



# The Dutch Vision on a European Digital Twin App Store

Building a European network of local  
digital twins

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**Zicht op  
Nederland**

# Summary

Europe faces major challenges, many of which require reliable, data-driven decision-making, such as climate adaptation, housing and the energy transition. While digital twins, virtual (3D) replicas of the physical environment, are a crucial tool in this battle, countries still tend to work in isolated pilots, relying on costly bespoke solutions and closed systems that stand in the way of scalability, collaboration and trust.

The Netherlands is now aiming for the Digital Twin Appstore (DTAS), an open, modular, European platform where public authorities, businesses and knowledge institutions can offer, share and reuse proven digital twin modules.

DTAS fosters interoperability, transparency and vendor independence, ensuring that a module developed in Rotterdam to analyse heat stress, for instance, could, with only minor adjustments, also be applied in Barcelona or Vienna. This paves the way for scalable solutions that can be exchanged across cities and regions.

DTAS brings together three key components:

1. An **open digital infrastructure** based on European standards;
2. A **catalogue of validated modules** tested for quality, legal soundness and reliability;
3. A **federated ecosystem** that respects local autonomy while promoting European coherence.

For public authorities, DTAS provides access to validated, reusable solutions that are cheaper, faster and more reliable. For companies, it opens up a scalable European market with clear quality criteria that encourage innovation. And for citizens, DTAS improves transparency and offers accessible visual information that fosters participation and confidence in policymaking.

With DTAS, Europe chooses collaboration over fragmentation, public values over dependency, and a future in which digital technology serves people, cities and communities. The future of digital decision-making in Europe calls for collaboration, open standards and trust.

The Netherlands invites European Member States, knowledge institutions and businesses to join forces and develop the Digital Twin Appstore (DTAS), a cornerstone of interoperable, reliable and public digital infrastructure. Together, we can build a federated European ecosystem that bolsters public values and supports transparent decision-making.

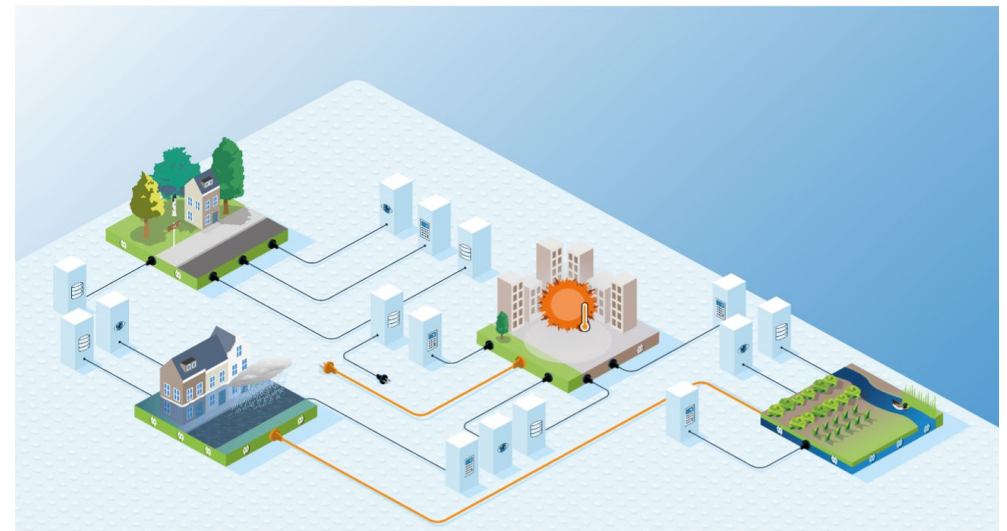
# 1. Locked into bespoke solutions

European cities, regions, and national governments face urgent and complex spatial and societal challenges in areas such as climate adaptation, housing, the energy transition and mobility. To navigate these challenges successfully, they will need practical courses of action based on comprehensive, data-driven insights. Digital twins, virtual (3D) replicas of the physical environment, can play a key role in this. Digital twins for the built and natural environment model physical and social systems, simulate user scenarios and underpin policy decisions, yet much of their potential remains untapped.

Bespoke solutions and closed systems have produced fragmented, expensive digital twin modules that are hampered by limited economies of scale and poor reusability. Poor interoperability has forced cities and regions to address similar challenges independently, even though their data needs are often comparable and the use of isolated modules means open standards and shared infrastructure are missing. At the same time, public authorities are reluctant to embrace this technology, as many of the applications on the market today are insufficiently transparent, reproducible or legally sound.

For years, the Netherlands has pursued digital innovation as a strategic priority, precisely because competing spatial claims will inevitably collide in a small, densely populated country. With a top-five ranking on the [Geospatial Knowledge Infrastructure Readiness Index](#), the Netherlands is at the bleeding edge of digital innovation and standardisation in European spatial planning. We are keen to leverage our experience in the central management of geospatial registries and our long tradition of innovation within collaborative ecosystems in order to create a shared European vision on a European Digital Twin Appstore (DTAS). This will allow knowledge, standards and applications for major societal challenges to be shared more effectively and scaled up efficiently. Without a joint approach, Europe will open itself up to the risk of growing fragmentation, inefficient use of public funds and increasing dependence on non-European technology providers.

Within the European Digital Infrastructure Consortium nLDT CitiVERSE (EDIC nLDT), Member States are already working together to build public digital infrastructures, but further EU-level capacity building will be essential. Interoperable platforms based on open standards form the foundation for a sustainable digital transformation for public-sector spatial professionals. Against this backdrop, Europe now has an opportunity to strengthen public-private collaboration within and between Member States, laying the groundwork for a resilient, future-proof European digital infrastructure.



*Building a digital infrastructure based on interoperability.*

## 1.2 Digital Twin Appstore

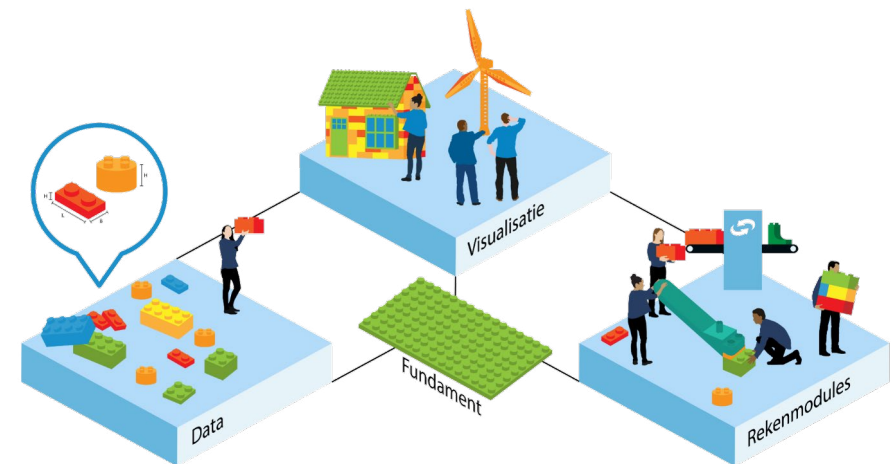
The Digital Twin Appstore (DTAS) introduces a joint European approach designed to make digital twins broadly accessible and reliable. DTAS is an open, modular digital environment where public authorities, businesses and knowledge institutions can offer, share and reuse proven digital twin modules. Instead of constantly rediscovering the wheel by developing new bespoke solutions, users build on a shared and decentralised infrastructure: a network of local digital twins based on open standards and interchangeable components such as datasets, computational models and visualisations. Public-sector spatial professionals can therefore reuse existing modules rather than having to rebuild them from scratch.

Modules offered through the platform are subject to testing for technical compatibility, reliability, legal and ethical compliance and reproducibility, ensuring trust and quality. The resulting federated ecosystem will advance collaboration and innovation without creating dependence on individual vendors. DTAS reduces fragmentation, reinforces Europe's digital autonomy and helps unlock the potential of digital twins in improving participation, policy-making and decision-making.

DTAS connects with and builds upon existing European programmes, including the Local Digital Twin Toolbox, the Data Space for Smart and Sustainable Cities and Communities (DS4SSCC), Citycom.ai and the EU Interoperability Framework. What DTAS adds is a practical system: a transparent, vendor-neutral framework providing relevant infrastructure components and functional applications to public and private-sector spatial professionals across the EU. Companies, research institutions and citizens can both contribute to and benefit from DTAS, which enables every city, region or Member State to deploy validated, reusable modular solutions within a coherent public-private innovation ecosystem. It also increases willingness to invest, allowing data assets, digital platform infrastructures and the functional modules built upon them to reach maturity more quickly.

## 1.3 Building on trust and interoperability

Experience in the Netherlands has shown that interoperable, reliable solutions are key prerequisites for the effective use of digital twins in policymaking and implementation. The age of isolated pilots is over. Professionals working on spatial challenges must have access to digital twins that they can deploy reliably in practice, which requires iron-clad confidence in the spatial and temporal data, computational models and visualisations.



*Building blocks of the reference architecture.*

To enable broader societal adoption of digital twins, the uptake and reuse of proven, high-impact digital twin solutions must be accelerated, scalability promoted and market dynamics encouraged. Closed systems are overly prone to causing vendor lock-in, and are either incompatible or only partially compatible with other digital infrastructures and applications. In recent years, the Netherlands has therefore explored alternative approaches and experimented with methods to make digital twins scalable.

Initial Dutch experience with the underlying principles of DTAS demonstrates that this is feasible. Cities such as Rotterdam, Amsterdam, Almere and Alkmaar are working with Geonovum, TNO, the Ministry of Housing and Spatial Planning (VRO), the Ministry of Infrastructure and Water Management (I&W)/DMI Ecosystem, and private partners to create a **reference architecture** based on open standards with a view to enabling the modular development of digital twins and the exchange of functionalities between models. Public-private collaboration on scalable, real-world applications has cultivated a fair and transparent playing field in which public values and market innovation reinforce one another. An open innovation ecosystem is now gradually taking shape in which digital twins can be developed sustainably and deployed at scale.

## 2. DTAS as a cornerstone of Europe's digital infrastructure

The Digital Twin Appstore (DTAS) has the potential to become a vital component within a future-proof European digital infrastructure supporting a vibrant network of local digital twins. With DTAS, existing solutions can be combined, shared and scaled intelligently, saving spatial professionals from having to keep reinventing the wheel.

Conceptually, DTAS can be compared to Apple's App Store or Google's Play Store, though the underlying premise is fundamentally different.

Whereas the aforementioned commercial stores and their digital environments are fully owned and controlled by a single corporation, DTAS is designed as an open public-private collaboration within a European innovation ecosystem. A modular infrastructure built on open standards serves as the operating system on which computational models and visualisations can be exchanged safely, reliably and securely. Through DTAS, Europe can embed its requirements directly into European frameworks, legislation and policy, including the Digital Decade, Data Governance Act, AI Act, Digital Services Act and Digital Markets Act. This paves the way for an ecosystem that drives innovation at scale while safeguarding public interests.

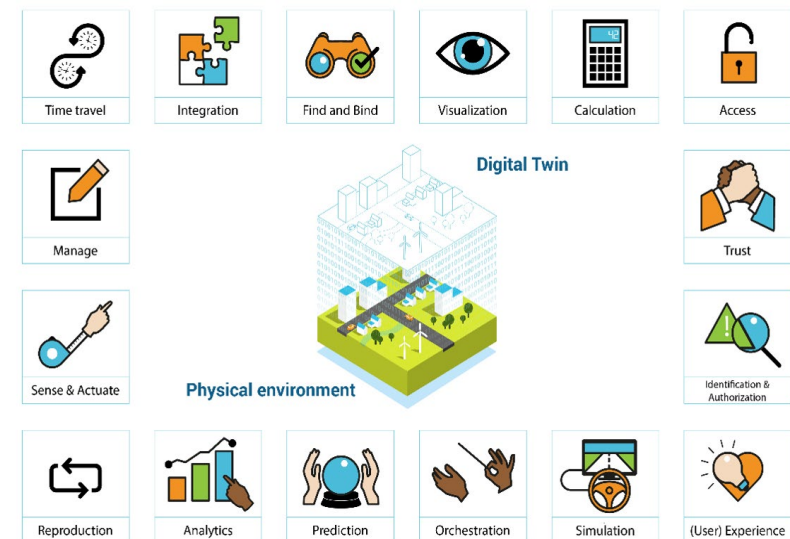
## 2.1 Modular and vendor-agnostic architecture

At the heart of DTAS lies a modular architecture composed of three distinct layers:

- 1) **A modular digital platform infrastructure based on agreed standards and agreements.** Digital twins must be constructed from a modular digital infrastructure grounded on European open standards. This infrastructure must align with the design principles of European Data Spaces, enabling digital twin modules (or “apps”) to be exchanged and reused between cities. Reference architectures and governance arrangements ensure that functional modules remain compatible with any local infrastructure designed according to the DTAS principle: build once, reuse many times over.
  
- 2) **Functional, infrastructure-compliant modules validated against quality criteria.** Modules can vary widely in subject matter, target audience, functionality and user interface, provided they meet the required standards. The reliability of each application depends on its intended purpose and may therefore differ. For every module, the DTAS catalogue specifies the relevant data and infrastructure requirements as well as the criteria it satisfies, allowing users to assess compatibility and suitability at a glance. The outcome is not a single, uniform EU infrastructure but a federated system in which each city or region can compose its own digital environment from validated, compatible components. Public authorities can then make full use of proven and, where appropriate, combined modules, significantly lowering the threshold for implementing their digital ambitions.

- 3) **An appstore for easy module discovery and deployment.** An appstore mechanism enhances the findability, usability and credibility of digital-twin modules. Modules are listed on a shared marketplace where policymakers, data specialists and other professionals can readily find, compare and implement them in their own context

Unlike in proprietary catalogues tied to a single vendor, not every module is automatically listed. New modules are added following a user- and expert-based evaluation covering quality, reusability, legal reliability and technical compatibility. This approach creates an environment in which public authorities can trust the available offerings and developers are incentivised to invest in well-maintained, high-quality modules. The accreditation process is still evolving, with the intention of ultimately establishing it as a publicly governed framework.



*Policy Capabilities Functional Map for Digital Twinning.*  
 (Source: [Eindrapport Advies Beleid en Digital Twins - provincie Utrecht](#))

This tripartite design safeguards vendor neutrality, while ensuring that components can be reused with ease, and that spatial professionals retain freedom of choice in selecting the modules they wish to deploy. Moreover, DTAS establishes a set of criteria that ensure compatibility between functional modules, platform infrastructure and data.

The effectiveness of DTAS hinges on access to current, reliable and well-governed data. While data provision itself falls outside DTAS's remit, it constitutes a critical dependency for which the platform relies on European initiatives such as European Data Spaces, INSPIRE, and the Data Governance Act / Data Act. These frameworks safeguard secure, reliable data sharing and define clear rules for ownership, provenance and data minimisation. Developers working within the DTAS environment therefore know precisely which data are available, for what purposes and under what conditions. Policymakers, in turn, can rely on current and verifiable insights generated from those data sources.

## 2.2 Validation and trust

To safeguard quality and reliability, all modules listed in the Appstore undergo objective validation in line with European guidelines, supplemented by additional national requirements as needed. Providers must comply with these shared rules in order to participate in the DTAS ecosystem. Module validation is secured by defining clear assessment criteria addressing:

- Technical compatibility and reliability;
- Transparency and explainability of algorithms and underlying logic;
- Legal and ethical compliance (e.g., GDPR conformity);
- Reproducibility and traceability of outcomes;
- Operational management (e.g., lifecycle management and maintenance).
- User experience and feedback

User feedback plays an important role, driving continuous improvement of the modules. Modules deemed critical can be subjected to external reviews, such as peer review or independent audits, to ensure their ongoing quality and reliability. The academic community can play a key role in developing a quality assurance framework for computational models that supports independent verification. The outcome will be a curated catalogue of validated, transparent and trustworthy solutions ready for immediate deployment. Each module will be accompanied by clear information about its purpose, data requirements, validation status and available user support.

## 2.3 Federated governance anchored in European legislation

DTAS can be designed either as a centralised system or as a federated network of national and local marketplaces, linked by shared agreements on standards, validation and governance. Although its governance model is still in development, it will have to connect local and regional autonomy with European coherence. Member States may establish their own marketplaces - e.g., for national, regional or municipal collaborations - provided they are aligned with the joint European agreements on interoperability and governance. Any such marketplace must also follow the “no wrong door” principle, in that users should always be directed to the appropriate organisation regardless of which access point they use. This ensures that all initiatives, regardless of scale or location, remain part of a single coherent European ecosystem .

The orchestration role within this collaboration is crucial and should be entrusted to an independent entity. This discussion should preferably be initiated within LDT CitiVERSE EDIC, as a clear orchestrating body is essential to safeguard European-level coherence regarding open standards, consistent validation procedures, accreditation oversight and long-term continuity. In addition, strong links must be established with existing European programmes (such as the European Data Spaces) and regulatory frameworks (such as INSPIRE). In shaping the governance model, DTAS is guided by European values, thus ensuring seamless alignment with the goals of the Digital Decade, AI Act and Digital Markets Act, which emphasise transparency, non-discrimination, public interest and the strengthening of Europe’s digital sovereignty.



*Collaboration on digital twins in Europe.*

## 2.4 The value of collaboration

DTAS delivers added value from multiple perspectives:

- *Public authorities* gain rapid access to validated modules, enabling them to justify policy more effectively while saving both time and resources. DTAS thus boosts efficiency and speeds up access to a broad range of validated, compatible modules, allowing public-sector spatial professionals to assemble their digital infrastructures using proven building blocks. These provide dependable, immediately deployable solutions at far lower development costs while strengthening trust in digital twins as instruments for participation, policy-making, and decision-making. Open standards encourage scalability and help avert vendor lock-in, while encouraging reuse and rewarding the more effective use of public resources in line with the DTAS principle: build once, reuse many times over.
- *Companies* benefit from a scalable European market with clear admission criteria. At present, most digital twins are commissioned by individual public authorities and financed through public investment. For many, particularly smaller private organisations, such investment is only viable if sufficient scale can be achieved. DTAS's focus on reuse and economies of scale makes private investment more readily recoverable, thereby supporting the maturation of digital twin technology. It also allows companies to specialise in functional modules and fosters a European public-private innovation and development ecosystem.
- *Citizens* gain insight into public policy through transparent, visual and interactive applications, strengthening opportunities for meaningful participation based on shared information. Moreover, the visualisations provided by digital twins enhance both understanding and decision-making, which in turn can improve public trust in government.

- DTAS strengthens *Europe's* digital autonomy by contributing to EU-level capacity building and supporting the sustainable scaling-up of applications within a digital infrastructure built on European values. Public-sector professionals working on spatial challenges gain easier access to modules that enable parametric policy-making, a digital design approach in which models are built from variables (parameters) and algorithms that define the relationships between them. Wherever possible, policy parameters and indicators are harmonised at the European level to ensure consistent information across the EU.

### *The value of DTAS in practice:*

A city looking to tackle urban heat stress, for instance, could search the DTAS catalogue for a validated heat stress simulator that is compatible with its local or national data sources. It could then immediately implement this module in its own digital infrastructure, providing reliable insights for both policy-making and public participation. The experiences gained are then shared as user feedback to inform future improvements. Other cities can see how the same module has been applied elsewhere and can easily reuse it by finding it in the validated DTAS catalogue and implementing it in their own systems.

In practice, this means that a heat stress module developed in Rotterdam could, thanks to the agreed DTAS standards, be reused in Barcelona with minimal additional customisation. Explicitly developing proven modules as recipes enables other cities or regions to adopt and adapt them using their own contextual data. DTAS is therefore more than a technological framework: it drives a shift from isolated experimentation to a sustainable, federated European ecosystem in which knowledge, innovation and public values converge.

### 3. Federated collaboration: the way forward

DTAS provides Member States with a shared infrastructure for digital innovation, in which collaboration and bespoke development reinforce one another. As a result, public authorities no longer have to invest in full development pathways for every new application and can instead utilise a well-governed digital infrastructure to tap into a growing portfolio of proven solutions. By adhering to common standards and interoperability agreements, Member States strengthen their own national infrastructures without compromising their autonomy. Each Member State can contribute to the development of DTAS in line with its own policy priorities and level of technological maturity, whether as a user, developer, operator or validator. Through active participation in LDT CitiVERSE EDIC, countries can jointly shape validation frameworks, assessment procedures and governance structures.

The definition of validation and accreditation criteria also creates opportunities for collaboration: Member States, research institutes and businesses can pool expertise to develop robust models for testing, monitoring and quality assurance. The future lies in interoperable computational models that create a holistic representation of the real world. Digital twins used for water management and traffic flows, for example, can be combined to simulate evacuation scenarios, while indicators such as heat stress, biodiversity or economic vitality can be integrated to assess policy alternatives. By establishing further agreements at the application level, DTAS creates a framework in which functional modules can coexist and interact seamlessly, supporting integrated policy-making and collective intelligence.

How Member States contribute to DTAS will depend on their context, expertise and ambition. Some will lead in developing sector-specific use cases, for instance in urban mobility, water management or climate adaptation. Others may focus on advancing and standardising infrastructure components such as data platforms, visualisation tools or intelligent interfaces. The ultimate goal is a scenario in which digital twins are publicly accountable, scalable and future-proof, rather than fragmented and non-scalable, helping both spatial professionals and citizens address societal and environmental challenges.

The future of digital decision-making in Europe calls for collaboration, open standards and trust. The Netherlands therefore invites European Member States, knowledge institutions and companies to join forces in building the Digital Twin Appstore (DTAS) - a foundation for interoperable, reliable and publicly governed digital infrastructure, and a movement that seeks to build a future in which digital technology serves people, cities and communities alike. Join us in building a federated European ecosystem that strengthens public values and fosters innovation.

#### **More information and contact details**

To continue the dialogue, please contact:

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