

## Faculty of Science and Engineering

### Profile report: Software Engineering

- Discipline: Computer Science
- Level: tenure-track Assistant professor
- Fte: Full time (1.0)

#### 1. Scientific discipline

Software Engineering is the application of a systematic, disciplined, and quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software. Drawing on computing and mathematics as foundations, as well engineering disciplines and particularly systems engineering, software engineering seeks to develop systematic models and reliable techniques for producing and evolving high-quality software.

#### 2. Vacancy

This position is opened by the Board of the Faculty (PT/gl/18/00423) and will be embedded in the Bernoulli Institute (BI), basic unit Software Engineering, according to the framework of 'Career Paths in Science 4' ('Bèta's in Banen 4'). Please see link for [criteria and conditions](#).

#### 3. Selection committee (BAC)

Prof. dr. J.B.T.M. Roerdink	Scientific director Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence (Chair) and professor Scientific Visualization and Computer Graphics
Prof.dr. A. Telea	Program director bachelor Computing Science and professor Visual Analytics
Prof. dr. P. Avgeriou	Professor Software Engineering
Prof. dr. D. Karastoyanova	Professor Information Systems
Prof. dr. A. Lazovik	Professor Web Computing
D. Chirtoaca	Student member
Prof. dr. P. Lago	ext. member, professor of Software and Services, Vrije Universiteit

*HR advisor:*

L.A. Boomsma

#### 4. Research area

Software Engineering is a broad discipline covering the following areas (according to the Software Engineering Body of Knowledge): software requirements, software design, software construction, software testing, software maintenance, software

configuration management, software engineering management, software engineering process, software engineering tools and methods, software quality, software languages, verification and validation, formal methods, safety and security of software.

Some of the major challenges that the field of Software Engineering is facing are: increasing integration of Systems and Software Engineering; focus on the end user and the offered added value; increasing demand on software dependability and other critical qualities; dealing with rapid, accelerating change; continuous distribution, mobility, interoperability and globalization; emergence of ultra-large systems (systems of systems); demand for reusability and legacy integration; proliferation of data-intensive (big data) and computation-intensive applications; and the trend of autonomous or self-managing software. For all these challenges the areas of software architecture and software evolution are of paramount importance. For the last two challenges specifically, the areas of big software (big data in software engineering) and software analytics are of particular relevance. Thus, the aforementioned areas will be at the heart of this position and are also central to the theme of Data Science and Systems Complexity.

### **5. Embedding: institute (and base unit)**

The position will be embedded in the Software Engineering research unit of the BI. The Software Engineering group was founded in 1999 and the four faculty members (Paris Avgeriou, Vasilios Andrikopoulos, Michael Stal and Tijs van der Storm) are internationally acclaimed in the field of Software Architecture, Cloud/Fog/Edge Computing, Software Patterns and Domain-Specific Languages. The group is working on numerous research projects together with the Dutch and European industry for software-intensive systems. It currently comprises 15 PhD students. The group plans to maintain a leadership role in the aforementioned fields, as well as expand further in the fields of software analytics, systems of systems and DevOps.

The Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence is part of the Faculty of Science and Engineering (FSE). The profile of the institute centers around modelling, computation, and cognition with a focus on science and technology, keeping a balanced mix of fundamental and applied aspects. The Bernoulli Institute comprises five mathematics programmes, six computer science programmes, and four artificial intelligence programmes. The constituting programmes participate in various national research schools and most of the PhD students are enrolled in an educational programme and take part in other activities offered by these schools. The Bernoulli Institute aims to strengthen the current research portfolio in Mathematics, Computer Science and Artificial Intelligence by expanding both in fundamental areas that have a prominent role in education as well as in directions that are essential for new technological and societal developments.

The Bernoulli Institute has a leading role in the recently established cross-disciplinary research theme on Data Science and Systems Complexity (DSSC) within

the Faculty of Science and Engineering. This concerns a research cluster of 60+ researchers in a number of basic disciplines (mathematics, computer science, artificial intelligence, systems & control, engineering, astronomy) and various scientific application domains. The ambition is to understand and solve big data problems by exploiting the joint perspectives from both data science and complexity science. The institute is also heavily involved in the Groningen Cognitive Systems and Materials Center (CogniGron), which is a joint venture between the Bernoulli Institute and the Zernike Institute for Advanced Materials. It comprises researchers from materials science, physics, chemistry, mathematics, computer science and artificial intelligence. The center provides structure, coherence, and visibility for a joint research program in the direction of cognitive systems and materials.

## **6. Local and (inter)national position**

Nationally, most universities have strong research efforts in software engineering. In particular, there are strong Software Engineering research groups at all three technical universities, as well as the universities in Amsterdam (both VU and UvA), Utrecht, Nijmegen and Leiden. The Software Engineering group in Groningen is among the leaders in the field of software architecture and empirical software engineering in general. Furthermore, the Software Engineering group participates in the Dutch Research School in Programming and Algorithmics (IPA), which has a strong tradition in Software Engineering, with Avgeriou sitting in the IPA board. In addition the group also participates in the Dutch National Association for Software Engineering (VERSEN), where Avgeriou also sits in the board. At the international level the research group is involved in several EU research projects with the high-tech industry (e.g., PROMES - Process Models for Engineering of Embedded Systems, SDK4ED - Software Development toolKit for Energy optimization and technical Debt elimination), has established collaborations with major high-tech companies (Philips Research, ASML, Océ) and technological institutes (Astron, TNO, Software Engineering Institute at Carnegie-Melon University), and has cooperation and exchange programmes with many universities (e.g., Vancouver, Leuven, Linnaeus, Milano, Gothenburg). Finally, the senior members of the group (Avgeriou, van der Storm) act as Editor-in-Chief in top journals in the field, frequently give keynotes and invited talks in international conferences, serve in numerous Program and Steering Committees of international conferences, and receive often Best Paper awards in top conferences.

In Computer Science, the BI has a strong position, as evidenced by participation in NWO and EU projects, publications in renowned journals and conferences, memberships of editorial boards and program committees, conference chairing, etc. Within the Bernoulli Institute there are strong connections between the Software Engineering group and the Distributed Systems, Information Systems and Scientific Visualization groups.

## **7. Expected contributions to research**

The candidate is expected to initiate and develop an internationally leading research programme in the field of Software Engineering. The research should have a visibility

on the national and worldwide level and lead to publications in top journals. Furthermore it is expected that the new assistant professor will take a leading role in the field of Computer Science within the Netherlands. The research is also expected to cross-fertilize the existing research within the Groningen Cognitive Systems and Materials center, the Zernike institute and should lead to a strengthening of the international reputation of the group, the research center and the institute. Obtaining substantial external funding for PhD projects is crucial. Supervision of PhD students is an important part of the research activities. The research is expected to strengthen the existing efforts within the Groningen Cognitive Systems and Materials center and the BI in the field of Computer Science and to take an international leadership.

### **8. Expected contributions to teaching**

The candidate is expected to contribute to the teaching programmes in the bachelor and master degree programs within the Undergraduate and Graduate Schools of Science and Engineering. She/he is expected to participate in the teaching programme of specialized courses in relation to Software Engineering and other related topics, e.g. computer networks, operating systems, information systems, parallel computing. Furthermore, the candidate will be involved in supervising bachelor, master and PhD students. Upon appointment, depending on experience and formal qualifications to date, the candidate may be required to enter a nationally standardized tertiary teaching skills certification trajectory (BKO or Basis Kwalificatie Onderwijs), successful completion of which is a condition for extensions and tenure. During the first 5 years of the appointment the tenure-track assistant professor will devote at most 30% of the total time to educational tasks. Once tenure has been obtained, these tasks amount to 40%.

### **9. Expected contributions to the organization**

The candidate is expected to have an active interest and to provide a positive contribution to the management and organizational tasks of the institute. At the level of the FSE, the candidate will contribute to the organization of the faculty, for example by participating in working groups and committees, in the fields of teaching, research and management. The candidate will participate in relevant national and international organizations.