Backgrounds to our choice for public cloud and AWS

Safeguarding data security and the permanent availability of .nl are our top priorities

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Background

In recent years, we 've been devoting ever more time, attention and resources to our domain registration system and particularly to the supporting infrastructure, with its aging technology. That's a huge drain on our capacity, which we would prefer to use for further enhancing our core service (DNS resolving), developing knowledge, and increasing the security of the .nl domain and the wider internet. So we want to outsource the management of our generic infrastructure and more routine processes, and to make more use of generic, open-source software and open standards. At the same time, we want to make sure that the highest possible levels of stability, availability and data security are maintained. We therefore intend to continue managing the actual registration system ourselves. We'll also continue developing the software ourselves, albeit in partnership with Canada's registry, CIRA.

Sourcing study

In the first 2 quarters of 2023, a sourcing study was carried out for us by Eraneos, a specialist external consultancy that knows the market well. Eraneos's consultants worked closely with our own internal experts to explore 3 scenarios: *investment in a self-managed (on-premises) solution, outsourcing to a private cloud* and *outsourcing to a public cloud.*

The 3 scenarios were compared on the basis of 7 strategic criteria important to SIDN:

1. Further enhancement of the resilience, availability and security of our services, and the reduction of latency.
2. Creation of scope for development in the field of internet infrastructure security and data.
3. Contribution to Dutch and European digital autonomy and counteraction of internet centralisation (NL/EU-first sourcing strategy).

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4. Retention of our ability to attract the next generation of technical personnel, and to provide them with training in the field of internet infrastructure.
5. Enhancement of our agility and flexibility, and therefore our capacity for innovation.
6. Assurance of our ongoing ability to use the latest, proven ICT solutions.
7. Improvement of cost-efficiency.

Next, with Eraneos's assistance, we carefully examined all the options available to us, including Dutch and other European public and private cloud providers. For that exercise, Eraneos compared a number of providers on the basis of various functional and security criteria, such as *data encryption at rest and in transit*, *managed open-source databases*, support for *open source and infrastructure-as-code*. We also took account of the findings of multi-year global research into the overall quality of public cloud providers. Finally, consideration was given to additional criteria of particular relevance to us, such as compliance with the EU's GDPR, ISO 270001 and other ISO standards, and service quality.

Findings and proposal

Taking everything into account, outsourcing to a public cloud was found to be the best solution, for the following reasons:

- A public cloud service gives us access to market-best practices, while a private cloud solution would imply a greater internal management burden and reduce our access to market-best practices.
- Compared with both a private cloud solution and an on-premises solution, a public cloud solution offers more standard services that are available for immediate use without customisation.
- With a public cloud solution, we are assured of access to extensive knowledge and expertise that can be used to safeguard the availability and continuity of our core services in the immediate future and longer term.

When the various public cloud providers were compared, AWS came out as offering the greatest benefits, particularly in terms of reliability and security. Currently, therefore, AWS meets the requirements that we have as the registry for .nl better than the other platforms we considered.

Because we regard strategic digital autonomy as very important, we were faced with a difficult decision. However, the need to assure the permanent availability of .nl and protect our data was decisive in this instance. Those are, after all, our primary responsibilities as a registry.

One of our architectural principles is the avoidance of vendor lock-in. Our new registration system will therefore be designed to be vendor-agnostic, and we'll use generic open-source technology and open standards. We won't therefore be tied to any particular cloud provider, and we hope to migrate the system to a Dutch or

European provider in due course. We also look forward to the possibility of cooperating with other stakeholders to bring that prospect closer.

Which systems are involved?

It's important to recognise that the proposed migration to AWS involves **only** the domain registration system for .nl (the DRS, the operational application used to register domain names and update existing registrations). We are **not** suggesting migrating our core resolving service and the associated DNS infrastructure (the system that ensures that websites with .nl domain names can be reached and that .nl e-mail addresses work). The plan is to make the switch at the end of 2025, after which we'll continue to develop and manage the system ourselves.

Our partnership with CIRA is mainly for the joint development of the software for a new registration system for .nl. We would like to emphasise that we will continue developing and managing the registration system for .nl ourselves in any future scenario involving the AWS cloud. Our plan naturally involves use of the European regional AWS service, and we will abide by all the relevant legislation and regulations, and (like the government) we will carry out a Data Protection Impact Assessment and other checks. Finally, migration to AWS will not happen until we have developed an exit strategy.

Under the terms of our agreement with CIRA, we'll have unrestricted use of the jointly developed registration system. We will co-own the new system, and we'll be able to modify the software any way we like.

DNS will not be affected in any way

The proposed migration to AWS does not involve the DNS. The .nl domain's availability to end users – their ability to access websites and use e-mail, for example – will not therefore depend on AWS. Nor do we have any intention of using AWS's DNS services, even at a later date; we are going to continue working with multiple DNS operators. As a result, .nl and the DNS will remain diverse and decentralised: technical characteristics that we are committed to preserving in the interests of internet availability and scalability.

Our DNS servers are geographically dispersed around the world, with numerous anycast nodes hosted by an external data centre providing global coverage. The entire technology stack (DNS server, operating system and network configuration) is under our own control, with the data centre simply providing the hardware. That arrangement is crucial, because, as an internet infrastructure operator, it's vital for us to maintain in-depth knowledge of the DNS and its extensions, and of related core internet systems, particularly systems for internet traffic routing and for time. In order to further enhance the availability of our DNS service, we also make use of DNS anycast services provided by 2 other registries.

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Strategic digital autonomy

With .nl, SIDN Labs and SIDN Fund, and the support we provide to others in the Netherlands and elsewhere, we continue to work for an open, secure and accessible internet. Moreover, our ambition of contributing both to Dutch and European strategic digital autonomy and to a decentralised internet remains undiminished. However, because we wish to safeguard our .nl services as effectively as possible, our preference for the short term is to transition to the proven technology of AWS. In the longer term, we aim to pursue an alternative when a Dutch or European provider is able to offer a public cloud service of a similar standard to that provided by AWS. With that goal in mind, we will continue to monitor developments and support promising European cloud initiatives. Transition to an alternative provider will be considered if and when a suitable service becomes available that can contribute to realisation of our strategic objectives. In line with those plans, our new registration system will be designed to be vendor-agnostic, and will make use of generic open-source technology and open standards.

In addition:
- We will investigate whether SIDN Labs' research network can be hosted by players that utilise Dutch or other European cloud service providers.
- We will continue investing in the development of open-source standards, e.g. through NLnet Labs.
- We will involve ourselves with initiatives that contribute to a decentralised internet and European digital strategic autonomy, and that advance the prospect of a competitive Dutch or European cloud alternative.
- We will publish a 'cloud cookbook' recording our experiences and the lessons we have learnt, such as how we have designed and configured our systems to be cloud-operator-agnostic. The intention being to help other registries and service providers within the internet infrastructure to make informed decisions about their sourcing strategies.

Preparation

We are currently making initial preparations for migration to AWS. Various things need to be done before we can proceed. For example, we have to perform a DPIA and a DTIA, draw up an exit strategy and agree a contract with AWS. The exit strategy will be developed in consultation with the Technical Committee of the Registrars' Association, and will address both an emergency scenario and a scenario where we migrate from AWS to an appropriate future Dutch or European alternative. The completion of those tasks with positive outcomes is, of course, a precondition for ultimately proceeding with migration before the end of 2025 as planned.

As the Minister of Economic Affairs and Climate Policy indicated when answering questions in parliament, we will continue our dialogue with stakeholders, including the government, regarding the considerations behind our proposal. In that context, we will look at the results of a quick scan that the ministry will carry out with

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stakeholder support to establish whether any Dutch or European alternative that meets our requirements can be identified. We will also keep the Dutch Authority for Digital Infrastructure informed about how we intend to assure compliance with the Networks and Information Systems (Security) Act. As agreed with the minister, no irreversible action will be taken until the consultation process has been concluded.