43 : UTC’s PhDs: our key players for innovation

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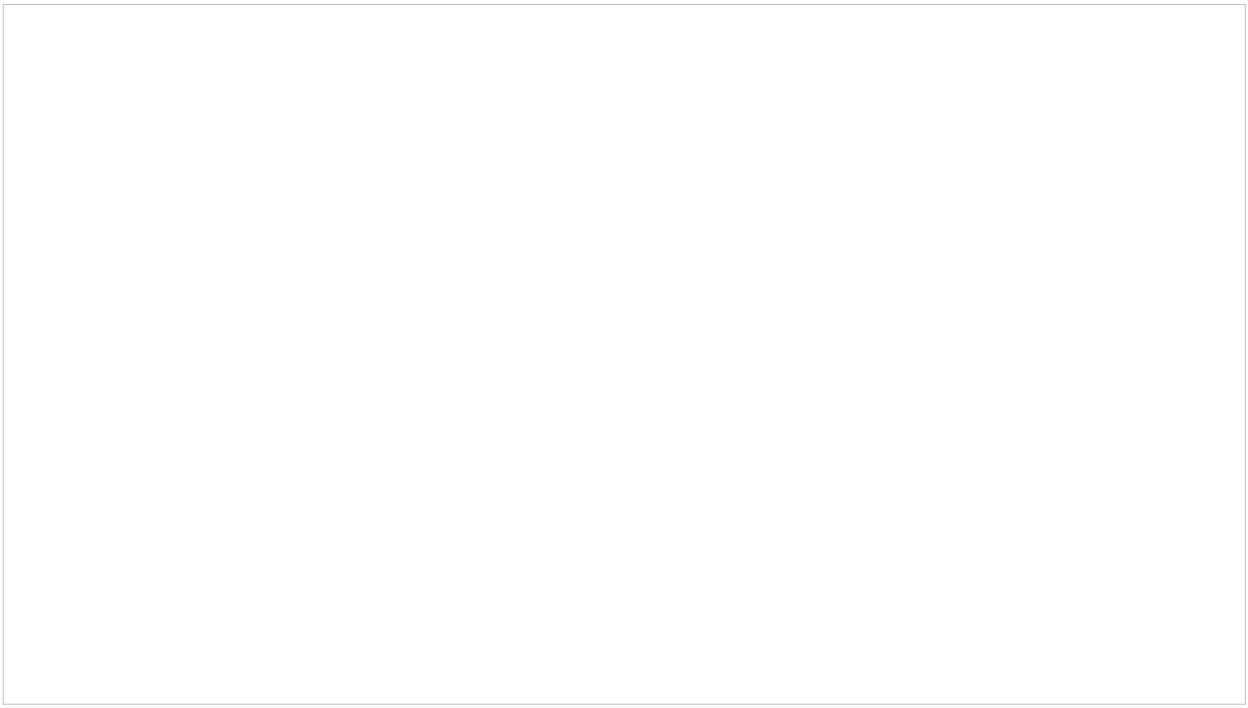
Summary

UTC’s PhDs: our key players for innovation



In the world today, where innovation (technology-intensive innovation especially) occupies an ever-growing position, the skills and know-how of PhDs specialists in engineering sciences, notably the double degree PhD-Engineers can be seen as increasingly important strategic players. UTC intends to prepare its PhD students to fit in with this new role and associate responsibilities.

UTC today has matriculated some 330 PhD students, 60% of whom are non-French nationals and awards between 60 and 80 PhD diplomas each academic year. The policy aim of the university is to strengthen this pool of PhD students and to increase the number of its graduate engineers who choose to pursue HE studies with a doctorate, whether it be at UTC-Compiegne or at another university. In a knowledge-based and increasingly globalised economy, faced with some major challenges (climate change, depletion of natural resources, etc.), research and innovation have become an unavoidable driving force to create added value. In this context, PhD students and graduates are (and will continue to be) key players.

"PhD students represent the main driving force in academic laboratories", underlines Dr. Bruno Bachimont, Executive Director of Research at UTC. "They alone, practically, are in a position to commit themselves 100% to research activities and to carry out long and in-depth investigations. In every university of technology that has engaged strongly in research activities, the PhD student's represent at least 20% of the institution's student population. At UTC, currently the figure is less than 10% hence the importance for us at UTC to reinforce our research capacity".

An increasingly valuable passport for enterprise

Once a PhD student graduates, he/she discovers that job openings and opportunities in university and public research laboratories are limited, but not negligible, and in France and elsewhere in the OECD countries, it often takes several years before a stable, tenured position is secured. But the importance now of innovation should encourage enterprises to open their premises to more and more PhD recruits, in particular recruiting specialists in engineering sciences. *"If you want to innovate, you must be able to identify and implement original solutions to as yet unsolved problems by mobilizing your knowledge, know-how and with off-the-shelf tools,"* explains Prof. Olivier Gapenne, Cognitive Science/Psychology and Head of the Doctoral School at UTC. *"This statement in fact summarises quite well the training engineers receive. But again, the PhDs must increasing be able to address problems where existing solutions/tools are inadequate and therefore new tools and new knowledge are needed. This is an area of skills that PhD student acquire when they work in research activities".*

In the opinion of experts, in France where the prestige attached to the engineering schools' diplomas masked the interest of going for the university's highest degree, *viz.,* the PhD, things are now beginning to change. "*Increasingly, the major industrial groups are recognizing the specific skills of PhD graduates and requesting their input",* notes Vincent Mignotte, director of the l'Association Bernard Gregory (ABG), a structure for over 40 years now has been assisting the world of PhDs to move closer to that of the entrepreneurial world. *"What is new here is that SMEs are also recruiting PhDs and very often these small companies are faced with innovation challenges in a world where ruthless competition rules and they need staff capable of 'thinking diagonally and not traditionally. Today most thesis offers and job openings we post on our web-site come from the' SMEs. The major Groups, who were our mainstay customers 15 years ago, now forward their requests directly to the 'doctoral schools'".*

This observation is also shared by Clémence Chardon, Head of the recruitment service of Adoc' Talent Management, an agency that specialises in recruiting PhDs. *"An increasing number of companies are recruiting PhDs today. Those that contact us are mostly SMEs or start-ups and their business lies mainly in advanced scientific and technical areas, such as aeronautics, biotechnologies, data sciences …".* Moreover, a distinction to be made with engineering diplomas, some of which are not recognised elsewhere, is that the doctoral PhD degree is accepted round the world. It represents a precious passport for a high level international career. *"In some counties, it seems ludicrous to entrust a managerial post to someone without a PhD, even if the person has been awarded a prestigious engineering diploma",* says Vincent Mignotte. *"This is one reason why French multinational groups are recruiting more and more PhDs".*

Initiating future engineers to research activities

The trends we observe benefit especially to PhDs who already have an engineering degree. For example, we find those who were recruited in the context of the "Young PhD incentive" where a tax relief (reformed in 2008) was conceded to companies that recruited a freshly graduated PhD to a researcher post on a no-time limit contract basis*.

Today, only 4% of graduate engineers from UTC pursue doctoral studies at UTC. In order to increase this fraction, our University is considering an action plan to make UTC students more aware of the research world as and when they start their engineering courses – for example, giving them some small research projects or encouraging them to do one of their one-semester placements in a research laboratory (internal or external). *"The challenge",* underlines Olivier Gapenne, *"is to forearm the students who do not pursue their studies beyond their engineering diploma. As the situation evolves, it is important toady to have them understand that the professions of research scientist and engineers are naturally different but not contradictory, nor exclusive one form the other. And if the engineers are working on a project with a company, it is in their interest to put themselves in the position of a research scientist, if only to be able to discuss matters with the PhD colleagues (or other academics) and to become involved themselves in the process of advancing our knowledge-base".*

In order to attract more PhD students, including candidates from other HE institutions an d to provide a better visibility for recruiting officers as to high quality of training these PhD students will receive, the University has also implemented a quality policy programme over the past few years in regard to its PhD degree award, putting it on a par with the UTC engineering diploma. As is the case for other doctoral schools, UTC's school for example has set up training modules that are design to reinforce the 'employability factor' of its PhD graduates. The objective notably is to provide a clear insight into the entrepreneurial world, but this now a standard approach. Where UTC proves original is that we try to make them aware of the need – whilst being experts in their specialist fields – to build up and possess a solid scientific and technological culture in their specialty. *"Whether they move towards the entrepreneurial world or to the public research sector, most of our graduates are not in fact recruited in their thesis specialty, but into a nonetheless close area of expertise",* explains Bruno Bachimont. *"They must therefore show their capacity to adapt rapidly to new subjects. Moreover, they will be increasingly expose to complex problems for which no single approach proves satisfactory. Last point here: private companies need experts to find solutions for specific technological*

obstacles, but they also need 'visionaries' capable of anticipating changes in their specialist areas and to enhance innovative products and processes. In other words, as far as PhDs are concerned more professionalism means more science".

Zero unemployed among UTC's younger PhDs

The high quality policy thrust of UTC also calls for valorisation of its PhDs. This is embodies in the Guy Deniélou Prize, the most recent edition of which took place on April 7, 2017. Every year, this Prize sheds light on the work of its younger research scientists population, selecting 4 recent graduates whose achievement were of special interest to a jury of experts.

As you read the experiences of these UTC PhDs in the next few pages, you will no doubt agree that the quality of their work deserves the recognition they get elsewhere: most of them were recruited very rapidly, often before they have made their public thesis presentation and this is confirmed by our polling enquiries. Globally speaking, the graduates, over the years 2010-2015, took between 2 to 3 months to secure their first job and it was noted, 3 years after graduation, that none of the PhD graduates (for years 2010, 2011 and 2012) was unemployed. 46% are currently employed in public service positions, 46% in the private sectors, the majority as lecturer-research scientists, research workers (as scientists or engineers) and all enjoy a stable job position. n

* Évaluation de l'impact du dispositif "jeunes docteurs" du crédit d'impôt recherche - Rapport au MENESR, octobre 2015.

[Ministerial assessment of the impact of the "Young PhD » incentive in the Government's tax rebate programme - Report to the French Ministry in charge of HE and Research (MENESR), October 1915].

Professional prospects for PhDs in France

A clear-cut added value of the PhD with respect to the Master's degree 2.

France awards around 14 000 PhDs per year, 40% of whom are non-French nationals. The most recent enquiry of the CEREQ (French national agency for analysis of qualifications) looking at the 3 year horizon mark of French national PhDs living in France, particularly the 2010 graduates (not including the health sector).

In 2013, the unemployment level, independently of the specialist area, was still relatively high: 9%. Nevertheless, it has dropped by 2 % over the decade. And of special note, the level is now below that of the Master's 2 degree, around 12% since 2010 but only 7% in 2007.

In contrast, however, it is higher than the comparable figures for graduates from the engineering schools (4%). However, the situation is highly contrasted depending on the specialty of the PhDs.

Advantage in computer sciences and applications, electronics and engineering sciences

PhDs in in computer sciences and applications, electronics and engineering sciences are those for whom the access to a first job is shortest in lead-time and who – 3 years after their graduation - have the lowest unemployment rate and the less employed under CDD (time limited) contracts. The fraction of those who are unemployed or under CDD contracts is higher than those with an engineering diploma but this can be explained by the difficulties inherent to securing a job in public research (for those who have chosen this career path). But they are almost all considered as being at management level and in terms of their median salaries can vie with the engineers.

Engineering diploma + PhD – the winning hand

PhD graduates who also hold an engineering diploma can access the employment markets easier than PhDs in the same specialty field but without an engineering degree. In 2013, three years after graduating, only 5% of the double degree category were still unemployed and 17% were engaged under time limited contracts (CDD). In the second single degree category, 12% were unemployed and 40% under time limited contracts.

Sources:

• *3 year Job horizon for PhD graduating in 2010 – Enquiry for Generation 2010, interrogation for 2013,* CEREQ, Dec. 2015.

• *Scientific employment status in France* – joint report 2016. HE and Research Directorate General, Research and Innovation Directorate General.

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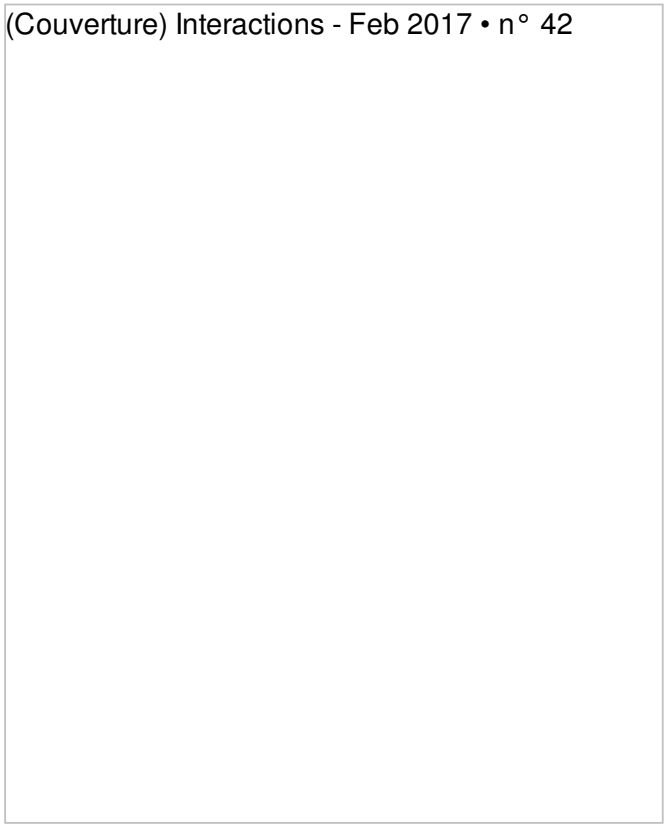

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