

# CONSTANT ROLE WITH CHANGING CONTENT

Despite a considerable growth in the number of PhD students and a shift in thematic emphasis, the main function of the three computer science research schools still stands tall: to ensure that PhD students are trained as broadly as possible.

By Bennie Mols Images iStock, Ivar Pel, Bart van Overbeeke

In 1991, the Minister of Education, Culture and Science, Jo Ritzen, established research schools with a dual purpose. The introduction of a new system for PhD students – the AIO system – necessitated well-organised researcher training, and there was also a wish to enhance the quality and coordination of the research done. To achieve these two goals, universities were invited to form highly qualified research centres for their major research fields, mostly via inter-university collaborations.



### Arno Siebes:

'Research schools have become mostly education schools'

For computer science, this development led to the establishment of three research schools in 1996: the Advanced School for Computing and Imaging (ASCI), the Institute for Programming research and Algorithmics (IPA), and the School for Information and Knowledge Systems (SIKS). Today, almost three decades later, the three computer science research schools still exist, even though the end of the research school phenomenon has been predicted many times before, and despite all the changes within computer science itself: in particular, the huge increase in the number of students and PhD students, and the substantive thematic changes with the strong growth of fields such as data science and AI.

## From research to education

How do current scientific directors Remco Veltkamp of ASCI, Arno Siebes of SIKS and Alexander Serebrenik of IPA view the role of their research schools?



### Remco Veltkamp:

'It is quite conceivable that we will develop some joint courses for all three research schools'

'In the mid-1990s, there was a fear that if you didn't join a research school, you wouldn't get funded,' says Remco Veltkamp, 'but it hasn't worked out that way at all.' Arno Siebes adds: 'In the end, research schools have become mostly education schools, which is a good thing.'

The role of research schools has not really changed in recent decades, says Alexander Serebrenik. 'We still make sure that PhD students are trained fairly broadly, that they not only know about their own subject, but also have a broader view of the field of computer science. In training them, you have a spectrum of skills. At one end of that spectrum are basic skills such as writing, oral presentation and research methodology. That is what universities are responsible for. At the other end of the spectrum, you have subjects and skills needed for a specific doctoral project, which is primarily on the individual supervisors. Research schools are in between.'

Each research school offers a variety of thematic courses. PhD students generally attend one or two courses per year. Siebes emphasises that establishing social contacts with PhD students from other universities is also an important function of the research schools: 'Courses often last two or three days. Especially in the evenings, PhD students share experiences with each other. It is good that they can vent to each other now and then about what is and what is not going well.'

Just how important the social aspect of research schools is can be seen in the strong recruitment of new members after the corona crisis. Veltkamp: 'During the pandemic, physical meetings naturally fell silent. In the past year, ASCI suddenly gained 35 new PhD students, so they are very eager to come to our courses.'

## Evolving topics

The main role of the research schools may not have changed in recent decades, but the topics they cover have. 'Of course, within IPA, we still cover software engineering, formal methods and algorithmics,' says Serebrenik, 'but nowadays, we also pay explicit attention to social aspects of software development, such as the topic of sustainability, for example. That's a substantial difference from twenty years ago when that was unthinkable.'

Siebes recognises this trend: 'I think the big change within SIKS is that we no longer deal only with pure computer science subjects. Topics such as data science and AI have moved into completely different subject areas. And that means that some non-traditional computer science groups have also joined SIKS, such as computational linguistics.'

Another trend is that in a subject such as AI, for example, there are more and more interfaces between the three research schools. Veltkamp: 'ASCI has two blood groups: computer systems and imaging. In imaging, which you can see in a broad sense as multimedia, a lot is happening on neural networks. But at SIKS and IPA there are also people working on that. It is, of course, quite conceivable that we will develop some joint courses in this area for all three research schools. We are thinking about that.'

At the latest ICT.OPEN conference, the three research schools already offered a joint leaflet of courses. In the past, there has been talk of a merger, but there is no urgent need for it. Veltkamp: 'If we collaborate well, that is fine enough.'

Over time, PhD students within the research schools have become increasingly international. All three scientific directors see this as a positive development. Serebrenik: 'That means that PhD students are easily exposed to different cultures and different opinions and that broadens the discussions, which is a good thing.'

A final trend to be mentioned is the sharp increase in costs of organising multi-day courses in hotels, as has always been the practice. Serebrenik: 'Especially for the social aspect, organising a course outside a university in a hotel works well, but we sometimes stay closer to home due to the high costs. We have also had to increase the participation fee.'

## Changes in content

The three scientific directors agree that the role of the research schools is still primarily to broadly train PhD students. Siebes: 'In that sense, nothing will change in the future. But, of course, there will be an incredible number of changes in terms of content that we can't predict. If I were to compare our course program of twenty years ago with that of today, then I am pretty sure that there is hardly any similarity.'

In recent decades, topics that have long been studied in computer science, such as neural networks, language models and mobile computing, have been developed by the computer industry into everyday products and services, from mobile phones to cloud services. These products and services have led to major societal changes, giving rise to new scientific challenges that the research schools also need to tackle. Siebes: 'Topics like fairness, explainability and trust have come up and will never leave. We still have plenty to do in our education in these areas.'

And a social theme such as sustainability has led to a research topic such as 'green computing' within computer science and will lead to changes in handling large amounts of data. Veltkamp: 'So far, only data has been added. But if the impact on our planet becomes too big, at some point we may no longer be able to store all data, and we will have to throw data away. How will this affect algorithms, databases, AI and data science?'

'Society is changing,' Serebrenik concludes, 'and that means that society's expectations of computer science are changing. While topics such as data, algorithms and software are traditional computer science topics, societal changes force us to look at them differently.'

### Alexander Serebrenik:

'We make sure that PhD students have a broader view of the field of computer science'



## ABOUT THE THREE COMPUTER SCIENCE RESEARCH SCHOOLS

### Advanced School for Computing and Imaging (ASCI)

Size: 106 PhDs, 83 staff members

Participating institutes:

Delft University of Technology ('administrative university'), VU Amsterdam, University of Amsterdam, Eindhoven University of Technology, Leiden University, Utrecht University, University of Twente, University of Groningen, Erasmus University Rotterdam

[asci.tudelft.nl](http://asci.tudelft.nl)

### Institute for Programming research and Algorithmics (IPA)

Size: 98 PhDs, 176 staff members

Participating institutes:

Eindhoven University of Technology ('administrative university'), Centrum Wiskunde & Informatica, Radboud University, University of Groningen, Delft University of Technology, Leiden University, Utrecht University, University of Twente, University of Amsterdam, VU Amsterdam, Open University

[ipa.win.tue.nl](http://ipa.win.tue.nl)

### School for Information and Knowledge Systems (SIKS)

Size: 300 PhDs, 350 staff members

Participating institutes:

VU Amsterdam ('administrative university'), Utrecht University, University of Twente, University of Amsterdam, Delft University of Technology, Eindhoven University of Technology, Radboud University, Maastricht University, Tilburg University, Open University, Leiden University, University of Groningen, Centrum Wiskunde & Informatica

[siks.nl](http://siks.nl)