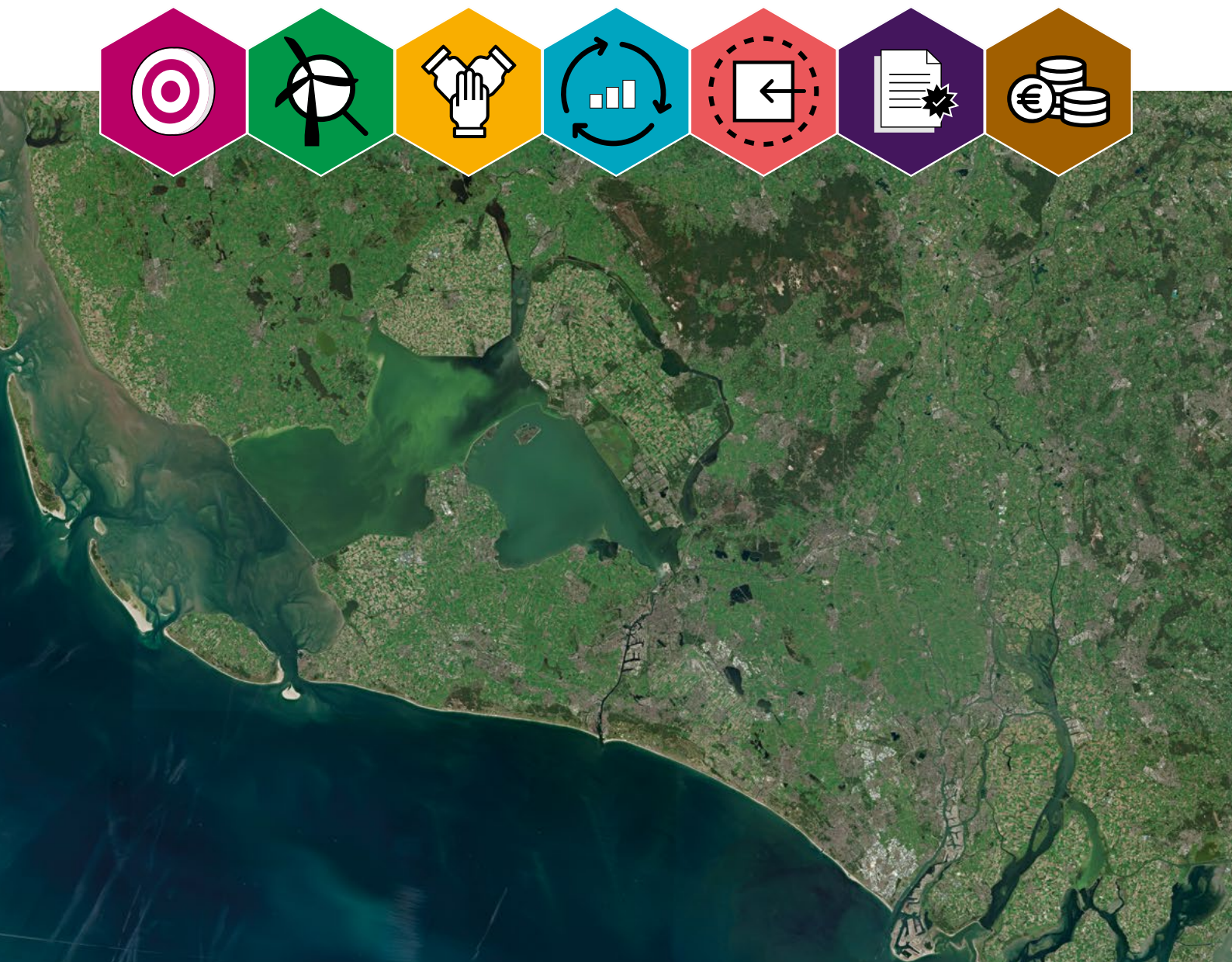
Ministerie van Binnenlandse Zaken en Koninkrijksrelaties

Multiyear Vision of the Council for Geo-information (2023)

View of the Netherlands

A new geospatial strategy for the Netherlands



This document was compiled in collaboration with the organisations with a seat on the GI Council

Ministerie van Binnenlandse Zaken en Koninkrijksrelaties

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VNG

ipo Interprovinciaal Overleg
van, voor en door provincies

UNIE VAN WATERSCHAPPEN

kadaster

TNO innovation for life

GEONOVUM

Netherlands Space Office

Centraal Bureau voor de Statistiek

October 2023

Zicht op Nederland

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Foreword

The situation of the Netherlands is unique. Second only to the island state of Malta, we are far and away the most densely populated country in Europe, with a population and economy that both continue to grow. Every square centimetre of the country therefore already has a designated use, while at the same time, new demands call for more space. The spatial puzzle facing us is hugely complex both in terms of substance and governance. We must employ a data-driven approach to manage that complexity: decision making based on information.

This vision is based on the combined knowledge and skills of all parties that have a seat on the Geo Information Council. The vision describes the movements that must be made if we hope to provide government organisations, businesses and citizens working on the societal challenges in the physical environment with the information they need, in a structured way. Those movements are extensive and have no clear finishing line. The challenges and needs of society will forever continue to develop, while technology itself is also constantly in motion.

Against that background, this multiyear vision should be viewed as a dot on the horizon. An ideal that can only be achieved if we take the necessary series of steps together, on the basis of deliberate choices. By realising that ideal, we will simultaneously fill a large proportion of the Federated Data Space of the Netherlands, a task which is already well underway under the auspices of the Inter-administrative Data Strategy, as well as contributing to the realisation of Data Spaces at European level.

Marjolein Jansen
Director General for Spatial Planning and chairperson of the Council for Geo-information

View of the Netherlands

View of the societal challenges

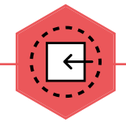
We are striving to achieve a future in which all the parties working on the societal challenges are able to better use and protect the already scarce space in the Netherlands through the use of sound spatial information.

Joint leadership

Between and across the administrative boundaries, we are working hard to bring about the transformation of our spatial information provision.

More value from data

We are gradually reinforcing our total data chain through sound agreements, standards and provisions.



With and within frameworks

We are actively contributing to sectoral, national, European and global frameworks and guidelines and their consistent application.

Conditions for success

We guarantee the conditions for success through effective legislation and regulations, embedding our public values and by implementing measures to promote a data-driven culture and work approach.

Robust funding

We make clear and honest agreements on the funding of our National Geo-Information Infrastructure in terms of both costs and benefits.

Document structure

Chapter 1 of this vision discusses the societal challenges in the physical environment and the urgent need for working on the basis of better information in the development, actualisation, implementation, monitoring and evaluation of policy. We offer the ideal future in which every government organisation, citizen and entrepreneur with a role in tackling societal challenges in the physical environment is granted easy access to relevant, usable information.
Chapter 2 describes the task of implementing the changes necessary to make this possible, and considers what that process calls for in terms of combined effort and governance.
Chapter 3 reviews the current data value chain and explains what needs to be improved and which additional building blocks are needed in order to provide optimum support to a demand-based data-driven work approach in the physical domain, in the form of a National Geo-information Infrastructure. Chapter 3 also describes which concrete efforts and priorities are contained in the working agenda accompanying this vision.
Chapter 4 describes the national, European and global context within which we are obliged to work together in establishing this system and where we can exercise influence on this context with a view to achieving value and safeguarding our ideal public values.
Chapter 5 describes conditions that must be fulfilled in order to successfully implement the system, and chapter 6, in conclusion, is dedicated to the urgency of arriving at a robust multiyear budget and an adequate system of funding.

All together this results in the following outlines that in turn form the central objectives of the chapters of this vision.

Management summary

The Netherlands faces huge societal challenges, all of which have an impact on our living environment, and as such require the implementation of spatial policy. Tackling those challenges is a complex undertaking that calls for clear and responsible choices. For their part, sound choices require a solid picture of the already scarce space into which these solutions must be carefully integrated. This essential view of the Netherlands can be brought about by joining forces and taking the next step towards data-driven working within the domain of the physical environment.

Our dream

Our ideal is to work together towards a future in which:

- Every government organisation, citizen and entrepreneur working on the societal challenges in the physical environment can use the same coherent information to answer the questions that form the central focus in developing, elaborating, implementing and evaluating policy.
- All users have access to reliable information about the physical environment and trust that information can be shared securely with everyone who is entitled to access it.
- Within this new approach to work, we not only safeguard but also successfully further reinforce our public values[1].

Working together

All in all, this requires us to reconsider the way in which we organise our information provision. Just as in tackling the coherent societal challenges, this calls for cooperation and coordination across all organisations. One essential precondition for that cooperation is the commitment, leadership and sense of responsibility of the various stakeholders. With that in mind, we have established a governance system that embeds and reinforces cooperation both between public parties and between public and private parties, and which ensures that agreements, standards and provisions are all established. On the one hand, governance relates to the process of government-wide decision making on the physical environment and on the other the government-wide process of decision making on data and digitalisation.

Reinforcing the entire value chain

We wish to deliver a view of the Netherlands by organising spatial information in such a way that it provides an all-encompassing picture of the living environment. A picture that is accessible to everyone, and that can be zoomed in or out, as required. A picture that enables us to combine a wealth of supplementary data, interpretations and applied models, and that makes it possible for us to simulate time-based predictions and the consequences of possible interventions. A picture that is developed in 3D so that it ties in effectively with the way we view the world as humans. In creating that picture, we wish to reinforce the entire value chain: from data gathering, access, analysis and interpretation, right through to using the insights acquired in this process. And that in turn calls for clear agreements, standards and provisions.

This process is not starting from scratch. The current National Geo-information Infrastructure (NGII) has already been operational for years and is widely used. Nevertheless, there is clear room for improvement in the accompanying data value chain. Essential data are missing, are insufficiently standardised and are not always of sufficient quality. There is also a lack of willingness and trust in sharing data, the relevant analysis, interpretation and visualisation options are missing, and for non-professional users, the threshold for practical application is still too high. For all these reasons, the NGII must be further developed and expanded. The central focus for all these developments combines the needs and requirements of users, and the challenges facing society. The practical elaboration of these developments in work packages and the priority with which they will be implemented will be placed in the working agenda that accompanies this vision.

Working with and within frameworks

We are not working on this Vision for the Netherlands alone. We are part of a national, European and global context that in terms of technology, policy making and law is very much in a state of flux and that also interacts with societal challenges. These developments and the new, sometimes unlimited possibilities in the field of data and data analysis that they create, will result in frameworks for the sharing of data and for the processing of data into information. Frameworks of this kind offer the necessary handholds for realising this policy vision. In striving to fulfil our dream of reinforcing the approach to the challenges of society with better information, we will comply with the valuable frameworks established elsewhere. We also hope to influence the frameworks that still need to be established, for example in situations in which our public values come under threat.

Sustainably safeguarding the conditions for success

In order to structurally reinforce the development, elaboration, implementation and evaluation of policy for the physical environment with sound information, it is essential that we sustainably safeguard the conditions for success of the NGII.

This means that

1. Sound agreements must be established on cooperation between all stakeholders in realising and using the information.
2. A number of essential agreements are laid down in legislation and regulations.
3. By design, we focus attention on security, ethics and public values and the sustainable accessibility of information. These values may not be come under threat for example from technological developments and the related risks.
4. People who process and use information are sufficiently equipped to be able and willing to do so (culture, education and labour market).

To successfully fulfil our dream, it is necessary that all these conditions for success be safeguarded. However, that is not enough and is also not self-evident. All the work that must be carried out in the framework of View of the Netherlands calls for a further essential condition for success: a robust multiyear budget and an adequate funding system that not only takes account of the costs but also the benefits. We are investigating how we can put the funding in order, and will focus urgently on securing structural funding for current management, further development and future management. We are working on clear and fair agreements on the financing of costs by all stakeholders.

[1] The coalition agreement mentions the following fundamental rights and public values in the context of digitalisation: security, democracy, self-determination, non-discrimination, participation, privacy and inclusiveness.

1 View of the societal challenges

The Netherlands faces major societal challenges all of which have an impact on our physical environment, and consequently define our spatial policy. All these challenges require space - both above and below ground. Certainly also with a view to future generations, it is essential that we deal carefully with the available space and the use and protection of our physical environment.

Tackling those challenges is a complex undertaking that calls for clear and responsible choices. In the practice of area development, there is clear evidence that data-driven working is based on reliable information and a shared picture of our physical environment can be extremely useful.

Our ideal is to work together towards a future in which:

- Every government organisation, citizen and entrepreneur working on the societal challenges in the physical environment can use the same coherent information to answer the questions that form the central focus in developing, elaborating, implementing and evaluating policy.
- All users have access to reliable information about the physical environment and can trust that that information can be shared securely with everyone who is entitled to access it.
- Within this new approach to work, we not only safeguard but also successfully further reinforce our public values[2].

1.1 Explicit choices needed in the physical environment

The Netherlands faces huge societal challenges with a major impact on our natural and built living environment. Both above and below ground, space is needed for housing, nature, for earning money, for our farmers, for a healthy living environment and for our energy supply and security. The smart combination of functions could be useful, but if we look at the big picture there is demand for more space. This growing demand for space over the next few decades will coincide with far-reaching changes. The certainties in our country such as sufficient affordable food, drinking water, energy and a guaranteed livelihood are under pressure. Sustainability, a circular economy and climate adaptation are also calling for more space.
In its annual report for 2022, the Council of State warns that without explicit choices, societal challenges will be tackled half-heartedly and government will undermine the trust of citizens3. It is essential to deal carefully with the available space in the interests of our general welfare, also with a view to future generations.

To face up to this multiplicity of challenges, national, provincial and municipal governments and the water authorities are working together in more than 20 national programmes and in many more domain and area-specific programmes. The structuring of the space available to us must be managed. For that reason, choices will be a central element of the new National Spatial Policy Document (Nota Ruimte). The Netherlands will be forced to choose where space will be made available, and for what purpose. These choices apply to the short, medium and long term. Clearly, if we continue along the same course we have been following for the past 10 years, spatial planning in the Netherlands is doomed to fail: we can no longer continue to assume that by combining local and sectoral decisions, the societal challenges facing us as a nation will automatically be solved. The challenges and transitions are so extensive and so interrelated that policy decisions may not be taken on a sectoral basis, but must be taken across the board. Not everything is possible in our living environment, and certainly not everything in the same place and at the same time. All the spatial challenges will have to be plotted out specifically for each area, so that all the interests can be considered coherently and the right choices are made.

To clarify where opportunities and bottlenecks arise, and where there are possibilities for combining functions in the spatial challenges, the Outline Document of the National Spatial Policy Document[4] combines those challenges in three movements: a movement towards a futureproof balance between agriculture and nature throughout the Netherlands, a movement towards a climate-neutral and circular society and a movement towards strong regions, cities and villages across the entire Netherlands. In all three of these movements, water and soil are guiding elements.

In the framework of digitalisation, the coalition agreement refers to the following fundamental rights and public values: security, democracy, self-determination, non-discrimination, participation, privacy and inclusivity.

A number of essential spatial choices from the outline document of the National Spatial Policy Document

- Area planning based on recovery and resilience of the water and soil system.
- Nature network robust for the future, with habitats appropriate to a new climate and
- water and soil system.
- Robust network choices that leave space for focus on economic and spatial structural change.
- Integrated approach to new urban density (transformation areas, densification locations, densification of post-war districts): integration of energy transition, underground, (circular) economy, healthy living environment, climate-adaptive structuring with green-blue networking, sufficient green areas and ties with landscape and the large-scale nature network.

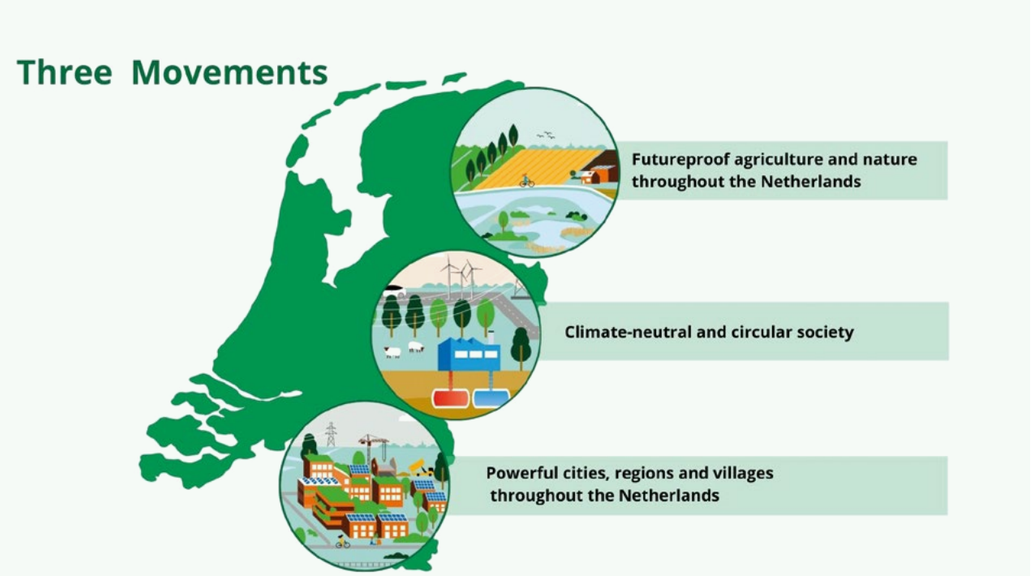


Figure 1: The three movements from the policy document National Spatial Policy Document

[2] Within this new approach to work, we not only safeguard but also succesfully further reinforce our public values.

[3] www.raadvanstate.nl/jaarverslag2022/beschouwing/inleiding-slagkracht-en-vertrouwen/

[4] www.rijksoverheid.nl/documenten/rapporten/2023/09/30/contourennotitie-nota-ruimte

1.2 Ideal situation: choices on the basis of a sound View of the Netherlands

The spatial puzzle has become so complex in terms of both content and governance that it cannot be solved using our substantive and administrative knowledge and experience alone. We can quite simply no longer allow ourselves to develop, implement, monitor and evaluate policy in the physical environment without a thorough analysis of the facts. To be able to use and protect our physical environment, government authorities, businesses and individual citizens desperately need a greater insight into all available information about that living environment. Only then is it truly possible to achieve the most appropriate balancing of societal interests. For that reason we wish to be able to work according to a data-driven approach: consideration and decision making based on information.

That was very much the underlying idea in the establishment of the National Geo-information Infrastructure (NGII). It has become clear over the past few years that the key register systems are regularly consulted, above all in numerous executive work processes both inside and outside government. This is due to the high quality data about the physical environment that are available as open data. It also emerges that the benefits that arise from using those key registers easily outweigh the costs of gathering, managing and accessing the data they contain. With more than 30 billion consultations each year, the NGII can justifiably be described as a critical infrastructure.

However, simply providing access to the current volume of open data is not sufficient for tackling the complex, mutually influencing societal challenges, in a coherent manner. Throughout the entire policy cycle, government authorities, businesses and citizens in their different roles (administrator, policy advisor, licence awarding authority, initiator) all need usable information in order to tackle the spatial challenges from the numerous national, domain and area-specific programmes.

Demand for information about the living environment

A whole raft of users have expressed a need for information about the living environment. Below we list a number of examples, derived in part from the Survey of Information Provision about the Physical Domain undertaken by the Association of Netherlands Municipalities (VNG):

- Local administrators urgently need an understanding of energy consumption, insulation value and structural characteristics of buildings in their municipality, from public and private sources, to enable them to bring about the energy transition in their municipality.
- Policy advisors want to know the impact of proposed housing locations on water,
- soil and the local ecosystem, to enable them to estimate the house building potential in their municipality.
- Initiators want to know the quality of biodiversity and the landscape to allow them to assess the potential effects of their activity, so they can plan appropriate measures for conservation and mitigation.
- Programme managers request up-to-date data on traffic flows, bottlenecks and parking problems, so they can develop mobility solutions and improve road safety.
- Licence awarding authorities need data about the quality of air, water and soil in order to determine whether measures have to be taken for protecting the environment and preventing negative impact on health.
- Parties implementing infrastructure projects need combined information about underground cables, pipelines, soil condition and traffic flows in order to optimise construction planning, to prevent damage from excavation work and to guarantee the safety of the public.

Ideal

We therefore wish to work towards a future in which:

- Every government organisation, citizen and entrepreneur working on the societal challenges in the physical environment can use the same coherent information to answer the questions that form the central focus in developing, elaborating, implementing and evaluating policy.
- All users have access to reliable information about the physical environment and can trust that that information can be shared securely with everyone who is entitled to access it:
  - in a form that is usable and understandable for all users (with and without digital knowledge);
  - which is complete for the multiplicity of societal challenges and possible options in three spatial movements: a futureproof balance between agricultural and nature, a climate-neutral and circular society and strong regions, cities and villages throughout the Netherlands;
  - which is mutually coherent and provides an overarching picture beyond the boundaries of individual sectors;
  - can be compared, combined and accumulated both regionally and nationally into a picture for the whole of the Netherlands;
  - that describes not only the current situation but also analyses developments and predicts scenarios;
  - both above ground and below ground, and where necessary three-dimensional;
  - is obtained from both public and private sources;
  - reliable, up to date, complete and available in a timely manner.
- In this new work approach, we are able not only to monitor but also to further reinforce our public values (safety/security, democracy, self-determination, non-discrimination, participation, privacy and inclusivity). In accordance with socially shared opinions and the appropriate legislation and regulations.

This ideal picture of better information for citizens, businesses and government organisations can of course not be achieved in a single day. The ideal we have sketched out is intended as a common dot on the horizon that we plan to further elaborate in a work agenda (see chapter 3). The ideal picture sets a course for the joint efforts of all participants in the Council for Geo-information, so that government, citizens and businesses can all make use of the best spatial information in protecting and using the physical environment.

1.3 The advantages of data-driven working

Data-driven working is the process according to which organisations gather and analyse data and then employ the resultant information and knowledge in processes of decision making and execution. The inter-administrative data strategy emphasises the importance of data-driven working as a means of improving the policy process in respect of societal challenges. If we want to turn our ideal picture into reality, data-driven working in the physical environment offers the best opportunities.

We are then capable of facilitating participation processes and creating political and administrative support for the decisions to be taken. And once those decisions are taken, using the right data, we are better able to take targeted measures, monitor the process of implementation, optimise the management process and evaluate the results. All in all, the benefits of better information provision are reflected throughout the policy cycle.

We are also in a position to compare and contrast the sectoral angles of approach, to gain an insight into opportunities and dilemmas, to balance interests and to seek possible solutions. Not only on a national scale with a high level of abstraction, or in detail for an individual domain but also on an area specific basis and across the board. By making area-specific cross-sections of data from different sectors, we can for example gain an insight into the specific needs and problems of a particular area. We can then develop a policy and implement effective solutions specifically for that area. After all, the challenges affecting society all come together in such areas.

Data-driven working in the physical environment not only offers added value for government authorities, but also different benefits for citizens and businesses, including:

- Improved living environment through faster problem identification.
- Better approach to the problems, better balancing of interests and controllable decision making based on objective data and facts.
- Encouraging public participation and transparency in decision making.
- More efficient service provision through data analysis and needs-based harmonisation.

In other words, a good information position offers huge benefits in the cycle of policy and implementation, and contributes to a better, faster and cheaper approach to the societal challenges. Better because decisions can be made on the basis of objectivised data. Faster because relevant data, recognisable for everyone, are available immediately. And cheaper because the same data do not have to be gathered time and time again, and because costs of failure in implementation are reduced due to the availability of the relevant information, in advance. By letting data work for us as smartly as possible, we also free up already scarce labour for implementation.

So what are we waiting for? We have laid a solid foundation for data-driven working with the current NGII. There is also considerable demand among administrators, policy makers, implementing organisations and society as a whole to make it possible to use all available information in tackling the societal challenges in the physical environment. In addition, the benefits of data-driven working are abundantly clear. However, this dream cannot automatically be turned into reality. What is needed are inter-administrative cooperation and improvements in the data value chain. The following chapters describe precisely what that means.

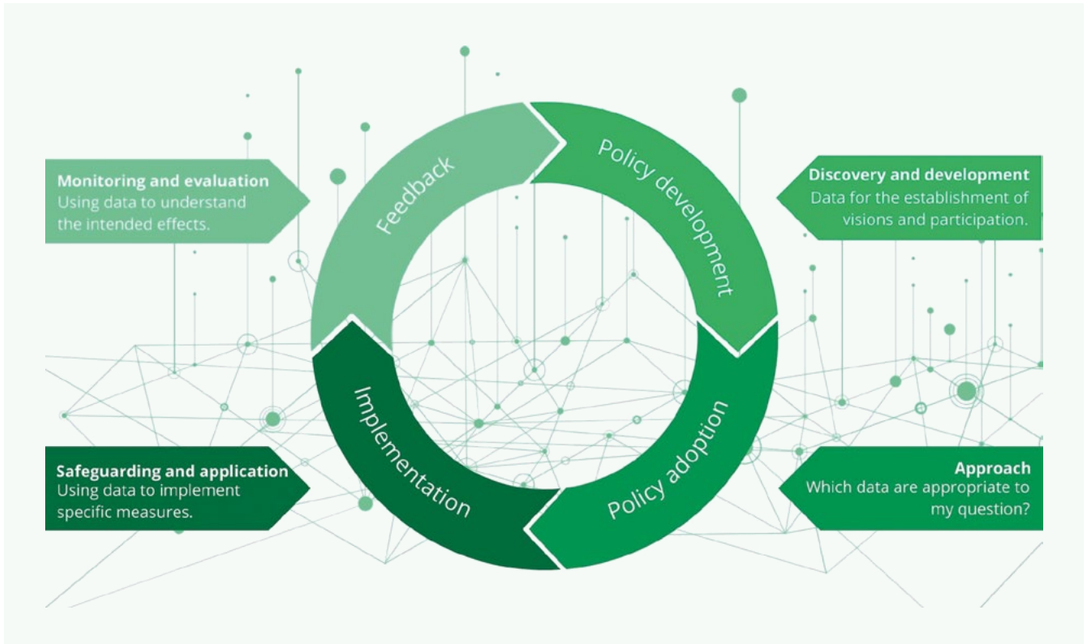


Figure 2: Data in the cycle for policy and implementation in the physical environment

2 Joint leadership

Our dream is to offer the various users the shared insight they need to make integrated considerations and better choices in tackling the societal challenges. All in all, this requires us to reconsider the way in which we organise our information provision. Just as in tackling the coherent societal challenges, this calls for cooperation and coordination across all organisations. One essential precondition for that cooperation is the commitment, leadership and sense of responsibility among all stakeholders. For that reason, we have established a governance system that promotes cooperation and that provides a structure for agreements, standards and provisions.

2.1 From supply-driven information development to a demand-based approach

Perhaps the most important element of cooperation in respect of data-driven working in the physical environment is that we must make sure we are holding the right discussion: how, on the basis of a shared picture of the societal challenges in the physical environment, can we develop the best integrated approach?
And that requires a turnaround from supply-driven (based on data) to demand-based (based on the challenge) cooperation. All with a primary focus on the societal value we aim to achieve. This results in a series of measures that need to be taken in the physical environment. And information is needed to enable us to take those measures. In other words, we will first have to agree on our generic needs in terms of data, information and insights before organising the required balance between demand and the supply that must be achieved to meet that demand.

This turnaround is a fundamental change that calls for serious commitment from all participating parties. For that reason, we are not only organising the substantive aspects of legislation, process agreements, standards and provisions, but also the administrative-organisation aspects, together with parties who are willing to work together in gathering, sharing, analysing and using data about the physical environment.

2.2 From point solutions to cooperation/collaboration and organised trust

We want to be able to offer government authorities, citizens and businesses an integrated (trans-sectoral) and cumulative (trans-regional) picture of the physical environment. This requires a shift from a fragmented landscape of isolated sets of information for each of the societal (sub) challenges and organisations (point solutions) to collaboration that encompasses all the desired spatial movements and challenges. It is no surprise that we have not yet reached that stage. It is entirely logical that until now, organisations have focused their work on organising and managing the spatial information needed for their own societal objectives and processes.

Nevertheless, specifically in the physical environment, those objectives and processes act upon each other. In both policy making and implementation, the cohesion between the various different aspects of the physical environment such as housing, commercial enterprise, nature and traffic is obvious. The integrated approach to issues in the physical environment is after all the very essence of among others the Environment and Planning Act, the National Strategy on Spatial Planning and the Environment, and the National Spatial Policy Document currently under development. When it comes to the provision of information about the physical environment, however, that same cohesion and degree of integration have not yet been achieved. To arrive at the ideal situation described in chapter 2 and to make it possible to employ a data-driven approach in tackling the societal challenges in the physical environment, the national geo-information infrastructure will have to be strengthened, beyond the boundaries of individual sectors. This policy vision is the first attempt at giving solid form to that ambition. Parties will occasionally have to set their own interests aside, and not be grudging, in doing so. To realise the ideal, the stakeholders will have to work together, not only on an operational level but also at tactical and strategic level, in order to set the course and create the conditions within which they can rely upon and trust each other's information provision. Users must know that the data are reliable, correct and cannot be improperly used.

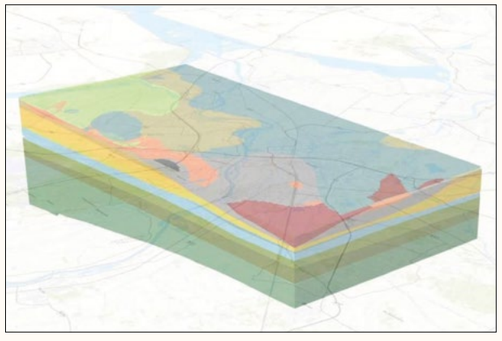
Example from practice

Successful cooperation and exchange of information

- Area planning based on the recovery and capacity of the water and soil system.
- Robust nature network for the future with habitats that are appropriate to the new climate and water and soil system.
- Robust network choices that allow space for a focus on economic and spatial structural changes.
- Integrated approach to new urban densification (transformation areas, densification locations, densification of post-war districts): integration of energy transition, underground, (circular) economy, healthy living environment, climate-adaptive structuring with green-blue networking, sufficient green areas and ties to landscape and the large-scale nature network.

Collaborating parties who provided data and participated in the discussions

- National Strategy on Spatial Planning and the Environment (NOVI)
- Municipality of Zwolle
- Drents Overijsselse Delta water board
- Province of Overijssel
- Netherlands Enterprise Agency (RVO)
- Central Government Real Estate Agency (Rijksvastgoedbedrijf)
- Land registry
- Stichting Climate Adaptation Services foundation
- Arcadis
- Geodan



Practical example of NOVI region Zwolle

2.3 Network-wide public partnership

Cooperation must be achieved across the entire network of parties that feel a responsibility for facilitating better spatial choices: both the parties with information needs (data recipients) and data providers. Because the focus is on the societal challenges, the ownership of data-driven working lies with the administrators and decision makers. In other words, it calls for leadership and a sense of responsibility at the pinnacle of governance, both among the responsible ministers and the heads of the organisations involved. This top-down support for improving the information position is clearly present among parties in the spatial domain. However, further anchoring and cooperation is also needed in other domains, too. For example in respect of societal challenges that may not be intrinsically spatial in nature, but that do impose demands on space. Further connection is also needed with the cross-government strategic consultations on data and digitalisation. A clear shared vision and focus on realisation of the vision are essential to get the actors in the playing field moving, and to keep them in motion. And on each occasion, the movement must be achieved in the most appropriate policy field.

2.4 Public-private partnership

Public partners are not alone in tackling societal challenges. Semi-public and private parties make an essential contribution to the entire chain of our spatial policy in terms of research, policy making, planning and implementation. We fully recognise the important roles that non-public parties have in promoting the further development of information provision for the physical environment:

- Subject to clear conditions they are able to share and supply data for the key registers. Wherever necessary, we wish to make use of high-quality data from non-public parties, for example data from drinking water companies, energy supply companies and network operators. That too calls for the organisation of mutual trust.
- They are able to develop applications based on (open) data about the physical environment. This is already commonplace, and is something we wish to encourage where possible, for example by working with (open) market standards for government.

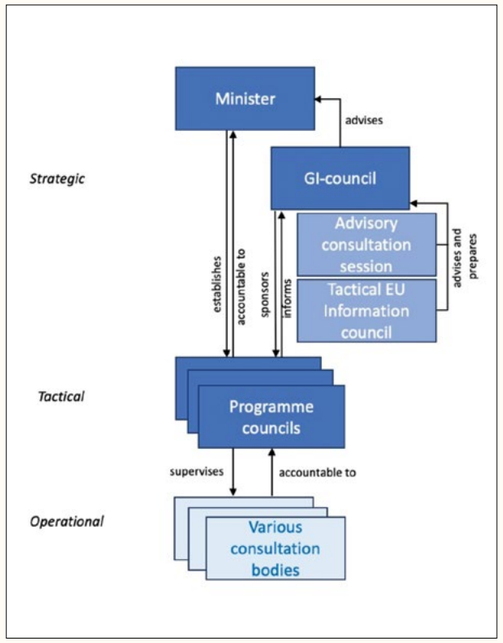
It is essential that we make use of the innovative capacity of businesses and knowledge institutions. In realising this vision, we will therefore actively enter into coalitions, for example GeoSamen.

The cooperation needed to bring together the demand for information about the physical environment and the provision of that information will not happen automatically. The next chapter deals in greater detail with the developments that must be brought about in information provision and have already been initiated, with a view to improving the provision of information for the physical environment.

Management

GI Council and programme councils

Within the View of the Netherlands, we intend to embed cooperation via shared governance at administrative level: in the Geo Information Council (GI Council) and the related programme councils. Strategic management for the overall process of change will take place within the GI Council. Tactical management for realising the necessary change will take place within the programme councils. And operational management will take place in the various consultation bodies within the programmes.
The GI Council will focus on realising the vision on overarching issues: what needs to be achieved in order to improve information provision about the physical environment, and on what aspects must we reach common agreements, establish (information) standards and develop provisions? The starting point must always be the (policy-based) needs of the members for a better view of the Netherlands. For that reason, the demand side from the government departments, provinces, water boards and municipalities is embedded within the GI Council. However, demands will also be imposed from outside, too. For that reason, cooperation with the GI Council is safeguarded with strategic consultation about the physical environment between national and other layers of government, for example via personal associations. The GI Council is also involved in government-wide decision making on data and digitalisation.



3 More value from data

We wish to work on a view of the Netherlands. We aim to provide that view by organising spatial information in such a way that it offers an integrated picture of the living environment. A picture that is accessible to everyone, and that can be zoomed in or out, as required. A picture to which a wealth of supplementary data can be linked, making it possible to simulate time-based predictions and the consequences of possible interventions. A picture that is developed in 3D so that it ties in effectively with the way we view the world as humans. In creating that view, we wish to reinforce the entire value chain: from data gathering, access, analysis and interpretation, right through to using the insights acquired in this process. And that in turn calls for clear agreements, standards and provisions.

A start has already been made on the movement we intend to make in order to develop a view of the Netherlands. The current National Geo-information Infrastructure (NGII) has been operational for years and is widely used. Although, in particular during the early years, the NGII was primarily focused on accessing the supply of data about the physical environment for government organisations, our clear desire is to start with the needs and requirements of users and the societal challenges for which they are responsible.
Data about the living environment within the frameworks of the Netherlands Federal Data System can also be better combined with the broader public data landscape.
Based on current insights, this chapter describes the improvements that must be made, and which additional building blocks must be provided in order to support demand-based data-driven working in the physical domain, using the NGII.

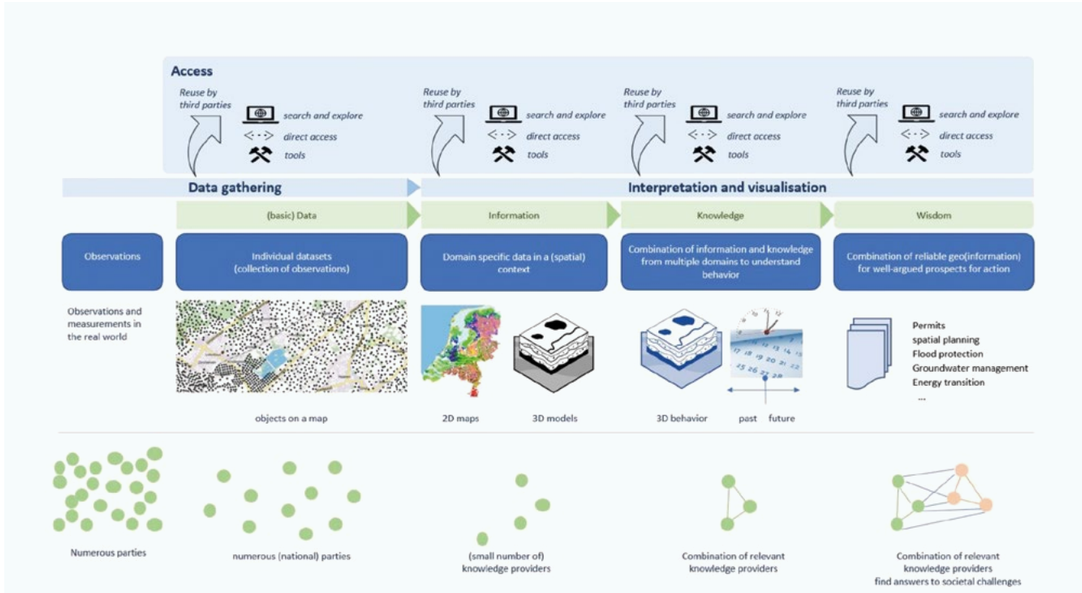


Figure 3: Data in the cycle of policy and implementation in the physical environment

3.1 The data value chain

Information in support of policy processes in the physical domain is obtained by successfully working through what is known as the data value chain. Data must be gathered and accessed, subsequently combined, analysed and visualised, before becoming usable information in the policy cycle. (See figure 3[5].)

Every link in the chain delivers standalone products. It is therefore not necessary to work through the entire value chain in order to arrive at usable results. Once gathered, data can be directly applied in the working process in which they are created. If access to that data is well organised, geo specialists can then set to work with data from different sources. Each link offers an option for reuse by third parties who often have different objectives from the objectives elaborated when the original decision was made to gather the data.

3.1.2 Weak links in the chain

A data value chain is only as strong as its weakest link. Viewed from the perspective of the user of geospatial information, our current geo-information chain unfortunately has a number of weak points. This applies both to individual links and to the overall chain.

5 Made available by TNO

Gathering

Relevant data are missing. The existing registers provide us with a rough picture of our living environment, but increasingly we are reaching the limits of our knowledge.
Consequently, our decisions are based on incomplete data, with all the resultant risks. Furthermore, gathered data loose a great deal of their value if poorly described. Users of the data are unable to form a clear picture of the quality and hence the usability of the data within their context. In particular this applies to users who wish to employ data for other purposes than that for which those data were originally gathered. The further you move away from the source, the more difficult it becomes to interpret the data. At present, the quality of the data and the description of datasets leaves a great deal to be desired.
This results in suboptimal use: as a precaution, users ignore data or alternatively allocate unjustified status to data.
Finally, the way in which data is currently gathered could be made more efficient, though automation and by avoiding duplication in the gathering process. Or by using artificial intelligence, for example for the automated tracing of changes to objects, or errors on maps.

Access

There is often a lack of trust and willingness to share data. The development of clear rules of play and the implementation of appropriate technical measures make it possible, wherever necessary, to share data subject to rules of confidentiality. A solution of this kind should preferably also make it possible to obtain simple access to private sources, in return for payment. If we do not make this possible, we will be missing out on many opportunities to make use of information already available.
Tying in with the previous point, obstacles to data access have a negative impact on an equal, shared information position between stakeholders. It is currently often the case that each government organisation creates its own picture of part of the physical environment, based on its own non-uniform (copies of) data and information sources. As a consequence, many parties rely on their own data and hence their own truth; data are not obtained ‘from source’. This undermines the basis for efficient and fruitful cooperation.

Analysis and visualisation

To analyse developments, to add value through interpretation and to make it possible to predict the consequences of interventions in the physical environment, it is necessary in many cases to combine information from multiple sources.
It is common for users to find themselves faced with a lack of clarity regarding the relationship between these sources. This results in considerable inefficiency, because each user must first introduce their own content. The next hurdle faced by users is the impossibility of accumulating data from different sources. Local and sectoral data cannot be sufficiently accumulated in developing a supralocal or integrated picture.
Although major advances have been achieved in the past few years with regard to basic data, when it comes to much sectoral data, users often still find themselves as it were comparing apples with oranges after first completing a series of sometimes complex intermediate steps. Differences in the definitions of terms are an obstacle to the completion time and/or the quality of analyses. Both forms of coherence need to be more prominently introduced in the development of information models and in gathering and accessing data.

The success or failure of analyses and predictions depends on the availability of underlying (calculation) models. Further standardisation of these models and the way in which their results are published can help to combine analyses and interpretations from different disciplines, areas, scales and organisations. In addition, new issues and insights demand constant maintenance of the available models. The use of artificial intelligence for analyses, interpretations and predictions also offers new opportunities, as long as it is carried out within the legal and ethical frameworks described in chapter 4. To date, these opportunities have in particular been used on an experimental or limited scale. At the level of the physical environment there is a clear lack of management on these points, resulting in a shortage of opportunities for analysis.

Three-dimensional visualisations of the living environment make it possible to reproduce the consequences of interventions and as such offer insights that contribute to the decision making process and to developing a perspective for action. The current method of creating visualisations ties in with the work of geo specialists. This must be retained, but could also be supplemented with new forms developed more for administrators, policy advisors and citizens. A pictures says more than a thousand words, if we actually succeed in creating clear insight into complex problems.

Use

Even if all the preceding links are in perfect order, data-driven working is not self-evident. The ability to successfully use data about the physical environment requires changes to the current work approach. It also requires employees with data skills and who are able to interpret and analyse data, and are equipped to do so. It also calls for administrators, citizens and policy officers who are able and ready to obtain easily accessible and user-friendly information products. Specifically in this area there is a world to be won.

Chain-wide

Links can only form a strong chain if they are strongly interwoven. At present this is insufficiently the case. Organisations and organisation elements generally work on one or at most two links from the data value chain. They are often insufficiently aware of what is actually needed in the rest of the chain. It must be possible to gather relevant data of sufficient quality, and it must then be possible to exchange those data without obstacles, but in confidence. It must then be possible for the data to be analysed, interpreted and visualised, unequivocally and more importantly still, the data must be usable for the societal goal for which they are intended. As already identified in the previous chapter, some form of common governance across the entire value chain is the key to creating societal value. This approach to the value chain is contrary to the usual flow of the production of information products. In this case it is the users who determine the demand and which analyses and visualisations are required. This in turn determines the way and the context in which that data must be accessed and which data are involved. See also figure 4.

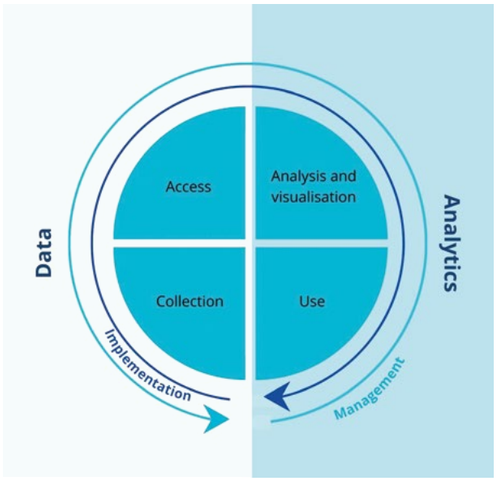


Figure 4: Use-based management of the data value chain Data and Analytics refers to the ways in which organisations manage data to support their applications and analyse data to improve decisions, processes and results (Gartner)

3.2 Steps for reinforcing the data value chain

The remainder of this chapter contains an outline description of the steps the GI Council wishes to take in order to reinforce the data value chain for the physical environment. This reinforcement is in fact not only relevant within the context of the living environment. Its achievement will also implement an essential element of the Federated Data Space of the Netherlands, for which, under the auspices of the Inter-administrative Data Strategy, much work is already being undertaken. Consequently, we will regularly refer to the steps being taken within that strategy.

The working agenda accompanying this policy vision will further elaborate the steps the GI Council wishes to take. The actual implementation of those steps will take place according to the programme and project plans of the participants in the GI Council.

3.2.1 From ideal to reinforcing the data value chain

We wish to realise the ideal of optimum information provision and a smoothly functioning data value chain for the protection and use of the physical environment. This will require us to move from a fragmented landscape of standalone information provision structures to structural cooperation that encompasses all of the desired spatial movements and tasks. Exercising this control is no simple task and has not yet been developed for the physical environment. As a rule, movements of this kind are characterised by:

- a high degree of uncertainty about the precise outcome;
- multiple stakeholders, each able to make their own choices;
- multiple transition pathways that can be followed;
- an important role for market parties who influence the possibilities through technological innovations.

For these reasons, this movement is in fact a digital transition. And a complex transition of this kind cannot be managed according to a detailed hierarchical plan. How do we as the GI Council intend to manage a transition of this kind, in which at least until now, many parties appear to be setting their own course? According to the transition management cycle (figure 5), it is possible to target the way in which transitions are influenced, in four steps:

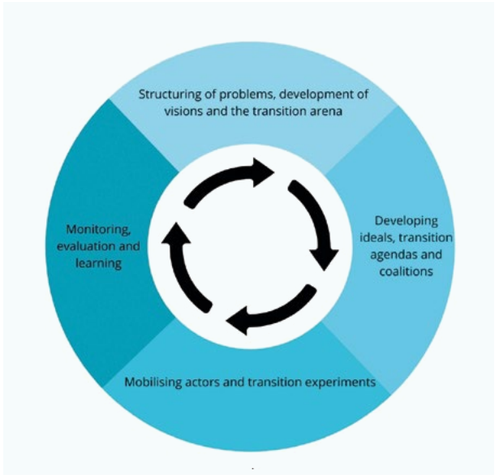


Figure 5: The transition management cycle (Loorback, 2007)

Step 1

Creating an arena

In this step, the vision is developed and maintained together with a broad group of stakeholders, based on the essential needs according to the societal challenges. The GI Council will play a crucial role at this stage. The policy vision acts as a shared and broadly supported picture of the dot on the horizon.

Step 2

Developing ideals, transition agendas and coalitions

The smart move is to combine these with other parties who have their own development agenda, as long as they contribute to the dot on the horizon. For example the agendas of the Association of Provincial Authorities (IPO) (data-driven area development) and the Association of Netherlands Municipalities (VNG) (information provision on the physical domain). Elsewhere, the coalitions under the auspices of the State Secretary for Digitalisation within the *agenda Coalitions for the Digital Society* are working together on generic solutions to data issues. Consideration must finally be given to the coalition with the Inter-administrative Data Strategy and the related work on the Federated Data Space of the Netherlands.

Step 3
Mobilising actors and experimenting

This step is essential for the actual implementation of the development agendas. All participants in the GI Council will implement their own development agenda, and take steps in their own digital transition. Much of the realisation will therefore be achieved by parties implementing subprojects within their own organisation. At the same time they will observe each other, and smart solutions can be adopted from each other. These solutions require a podium, to allow the best ideas and best practices to be adopted by others. Where possible use can be made of the same podia for broader processes, such as the Inter-administrative Data Strategy.

Step 4
Monitoring, evaluation and learning

By implementing this step collectively with an open exchange of knowledge, dominant transition pathways are revealed that are suitable for upscaling.

By concretising this cycle together with participants from the GI Council and the relevant parties outside that council, an ecosystem of parties is created that contributes to the development of the ideal.

3.2.2 Towards a working agenda

To be able to effectively manage the realisation of the ideal, within the GI Council we have together drawn up a working agenda 'View of the Netherlands'. The working agenda describes the task for change, the results achieved and the objectives we wish to work towards. It also translates these into measurable indicators and the specific actions we wish to undertake over the next five years wherever possible with clear timeframes. For its implementation, the working agenda will follow four tracks that also form the guideline for this policy vision: Cooperation, Further development and expansion of the NGII, Setting frameworks and Conditions for success.

Track 1
Demand-based focus on value creation

This track focuses on the value we wish to create with data and information. Within this track, we will determine what we need to develop to obtain a view of the information needs of the members of the GI Council. We will also elaborate a process for reaching agreements on aspects to be tackled jointly in order to meet those information needs. The value of data and information for the physical environment will only be revealed if we successfully work (together) on the societal challenges on the basis of demand.

Track 2
A strong data value chain for a mature NGII

In essence this track describes the work that will have to be undertaken within the NGII in order to reinforce the previously described weak links in the data value chain. The activities within this track will raise the NGII to a higher level of maturity.

Broadly speaking, activities will have to be undertaken that relate to improved data (gathering, linking and accessing) and improving the possibilities for analysis (analysis, visualisation and finally use), see also figures 3 and 4. At present the activities in respect of data and analysis will be implemented in the programme *View of the Netherlands - Data Foundation View of the Netherlands - Digital Twin*. By using the available spatial data to make information products for different themes and target groups, a 'family of digital twins' will be created. Together they will provide a complete picture of the physical environment. By operating within a common architecture, we can ensure coherence within the NGII.

Track 3
Setting frameworks

The working agenda will also contain targets and actions for further joint action in establishing global, European and national frameworks. There are opportunities for better embedding the needs identified in the NGII in frameworks. This requires the members of the Council to identify relevant developments at the earliest possible stage, to adopt common positions and to represent those positions at the discussion tables where decisions are made on these frameworks.

Track 4
Conditions for success

The fourth track will elaborate the essential preconditions in tasks for change, objectives and activities. This relates to all the conditions that must be organised to facilitate data-driven working in the physical environment such as financing, governance, agreements, standards, legislation and regulations and support, knowledge and culture among both the providers and users of spatial information.

The working agenda will be further implemented on the basis of in-depth discussions with the parties on the demand side and the supply side. We recognise that the environment in which we operate is extremely dynamic. New tasks and challenges may emerge at any moment, political priorities can change, legislation and regulations concerning data are themselves in a constant state of flux, and technical developments are constantly advancing. The GI Council will respond in a timely fashion by adjusting the working agenda as necessary.

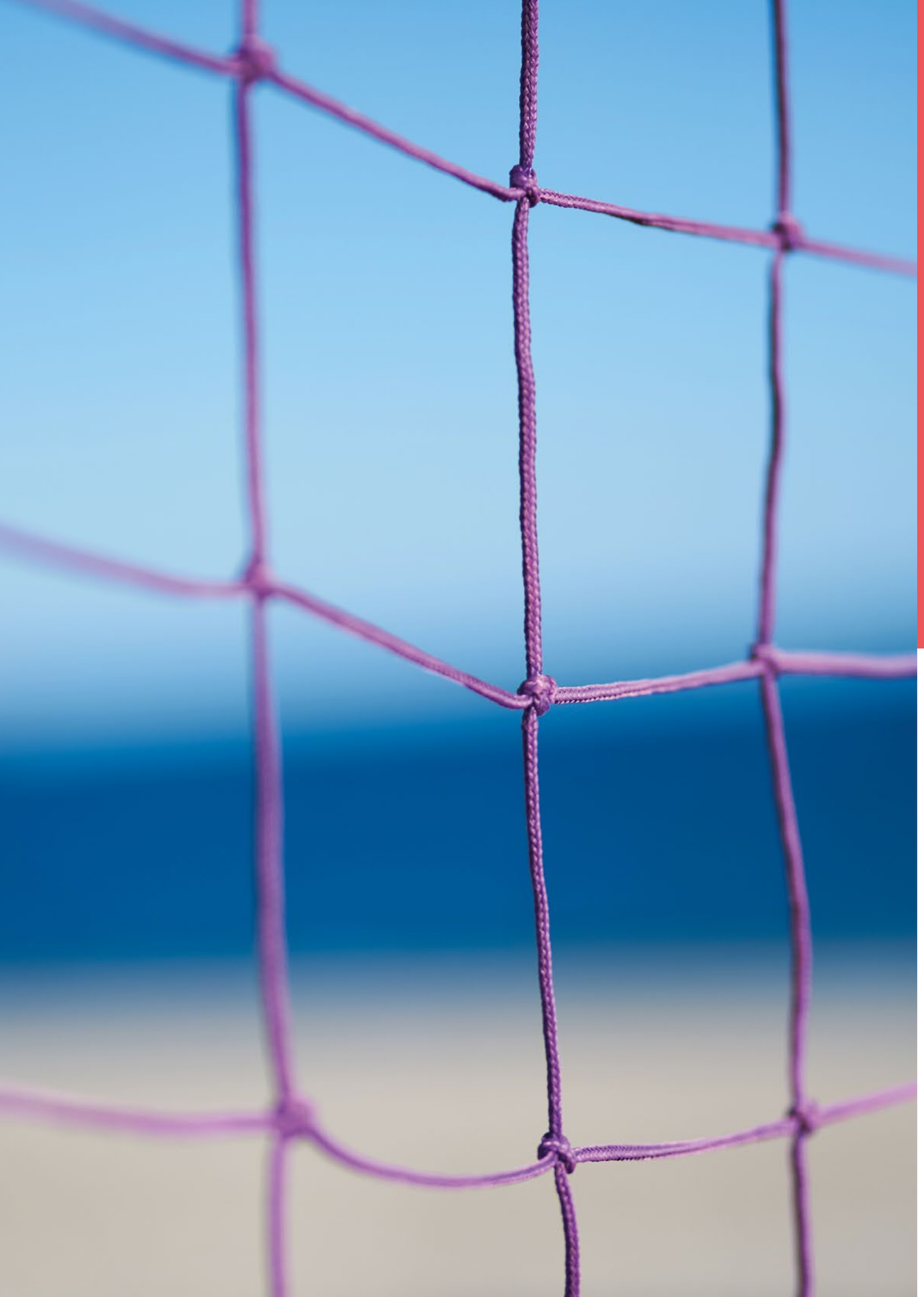
Programme View of the Netherlands - Digital Twin

Why introduce a national system for Digital Twins for the physical environment? A digital twin is a virtual representation of reality. A twin visualises the physical environment including the built objects, both above ground and below ground, on the basis of static and dynamic data or through the use of artificial intelligence. Predictive calculation models make it possible to predict the consequences of interventions and as such provide insights that contribute to decision making. These insights are also visualised in the digital twin.
The national system Digital Twin for the Physical Living Environment (DTFL) is not one system but a 'family of digital twins'. The system consists of a set of agreements that make it possible to compare and 'accumulate' regional thematic or urban DTFLs developed for societal issues in the physical environment.
To make this possible, standards must be established for visualisation and analysis and for calculation and simulation models, subject to the 'employ or explain' policy. New digital twins can then make use of existing functionalities and enriched source data and models. Those models can then be further built on, irrespective of which supplier they use, knowing that the ingredients come from a reliable DTFL infrastructure.

Programme View of the Netherlands - Data Foundation

In the programme View of the Netherlands - Data Foundation, we are working together on a fundamental transformation from individual key registers to a multifunctional data landscape that transcends the boundaries of individual organisations. With more than 36 billion requests per year from both public and private parties, the geo key registers are extremely successful. For many reasons it is important to reinforce and extend the existing data basis, to generate a solid geo-data foundation, that can be built upon. The most heavily used data in the physical environment represents the foundation for the provision of information for our societal challenges. The policy vision View of the Netherlands - Data Foundation describes what is needed in order to establish an NGII-wide, coherent and futureproof geodata foundation. This vision was adopted in early 2023 and identifies the following objectives:

- We will create a geo-data foundation that connects. With the National Geo-information Infrastructure (NGII) we will realise a stable basis for geodata to which other data can be easily connected and exchanged - at sectoral, national and European level.
- We will create an integrated and enriched picture of the environment in which we live. We will deliver data with greater coherence, better connectivity - also with sector data - and flexible opportunities for expansion in 2D and 3D.
- Data sharing: We will enable the optimum flow of geodata. Together we will create and use the data based on efficient processes, clear agreements, harmonised standards and flexible provisions.
- Our work will be demand-based. We will use the current needs based on the societal challenges to take clear steps, appropriate to the vision on the geodata foundation.
- Conditions for success: We will create the conditions for a futureproof data foundation. With sustainable governance, financing, legislation and regulations and close collaboration, will lay the foundations for an NGII that can match future needs.



4 With and within the frameworks

We are not working on this Vision for the Netherlands alone. We are part of a national, European and global context that in terms of technology, policy making and law is very much in a state of flux and that also interacts with societal challenges. These developments and the new, sometimes unlimited possibilities in the field of data and data analysis that they create, will result in frameworks for the sharing of data and for the processing of data into information. Frameworks of this kind offer the necessary handholds for realising this policy vision. In striving to fulfil our dream of reinforcing the approach to the challenges of society with better information, we will conform with the valuable frameworks established elsewhere. We also hope to influence the frameworks that still need to be established, for example in situations in which our public values come under threat. Individually, the members of the GI Council are involved to a greater or lesser extent in the establishment of frameworks. However, because these frames of reference are constantly shifting, it is essential that the members act in unity, thereby more effectively anchoring the needs of the NGII.

This chapter describes which values and which global, European and national frameworks we consider important, in realising the ideal. These include ethical values, security and equality/inclusivity. We also describe the frameworks in respect of which we see opportunities and space to free ride or to set the course, together.

4.1 Ethics and public values

The fundamental rights of citizens and ethical behaviour by government are cornerstones of our democracy. With a view to public values, both Europe and the Dutch government therefore deliberately impose restrictions on what is and is not permitted. A series of laws have appeared over the past few years, and this process is expected to continue over the coming years.

For this policy vision, the European Artificial Intelligence Act is relevant. At the end of the day, to an increasing extent, data products will be the result of a complex interplay of algorithms. The interpretation and application of this Act in the physical domain will also demand our attention over the coming years. This fact presents opportunities for helping to set the course to be followed. At national level, the NGII will also have to take account of the algorithm register. We must be transparent about the algorithms we use, and aware of the choices we make in designing those algorithms.

The European General Data Protection Regulation (GDPR) also applies to our cooperation. As the level of detail of spatial information increases and the possibilities of combining this data grow, safeguarding privacy will require more and more attention.

Netherlands, the working agenda Value-driven Digitalisation forms the anchor point for the responsible use of data. The underlying idea is that if government is open and transparent about the way in which it uses data, this will help create confidence and support for new working methods. The same agenda specifically makes it clear that digitalisation must work for everyone. One fine example is the use of visualisation as a means of clarifying spatial issues for everyone involved in participation processes. By making (mapping) information of this kind accessible and literally tactile for people with a visual impairment, even more inclusivity can be guaranteed.

In addition to formal legislation and regulations, government, industry and science and have been working on an ethical reference framework for the responsible gathering and use of location data. This framework combines central ethical principles, which are subsequently constantly updated on the basis of experience and questions from practice. As part of this vision, the GI Council will continue to work over the coming period on a broadly supported ethical framework for responsible use of geodata, since a shared framework of this kind will help promote cooperation between parties.

4.2 Security

In a world in which cyber attacks are commonplace, information security is indispensable and increasingly important as the volume of data-driven work increases. The recently adjusted European Network and Information Security (NIS2) directive imposes strict requirements on cybersecurity. At national level, the Dutch Cybersecurity Strategy and Government Information Security Baseline serve as the starting points. The NGII will naturally be required and indeed be keen to comply with these frameworks.

Special attention will be paid to preventing potential vulnerabilities and security risks which could emerge from the combining and sharing of data. Parties must be confident that no high-risk information will end up in the wrong hands.

4.3 Data-driven working

In respect of data-driven working practice, a number of aspects must be mentioned, on which we wish to free ride or which we will be able to strengthen, on the basis of our policy vision. Firstly the European Data Strategy, which among others is focused on maximising the social value of digitalisation and data use. In this connection, for example, Brussels refers to a twin revolution: the green transition is impossible without the digital transition.
Such initiatives as Green Data 4 All and the establishment of a High Value Dataset under the Open Data Directive should together help further expand the supply of data about the living environment.

At national level, national government and local and regional authorities will literally tie in with this approach with the Inter-administrative Data Strategy (IBDS): via the IBDS, government wants to ensure that the full potential of data is used in tackling the societal challenges. The IBDS specifies that the value of data-driven working can above all be realised by digitalising working processes in close concert with practice, in domains. For the physical domain, this policy vision is an implementation of that objective.

4.4 Agreements, standards and provisions, sectoral regulation

Agreements, (ICT) standards and provisions will be needed to allow data to flow between organisations, businesses and countries. At international level, the FAIR principles have been broadly adopted, according to which data must be Findable, Accessible, Interoperable and Reusable. These principles have now also become widely accepted within the geo-information field.

At a European level, the central concept is that of dataspaces. Although the definition has not yet been entirely clarified, essentially it relates to agreements between public and private parties for the simple and trusted sharing of data, whereby the provider maintains total control (sovereignty) over their own data. Although the spatial domain is not included in the leading group of eight sectoral dataspaces identified by the EU (but does share considerable overlap with a number of them), the concept is perfectly suitable for application in the physical environment. The INSPIRE Directive, which requires Member States to ensure access to a large number of spatial and environmental data, has resulted in a forerunner to a dataspace for the physical domain.

In parallel, under the flag of the Inter-administrative Data Strategy, the Netherlands is working on a Federated Data System (FDS). Here, too, the idea is that complex societal challenges will increasingly demand cooperation within chains and networks, based on shared use of data. The underlying principle is that data remain at the source and are made broadly available via a single system of existing functions, agreements and standards. The concept of dataspaces and its Dutch elaboration in the FDS will determine the form for the further development of digital information management within the government, and hence also for the NGII of the future. It is therefore essential to closely monitor the developments, and to contribute to them from the physical domain. And where necessary to implement adjustments. That then is the role for the parties affiliated to the GI Council.

Sectoral legislation and regulations may also contain provisions relating to information management, such as conditions of use for data. Both at European and national level, we must aim to ensure that these sectoral provisions also comply as far as possible with the broader frameworks. This will prevent costly separate point solutions and new obstacles for the sharing of data.

5 Conditions for success

In order to structurally reinforce the tasks of public services through the provision of good information, it is essential that we sustainably safeguard the conditions for success of the NGII. The process of further development must be carefully considered and equipped to be futureproof. Users must be able to continue to rely on information and the provision and application of that information must be constantly able to adapt to new needs. At the same time, our public values must remain the central focus and not be threatened for example by technological developments and the related risks. Finally, we must not forget that the success or failure of effective use of data depends on the people involved, both on the supply side and the demand side. Developing a solid system of information provision is not a one-time exercise but will demand structural attention.

To safeguard the conditions for success, the following is essential:

1. Sound organisational agreements about cooperation between all stakeholders in realising and using the information.
2. A number of essential agreements laid down in legislation and regulations.
3. By design, we focus attention on security, ethics and public values and sustainable accessibility of information. These values may not be come under threat for example from technological developments and the related risks.
4. The people who process and use information are sufficiently equipped to be able and willing to do so (culture, education and labour market).

5.1 Attention for a demand-based approach and cooperation

The elaboration of the vision in work packages and their prioritisation will take place in stages in the working agenda appended to this vision, as outlined in chapter 3. The implementation of the working agenda will to a large extent take place in programmes and programme projects. At each of these stages, attention must be paid to the collaborative network of parties involved in the data value chain (from supply to use). In setting the priority for the tasks, demand-based management will be necessary in order to closely match the needs of users (connection with the tasks). In addition to consultative bodies in which organisations exercise formal influence, working with communities can also be valuable in acquiring a picture of what (end) users and makers consider important. It is also essential that the input from these groups be put to use.

5.2 Agreements, standards, legislation and regulations

Agreements and (technical) standards for the NGII are safeguarded formally. Wherever relevant agreements and standards are missing, they must be created, as necessary via lower-tier regulations. Wherever there is insufficient coherence between agreements, standards and rules they must be streamlined. Agreements and standards are only effective if complied with.
Safeguarding will above all be achieved via quality assurance, progress monitoring and supervision.

To realise the plans for the future it will be useful to grant status to a number of the abovementioned and standards, via legislation. The current framework in which the existing geo key registers are laid down issues almost no statements about the combination and (federated) sharing of data, and consequently falls short if we wish to realise the ideal from this policy vision, and to meet the wishes of future users. Further development and streamlining of legislation and regulations are therefore essential in order to offer the necessary space for future expansions. This will take into account new European and national regulations on the sharing of government data.

5.3 Structural attention for security and our public values

Our aim is a data system with public value, for the benefit of all, in line with our rules and public values, including security, democracy, self-determination, non-discrimination, participation, privacy and inclusivity. It is therefore essential that we embed attention for these aspects explicitly in the elaboration of the vision. Data sharing and mutual reliance on each other's data facilities first and foremost calls for a strong sense of mutual trust. Users and data providers must be able to trust that data are correct, can be exchanged securely and cannot be used improperly. We must also ensure that our public values are not threatened by unforeseen technological developments and the related risks. This means not only focusing attention on access to data but also the effects of the combination of data and data use. We must avoid the creation of information that is contrary to our security, privacy, democracy or any other public value. This is not an issue we will be working on alone. Wherever possible, we will tie in with and make use of the related key functions developed within broader frameworks such as the Federated Data System of the Dutch government or the European Data Strategy. Wherever these functions are absent or non-compliant, we will ensure that they are developed or reinforced, for example by further developing the ethical framework for responsible use of geodata.

5.4 The human factor

We must not loose sight of the fact that the development and application of data and information about the physical environment is above all for and by people. The effective use of data therefore imposes certain demands on the people involved in supply and demand. It is important that we include and support them sufficiently.

- **Support**
  We must establish and remain in dialogue with all stakeholders. The user stories of frontrunners which demonstrate the benefits that can be achieved with information about the physical environment, will for example help in achieving support for a broader range of parties in this transition. As indicated, the playing field is already broad. Many parties will make a contribution and it is important to include them and to let them learn from each other.
- **Knowledge**
  Knowledge among data workers (including users) and data awareness among broader groups (administration, policy and implementation) are important. We recognise that we will require a great deal of data expertise and we know that such expertise is scarce. Data knowledge among users is also a requirement, if data-driven working is to become commonplace. Here, too, community forming can make a contribution. Learning from the experience of others is known to be effective. Working with a lead group and a pack is an example commonly found in development processes.
- **Culture**
  Data-driven working can only exist by grace of a culture focused on collaboration and sharing - with respect for personal responsibility. The challenge in data-driven working is not so much of a technical nature but is above all an issue of change management: how can we arrive at successful data-driven working and how to we ensure that data-driven working becomes embedded in primary processes within and between our organisations? There must be no rewards for exclusively aiming for personal interests. Working together for a common goal should be rewarded. This calls for an alert and active attitude from the GI Council.

To fulfil our dream, it is necessary that all these conditions for success be safeguarded. However, that is not enough and is also not self-evident. All the work that must be carried out in the framework of the View of the Netherlands calls for a further essential condition for success: robust and sustainable financing. This is the central condition discussed in the next chapter.

6 Robust financing

Robust financing and an adequate funding system that not only takes account of costs but also benefits of the NGII. This may well be the most important condition for success. However, this condition is not yet in place. For that reason, we must urgently focus on guaranteeing structural funding for current management, further development and future management. This in turn calls for clear and fair agreements and the distribution of costs between all stakeholder parties. With that in mind, in this chapter we outline the most important challenges and potential solutions.

6.1 Challenges

Towards structural and stable financing for further development and management.

There are no doubts about the huge benefits from the planned investments in the National Geo-information Infrastructure (NGII). However, as a consequence of the high level of use and new demands, management costs for the current ICT components and data maintenance are under pressure. To realise the ideal expressed in this policy vision, it is also essential to invest in further development. This applies both to the provision of data, the sharing of data and the further development of options for analysis and visualisation. Temporary programme and project funding is available for these developments, but this funding is not structural. At the same time, newly developed components will also have to be managed and financing will be required for regular further development, for example in response to new legal or technical requirements (lifecycle management). For this form of funding there are also no structural guarantees.

In other words, there is a major discrepancy between the budget available and the budget required for (further) development and management of the NGII. This is due to the following factors:

- The existing budgets are focused on management and not or not sufficiently on further development. They are not planned to grow in line with increased use and expanding requirements.
- Until now, there has been insufficient clarity regarding the scope of the intended further development of the NGII and insufficient clarity on the work packages and accompanying costs and benefits.
- There is much dissatisfaction about the current funding method (central/local, allocation keys and rates) and the structuring of the budgets.

These factors closely relate to other elements of the policy vision: the importance of a common approach and the translation of the ambitions for data and analysis into common programmes.

For all these reasons we are urgently focusing on safeguarding structural financing for the current management, for further development and for future management. This entails reaching clear and fair agreements on the allocation of costs between the various stakeholders. Only then can we provide sound information to the parties that are tackling societal challenges in the physical environment. The aim is to arrive at a structural and stable financing for management and further development of the NGII.

Towards a clear scope and insight into the costs and benefits of policy variants

Discussions regarding the (coverage of) costs would be hugely assisted by the availability of a clear scope and insight into the situation regarding the costs and benefits of the different policy variants:

- A variant in which NGII makes it possible to fulfil the agreements in existing policy and the related legislation and regulations. This would include existing policy and accompanying legislation and regulations in respect of a number of issues including privacy, information security and digital access.
- A variant in which the NGII as we know it now is further developed into a data foundation for the physical environment, according to the View of the Netherlands -Data Foundation. This can be achieved by working to achieve greater coherence between datasets and improving access (sharing) of datasets for data applications such as digital twins.
- And finally a variant in which the NGII is further developed into an infrastructure that encompasses the entire scope of this policy vision (View of the Netherlands), consisting of both a data foundation and an infrastructure for analysis and visualisation.

6.2 What we need to do

Due to the lack of results, the further development of the NGII is stagnating and even the basic variant appears to be under threat. In response, advice has been requested to arrive at a robust multiyear budget and an adequate system of financing. The proposal for a robust multiyear budget will be based on the already mentioned policy variants that are now to be elaborated.

However, merely establishing a multiyear budget is not enough. We will also have to reach agreement on an adequate system of financing. There is currently much discussion about the various aspects of the financing and funding of the NGII:

- Should the source holder costs be included in the system or not?
- How do we arrive at an allocation of costs between national government and local and regional authorities, and within national government itself?
- Can other parties also contribute to the costs and in this case should a set of rates be employed?

External advice has also been requested on these aspects, including the approach to budgeting, decision making, reporting and accounting - all taking account of successful practices employed elsewhere in comparable situations. On that basis, together we will arrive at clear and fair agreements for the financing of the NGII.

Glossary of terms

Council for Geo-information (GI Council)	The strategic consultation and advisory body for geo-information in the public sector in the Netherlands. Participants in the Council are the government departments of the Interior and Kingdom Relations (BZK), Defence, Economic Affairs and Climate Policy (EKZ), Infrastructure and Water Management (IenW) and Agriculture, Nature and Food Quality (LNV), the umbrella organisations the Association of Netherlands Municipalities (VNG), the Association of Provincial Authorities (IPO) and the Union of Water Authorities (UvW) and implementing agencies that supply spatial information (Land Register, TNO, Rijkswaterstaat, RIVM, Statistics Netherlands, the Netherlands Space Office and Geonovum). The Council is chaired by the Director-General for Spatial Planning.
National Geo-information Infrastructure (NGII)	The national infrastructure that produces widely used public geo-information. This includes the geodata key registers, other widely used geodata sources, standardised analysis models and visualisation techniques and the related agreements, standards and provisions.

Chapter 1

Societal challenge	Complex issue that impacts on various aspects of the social, financial-economic or physical domain. Challenges of this type require joint efforts and cooperation between government bodies, civil society organisations, businesses and individuals in arriving at effective solutions.
Physical environment	The tangible environment in which we live. This encompasses for example building structures, infrastructure, water (systems), soil, air, landscapes, nature, cultural heritage and world heritage.
Information provision	The combination of people, resources and measures focused on meeting the information needs of one or more parties.
Data-driven working	The process according to which organisations gather and analyse data and then employ the resultant information and knowledge in processes of decision making and implementation.
Area specific	The integrated focus on a specific geographical area, with attention for the complex interplay between the set of issues relevant in that area.
Domain-specific	The specific focus from the perspective of a single working domain or sector, with attention for the issues that are relevant in that domain.
Open information	Information that is freely available.
Closed information	Information that is not freely available, but that is only accessible to specific parties with the appropriate rights.
Basic data	Data contained in the key registers.
Key registers	Registers officially designated by government that all government organisations are required to use in implementing their tasks under public law. These contain the most widely used data in the public sector.
Sectoral data	Data within a specific domain of government that are relevant for multiple organisations and within that domain are managed at a single location for multiple organisations.
Public values	The values we consider important as a society. In the framework of digitalisation, coalition agreement refers to the following public values: security, democracy, self-determination, non-discrimination, participation, privacy and inclusivity.

Chapter 3

Data value chain	The total production chain for the gathering, accessing, analysis and visualisation of data through to the use of the resultant insights.
Data at source	The principle that for data used by government, there is always a single source which can be considered leading.
Information model	Structured description of the structure, semantics and characteristics of information about things in reality.
Algorithm	A set of rules and instructions executed by a computer for example in order to analyse a problem or reach a decision.
Artificial Intelligence (AI)	The capacity of a system to correctly interpret external data, to learn from those data and to use those lessons to realise specific objectives and tasks via flexible adaptation. This capacity is traditionally the preserve of humans.
Information product	An information product delivers a selection of data which in terms of form are specific to a particular intended use.
Transformation management cycle	A methodology specifically focused on complex transition issues.

Chapter 4

Inter-administrative Data Strategy	The data strategy for the whole of government, which has been established through inter-administrative cooperation.
Dutch Federated Data System	A system of agreements and standards that makes it possible for government organisations to share data across the boundaries of organisations and sectors, in a responsible and secure manner, and to use that data to implement societal challenges and to provide services to businesses and citizens.
European Artificial Intelligence Act	Act that ensures that artificial intelligence is used responsibly in Europe. According to this Act, IA systems must be secure and transparent. Furthermore, algorithms may not discriminate or violate human rights.
Network and Information Security Directive (NIS2)	European directive that imposes requirements on cybersecurity.
European Data Strategy	Agreements at EU level among others on the standardisation and interoperability of basic data.
Dataspace	Common and interoperable subsystem that facilitates the exchange of data on a specific theme subject to supplementary agreements.

Chapter 5

Community	A group of persons with a common (data) interest or a common professional field which creates, expands and shares knowledge on that field, through regular interaction with one another.
System functions	Specific organisational or technical functions occupied within the data system to facilitate the optimum exchange of data.

This policy vision is published by:

Ministry of the Interior and Kingdom Relations
PO Box 20011 | 2500EA The Hague

April 2024