

Structural Investment in Dutch Computer Science: Academia is Vital for Digital Sovereignty

We bring people together to strengthen academic research and education in computer science by fostering a national community and developing policies that advance the field.

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IPN (ICT Research Platform Nederland) unites all Dutch academic research groups that have ICT science as their core and, as such, acts as a single point of contact for all matters relating to ICT innovation and its importance for our current and future society. IPN is supported by the NWO Domain Science.

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Executive Summary

Digital sovereignty is a national strategic priority.

As global geopolitical tensions rise and dependence on foreign digital infrastructure increases, the Netherlands faces growing risks to its economic resilience, democratic integrity, and national security. To address these vulnerabilities, the Dutch government must act decisively to support a *sovereign digital ecosystem* rooted in domestic capability and innovation. Now is the moment to assert control over our digital footprint and infrastructure in the midst of an increasingly volatile and hostile global landscape.

A critical enabler of this transition is the academic Computer Science domain. Dutch universities, as well as adjoining national research institutes like Centrum Wiskunde & Informatica (CWI)¹ and eScience Center², provide the foundational research, innovation, and education required to develop secure, autonomous technologies and to train the highly skilled workforce necessary to support digital sovereignty. Yet current funding models are insufficient to meet this strategic need. Structural investment in academia is essential for building the long-term capacity necessary to secure our digital future.

The path towards digital sovereignty requires several strategic national actions across multiple fronts, for which the academic Computer Science domain will be an instrumental partner:

- ▶ Developing a national data center & cloud strategy to secure critical digital assets on Dutch soil;
- ▶ Designing transparent and sovereign cloud architectures to host data and AI applications;
- ▶ Creating user-friendly, modular and composable digital services that provide competitive alternatives to Big Tech platforms;
- ▶ Building a resilient and sovereign digital infrastructure capable of withstanding both natural and man-made threats;
- ▶ Embedding foundational knowledge of secure and sovereign digital systems into education and training at all levels;
- ▶ Training top-tier talent, creating the necessary environment for them to stay in the country, as well as incentivizing exceptional talent to move to the Netherlands.

1 www.cwi.nl

2 www.esciencecenter.nl

Dutch Knowledge Institutes: Strategic Assets for Digital Independence

The Netherlands must increase its ability to maintain digital autonomy and integrity of its digital infrastructure and should therefore reduce its dependence on foreign – particularly American and Chinese – ICT providers.

These measures will foster a digital ecosystem that is more resilient to geopolitical shifts and aligned with national and European values. Realizing these measures at the required scale and speed demands a substantial and coordinated investment effort. Incremental or fragmented funding will be insufficient. Instead, a “Delta Plan”-like approach is needed to strengthen the academic Computer Science domain as a cornerstone of digital sovereignty.

These dependencies threaten not only our ability to independently manage critical national functions – such as energy grids, transportation systems, healthcare networks, and defense mechanisms – but also undermine our control over data, innovation trajectories, and economic competitiveness. Identical conclusions have been drawn by many recent policy documents, such as the Draghi Report³, the Rathenau report on Strategic Autonomy⁴, and of course the recent Rapport Wennink⁵. Dutch knowledge institutes, like universities and national research institutes, are uniquely positioned to drive the transition towards digital sovereignty through:

1. World-Leading Research

Our knowledge institutes conduct world-class research across all critical areas of Computer Science, including cyber security, artificial intelligence, data science, human-computer interaction, and software engineering. This research fuels homegrown technological solutions that reduce our reliance on external platforms and providers.

2. Workforce Development

Our universities educate the next generation of digital professionals who will design, operate, and secure the sovereign technologies of tomorrow. In addition, Dutch universities play a crucial role in life-long learning, enabling continuous upskilling and reskilling of the existing workforce as digital technologies, security threats, and regulatory frameworks rapidly evolve. Investing in academia ensures a stable pipeline of skilled talent aligned with national and European priorities.

3 https://commission.europa.eu/topics/competitiveness/draghi-report_en

4 <https://www.rathenau.nl/nl/werking-van-het-wetenschapssysteem/wetenschap-van-de-toekomst/dialog-over-de-toekomst-van-onderzoeksfianciering>

5 <https://www.rapportwennink.nl>

A Holistic ICT Innovation Strategy

Digital sovereignty cannot be achieved through isolated technological efforts.

It requires a coordinated approach involving the entire Computer Science spectrum:

- 1. Computer and Network Systems.** This discipline underpins the infrastructure for secure and autonomous digital services. Research in this area enables the Netherlands to build and maintain resilient, scalable, and energy-efficient computing and communication systems without relying on foreign platforms – a foundation for sovereign control over critical digital infrastructure.
- 2. Software Engineering and System Design.** Developing robust, transparent, and adaptable software systems is vital for reducing dependence on proprietary technologies. Research in this field ensures that mission-critical applications – from healthcare to public administration – are secure, maintainable, and aligned with national and European values and standards.
- 3. Artificial Intelligence and Data Management.** AI and data systems are central to modern innovation and governance. By advancing trustworthy, explainable, and ethically aligned AI, and techniques for reliable, secure and privacy-aware data management, Dutch researchers help ensure that critical decisions, services, and innovations remain under national control and reflect societal norms rather than foreign commercial interests.
- 4. Cyber Security and Privacy Technology.** Safeguarding digital assets, infrastructure, and citizen data is fundamental to digital sovereignty. Research in cyber security and privacy delivers the tools, protocols, and frameworks needed to defend national systems against cyber threats and to uphold privacy as a non-negotiable democratic value.
- 5. Algorithms for Complex Computational Problems.** Efficient and specialized algorithms are the engines behind digital systems. Advancing this field enables sovereign optimization and control of national processes – such as logistics, energy distribution, or financial modeling – without being constrained by foreign intellectual property or opaque algorithmic decision-making.
- 6. Human-Computer Interaction (HCI).** Digital systems must be usable, accessible, and designed to serve people. Research in HCI ensures that technology enhances human agency, aligns with diverse user needs, and reinforces trust – critical components of a digital ecosystem that is both sovereign and democratic.
- 7. Strategically Important Open-Source Software.** A critical cross-cutting enabler of digital sovereignty is the incentivization of the creation, maintenance, and long-term stewardship of strategically important open-source software artifacts. Open-source software provides transparency, auditability, and freedom from vendor lock-in, allowing the Netherlands to retain control over core digital building blocks across all layers of the ICT stack. By treating strategic open-source software as digital public infrastructure, the Netherlands can strengthen its technological autonomy while fostering innovation, collaboration, and trust across government, industry, and academia.

Regarding all of the aforementioned innovation efforts, Dutch knowledge institutes serve as the nexus of interdisciplinary innovation, fostering collaboration across academic, industrial and public sectors. However, their ability to deliver impact at scale depends on long-term, structural funding rather than fragmented, project-based grants.

Policy Gap: Structural Underfunding

Despite the strategic importance of academia in achieving digital sovereignty, current funding frameworks fall short.

Reliance on short-term, competitive project grants limits the ability of universities to build sustainable research programs, invest in infrastructure, and retain world-class talent. This policy gap results in:

- ▶ A persistent and alarming mismatch between student demand and staff capacity⁶, which also undermines the ability to quickly adapt educational curricula to emergent strategically important working skills.
- ▶ Inhibited response to emerging national and EU digital priorities.
- ▶ The inability to attract and retain high-potential talent for Dutch academia and industry.
- ▶ Reduced ability to undertake high-risk, high-reward research.

Policymakers must recognize that digital sovereignty requires stable and strategic investment in academic Computer Science capacity.

⁶ The student-staff ratio in the academic Computer Science domain (currently 28:1) has consistently been one of the highest in academia where the average ratio is 17.5:1 (see <https://ict-research.nl/wp-content/uploads/2025/04/Update-Sector-Analysis-Informatics.pdf>)

Policy Recommendation

To address this strategic challenge, we urge the Dutch government to:

- ▶ Establish a dedicated structural funding program for academic Computer Science departments;
- ▶ Support capacity-building and invest in human capital in Computer Science, especially in high-demand areas such as cyber security, AI, and data science;
- ▶ Facilitate partnerships between academia, government, and industry to accelerate domestic innovation;
- ▶ Align national research priorities with the EU digital sovereignty agenda via mechanisms such as co-funding schemes and facilitating European collaboration using funding schemes like NWO Weave but at larger scale;
- ▶ Invest in a transition of SURF⁷ towards a sovereign infrastructure supporting research and education;
- ▶ Support open source/open protocol development of mature software artifacts, rewarding knowledge institutes for developing them.

These actions will empower universities to serve as the backbone of a sovereign digital ecosystem that reflects Dutch and European values. To this end, incremental or fragmented funding will not be sufficient. Instead, a “Delta Plan”-like approach is needed to strengthen the academic Computer Science domain as a cornerstone of digital sovereignty. This entails long-term, structural funding through complementary schemes at multiple levels, including the possibility of a new national sector plan for Computer Science to reinforce core academic capacity, targeted investments via the National Growth Fund to accelerate large-scale infrastructure and innovation programs, and dedicated thematic calls within NWO to stimulate breakthrough research in areas such as sovereign cloud, secure systems, and trustworthy AI. Only through such a coherent and sustained funding strategy can the Netherlands ensure that its academic ecosystem has the critical mass, continuity, and international competitiveness required to underpin a truly sovereign digital future.

⁷ <https://www.nwo.nl/nieuws/oplossingen-vragen-om-rekenkracht-nederlandse-wetenschap-loopt-achter>

Conclusion

Digital sovereignty is a strategic imperative that demands decisive policy support.

Digital sovereignty is a strategic imperative that demands decisive policy support. The Dutch academic Computer Science sector must be structurally empowered to deliver the research, innovation, and talent required for a resilient, autonomous digital future. Investing in our knowledge institutes today is the most effective and sustainable way to protect our national interests, enhance our economic competitiveness, and uphold our democratic values in the digital age.



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