Berenschot

OUTLOOK I

Speeding up swiftly: the current state of hyperloop development in the Netherlands

Hyperloop Development Program

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Hyperloop Development Program

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Kaj Mook (Workpackage Lead)

Rogier Beenders

Niek Overgaauw

Eva Starmans

Hyperloop Development Program

Dominik Härtl (Working Group Lead)

Stefan Marges (Program Manager)

Inhoudsopgave

1. Introduction

The hyperloop is a mode of land transportation capable of high speed and driverless operations, in which a vehicle is guided through a low pressure tube or system of tubes, for passengers and/or cargo. Several organizations have joined forces within the Hyperloop Development Program (HDP) to develop hyperloop as a safe, sustainable and commercially viable mode of high-speed transportation and to bring the hyperloop to commercialization. The HDP is a public-private partnership, between the Dutch Ministries of Economic Affairs & Climate Policy and Infrastructure & Water Management, the Province of Groningen and a group of industry parties, knowledge and research institutes and other private entities.

Over the course of the coming two years the Program aims to achieve the following goals:

1. To prove the feasibility of hyperloop as a safe and sustainable low-emission method of transport for people and goods.
2. To test & demonstrate in the European Hyperloop Center Groningen that the technology works as intended (designed) and can be operated safely.
3. To identify the future prospects and opportunities for industry and stakeholders clustered around the hyperloop ecosystem.

Roadmap and outlooks

As part of the third goal, to identify future prospects and opportunities, a roadmap will be developed. This roadmap is a country specific development agenda for hyperloop, including high potential routes. Berenschot will define the roadmap for the Netherlands. This Dutch roadmap will be preceded and substantiated by two outlooks, of which the document in front of you is the first.

The goal of this first outlook is to inform and inspire national and regional authorities and other key stakeholders regarding the potential of a hyperloop network in the Netherlands and Europe and the possibilities to contribute to the realization of the network. In this first outlook we will explore the current context in which the Hyperloop Development Program operates, combining different sources into one distinct story about hyperloop technology, the high-potential Dutch routes and the key stakeholders to realize the hyperloop ambition.

2. The Dutch mobility and logistics context at a glance

With the exception of some islands and city states, The Netherlands is the most densely populated country of Europe. Most notably is the Randstad area, which includes the four major cities Amsterdam, Rotterdam, The Hague and Utrecht. However, the country does not possess any megacities that usually characterize densely populated countries. Transport and logistics between cities and villages therefore relies on a close-knit network of roads, waterways and railways.

The logistics sector makes up a significant part of the Dutch economy. Three of the ten core network corridors of the Trans-European Transport Network (TEN-T) pass through the Netherlands: the North Sea-Baltic Corridor, the Rhine-Alpine Corridor, and the North Sea-Mediterranean Corridor. This makes the Dutch mainports, namely the Port of Rotterdam and Amsterdam Schiphol Airport, and infrastructure vital links for the transport of goods to and from large parts of the European continent.

2.1 An overview of the transport sector in the Netherlands

The current Dutch mobility and logistics sector uses multiple modes of transport. While there is a strong emphasis on road transport, rail, waterways, bikes and local public transport make up a significant part of Dutch mobility and logistics.

Logistics

The most used method of freight transportation is road, while rail and air constitute a relatively small percentage of total cargo moved in the country. About a third of goods transported in the Netherlands arrives through seaports, while one sixth of all transported cargo is shipped using the internal waterways.

This division only tells half the story. Transportation in the Netherlands is highly multimodal and in large part oriented on export. Freight arriving through a seaport can be transshipped by truck, internal waterways, pipelines or freight train, often ending up abroad. The choice for a certain mode of transport is based on cost, flexibility, length of the journey and speed. While road transportation offers great flexibility and speed, transporting directly between pickup and drop-off point, the cost per ton for bulk goods is much lower when using rail or internal waterways.

A large percentage of Dutch cargo arriving in the port of Rotterdam is destined for Germany (and beyond) and vice versa. Two major transport corridors between the Port of Rotterdam and Germany exist: the east and south-east transport corridors. The Ministry of Infrastructure & Waterworks works with businesses, the Port of Rotterdam and regional and local governments to further improve the cargo flows on these corridors.

Transportation in the Netherlands is faced with certain challenges. The road network in the Netherlands, though highly developed, faces congestion. This is especially prevalent in the Randstad area during rush hours, but could in the future also extend to other times of day and areas. Congestion is already resulting in economic losses throughout the country. For shipping, the capacity of locks and bridges poses a bottleneck. With increased demand for transportation of goods in the future, these bottlenecks will worsen. This is also the case for railroad transportation, which is limited by rail capacity, among other things.

Passenger mobility

In a country as densely populated as the Netherlands, creating efficient mobility opportunities is a challenge. Mobility patterns in the Netherlands are highly dependent on the length of the journey. For very short distances, the Dutch prefer to walk or cycle to their destination, while for any distance over 7.5 kilometers, the car becomes the dominant mode of transport. The train is mainly a mode for distances greater than 15 km, while bus, tram and metro are mostly used for trips up to this distance. As with cargo, mobility in the Netherlands is highly multimodal, with people often switching modes of transport mid-journey. The Netherlands has well-funded public roads, with the national government ensuring the quality of national highways, while local and regional public bodies take care of municipal and regional roads.

The right to operate public transport is granted to (semi-)private companies through concessions. For bus, tram, metro and regional rail lines, concessions are granted by transport authorities and provinces. The national government grants the concession for the core rail network, currently operated by NS, the privatized national railway company. Management and maintenance of rail infrastructure is separated from operation and is performed by ProRail, an independent administrative body with strong links to the Ministry of Infrastructure & Water Management.

As with freight transportation, passenger mobility faces pressure from congestion. This is the case for both roads and public transport. The COVID-19 pandemic has temporarily relieved these pressures but new investments in infrastructure, combined with unprecedented demand-management, are expected to be required to deal with future mobility demand.

2.2 Key developments in Dutch mobility

There are a number of factors and developments affecting mobility and logistics in the Netherlands. First of all, space is a premium, especially in the Randstad metropolitan area, and budgets are limited. The demand for mobility and logistics is growing, but infrastructure development has to compete with other land uses and investments such as housing, renewable energy generation, climate adaptation and nature. Spatial planning and design procedures are time consuming and realization times for major infrastructure projects of 15 years or more are no exception.

Rising attention for a sustainable environment

The lengthy planning procedures have recently been exacerbated by the so called nitrogen crisis. In 2019 the Council of State ruled that the Dutch policy framework for regulating nitrogen depositions was unlawful. Many construction projects have since been paused or delayed because their permits were withdrawn. A new policy framework is yet to be developed. However since 1 July 2021 the construction phase of infrastructure is exempted from the nitrogen deposition rules, which should ease the continuation of projects. Meanwhile, nitrogen deposition for the use phase of infrastructure is still problematic, thereby strengthening the case for emission-free modes of transport.

Limits to the growth of aviation

The nitrogen crisis combined with the Paris agreement have further fueled a long lasting debate about the future growth of Amsterdam Schiphol Airport. Schiphol's growth is currently limited due to its proximity to neighboring towns and cities. Plans to develop Lelystad Airport as a secondary location for Schiphol, have been put on hold, mainly as a result of the nitrogen crisis and changing views in society on the future growth of aviation. These developments made Schiphol adopting a new strategy, focusing on attracting more long haul flights instead of shorter intracontinental flights. This strategy relies on stimulating alternative modes of transport for short haul travel.

In need of (climate) resilient networks

As the climate changes, the Netherlands will see an increase in extreme weather conditions such as droughts, heatwaves, heavy rainfall and high water of even floods. These events threaten existing and future infrastructure and can cause major disruptions in Dutch logistics and transportation networks. In multiple projects different levels of government, knowledge institutes and private companies work together to gather and share knowledge on how to best adapt to these climatic changes. For example, in the Program for Climate-resilient Networks, the national government is working with ProRail to conduct stress tests on existing infrastructure. In the program City Deal *Klimaatadaptatie* ten Dutch cities work together with the private sector and the national government to develop pilot programs and exchange knowledge on climate adaptation.

Nationaal Groeifonds (National Growth Fund)

Early 2021, the Dutch national government has initiated the National Growth Fund, a major fund for investments in domestic projects that can contribute to structural and sustainable economic growth. A total of 20 billion euros is reserved until 2025. Applications are welcomed for projects in three fields: 1) knowledge development; 2) research, development & innovation; and 3) infrastructure. Proposals are reviewed by a commission and scored for their impact on economic growth and benefits for society, such as sustainability.

EU Green Deal

The Green Deal is the European Commission's program against climate change. The first aim is to reduce carbon emissions in 2030 by 55% compared to 1990. The ultimate goal for the European Commission is to achieve carbon neutrality in 2050, becoming the first carbon neutral continent.

To achieve these goals, a roadmap with measures has been launched which covers all sectors of the economy, with a heavy focus on transport, energy, agriculture and infrastructure. The total investment in these measures will amount to over a trillion euros. In addition to reducing carbon emissions, the measures are aimed to transform Europe in many ways, resulting in cleaner air, increased access to public transport, sustainable jobs, more affordable energy and an overall better quality of life.

3. Hyperloop: a promising new mode of transportation

3.1 What hyperloop brings

The hyperloop is an innovative form of high-speed transport for large volumes of passengers or cargo. It can connect cities, countries or even continents with short travel times, in a safe and sustainable manner.

Hyperloop works by propelling vehicles using magnetic levitation in a low air pressure tube to reduce drag. This combination of technologies allows hyperloop to travel faster than in aviation. It will typically operate at speeds around 500-700 km/h but can reach velocities up to over 1000 km/h. In doing so it causes no direct carbon emissions, enabling sustainable, high-speed, long-range travel.

Hyperloop can be integrated with other modalities and connected to central transport hubs. Thereby it can drastically reduce total travel times. While weather is responsible for 70% of delays in current transport modalities, the encasement of hyperloop in its tube renders it independent from this interference. With a capacity equal to or greater than current high-speed rail, hyperloop will be an alternative mode of transportation, substituting rather than replacing air and rail travel, to account for the growing demand in mobility in the coming years and decades.

Hyperloop is currently in development, but could likely be implemented on cargo routes by 2029, passenger transportation following not much later.
In the coming decades, it is possible to develop a pan-European hyperloop network, contributing to the European goal of zero carbon emissions in 2050.

3.2 Reception of hyperloop in the Netherlands

The concept of hyperloop has been received with interest in the Netherlands for its potential as a sustainable, safe and reliable mode of transport.

In 2019, the State Secretary for Economic Affairs and Climate Policy issued a policy letter to support innovation by key Dutch economic sectors, including logistics. In this context, innovation should be aimed towards societal challenges, while shaping economic opportunities along the way. A prominent challenge for the logistics sector is the mission to achieve ‘emission-free mobility of people and goods by 2050[1].

To work towards achieving that mission, industry, knowledge institutes and government bodies jointly formulated a knowledge and innovation agenda for the coming years[2]. This agenda mentions hyperloop as a novel mobility option to be developed and demonstrated.

1 https://www.topsectoren.nl/missiesvoordetoekomst
2 https://topsectorlogistiek.nl/2019/10/14/deel-kia-toekomstbestendige-mobiliteitssystemen-2/

4. Building a Dutch-European hyperloop network

The Delft University student team was successful at Elon Musk's first international hyperloop competition. Not long after Hardt Hyperloop started, as one of the first hyperloop companies in the world. Hardt on its turn started to build an ecosystem that resulted in the public-private Hyperloop Development Program. This all shows that up to now the Netherlands has been a front-runner in hyperloop development and the future looks even more promising.

4.1 European Hyperloop Center

As part of the HPD the European Hyperloop Center (EHC) Groningen will be established. The EHC Groningen is one of a handful of European hyperloop test facilities that are currently being developed. The EHC will consist of a learning facility and research center with a 2.6 kilometer test tube. It is planned to open in 2022 in the Dutch province of Groningen. The center will be an open testing facility that will provide home to developers from all over the world to test, validate and further develop their hyperloop technologies. As an integral part of the Hyperloop Development Program, the EHC will serve as a research site for several of its activities, such as the testing and validation of hyperloop safety standards. A place where companies and research institutions can work together to accelerate the realization of the hyperloop.

4.2 High potential routes

After concept developing and testing, the next major milestone will be the deployment of a first hyperloop solution. The Hyperloop Development Program has identified a handful of routes through the Netherlands that offer high potential for the realization of hyperloop infrastructure. This potential was assessed based on different factors, such as demand for logistics and/or passenger transport, presence of economic clusters and their ambitions for sustainable growth, and presence of existing transport modes and lines. Moreover, due to the relatively short travel distances in the Netherlands, there is a large focus on international connections for routes through the country.

The goal for the Hyperloop Development Program in the coming years should be to further explore and develop the potential of these routes. By studying costs and benefits and societal impact and by engaging relevant stakeholders, the potential routes can be fine-tuned and alliances towards realizing these routes can be built and strengthened.

4.2.1 Amsterdam-Berlin

Constructing an international hyperloop route between Amsterdam and Berlin, with intermediate stops in cities like Utrecht, Düsseldorf and Hannover will connect the largest metropolitan area of the Netherlands, the Randstad, with the populous Rhine-Ruhr area and Germany's capital. The route is currently being considered as a missing link on the European high-speed network and governments and railway operators on both sides of the border have expressed their ambition to realize a faster connection between Amsterdam and Berlin for already a number of years now. However, both on the short and longer term the limited track capacity on the railway network turns out to be bottleneck; despite planned enhancement and capacity extensions.

Realizing a hyperloop between Amsterdam and Berlin showcases how hyperloop can complement existing modes of transport, connecting millions of people and multiple airports. Substituting short-haul flights between these destinations, this Hyperloop will lead to decreased carbon emissions.

Currently there are around 3 million annual passengers travelling point-to-point between Amsterdam and Berlin[3], with millions more travelling between the different intermediate cities that will be connected. Hyperloop could become the dominant mode of transportation on this route, alleviating traffic on existing overburdened modalities. In addition, hyperloop will provide positive externalities in reduced carbon emissions, noise reduction and travel time reduction. While initial construction costs are significant, the operating costs of hyperloop are lower than those of traditional modes, which should allow for a profitable business case on this route

In addition to the economic benefits such a route will have on the directly connected areas, this could also be a starting point to an extended hyperloop network towards the Nordic countries and Eastern-Europe. Two regions that are currently not served by direct train connections to and from the Netherlands.

3 ProRail: Versnelling Amsterdam - Berlijn (2020) and Brietzke, De Keizer en Van Oord: Nieuwe methodiek voor internationale-reizigers-prognose: Wat beweegt passagiers tussen Nederland en Duitsland? (2015).

4.2.2 Lelylijn (Amsterdam – Groningen/Leeuwarden)

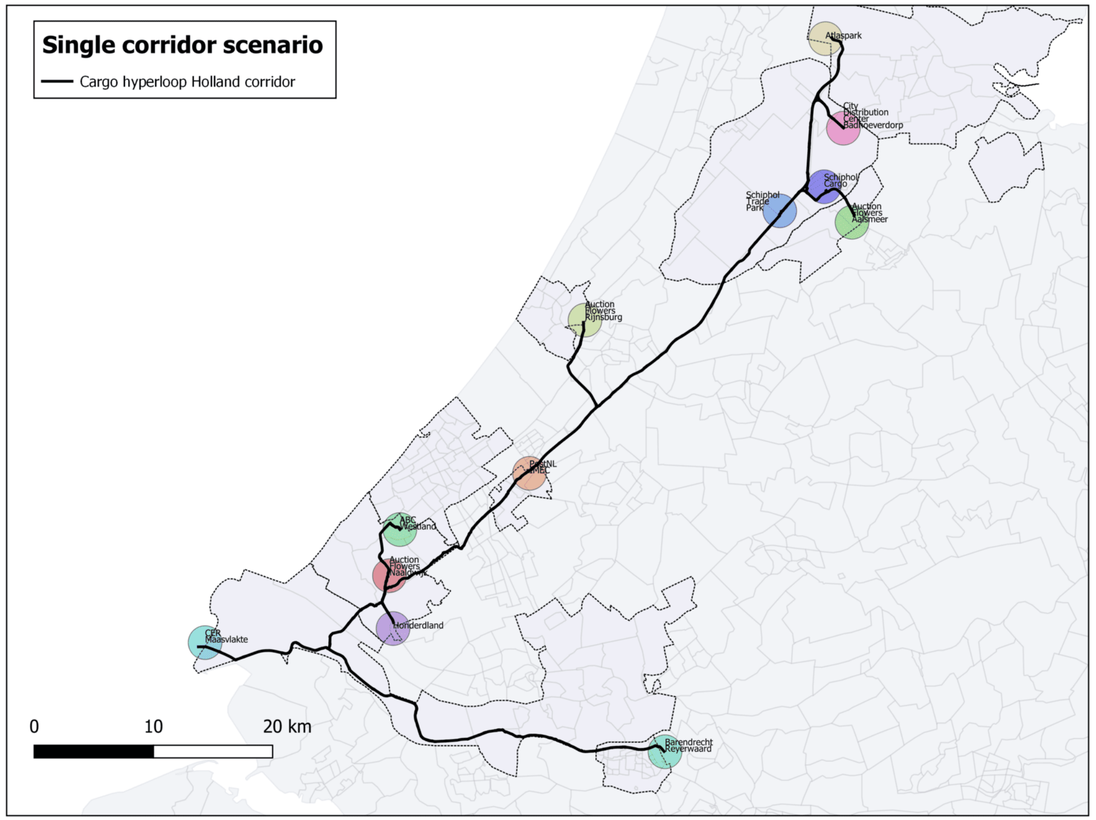
An improved higher-speed passenger connection between the Randstad area and the North of the country has been a long time wish of the Northern Dutch provinces. The fastest rail connection currently runs through the city of Zwolle, a considerable detour from the most optimal route. The Amsterdam – Groningen / Leeuwarden corridor has potential for the construction of new high-speed infrastructure. Also this corridor could be a starting point for an intra-European hyperloop network, expanding to include Bremen, Hamburg and further, either north to Scandinavia or east to Berlin.

A direct hyperloop connection would alleviate pressure and congestion on existing public infrastructure, thereby reducing carbon emissions. In addition, this connection could create economic opportunities and strengthen the appeal of the Northern provinces as a place to settle as daily commuting to the Randstad becomes possible, thereby easing the tension on the housing market in the Randstad area. The concept of the Lelylijn route is mainly focused on passenger transport. However, connecting the ports of Amsterdam, Eemshaven / Delfzijl, Bremen and Hamburg could potentially make it an interesting route for cargo as well.

4.2.3 Cargo hyperloop Greenports Connection

The provinces of South and North Holland are world famous for their flower production, as well as the large amount of vegetables being produced in the greenhouses in the Westland area. This production takes place in what is already the busiest freight corridor in the Netherlands, between the three largest cities of the country: Amsterdam, Rotterdam and The Hague.

A cargo hyperloop connection in this area is currently being studied as part of the Hyperloop Development Program. Connecting producers, traders, buyers and logistics nodes on this corridor by hyperloop offers the potential to drastically reduce transport with existing modalities and significantly increase the speed and reliability of delivery. This would mean a gross reduction in maintenance costs for existing infrastructure and would alleviate congestion. Transportation of flowers from the producers to the auction clusters by hyperloop will replace up to 2500 trucks per day by 2050. By replacing these trucks with environmental friendly infrastructure a significant improvement of the air quality in the heavily populated area could be achieved by reducing CO_2 and particulate matter emissions. This would be a major step for the transport sector in achieving its ambitions towards achieving the climate agreement goals.



The hyperloop on this route will connect four hubs: Aalsmeer, Schiphol, Rijnsburg and Naaldwijk. This will link the floriculture regions with the auction clusters and Schiphol Airport for further intercontinental transportation. The direct, quick and uninterrupted hyperloop infrastructure offers reliability to flower traders, who are dependent on quick and punctual deliveries for exports. Since the Hardt hyperloop design fits existing transportation standards, it can be easily integrated into the logistics processes of producers, auctions and the Schiphol Airport.

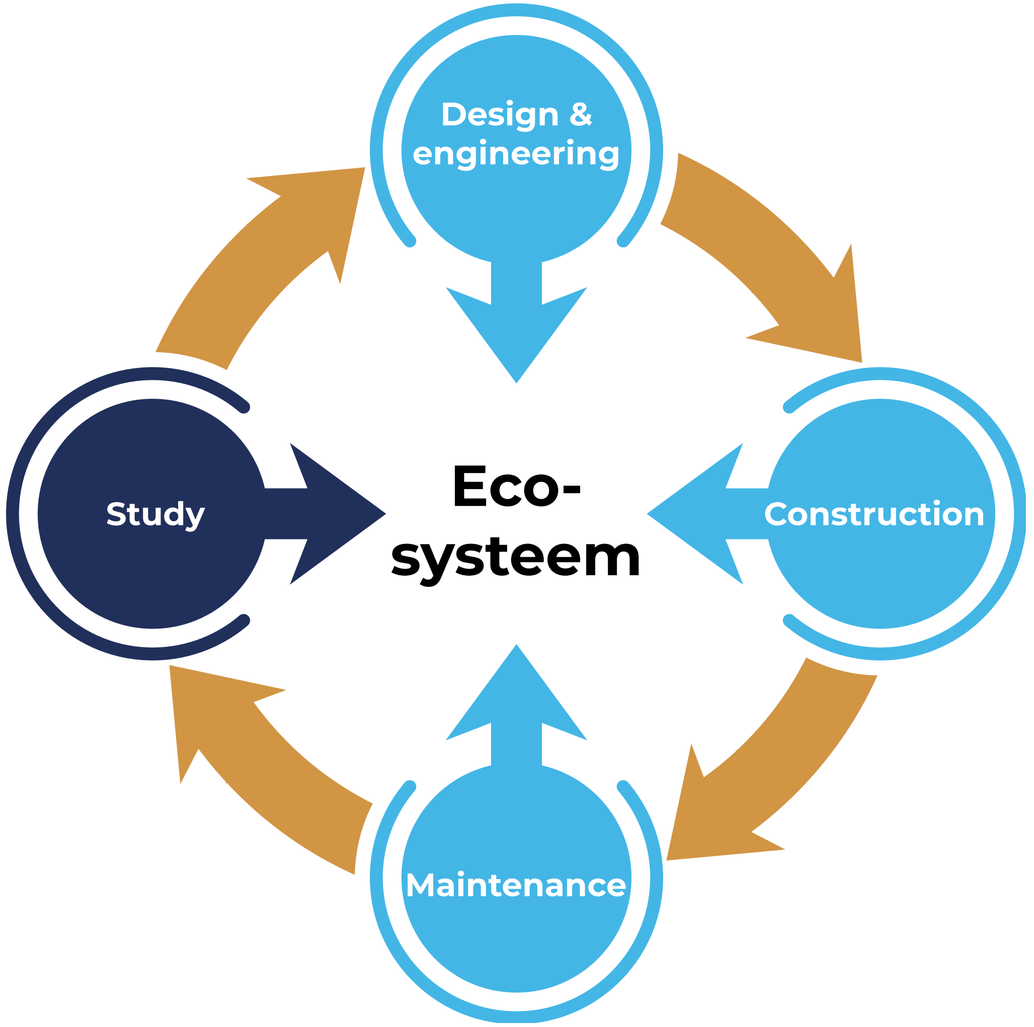
The Greenports Connection cargo hyperloop can be a stepping stone for a larger international cargo route. It can potentially strengthen existing European core corridors such as the Rhine-Alpine, the Atlantic and the North Sea-Mediterranean corridors. The HDP-study regarding this route therefore includes the broader European context for cargo transportation.

5. The Hyperloop Development Program ecosystem and its focus areas

The Hyperloop Development Program (HDP) has been designed as an inclusive ecosystem where companies and institutions can collaborate equally to accelerate the development of hyperloop. The HDP works closely together with various cooperation partners and knowledge institutions in all relevant sectors for the development of hyperloop.

The ecosystem supports the realization of a Dutch and European hyperloop network. It welcomes partners willing to make a meaningful contribution, adding value to the collaboration towards achieving the goals of the HDP. Entry is open to everyone who can equally participate in this new industry.

All partners can benefit from different stages in the hyperloop development, from concept studies and financing up until the operation and maintenance of a hyperloop route as part of a transportation network. The focus in the ecosystem is currently on research and innovation (‘study phase’). The ecosystem will continuously expand in number of partners and in knowledge, along the route towards an European network. Thereby for existing partners it is key to further strengthen the ecosystem by actively engaging new relevant partners as the development of hyperloop progresses.



5.1 Adding value on six key aspects

The current activities and partners in the ecosystem focus on adding value in six key aspects: safety, standards, integration, socio-economic costs & benefits, public adoption and technology. These aspects are crucial for realizing hyperloop routes and responding to the challenges in society and the mobility system (see chapter 1.2). In the next paragraphs, we give a short overview of the aspects and explore in brief the opportunities for (potential) partners in the ecosystem to benefit from or contribute to the development of the network in the Netherlands and wider Europe.

Safety

The aspect ‘safety’ distinguishes the physical and societal angle. From a physical angle, the partners of the HDP currently work together on developing a functional safety concept and safety requirements for hyperloop. The approval by the public authorities of the safety of hyperloop is an essential element in the process, at which the cargo hyperloop might be implemented earlier than a hyperloop for passengers because of the less stringent safety requirements for logistics. From a societal angle, hyperloop could contribute to the ‘vision zero’-ambition of the governments in offering a safe transport system in relation to most other modes of transport where the amount of accidents and casualties is significantly higher.

When it comes to the safety concept it is imperative the Dutch government establishes an approval authority for hyperloop and designs a framework for approval. Moreover, the Dutch government has a valuable opportunity to actively provide input for the European regulatory framework, thereby shaping the future of hyperloop in Europe and positioning the Netherlands in the center of international hyperloop development. The responsible ministries can achieve this by participating in the expert groups and impact assessments which are planned for 2022/2023.

Standards

Standards are key to create a certified, sustainable, interoperable system and transport network with the appropriate level of safety. The HDP ecosystem actively participates in the development of European standards. Doing so offers the opportunity to include the hyperloop technologies that the ecosystem has developed and patented, such as hyperloop switching-lane technology.

There is a National Committee on standardization in which a number of HDP partners are seated. The NEN (Royal Netherlands Standardization Institute) provides the secretariat for the technical commission (JTC 20) that develops the European standards for hyperloop.

Integration

Hyperloop needs to be integrated into the physical domain as well as into the mobility system for passengers or the logistics system for freight. From a land-use perspective a well-considered integration, with attention to the spatial characteristics of a region, smart combinations (e.g. integration of solar panels) and an eye for any legal restrictions. This aspect is strongly connected to the aspect of 'public adoption', due to the interventions in the spatial environment stakeholders should be enabled to participate and contribute to the thinking around the integration of potential hyperloop routes in the landscape and cities.

The integration into the mobility system requires new arrangements between transport and logistic operators to connect the different modes of transport in an efficient and seamless manner for the end-users (travelers or shippers). The existing and developing knowledge around Mobility as a Service and mobility or cargo hubs could also prove of value for the development of hyperloop hubs.

Public adoption

The needs and wishes of end-users are an important aspect in creating a successful new mode of transportation. Hyperloop should offer a comfortable, affordable, sustainable and safe way of travelling, supported by a broad spectrum of customers: residents, passengers, shipping companies, policy makers, etc. This requires knowledge of the needs and wishes of those costumer groups, now and in the future, as well as promotion and communication efforts. To this extent the HDP-partners will actively co-develop and test hyperloop with stakeholders.

Socio-economic costs & benefits

Hyperloop routes need to have a positive business case in social, economic, financial and environmental terms to be implemented. Investments in research and development can eventually lead to a significant growth of the GDP and reduction of CO_2 on a national level. Hyperloop would enable a greater number of people to access a more diverse labor market within the average door-to-door commuting time of sixty minutes. To further improve the societal impact of hyperloop, the HDP ecosystem will focus on cost reduction from an environmental, social and financial perspective.

Technology

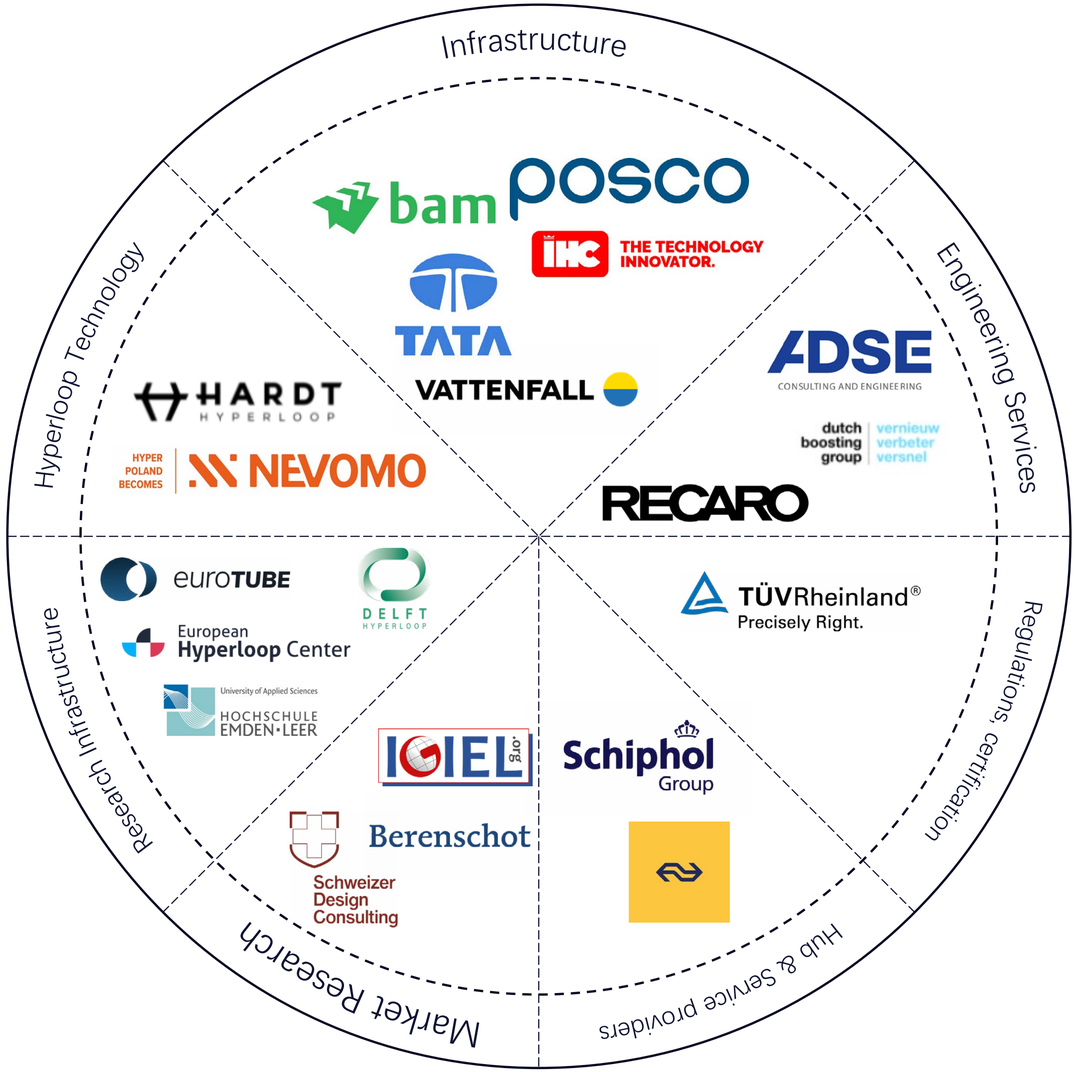
Before commercial realization, the hyperloop technology has to be further tested and developed. This is already being done withing the HDP with smaller scale prototypes. The European Hyperloop Center will provide a site that enables full-scale application, testing and further development of hyperloop technology, as well as providing a center for cooperation and knowledge sharing.

6. Getting all key stakeholders gathered around hyperloop

At this moment in time the developing hyperloop concept provides a unique innovation environment, but on the longer term we are talking about a transport solution, a new modality that has to find its way to the daily system of millions of passengers and thousands of shippers. The partners united in the HDP recognize the importance of getting the key public and private stakeholders on board to realize this ambition.

6.1 Current partners

The current ecosystem, united in the Hyperloop Development Program has grown over the last five years and contains of more than twenty partners varying from the national government and research institutes to scale-ups and multinationals. Together the partners are well suited to further develop the hyperloop technology and prove the feasibility, from a technical, commercial and socio-economic perspective.



6.2 Potential partners

With the Ministries of Economic Affairs & Climate Policy and Infrastructure & Water Management and the Province of Groningen participating in the HDP, the national and regional governments have become more involved in hyperloop development. However, the HDP-partners realize that the buy-in and support of many more key stakeholders is needed for the Netherlands to remain a front-runner in hyperloop development. This is even more the case if the country has the aim to become a front-runner in hyperloop implementation. Towards the end of this chapter we listed some key stakeholders from all parts of society, but we first shine a light on the key decision makers regarding Hyperloop implementation in the Dutch context.

6.2.1 Key decision makers

Decision making in the Netherlands is characterized by the world-famous ‘polder-model’. This is even more the case for impactful decisions, like multi-billion major infrastructure projects with a significant spatial impact. The polder-model is all about getting to a broad consensus and finding a proper balance between different perspectives and interests. Also it often turns out to be a rather time-consuming and costly model, with significant time and money being spent on getting to joint positions.

Hyperloop has a lot to offer to Dutch society, but for the country to reap these benefits at the earliest opportunity, the traditional way of decision making won’t suffice. It could well be that, e.g. from an business case or financial perspective, new forms of public-private partnerships have to be formed around hyperloop. Nevertheless, given the nature of the project, national, regional and to a certain extent local governments will be the key decision makers. A way to speed-up decision making and staying true to the intentions of the polder-model at the same time is coalition building well before the start of the political debate and formal planning procedures. With this ambition in mind the HPD-partners invite key stakeholders like the Ministry of the Interior, the Ministry of Finance and all provinces and regional authorities to already at this moment in time engage in developing the suitable hyperloop solutions for the Netherlands.

6.2.2 Main influencers

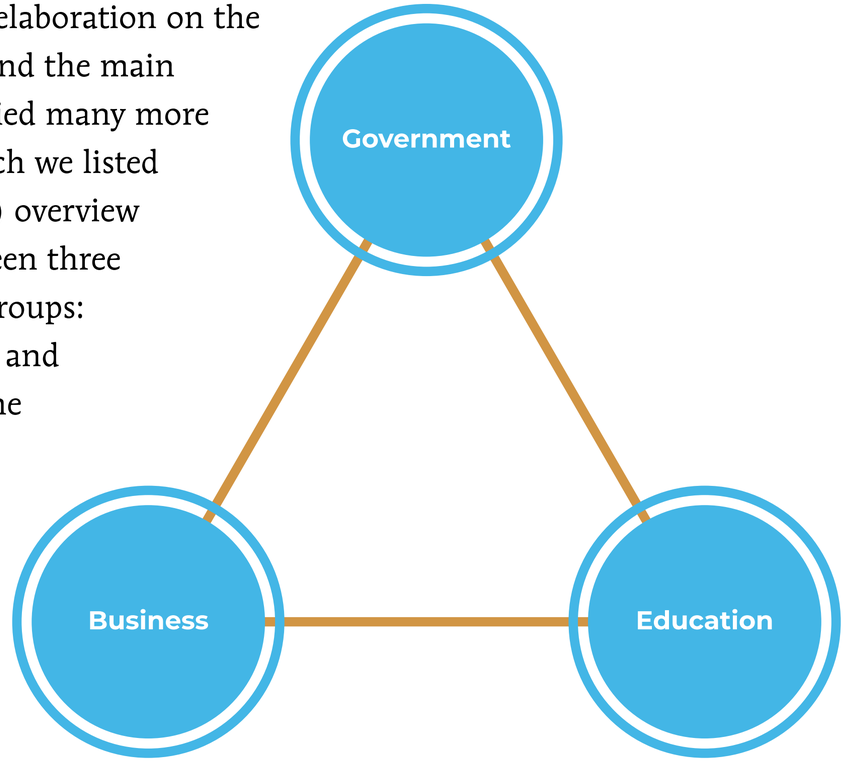
Where the final decision is up to the politicians, they will listen to the views of society when it comes to establishing the added value of hyperloop. This is why the HDP-partners are keen to strengthen the links with the organizations caring about and shaping the future of Dutch mobility. When it comes to cargo hyperloop solutions we are eager to take a role in intensifying the dialogue with parties like Evofenedex and TLN, the main seaports and the logistic operators. On the passenger side we are looking to strengthen the partnerships with the likes of the *Mobiliteitsalliantie,* ANWB and Rover.

As highlighted before, financing the new hyperloop routes might well benefit from bespoke financial solutions. Against this background, next to potential private investors, the Dutch pension funds could play a key role in establishing hyperloop in the Netherlands.

6.2.3 Initial overview of key stakeholders

Meanwhile the inclusive character of the HDP ecosystem makes it possible for all organisations to join the program (and co-produce). For other organisations it may be more interesting at this moment in time to stay informed about the progress of hyperloop and to have the opportunity to join at a later stage.

Building on the brief elaboration on the key decision makers and the main influencers we identified many more key stakeholders, which we listed below. In this (initial) overview we distinghuish between three types of stakeholder groups: government, business and education. Many of the specific stakeholders or stakeholder groups are described in more detail in Appendix I



Governments / (Semi-) public organisations

Group	
European	European Commission, DG Move
National	**Ministry of Economic Affairs & Climate Policy, Ministry of Infrastructure & Water Management**, Ministry of the Interior, Ministry of Finance, Rijkswaterstaat, ProRail, ILT, RDW, ...
Regional	Provinces Noord-Holland, Zuid-Holland, Flevoland, Utrecht, **Groningen**, ... Vervoerregio Amsterdam, MRDH, water authorities, municipalities, Omgevingsdiensten, ...
Local	Municipalities, districts

Society

Group	
Associations (private interests)	Mobiliteitsalliantie, ANWB, RAI, TLN, Evofenedex
Associations (public interests)	Rover, Milieudefensie, Natuur&Milieu, ...
Pension funds	ABP, PGB, Pensioenfonds Zorg en Welzijn, ...
Ports	Havenbedrijf Rotterdam, Havenbedrijf Amsterdam, North Sea Port, Groningen Seaports
Airports	Schiphol, Rotterdam-The Hague, Maastricht-Aachen, Eindhoven, Groningen-Eelde
Network operators	Liander, Stedin, ...

Business / Private organisations

Logistics and transport (commercial, supply chain)

Group	
Public transport operators	**NS**, RET, HTM, GVB, Arriva, Transdev (/Connexxion), Qbuzz, Arriva, Keolis, EBS
Logistic operators	Maersk, DB Cargo, PostNL, DHL, UPS, ...
Airlines	KLM, ...
Distribution centers	Royal Flora Holland, ...

Industry

Group	
Construction companies	**BAM**, Strukton, Heijmans, ...
Civil engineering	Movares, Fugro, Arcadis, Royal Haskoning DHV, ...
Producers of materials and components	**Tata Steel**, VDL, ASML, NXP, ...

Other

Group	
Energy companies	**Vattenfall**, Essent, Engie, ...
Consultancies	**Berenschot, TUV Rheinland**, Rebel, ...
Media	Newspapers, television channels, radio, ...

Education / Knowledge

Group	
Universities	TU Delft, TU Eindhoven, TU Twente
Research institutions	TNO, NLR

Appendix I – More detailed stakeholders description

Stakeholder (group)	Description	Stake
Ports	The Netherlands houses some of the most important European ports. The Port of Rotterdam is by far the largest European seaport and the Port of Amsterdam ranks fourth. Other major ports are Zeeland Seaports en Groningen Seaports and the country has dozens smaller seaports and inland ports along the major rivers and canals. In addition the second port of Europe, the Belgian Port of Antwerp, is located close to the border. Port of Antwerp partly shares Dutch infrastructure for transit to Germany and beyond.	Dutch ports are exploring ways to reduce their carbon footprints. Sustainable cargo transit is an import aspect thereof. Already, several ports strive to further develop rail freight as means for transit. Hyperloop has the potential to satisfy the demand of sustainable transit for the ports in the Netherlands. Moreover, the ports endeavor to further strengthen their position in the Europe logistic corridors.
Airports	The Netherlands contains five civil airports: Amsterdam Airport Schiphol (including the Schiphol-owned Lelystad Airport), Rotterdam The Hague Airport, Groningen Airport Eelde, Eindhoven Airport, and the Dutch-German Maastricht Aachen Airport. Schiphol is by far the largest of the five and ranks third in Europe for passenger transport and fourth for cargo.	Hyperloop could potentially replace intracontinental flights. This could compete with the core business of airports but, in the Dutch context, can also be an opportunity. Potential for Dutch airport growth has been limited in recent years. Hyperloop provides a sustainable alternative for substituting short haul flights, thereby opening airport slots for more lucrative intercontinental flights and / or contributing to sustainability targets and ambitions.
Train operators	The Dutch rail system is operated by (semi-)private train operators that have government concessions to operate certain routes. For the core network, a single concession is granted to NS, which makes them by far the largest rail operator in the country. In partnerships with the likes of Eurostar, Thalys and DB NS also operates international routes to Belgium, Germany and further. Other rail operators include Arriva, Transdev / Connexxion, Qbuzz and Keolis.	Hyperloop could become an important mode of transport both in national transportation, as well as on international routes. Thereby it can act as a disruptive force on the current rail system. Train operators could see hyperloop as a competing mode, but they are also in a perfect position to be involved in running the hyperloop network from both an commercial and operational perspective.
Airlines	The Netherlands is home to a number of airlines. Of these, (Air France -)KLM is by far the largest both in terms of passenger numbers and cargo transshipment.	Airlines that mainly operate long-haul flights would welcome the arrival of hyperloop as a way to substitute short-haul flights, leaving more slots open for lucrative intercontinental flights. Airlines that mainly fly on short-haul routes, however, would be in direct competition with these Hyperloop routes. It could become viable for airlines to operate future Hyperloop routes in much the same way as rail operators. Interested airlines could find a future growth market in this new modality.

Government and semi-government

Stakeholder (group)	Description	Stake
European Commission - DG MOVE	The Directorate-General for Mobility and Transport is the Commission's body responsible for transport in the European Union. Through regulation, financial stimulation and coordination, the DG MOVE aims to improve transport opportunities within the EU.	The European Green Deal relies heavily on decarbonization of transport, including intra-European routes that can be served by Hyperloop. The DG is further concerned with safety standards and the dispersion of technology.
Ministry of Infrastructure and Water Management (IenW)	The Ministry of Infrastructure and Water Management is the centralized authority for infrastructure, public transport, spatial planning and water safety.	As the competent authority for large infrastructural works, the Ministry of Infrastructure has a coordinating role in the development of hyperloop. The Hyperloop could contribute to their goals of shorter travel times in public transport and the decarbonization of international travel.
Ministry of Economic Affairs and Climate Policy	The Ministry of Economic Affairs and Climate Policy is the Dutch ministry that's occupied with all aspects of the Dutch economy including climate policy.	The Ministry of Economic Affairs and Climate Policy has a dual stake in the development of Hyperloop. They are interested in the positive economic development that high-tech transportation methods bring to the country, as well as in the role hyperloop can play as a green technology in achieving its goals with regard to climate change.
Ministry of the Interior	The Ministry of the Interior has among its responsibilities the care for spatial development. This encompasses the shortage on the housing market, as well as building policy.	The Ministry of the Interior is currently strongly focused on looking for ways to alleviate the housing shortage. Hyperloop can contribute to more evenly spaced public housing in the Netherlands, through enhanced mobility in the country.
Rijkswaterstaat	Rijkswaterstaat is the executive agency of the Ministry of Infrastructure. It is in charge of the construction and maintenance of national road, waterway and water management infrastructure, as well as traffic management. This also includes the management of the most important dykes and flood barriers, as well as guidelines for the construction of roads, viaducts, tunnels and other infrastructure.	It is yet unclear whether Rijkswaterstaat will have a direct role in the realization of hyperloop infrastructure. ProRail might be a more logical candidate for that. In any case, Rijkswaterstaat will most likely be involved in any spatial planning procedures as any hyperloop route through the Netherlands is bound to cross with Rijkswaterstaat infrastructure.
ProRail	ProRail manages the physical rail infrastructure in the Netherlands, including both the tracks and the stations. ProRail is a state-owned company.	Hyperloop would ideally be connected to existing transport hubs such as major railway stations. This requires cooperation with ProRail. It is also possible that ProRail will play a role in the construction and management of Hyperloop infrastructure. ProRail sees Hyperloop as a possible solution to the current pressure mobility faces in the Netherlands and is part of the Hyperloop Development Program.
ILT	The Human Environment and Transport Inspectorate (Inspectie voor de Leefomgeving en Transport, or ILT) is the supervisory agency of the Ministry of Infrastructure. As such, it enforces rules and regulations in transport, as well as granting associated permits.	The ILT will be involved in any hyperloop project, from their role in monitoring infrastructure and vehicle safety and for granting the associated permits..

Stakeholder (group)	Description	Stake
Provinces	The Netherlands consists of twelve provinces, each with their own assembly and government. They represent the interests of the residents of their territory in matters concerning among others spatial planning, infrastructure and culture.	The different provinces have differing stakes in the development of hyperloop infrastructure. Better connectivity with main economic regions of the Netherlands will provide the peripheral regions with economic opportunities. Meanwhile, many provinces could benefit from better connections with other countries. Certain provinces can also use the development of hyperloop to become or develop a technology-hub and enlarge their high-tech industries. The HDP is in contact with different provinces about joint opportunities in developing hyperloop. The Province of Groningen is involved in the development of the European Hyperloop Centre.
Municipalities	There are currently 352 municipalities in the Netherlands, which like the provinces all have their own assembly and government. The municipalities vary wildly in population and territorial size. The smallest municipality has less than a thousand inhabitants, while the capital city Amsterdam has over 850.000. Representing their citizens interests on a local scale, municipalities have large decision making powers when it comes to spatial planning.	Many municipalities desire better connectivity with the rest of the country, especially metropolitan areas, as well as with neighbouring countries. At the same time, municipalities will be hesitant towards infrastructure crossing their territory if they are not connected to this infrastructure. Regional connectivity to hyperloop stations can be a crucial aspect in these cases.
Water authorities	The 21 water authorities of the Netherlands are democratic governmental structures with territory that corresponds to the catchment area of rivers. Within their territory, water authorities are responsible for ensuring safe waterlevels, maintaining dykes and protecting the aquatic environment.	The water authorities have no direct stake in mobility, or hyperloop for that matter. However, they are involved in any processes of spatial planning and environmental management that cross their territory.
Vervoerregio Amsterdam	The Vervoerregio Amsterdam is a cooperative body of Amsterdam and 14 neighbouring municipalities. The body is responsible for maintaining accessible mobility in this region. As such it grants concessions for local routes in the region, mediates between the participating municipalities and represents the interest of the region to higher governments.	Being interested in the challenges mobility faces connected to the growth of Amsterdam and the growing demand for mobility, the Vervoerregio Amsterdam is interested in novel solutions for both passenger as well as cargo transportation.

Industry

Stakeholder (group)	Description	Stake
Construction companies	The Netherlands is home to a number of large construction companies, of which Royal BAM Group and Royal VolkerWessels are the largest. These companies are active in all types of construction, such as telecom, housing and infrastructure. Royal BAM Group is a member of the HDP.	Realization of hyperloop routes will require large infrastructure projects which offer great opportunities for industry in terms of innovation and business. Additionally, industry has an incentive to invest early in hyperloop to innovate and gain experience with technologies with high growth potential.
Engineering firms	Large Dutch engineering firms are Arcadis, Fugro, Antea, Royal Haskoning DHV, Tauw, Movares and Witteveen+Bos. These companies typically offer services in civil engineering as well as other types engineering.	
Producers of materials and components	Hyperloop requires a wide range of material and components. Bulk materials such as steel and concrete as well as more specialized materials such as polymers, magnets and specialty alloys. The largest steel producers of the Netherlands, Tata Steel, is a member of the HDP.	

Special interest groups

Stakeholder (group)	Description	Stake
TLN	Transport and Logistics in the Netherlands is the organisation for businesses in the transport and logistics sector.	Hyperloop will enable a new form of highspeed transportation opportunities. TLN has expertise on the topic of logistics and has a stake in the proper functioning of Dutch transportation networks.
Evofenedex	Evofenedex is an association for businesses in international logistics. Through providing its members with training, tools and through lobbying, they represent the interest of their members in the Netherlands and abroad.	Evofenedex represents logistics companies operating on an international scale. They will be particularly interested in international hyperloop cargo routes, for which they could lobby both in the Netherlands, as well as in neighbouring countries.
Mobiliteits-alliantie	The Mobility Alliance (Mobiliteitsalliantie) is a consortium of different mobility-focused companies and associations and has as its goal to maintain the ability to freely move through the Netherlands. This includes smart, flexible, safe, green and affordable transportation systems in the Netherlands.	Hyperloop can be a part of the solution to create safe, green, fast and affordable mobility in the Netherlands. As such, the Mobility Alliance could lobby in favour of hyperloop. At the same time, certain companies or associations that make up the alliance could hinder this, as they would want the investment in public transportation to go to them instead of to a new technology.
ANWB	The Royal Dutch Touring Club ANWB is an association offering a wide range of services including road assistance and mobility services. Moreover, ANWB is active in lobbying in the fields of driving, mobility, travel and recreation. With 4.4 million members, the association has considerable political influence.	ANWB has no direct stake in hyperloop but, as part of the Mobiliteitsalliantie, underlines the potential of hyperloop to alleviate congestion in the Dutch mobility system
Rover	Rover is the Dutch association for travellers in public transport. They advise and lobby public transport companies and governments, both regional and national, on matters concerning public transport.	Passenger Hyperloops can benefit travellers through shorter travel times. Rover will be representing these travellers and looking out for their interest. Like ANWB, Rover is part of the Mobiliteitsalliantie.

Knowledge

Stakeholder (group)	Description	Stake
TNO	TNO is an independent research institute, focused on innovation. As an independent public body, it researches topics based on societal needs without a profit motive. As such, it is a major innovation driver, researching for both the public and private sector.	TNO already has provided and can continue to provide research into Hyperloop.
Universities	The Netherlands has a number of universities. These universities have a role in research and education. As major research institutes, the universities are often contracted to do research for the public- and private sector.	One university in particular, Delft University, has been involved with the hyperloop project since the start. Universities can play an important role in developing and dissipating knowledge on Hyperloop, which will further (international) development of Hyperloop.

Berenschot

We see that the Netherlands is constantly evolving. A lot is changing, both in society and in the nature of organisations. We have closely followed these developments for more than 80 years while working towards a progressive society. And in that context we have become known for providing consultancy for the long term and support for its implementation. Always focused on progress and making a real difference to people, organisations and society.

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Berenschot Groep B.V.

Van Deventerlaan 31-51, 3528 AG Utrecht
Postbus 8039, 3503 RA Utrecht
+31 (0)30 2 916 916
www.berenschot.com