Summary

Background

The current government's goals as set out in the Coalition Agreement, are ambitious. It has been agreed that over the next <u>eight years</u> carbon emissions must be reduced by at least 55%, nitrogen emissions must be halved, and 900,000 additional homes must be built. Pressure on available space, the transport system, public finances and business has thereby increased further in recent years. Citizens, businesses and government bodies experience this on a daily basis. Topics such as sustainability, affordability, accessibility and housebuilding seem to be fighting for priority, and are closely interrelated in terms of goals, mutual impact and effects. Meanwhile, autonomous and macroeconomic developments are also making themselves felt. We are noticing this in a growing labour shortage, high transport costs due to congestion, diminishing accessibility of facilities, rising energy prices and the rapid growth of information technology, also through the influence of large platform corporations. Urbanisation can lead to attractive agglomeration effects, provided that densification and mobility are optimally designed and supported. Data plays an important prerequisite role in this.

Against this backdrop of significant challenges and ambitions, we are urgently looking for new solutions in the form of tools, policies and business opportunities. Data and information technology are expected to provide a lot of solving power. At the same time, the pitfalls of these developments are also the subject of public debate. Platform power and privacy violations by parties such as Google and Amazon as well as the unethical use of artificial intelligence demand well-considered choices. We want to use technology responsibly and effectively for mobility innovation and smart sustainable urbanisation[1]. We also want to secure the Netherlands' future economic position. We are thereby encountering various problems, particularly in the digital domain. Yet, that is precisely where concrete opportunities exist to come up with new solutions quickly, efficiently and with adequate scale.

> **This proposal for the DMI ecosystem aims to remove a significant part of these existing obstacles and barriers, so that the physical domain can be better furnished with tools and capabilities from the digital world.**

The DMI ecosystem is a public-private partnership that facilitates the responsible sharing and use of data on a solid foundation of mutual trust, clear agreements and open standards. This creates new business opportunities for a variety of market players, which in turn enables government bodies to give concrete form and substance to mobility innovation and smart and sustainable urbanisation. The DMI ecosystem ensures a *better connection* between the various domains and stakeholders, in order to be able to optimise continuously and coherently on that same basis. As a result, the intended agglomeration effects and a sustainable society with vibrant towns and cities will be achieved faster.

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[1] Mobility innovation for smart sustainable urbanisation is the broad, integrated and multi-year approach to digitisation and digitally supported services, shared mobility, hubs, MaaS, smart urban logistics, intelligent access and facilitating walking and cycling. This is designed to encourage and facilitate a transition in the supply and provision of new mobility, such that this new mobility supports and continues to support sustainable urban densification in a targeted way. This mobility innovation does not happen in isolation, but takes place in conjunction with other urban developments in the areas of water storage, energy generation and use, and sustainability, with respect for nature and together with residents.

Problem analysis

The challenges and constraints on the digital side are the following:

a. Data from different domains of mobility and housebuilding and urban planning is hard to find and cannot be combined and analysed efficiently;

b. The meaning and value of data are insufficiently expressed because the development of data-intensive applications is lagging behind: supply and demand are keeping each other waiting;

c. Data sources and potential users of data are not finding one another due to a lack of familiarity with the other's potential added value;

d. Different layers of government are insufficiently linked up in their digital strategies and implementations (e.g. central government versus local and regional government);

e. Making data available to third parties is relatively costly and cumbersome. Either numerous bilateral bespoke agreements are needed or data has to be delivered to a central platform, which can lead to loss of control over one's own data;

f. There is little trust between data sources and users. This is due to the lack of recognisable, consistent and enforceable agreements. In addition, there is a lack of objective insight into the quality of data;

g. Knowledge about data quality, intelligence (availability, sharing and application of data), applications and opportunities for upscaling and commercialisation is very limited and mainly theoretical in nature, as practical experience is mostly lacking.

The consequences are being felt by both government bodies and businesses:

- Many municipalities are 'flying blind': they have a clear responsibility when it comes to a town or city, but no effective insight whatsoever. Avoidable costs for monitoring the public space are thereby repeatedly being incurred;

- Transport costs for goods and people are rising, as is their impact on quality of life and affordability, while a proportion of this would be avoidable using better data/providing better information to road users;

- Peak/off-peak ratios on the roads and on public transport and high transition costs towards greater sustainability and flexibility are imposing a heavy burden on the operators of public transport, freight delivery and lease fleets;

- The degree of self-direction and self-organisation by residents and businesses is limited. The opportunities for improvement offered by platform technology, such as establishing collaborations or switching from a leased fleet to a mobility budget, remain unexploited;

- Government bodies and businesses remain stuck at pilot level in their digitisation and are not progressing towards national or even international upscaling under normal market conditions and uniform agreements.

Problems in practice

The problem analysis set out above is not merely based on theory. Reality is that government bodies and businesses that have already been forming a community on a smaller scale in recent years as a result of various programmes and projects, are flagging up problems on a daily basis that could be better tackled with data and intelligence. However, these digital solutions are not being implemented due to the challenges and limitations outlined above.

Approach

The problems of a lack of data and intelligence play out nationwide across a wide range of domains and sectors. The investment proposal for the DMI ecosystem focuses on facilitating and stimulating the exchange and intelligent application of data in relation to the domains of mobility and housebuilding and urban planning. Better connecting those domains is a necessity and offers immediate added value. Our tool for this is a nationwide DMI ecosystem, which is being built step by step. To ensure manageability, retention of quality and the pace of realisation, we are adopting the following approach:

- By applying services in several municipalities of sufficient size and spread across the country, we are making a start in all regions of the Netherlands; a number of services are being rolled out nationwide immediately;
- These municipalities are building experience and expertise. In addition to being customers, they are also co-developers and partners for businesses in the ecosystem;
- The realisation of the first applications and data exchanges in the DMI ecosystem is taking place between businesses and municipalities, but also amongst businesses and amongst municipalities;
- For the supplying businesses, the first customer group is both diverse enough and manageable;
- We are starting with a compact collection of data sources and applications which are sufficiently related. The addition of other data sources, applications and domains is desirable and will take place once the first applications are functioning as planned;
- The standard is being set with this first group of government bodies and businesses, and is being recorded, adopted and published through knowledge-oriented activities;
- Businesses and government bodies that start to use the DMI ecosystem after this first group can build on the experience and tried and tested standards that have already been developed;
- A solid network of knowledge, experience and competences will then have been built which can support further spread;
- During the planning and implementation, we will constantly link knowledge and experience to developments and knowledge outside the DMI ecosystem, such as EU developments and possible other ecosystems.
- The wider DMI ecosystem in all its diversity ensures that the digital world and all digital tools match the needs in the physical world.

The digital component: the NGF investment proposal

In order to make data available in a simple, secure and reliable form for use in a variety of applications, and make the knowledge thereby acquired available to all, we distinguish five essential components within the DMI ecosystem:

1. *Decentralised platform*

The 'digital' basis of the ecosystem consists of a decentralised platform with a number of General Facilities.

These General Facilities ensure:

- Establishing identities and authorisation levels (using iShare);
- Complying with applicable conditions and legislation;
- Recording the payments due, based on price and volume; the recording and traceability of agreed transactions;
- A central Products and Services Catalogue (PSC) which contains all the data on offer, available applications, privacy restrictions, quality characteristics, services offered and participants within the DMI ecosystem;
- The data transactions are recorded, partly for the purpose of fulfilling joint agreements and being able to verify compliance with legal obligations (such as GDPR and registration of used algorithms).

The design and operation of the General Facilities are in line with the central mechanism of the DMI ecosystem, which is based on the 'federated principle'. This means that data is not transferred from source to user or to a central platform but remains 'at source' with the provider. That is where the user can use the data, for example by transferring the algorithms to that source instead of transferring the data to the algorithms. This enables the source holder to retain data sovereignty, i.e. the independent right of disposal over the data, and they do not have to fear unauthorised sharing of or other improper use by users of its data.

2. *Agreements System*

Agreements have been made about the use of the General Facilities, among other things, which are referred to as the Agreements System. The Agreements System comprises all the agreements to be made to which participants in the ecosystem conform, e.g. certain standards or decision-making. This Agreements System will be given further shape and content in a public-private setting over the coming years. The starting point for the Agreements System is the 'General Terms and Conditions for Participation in DMI ecosystem', which have already been agreed. These terms and conditions already contain a number of agreements made about governance, joining and departing, etc.

The Agreements System gives users of the platform functionalities the required degree of trust, discoverability, quality measurement and safeguarding, traceability of transactions and compliance. To ensure familiarity with one another and cross-fertilisation between participating parties, agreements have been made about the governance of the DMI ecosystem. The governance agreements also ensure alignment of investment directions and structured issue management of (the technology of) the General Facilities and applications.

3. *Applications*

The applications are provided by a broad group of market players and public-private consortiums. In those applications, data is given a specific and concrete use value by adding intelligence. The applications make a concrete contribution to the challenges of mobility innovation and urbanisation. They thereby utilise the available data and intelligence of the DMI ecosystem or supply data and knowledge to participating parties through the DMI ecosystem. This is all 'machine2machine linked': programmed, without the intervention of manual input. The implementation and execution does sometimes require some human intervention for verification and validation. The modular structure

and use of standardised interfaces prevents market dominance and dependence on individual players, and also makes it easier to scale up the various related applications.

4. *Knowledge*

One key factor for growth in the supply of data and its smart application consists of the activities around the topic of Knowledge. These include:

- The development and refinement of tools;
- How to use and deploy algorithms to realise specific applications;
- Validation of outcomes;
- Adopting the right design principles to safeguard privacy and security;
- Reusing best practices;
- Registering operational sensors and algorithms;
- Knowledge and competence development;
- Connecting with other sectors.

These knowledge-related activities enable faster upscaling and alignment with the international playing field. The economic and social value of the ecosystem can thus be realised, partly due to the appeal it has to new participants.

5. *Commons*

Commons are defined in the Terms and Conditions for Participation in DMI ecosystem (see Appendix 7). This refers to a certain value of the shared data and services that all participants within the DMI ecosystem offer to each of the other participants free of charge, subject to conditions. The Commons strengthen mutual collaboration and knowledge accrual, but also ensure that public investments can benefit the entire DMI ecosystem and the applications realised within it.

Support and participation

The DMI ecosystem is open and freely accessible, and participation is voluntary but not without obligation: there are common ground rules to which all participants must adhere (see Appendix 7, System of Agreement including General Terms and Conditions for Participation in DMI Ecosystem).

The investment plan for the benefit of the DMI ecosystem was created jointly by government bodies, businesses and knowledge institutions. This has required a series of collective and bilateral consultations. As a result, all participants have expressed their commitment to one another, are willing to get involved and also make their own investments in the development of the DMI ecosystem.

A proportion of the new products and services are available nationwide straight away. A proportion will initially be applied in a group of municipalities and areas where expertise and experience are being built up rapidly: Groningen, Amsterdam, Almere, Apeldoorn, Amersfoort, Zwolle, Dordrecht, Rotterdam, Heerlen, Helmond, Utrecht, The Hague and Zeeland. Together they make up the vanguard and the starting point for a further national rollout. The municipalities of

Haarlemmermeer, Hengelo, Deventer, Sittard-Geleen, Alkmaar, Hoorn, Breda, Tilburg, Den Bosch, Emmen and Velsen have also expressed their desire to join.

Co-investments

Alongside a planned investment stimulus from the NGF of approx. € 85 million incl. VAT, parties are willing to make their own investments in the DMI ecosystem and the associated General Facilities. The breakdown and amount of that co-investment in the first 5 years is as follows (all amounts including VAT):

- Ministry of Infrastructure and Water Management: approx. € 108 million
- Participating municipalities: approx. € 51 million
- Business: approx. € 42 million.

Economic rationale

The economic rationale is based on a Theory of Change: mobility innovation, sustainable urbanisation and platform technology including agreements system. This includes input, output, intermediate outcomes and long-term outcomes. A social cost benefit analysis has been added to quantitatively and qualitatively substantiate the economic value in terms of costs-benefits and contribution to GDP.

What will citizens, businesses and government bodies notice of the DMI ecosystem's functioning successfully?

The successful functioning of the DMI ecosystem will contribute to mobility innovation and smart and sustainable urbanisation by providing opportunities for:

1) Better designed and executed urban residential densification (resulting in lower failure and repair costs);
2) Being able to better manage the accessibility of key economic and social facilities (work, healthcare, education, leisure);
3) Reducing transport costs by reducing congestion and thus vehicle loss hours;
4) Boosting healthy and sustainable mobility, creating proximity, policies focused on the urban policy sequence of measures focused on Walking, Pedalling, Public Transport and MaaS first and only then Private Car Use (in Dutch abbreviated to STOMP);
5) Cost-effective, scalable and futureproof tools, collaboration and agreements;
6) New opportunities to promote and measure location-specific, target group-specific, time-specific and sustainable mobility behaviour;
7) Eliminating fragmentation in terms of policies and conditions between government bodies and areas. Think of examples such as PostNL, Go-sharing and many other companies which operate nationally that currently often have to comply with vastly different conditions for each town/city or areas at relatively high costs and with additional operational downside risks;
8) Reducing the cost of data access and data sharing with better verification and manageability at source;
9) Better insight into the quality, usability and use of diverse datasets;
10) Increasing the use of data and creation of value with it through intelligent applications.