

Faculty of Mathematics and Natural Sciences (FMNS)

Profile Report

Discipline: Information Systems

Level: Tenure-track assistant professor (UD)

Fte: 1.0

1 Scientific discipline

The field of Information Systems concerns the study of systems with a specific reference to information and the complementary networks of hardware and software that people and organizations use to collect, filter, process, create and distribute data. Within the discipline of Computer Science, the field of Information Systems is characterized by the following sub-disciplines: Data management systems, Information storage systems, World Wide Web, Information Retrieval, Smart Systems, Distributed Systems, Data Processing Systems, Information Systems Security, Information Systems applications.

2 Vacancy

This vacancy concerns a tenure-track assistant professor (UD) position, according to the Faculty's career policy "Career Paths in Science edition 3" (FB ref: JK/gl/5/00745). The new position will be embedded in the Distributed Systems programme.

3 Selection Committee

Prof.dr. J.B.T.M. Roerdink	(scientific director of JBI, Chair)
Prof.dr. T. Elzenga	(director Undergraduate School FMNS)
Prof.dr. M. Aiello	(group leader of Distributed Systems)
Prof.dr. N. Petkov	(group leader Intelligent Systems)
Mw. Prof.dr. L.C. Verbrugge	(chair of Logic and Cognition)
Mr. J. Bekker	(student member)
Prof. dr. M. de Rijke	(ext. member, professor of Information Processing and Internet, University of Amsterdam)

HR advisor:

Mr. L.A. Boomsma, Human Resources Department

4 Research area

Information Systems revolve around the notion of data. Such systems are concerned with the acquisition, processing, storage, retrieval and overall analysis of data. As such they are the backbone to enable and build computer-based systems. It is a broad discipline that includes the theory and application of information storage (databases), the retrieval of information, information processing and analysis, information systems security, the creation of smart systems based on data processing and analytics. It naturally lends itself to interdisciplinary research with Astronomy, Biology, Chemistry, Physics, and any other data intensive discipline. As such, it is central to the theme of Data Science and Systems Complexity.

The increased complexity of information systems, however, leads to challenges. There are new approaches, needs, business imperatives and strategies that enterprises, public organizations, and nonprofits need to understand and apply. There are tradeoffs in resources required, costs and benefits, priorities, risk levels, and the ability of the organization to absorb change. How should these issues be governed and managed? The overall complexity is amplified when one appropriately includes cyber security and data privacy. There are varying levels of maturity in organizations with regard to the ability to make intentional decisions, measure results, apply appropriate levels of investment and govern these processes, while securing intellectual assets and safeguarding personal and financial information. At the same time, from the technical point of view, there are issues of managing rapid, heterogeneous, large volumes of data that can come from a plethora of sources. Social networks based on

ICT, sensors, digital infrastructures, all generate an increasing amount of data that needs to be processed. Architectures for managing these are constantly evolving to meet rapidly changing requirements.

5 Research group and Institute

The Johann Bernoulli Institute for Mathematics and Computer Science (JBI) is part of the Faculty of Mathematics and Natural Sciences (FMNS). The profile of the institute centers around modeling and computation with a focus on science and technology, keeping a balanced mix of fundamental and applied aspects. The JBI comprises five mathematics programmes and five computer science programmes. The constituting programmes participate in seven 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 JBI has a leading role in the recently established cross-disciplinary research theme on Data Science and Systems Complexity (DSSC) within the Faculty of Mathematics and Natural Sciences. 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 JBI aims to strengthen the current programme in Data Science and System Complexity, by expanding in the area of information systems, scalable databases, smart systems, secure information systems, etc. These areas also have a prominent role in education and new technological and societal developments requiring expertise in application domains mentioned under point 4.

6 Local and (inter)national position

At the national level the JBI participates in the Dutch computer science research schools Advanced School for Computing and Imaging (ASCI), Dutch Research School in Logic (OZSL), the Dutch Research School in Programming and Algorithmics (IPA), and the School for Information and Knowledge Systems (SIKS), the latter being the most relevant for the position. At the international level the JBI is involved in several EU research projects (e.g., Human Brain Project, Smart Homes, Visual Analytics), has established collaborations with major companies (Philips Research, IBM) and technological institutes (Astron, TNO, NLR, ECN), and has cooperation and exchange programmes with many universities (e.g., Rome, Leipzig, Birmingham, Barcelona, Ghent, ESIEE-Paris, Tampere). In Computer Science, the JBI 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.) in intelligent systems (biologically inspired computational modelling, machine learning, morphological image processing); pervasive middleware and energy distribution infrastructures; architecting of software-intensive systems and object-oriented software design; data and information visualization, and visual analytics. The distribution of research effort over these areas is about equal.

7 Expected contribution to research

The assistant professor is expected to develop an internationally leading research track record in Information Systems, leading to an autonomous research programme within the JBI. The research should lead to publications in high impact scientific journals and to contributions to major conferences in the field of expertise. Supervision of PhD students and postdocs is an important part of the research activities. Obtaining substantial external funding for PhD and postdoc projects is crucial. A strong involvement in the research theme Data Science and Systems Complexity is expected. Interaction with other domains that require support from information systems (e.g., astronomy, biology, medicine, data analytics companies, big data, smart energy systems), or provide relevant complementary expertise (artificial intelligence) is very important.

8 Expected contribution to teaching

The successful candidate is expected to contribute to the teaching programmes of the bachelor and master programmes of Computer Science in the Undergraduate and Graduate Schools of Science of the FMNS. He/she will contribute both to teaching existing courses, and to the development of new courses in data science, engineering, energy. This includes the supervision of bachelor and master theses. During the first 6 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 contribution to the organisation

During the first five years, the assistant professor is free from substantial administrative tasks. However, it is expected that he/she will play a role in the general organisation of the research programme, such as supervising PhD students or postdocs, running a seminar series, and contribute to the organisational tasks of the research institute JBI, the (under)graduate school, and the Faculty.

10 Career perspective:

The position will be on a temporary basis for a maximum of six years as tenure track researcher according to the document "Career Paths in the Sciences" (www.rug.nl/fwn/careerpathsinScience) of the Faculty of Mathematics and Natural Sciences. After five years, the performance of the assistant professor will be assessed according to the criteria outlined in the document. A negative assessment will result in the termination of the appointment after a total duration of six years. A positive assessment will lead to a tenured appointment and a promotion to adjunct (associate) professor in line with the actual university function ordering system. An adjunct professor has the *ius promovendi*, i.e. the right to independently supervise own PhD students. After another 4-7 years the adjunct professor may apply for a promotion to full professor.