PhD positions on "*Complexity in high-tech manufacturing*" at TU/e

The Departments of Industrial Engineering (IE) and of Mathematics and Computer Science (M&CS) of the Eindhoven University of Technology invite applications for two four-year Ph.D. positions in the area of supply chains and high-tech manufacturing systems. The intended starting date for these positions is May 1, 2017 and can be further negotiated with interested applicants.

The positions are embedded in the NWO-funded project "*Complexity in high-tech manufacturing*", which includes several partners in high-tech manufacturing such as ASML, Philips HealthTech and VDL/ETG. PhD candidates will be involved in research with these companies, as well as with the Multi-actor Systems group at Delft University of Technology.

Research topic

Manufacturing high-tech systems requires the effort of some hundred teams of highly specialized engineers employed by the manufacturer and dozens of suppliers. Nobody can oversee the entire operation. Instead, the process is somehow orchestrated by delivery deadlines agreed between upstream teams that produce a (sub)component and downstream teams that need it. Teams are pressured to deliver early, but are limited by scarce production capacities, their ability to bear financial risks, and agreements with teams further upstream. In these two projects, we study how deadline agreements are made, and prescribe how they should be made such that responsive, resilient and cost-effective supply chains emerge.

The first project focuses on the development of stochastic optimization techniques in order to tackle the production planning problem of high-tech manufacturers. Production planning is a key process in the high-tech supply chain, because by sharing their production plans with suppliers and customers the high-tech manufacturers can orchestrate all activities in the entire supply chain. The projects' first goal is to accurately model this production planning and information sharing process. Subsequently, the researcher will develop mathematical optimization methods to optimize the production plan, for example using mixed integer linear programming (MILP) techniques.

The second project will apply probabilistic scaling techniques, such as fluid and diffusion limits and mean-field scalings to supply-chain models that are sufficiently tractable to apply techniques from optimal control theory. The goal is to gain fundamental insights into the macroscopic behavior of supply chains. This will lead to a rigorous assessment of performance of the MILP formulations in situations where multiple companies plan their production individually in a single supply chain.

Candidate

The two positions are related, but have different profiles. The first position will be filled preferably by a candidate in Industrial Engineering or a different background (e.g. Operations Research, Econometrics, Mathematics), but with a strong and verifiable interest in stochastic optimization, preferably with applications in inventory control or supply chain.

For the second topic, preference will be given to candidates in any branch of applied mathematics and to candidates from a different background (e.g. engineering) but with strong mathematical foundation. Research experience will be highly valued. Strong knowledge of applied probability and analysis is highly desirable.

The successful applicant will hold a Master's degree in Mathematics, Applied Mathematics, Computer Science, Engineering Sciences or related fields. All applications should include a cover letter, curriculum vitae, and transcripts. Proficiency in English is also required.

The departments

The projects will be carried out at the M&CS and IE departments of TU/e. M&CS has a vibrant international environment, with 46% of the scientific staff being non-Dutch nationals and more than 100 PhD candidates. It has extensive experience in helping new (foreign) employees settle in. IE is one of the longest-established IE Schools in Europe, with a strong presence in the international research and education community, especially in the field of Operations Management and Operations Research. Researchers in the school are member of the Beta research school and participate in industrial activities with members of the European Supply Chain Forum.

The two PhD candidates will be supported and supervised by an extensive research team of experienced faculty and industrial partners. At TU/e, Prof. Dr. Ton de Kok (t.dekok@tue.nl), Dr. Willem van Jaarsveld (w.l.v.Jaarsveld@tue.nl), Prof. Dr. Bert Zwart (bert.zwart@cwi.nl), and Dr. Maria Vlasiou (M.Vlasiou@tue.nl) will be involved. Further collaboration with researchers from ASML, Philips HealthTech and VDL/ETG is expected, as well as collaboration with researchers working on this project at Delft University of Technology. At Delft University a postdoc position on agent-based modelling and simulation becomes available in 2018.

Conditions of employment
- PhD candidates are appointed as temporary university employees for a four-year period (based on an initial one-year contract, with a three-year extension after a positive evaluation as to whether the research is expected to result in a PhD degree after four years).
- The terms of employment are governed by the Collective Labour Agreement of Universities in The Netherlands, with a monthly salary starting at 2174 Euro in the first year, and increasing to 2779 Euro in the fourth year, and an additional 8% holiday allowance and 8% end-of-year bonus. An extensive fringe benefits package is included. Further details can be found here. Additional budget allows for extensive research visits abroad and conference attendance.
- For information regarding the university, please visit the website of TU/e. Here you can find information about the sports facilities on campus. Information about Eindhoven can be found here. The international office provides support with administration and housing to foreign nationals and their spouses.

Information
Questions about this position should be addressed to:
Prof. Dr. Ton de Kok (t.dekok@tue.nl)
Dr. Willem van Jaarsveld (w.l.v.Jaarsveld@tue.nl)
Prof. Dr. Bert Zwart (bert.zwart@cwi.nl)

Dr. Maria Vlasiou (M.Vlasiou@tue.nl)

Information about terms of employment can be obtained from the personnel officer, Kees Deneer MSc. (pz.ieis@tue.nl).

PhD researchers that are close to graduation, and that are interested in the PostDoc position that will be become available in 2018 at Delft University of Technology, can contact Dr. Jan Kwakkel at j.h.kwakkel@tue.nl.

Application
Your application must contain the following documents (all in English):
- Cover letter (1 page max), which includes a motivation of your interest in the vacancy, a preference for one of the two projects, and an explanation of why you would fit well for the project;
- An extensive curriculum vitae;
- A course list of your Masters and Bachelor programs (including grades);
- Results of a recent English language test, or other evidence of your English language capabilities;
- Name and contact information of two references.

Note that incomplete applications will not be considered.

If you are interested, we invite you to apply as soon as possible via http://jobs.tue.nl/nl/vacature/phd-position-on-complexity-in-hightech-manufacturing-299130.html (First project)
or http://jobs.tue.nl/nl/vacature/phd-position-complexity-in-transport-and-logistics-300673.html (second project). We will start considering applications and interviewing immediately upon receiving an application.