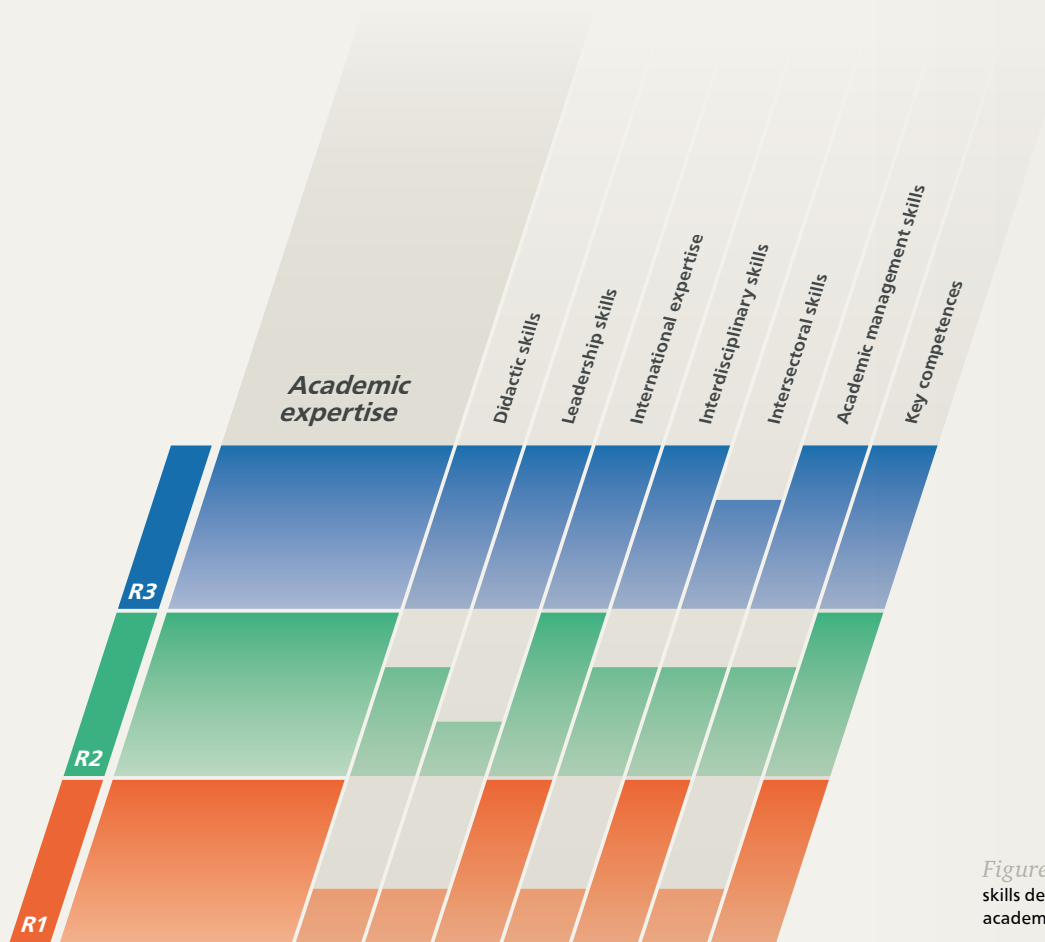


Figure 2: Skills dimensions and skills development in the phases of academic qualification.

Shaping transitions

TU Darmstadt pays particular attention to preparing and shaping the transitions between the qualification phases. It has developed a range of tools and measures to support early career researchers at these key points in career development, to facilitate the development of a career plan and accompany the transition to the next phase. TU Darmstadt is particularly active in its efforts to acquire talented, external early career researchers who

would like to undergo further qualification at TU Darmstadt, and provides support for integration in an academic and social environment. The corresponding entry requirements for the three phases and the expectations of the University with regard to the development of the skills profile are conveyed in a transparent, binding manner.

Support during the doctoral phase

R1

Support goals and intended skills development

Support during the doctoral phase is led by the basic understanding that the core of a doctorate is individual, independent and internationally recognised research. Building on the technical foundation laid during scientific university studies, the focus in the doctoral phase lies on qualification for independent academic work, the deepening of technical and methodological knowledge, and technical specialisation. This academic expertise is demonstrated by successfully completing the doctorate. At the same time, the acquisition of transferable skills by the doctoral candidate is promoted. Through this comprehensive approach, TU Darmstadt qualifies its doctoral candidates for multiple career goals in an academic and non-academic environment.

Entry requirements

TU Darmstadt would like to acquire university students with outstanding academic performance and suitable academic progress to undertake a doctorate. Demonstrated qualification in the respective subject or research topic and an interest in academic work are equally relevant for admission. The responsibility for the quality-assured selection of future doctoral candidates lies with the department hosting the doctoral candidate. Besides the professional aspects, personality traits and individual qualification paths also play a role. By developing platforms for cooperative doctorates, TU Darmstadt would also like to offer outstanding graduates from universities of applied sciences an institutionalised opportunity for a doctorate at a university.

Measures

The pillars in this early qualification phase are the departments with their professors. They impart their technical expertise to the doctoral candidates, supervise academic work and introduce the junior scientists to the national and international scientific community. To ensure that the technical quality of doctoral theses is high, the right to award doctorates lies within the responsibility of the departments.

With its University-wide guidelines on the promotion of early career researchers, TU Darmstadt ensures the supervision of doctoral candidates under binding, transparent conditions and thus supports the successful completion of the doctorate within an appropriate period of time.

Besides research- and subject-related support, the supervisors advise doctoral candidates on career planning and sensitise them to the prerequisites of an academic and non-academic career. Various joint research activities with commercial and industrial companies allow the doctoral candidates to familiarise with career goals outside the University and to establish links for a later career entry.

At the University, an umbrella organisation to promote early career researchers has been established with 'Ingenium – Young Researchers at TU Darmstadt'. It supports the doctoral candidates with regard to an academic and non-academic career together and in coordination with the departments. Ingenium fosters the acquisition of transferable skills with a comprehensive qualification programme tailored to the target group. The doctoral candidates thus develop an individual skills profile and are ideally prepared for career paths outside or inside academia.

In collaboration with Ingenium, other university institutions support skills development in the doctoral phase. Mentoring programmes are intended to offer academics guidance for the early development of a personal career plan.

Doctoral candidates interested in founding a company are provided with support and assistance on their path to independence at the business incubator HIGHEST.



FACTS

Approx. 400 successfully completed doctorates per year – about half of them in the engineering disciplines.

TU Darmstadt has University-wide 'Guidelines on the Promotion of Early Career Researchers by Ingenium – Young Researchers at TU Darmstadt', which have been approved by the Senate.

Ingenium is based on voluntary membership of the departments and the structured doctorate programmes. All departments, graduate schools, research training groups and collaborative research centres have acquired membership.

As part of the Ingenium qualification programme, a variety of quality-assured, appropriate further training courses are offered for career development each year. The programme is characterised by very good take-up and outstanding evaluations.

With the event 'Impulse – Getting started and connected', TU Darmstadt invites all new doctoral candidates each year to set the course for a successful doctorate.

TU Darmstadt thrives on multiple career paths: 14% of doctoral candidates aim for an academic career at a university, 11% at a non-university research institution. The majority of respondents see their career prospects in industrial research and development or in a managerial position in a company.

About 80% of people who have completed a doctorate at TU Darmstadt are employed in line with their level, over 75% display a high level of satisfaction in their professional environment.

Support during the postdoctoral phase

R2

Support goals and intended skills development

The postdoctoral phase is a highly productive, time-limited phase of personal, academic development in which the professional profile of the early career researchers is increasingly refined and the track record in research, teaching and academic self-administration is developed. The focus during qualification lies on increasing academic expertise and developing a broader or new research area. The postdocs work with increasing academic independence, which manifests itself in independent publications or the supervision of final theses.

To strengthen the personal profile, the transferable skills are developed in line with the intended individual career path. The postdoctoral phase is particularly the time to acquire international and – depending on the discipline – interdisciplinary and intersectoral experience, e.g. experience in the private sector. At the end of the postdoctoral phase the researchers have developed a track record that creates the conditions necessary for a successful scientific or academic management career and forms the basis of a careful decision to undertake further academic qualifications.

Entry requirements

Early career researchers who would like to gain further qualifications as part of a postdoctoral phase at TU Darmstadt have completed their doctorate with an outstanding result. They have demonstrated their suitability for in-depth academic work in their doctoral thesis, further achievements and proof of competence. They pursue career aspirations in academia or science management and demonstrate a high level of motivation to develop a personal track record. The quality-assured selection of postdocs in this phase lies within the responsibility of the professors who provide the postdocs with a supportive academic environment and room for independent research. They see themselves as mentors to the postdocs and contribute to the visibility of talented individuals in the international scientific community.

In the engineering disciplines, where a doctorate is often followed by a position in a commercial or industrial company, the professors at TU Darmstadt maintain close collaborations and offer selected junior research staff a connection to the University and the academic environment. Active involvement in academic tasks is intended to facilitate a possible return to a university at a later phase and lay the foundations for a professorship in engineering.

Measures

The development of the track record takes place in the departments under the guidance of professors. The experienced researchers are aware of the tensions between early academic independence and supervision and guidance of the junior researchers. They thus act as mentors and create the best conditions for the postdocs to allow them to be noticed in the international scientific community.

TU Darmstadt has developed a University-wide programme for postdoc support under the umbrella of Ingenium, which is tailored to the specific needs of postdoctoral researchers.

The Ingenium support package provides financial support in specific teaching and research situations, for the founding of research groups and networks, and for the organisation of conferences to foster early academic independence. Career bridging grants are intended to close short-term financial gaps that arise between academic qualification phases and often before or after a mobility phase, hence making academic career paths easier to plan.

Postdocs can develop transferable skills, such as didactic skills or leadership and management skills, as part of the Ingenium qualification programme and through services by the Center for Educational Development and Technology and Human Resources Development. (Career)Coaching and mentoring tailored to the qualification phase and targeted career advice are intended to provide guidance for postdocs when planning their further careers. The researchers should thus be ideally prepared for the requirements of the next career phase and, in particular, for career goals in academia.

TU Darmstadt wants to increasingly acquire excellent postdocs from around the world. As part of the Future Talent' Guest Stays, it enables talented, international doctoral candidates and postdocs to get to know the University with their research profile and their career options. The increased involvement of visiting doctoral researchers is also used as an effective method of subsequently acquiring postdocs. With the central Welcome Centre, TU Darmstadt has a facility at its disposal where international researchers are welcomed and provided with individual support in the initial phase.



FACTS

Since 2016, the postdoc support programme at TU Darmstadt promotes early academic independence and facilitates transitions between qualification phases.

TU Darmstadt awards the prestigious and highly endowed Dr. Hans Messer Foundation Prize each year to postdocs who have demonstrated outstanding achievements.

Since 2015, senior scientific advisors have advised early career researchers on an individual basis when preparing research proposals for individual funding.

As part of the yearly 'RMU Postdoc Career Weeks' postdocs are given information and assistance relating to individual career planning.

TU Darmstadt achieves a very good ranking group in the nationwide 'Hochschulranking nach Gleichstellungsaspekten 2023' ('University Ranking according to Gender Equality Aspects 2023') by the Center of Excellence Women and Science (CEWS); it is within the top group for the areas of postdocs and professorships.

Support in the phase of qualification for a professorship

R3

Support goals and intended skills development

The promotion of early career researchers in this qualification phase aims to prepare for the career goal of a professorship or equivalent. This takes place through a consistent increase in scientific independence and the specific development of the individual track record. The focus lies on creating an optimum scientific environment that allows for outstanding research achievements and the recognition of the scientific community. Furthermore, it promotes a commitment to teaching and the supervision of students and doctoral candidates as well as involvement in academic self-administration.

With transparent quality assurance and long-term, plannable and internationally competitive career paths, the University acknowledges its responsibility in setting the course for a successful appointment as professor or equivalent. A high level of commitment in improving equal opportunities, the compatibility of work and family, and the promotion of developing transferable skills complement the services that prepare researchers for an academic career. The extensive support leads to a comprehensive academic track record and a personal profile at the end of the qualification phase, allowing the academics to be appointed.

Entry requirements

Early career researchers who enter the phase of qualification for professorship or equivalent have made a conscious decision in favour of an academic career. They have already achieved scientific independence and display an internationally visible academic profile. Over the course of their academic qualification, they have been able to gain experience outside the German academic system and expand their own skills profile through international, intersectoral or interdisciplinary mobility. Positions in this phase are filled in a highly selective, competitive manner and, besides scientific excellence, also require transferable skills, which qualify the academics for a professorship or an equivalent position.

Measures

The early career researchers performing independent research in this advanced phase are integrated into the departments and find an environment there that offers them the necessary scope to pursue the career goal of a professorship or equivalent. They are supported by experienced professors in order to establish themselves in the University and scientific community.

From the R3 phase onwards, TU Darmstadt offers early career researchers various, parallel options and career paths up to appointment to a permanent professorship (*Figure 3*).

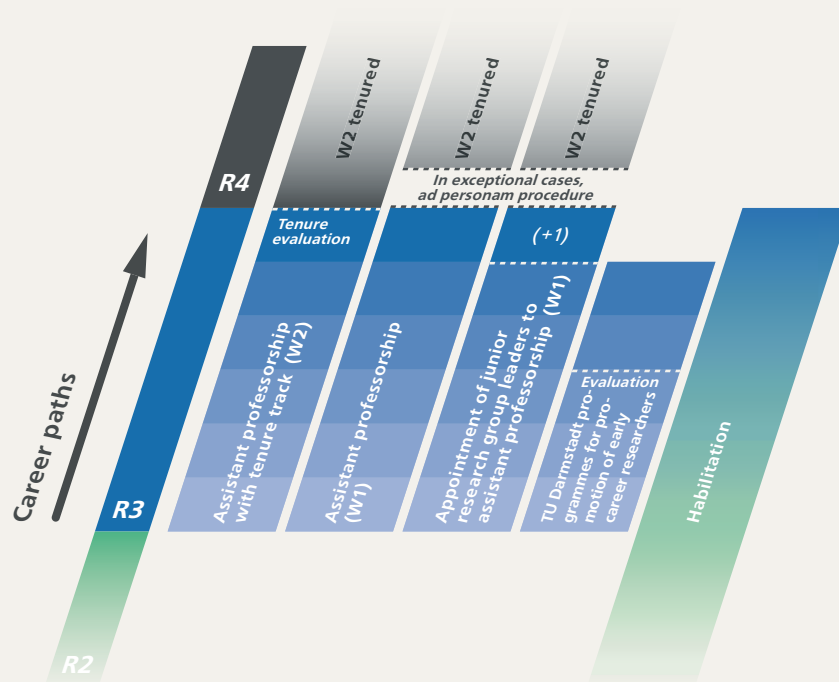


Figure 3: Appointment and career system at TU Darmstadt from the R3 phase onwards.

FACTS

TU Darmstadt is successfully involved in externally funded programmes for early career researchers, e.g. by the DFG, federal government and EU. Many Emmy Noether Independent Junior Research Groups, Helmholtz Young Investigator Groups and ERC Starting Grantees find a productive environment at TU Darmstadt.

Early career researchers at TU Darmstadt can also be found among the winners of the Heinz Maier-Leibnitz award.

More than 80% of former assistant professors at TU Darmstadt were appointed to a professorship in Germany or overseas.

With “Proführung – Executive Development for Newly Appointed Employees”, professors are supported with the establishment and development of their management skills.

As part of a structured further training programme alongside a job, lecturers at TU Darmstadt have the possibility of further developing their teaching skills. The ‘Higher Education Teaching Certificate’ is awarded to successful participants on the accredited programme.

The transparently arranged career paths on offer are intended to open up attractive career prospects for experienced postdocs as an alternative to a habilitation and make it possible to plan their individual path to a professorship.

Programmes for the promotion of early career scientists such as the Athene Young Investigator programme and the Claude Shannon Fellowship were set up at TU Darmstadt to provide early support for scientific independence. Both are designed as five-year, quality-assured programmes (selection procedure and evaluation in the third year), in which the junior research group leaders are equipped with certain professorial rights and their own budget. Successful qualification in the TU’s own early career programmes is intended to provide junior researchers with eligibility for an appointment.

TU Darmstadt offers appointment to a temporary assistant professorship (W1) for externally funded junior research group leaders who have already been successful in a competitive evaluation procedure, thus giving them

professorial rights. Through inclusion among the professors, it grants these people scientific independence and allows for cooperation and communication with the permanently employed professors. With excellent development in research and teaching, W1 professors can be appointed to a permanent W2 professorship in an ad personam procedure. Junior research group leaders also have the possibility of applying for an assistant professorship with tenure track (W2).

TU Darmstadt established a tenure procedure back in 2011, which enables assistant professors to assume a permanent W2 professorship following a positive tenure decision. The University has employed this tool consistently since then, thus opening up long-term, predictable career prospects for early career researchers. The assistant professorship with tenure track (W2) was introduced at the end of 2016 as a further development of the tenure track model. It offers the opportunity for extensive career development for academically proven national and international early career researchers. During the period of usually six years, the personal further development of





tenure track professors is supported with target group-specific measures. Mentoring and a successive feedback- and evaluation process, which is transparent and authoritative, represent supporting and quality-assuring elements of the tenure procedure.

Two further measures aim to specifically improve eligibility for appointment among engineering academics, who can be appointed following employment in a company. The switch from employment outside of academia to a permanent university professorship is highly valued and undertaken in these departments. TU Darmstadt would like to offer selected young engineers working in a company an early link to TU Darmstadt.

It supports this with the programme 'UNICO — University Industry Collaborative Young Investigators' (see Figure 3). The TU's own model of an industrial joint professorship also offers an intersectoral link between industry and academia, which allows for research and teaching activities to be undertaken at the University alongside a main job.

The qualification phase for a professorship often also involves important decisions in terms of family- and life planning. Particular attention is paid to improving equal opportunities and the compatibility of work and family in this qualification phase. Family phases and parental leave are taken into account in all selection procedures, particularly in tenure procedures, and do not negatively affect the assessment of the candidate's achievements.



Coordinating support offers

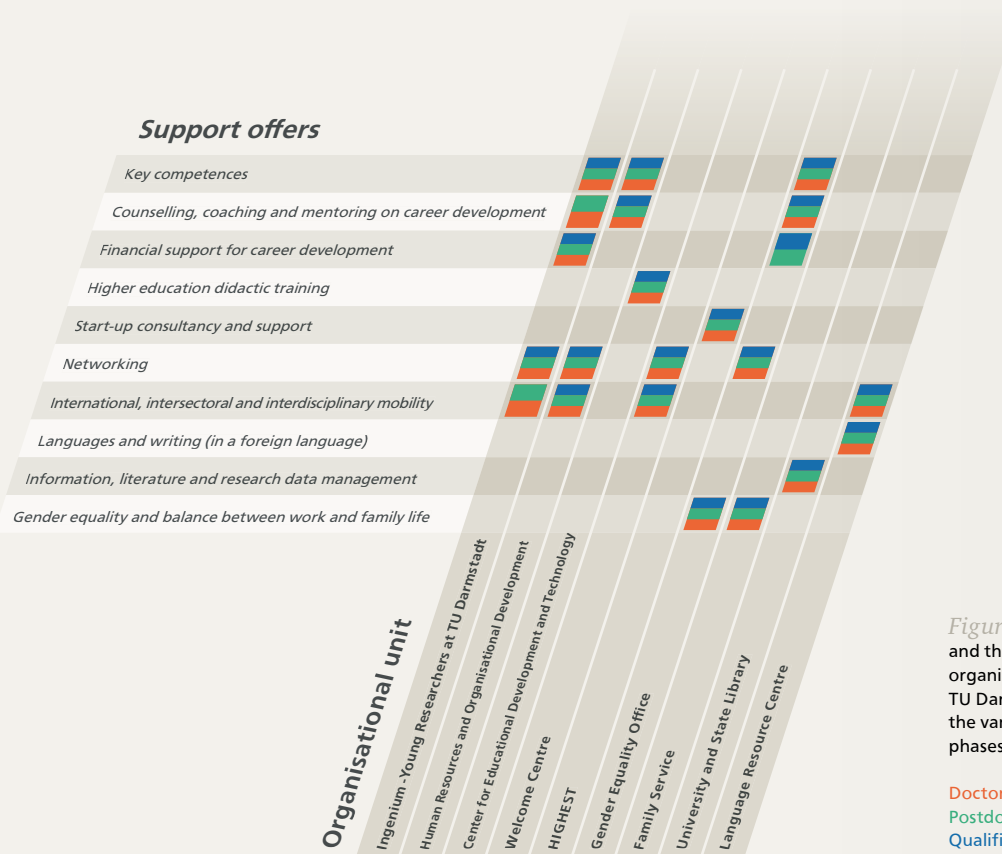


Figure 4: Support offers and the associated central organisational units at TU Darmstadt. The services for the various qualification phases are indicated in colour:

Doctoral phase – orange
 Postdoctoral phase – green
 Qualification phase
 for a professorship – blue

TU Darmstadt offers a comprehensive range of support that helps early career researchers as needed in the academic qualification phases (see Figure 4). Various central organisational units use coordinated services to foster the acquisition of transferable skills and enable the development of an individual skills profile in line with a career goal.

The Ingenium support programme, which is specifically oriented to the needs of early career researchers in all qualification phases, is complemented in terms of conveying didactic skills, for instance, by services by the Center for Educational Development and Technology. Human Resources and Organisational Development has also oriented its target group-specific formats in a suitably complementary manner.

While pursuing the overarching aims of the promotion of early career researchers, the central support on offer is continuously further developed in a coordinated way and consistently oriented to the needs of early career researchers in various qualification phases.

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