

More Use of Open GEO-Data in PDOK

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Key words: Cadastre, e-Governance, Geo Information, GSDI, Land management, Spatial Planning, PDOK, Standards, W3C, OGC, Open GEO-data

SUMMARY

PDOK is known as a very successful and open GEO-data platform, being a part of the National Spatial Data Infrastructure. This central platform has an organizational structure, an infrastructure with data and frameworks of legislation and standardization where customers can make use of products and services. The fact that the Open GEO data originates from Public Administrations offers information certainty.

With knowledge of the Dutch Digital Government and insight into the aspects of PDOK it becomes clear what contribution this central platform makes to society. The comment is that the users are mainly geo-experts and not the whole society.

In order to strengthen PDOK's contribution to the Dutch Digital Government, the use of Open Geo-data will also have to be addressed outside the geo-domain. . By offering geo datasets through W3C standards in addition to the OGC standards the reach and the use of geo data, will be increased. By using the W3C standards in particular, you ensure that GEO data is easier to use for non-spatial specialists, other developers.

The adaptation of the W3C standards and expansion of PDOK's product and services portfolio is conditional, but is it really that simple?

PDOK staat bekend als een zeer succesvol en open GEO-dataplatform, dat deel uitmaakt van de National Spatial Data Infrastructure. Dit centrale platform heeft een organisatiestructuur, een infrastructuur met data en kaders van wetgeving en standaardisatie waar klanten gebruik kunnen maken van producten en diensten. Het feit dat de Open GEO-gegevens afkomstig zijn van overheidsdiensten biedt informatiezekerheid.

Met kennis van de Nederlandse Digitale Overheid en inzicht in de aspecten van PDOK wordt duidelijk welke bijdrage dit centrale platform levert aan de samenleving. De opmerking is dat de gebruikers vooral geo-experts zijn en niet de hele maatschappij.

Om de bijdrage van PDOK aan de Nederlandse digitale overheid te versterken zal ook buiten het geodomein het gebruik van Open Geo-data aan de orde moeten komen. . Door het aanbieden van geodatasets via W3C-standaarden naast de OGC-standaarden zal het bereik en het gebruik van geodata worden vergroot. Door met name gebruik te maken van de W3C-standaarden zorgt u ervoor dat GEO-data makkelijker te gebruiken is voor niet-ruimtelijke specialisten, andere ontwikkelaars.

De aanpassing van de W3C-standaarden en de uitbreiding van het product- en dienstenportfolio van PDOK is voorwaardelijk, maar is het echt zo simpel?

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1. INTRODUCTION

Various legislation, i.e. legislation of the eleven Public Administrations, European INSPIRE standardisation, the Digital Government Act and the Dutch e-governmental standards, in which a distinction is made between open and closed data turned out to be the reason for the introduction of distribution channels for Open GEO-Data by governmental organizations. By knowing that economy, government, citizens, education and research benefit from qualitative geographical datasets, some governmental organizations decided to work together to create a central distribution platform (Zeeuw, de K., Tierolff, F., 2014). In addition to the needs of Dutch governmental organizations to have distribution channels for Open GEO-Data, European legislation (i.e. INSPIRE) and the way in which it is applied in the Netherlands is also one of the reasons for implementing further necessary developments in the Dutch National Spatial Digital Infrastructure (NSDI) called Public Services on the Map or in short PDOK (Vegt, van der H., Sluijs, van der L., 2013).

PDOK was already available and used for deploying some geographical datasets but not created for many suppliers and many users. In collaboration of the Dutch Kadaster, Dutch Ministry of Internal Affairs, Dutch Ministry of Economic Affairs and Climate, Dutch Ministry of Environment and Water and Geonovum (a governmental body that develops standards and helps as an advisor to better exploit governmental geographic information), PDOK has been transformed to a platform of open Geo-Information. PDOK offers geographic accessibility of nationwide datasets from government parties. The data is reliable, actual and also available for the business community and citizens .

Nowadays PDOK makes multiple Open GEO-Datasets available from various governmental organizations, municipalities and other public agencies, but increasingly purchased by other parties such as businesses, educational institutions and citizens. Many users are already aware of the existence of PDOK which contains more than 400 webservices, download files, API's and Linked Open GEO-Datasets at the moment. In this way, the Dutch government is stimulating innovation and the (re-)use of free open geo-information and promoting Public and Privat Partnership.

An increase in the use of these services is very important to keep PDOK viable. In addition to viability, the following main question arises: which aspects of PDOK give an impulse to the digital Dutch government?

2. PURPOSE, HYPOTHESIS AND RELEVANCE

2.1 Purpose

In order to achieve a viable, state-of-the-art and multi-use PDOK that can give a boost to a digital Dutch government, PDOK aspects and Digital Dutch Government aspects will have to be further investigated. Knowledge of these aspects makes it possible to keep turning the right buttons. This research combines theory with the PDOK case study. Governmental experts will deliver qualitative information for this research.

2.2 Hypothesis

The overall experts assumption is that the innovation, the use of the by government provided Open GEO-Data and the public and private partnership are of great importance for a Digital Dutch Government, but it can be more. A complete view of PDOK and a Digital Dutch Government is necessary in the theoretical research. By studying both environments answers will be formulated to “what is PDOK what does PDOK consist of (aspects), what is digital Dutch government and what aspects of are considered in this paper?”. These obtained results gives substance to the theoretical research, found in chapter 3. There is already an opinion of experts, however the theoretical research will be used to get more specific answers questions about recent case studies and thoughts. The research group will consist of PDOK experts, responsible for the entire governmental service of PDOK. It is expected that more depth and confirmation will be found about the assumed aspects. This empirical research is obviously of crucial necessity and found in chapter 4. The analytical research delivers possible connections between the aspects of PDOK and the way in which these aspects can boost the Digital Dutch government other and more various ways. Also aspects of PDOK that are not yet assumed and the most interesting aspects of a Digital Dutch Government will be mentioned. The results of the analytical research can be found in the final chapter.

2.3 Relevance

Scientifically, these results can be re-used to create and to maintain an environment with governmental Open GEO-Data, which can be used by anyone as information in the whole society. The essential aspects to contribute to a digital government are universal, so the ideas to use, maintain and distribute Open GEO-Data can be use all over the planet.

Practically, these results can be used for focussing on transformations to the state-of-the-art PDOK and communicating these ideas to governmental stakeholders. It can be helpful in focussing and increase the use even more. The combination of different Open GEO-Datasets and expertise delivers new information for resolving problems on public themes. Socially, the further development of PDOK ensures more interaction and cooperation between all parties involved. This could be helpful in this rapidly changing world with all the challenges we are facing at this moment.

3. STATE OF THE ART

3.1 PDOK

Nowadays PDOK is the central and leading distribution platform used for deploying high-quality Open GEO-Data in the Netherlands and making them available as webservice, geographical information files, API's and Linked Data for everyone as described in detail in former papers by PDOK experts (Kruse, D., 2018 and Kruse, D., Roes, J., 2019).

3.1.1 Organisation and partners

PDOK is a collaboration of the Dutch Kadaster, Dutch Ministry of Internal Affairs, Dutch Ministry of Economic Affairs and Climate, Dutch Ministry of Environment and Water and Geonovum, a governmental body that develops standards and helps as an advisor to better exploit governmental geographic information. The Dutch Kadaster, one of the early relevant stakeholders, wanted to develop a central platform only once, that could be used by many and therefore decreasing costs. This meant also increase and efficiently sharing of quite rare knowledge and PDOK was born. The Open GEO-Datasets in this portal are supplied by government and Public Administrations. They are therefore guaranteed to be up-to-date, reliable and for free (Zeeuw, de K., Tierolff, F., 2014). The organisation of PDOK consists of functional management, technical management, steering board and customer panel. The functional and technical management is executed by the Dutch Kadaster. In this role the Dutch Kadaster is responsible for delivering the web- and download services of PDOK by using an IT distribution platform and also for supporting the users by providing a customer contact centre, a PDOK community and a successful realized PDOK forum (<https://www.geoforum.nl>). PDOK is mostly open source based whereas each developed functionality is shared with the community. Not only open source software (i.e. Postgress, Geonetwork, Mapser and Mapproxy) is used, also co-developers of these tools and active members of the regarding communities are developing the PDOK services. The steering board is responsible for the control and consists of representatives of all partner organisations. They monitor the quality of the service and are responsible for the long term development of PDOK. Finally there is also a customer panel, which represents the users of PDOK and acts as a sounding board for customer satisfaction.

3.1.2 Customers and user services

The current customers of PDOK are very diverse, over 450 governments are registered users at PDOK and more than 15.000 websites use Open GEO-Data from PDOK, whereby PDOK the leader is of the Open GEO-Data community. For instance the customer can be a GIS expert searching for Open GEO-Datasets, services or other geo-information. PDOK is also available for the policy maker who wants to consult a map or for the Geo-IT developer who needs geo information to develop a website or an application.

A webservice makes it possible for every user to view the Open GEO-Data in any available internet browser. More than 500 services, more than 100 INSPIRE services, lots of download

files, API's and Linked Data are available at the moment in an uptime of 99,71%. These webservices are particularly meant to be used by municipalities and other public agencies, but more and more also in use by businesses, educational organizations and citizens.

In its role as a central distribution platform, PDOK is used for deploying Open GEO-Datasets and making them available as webservices, geographical information files, API's and Linked Data. To ensure that more software developers started using Open GEO-Datasets, PDOK had to expand its service package. Because Geo-standards are not used by non-geo specialists, PDOK started to deliver, since 2015, some of their Open GEO-Data also as high quality Linked Data and application program interfacing (API). Developments in the field of API's created new opportunities. Not only in the use of the open API Json Restful web service, but also due to the developments with OGC API – Features.

3.1.3 Infrastructure and data

PDOK is based on a service oriented architecture (SOA). This enables PDOK not only to deliver the actual Open GEO-Datasets, but also the metadata and webservices, needed in the production processes of its users. The actual datasets are Open GEO-Datasets, supplied by government and Public Administrations and therefore guaranteed to be up-to-date, reliable and for free. There are 192 Open GEO-Datasets available in areas such as cadastral parcels, hydrography, topography, etc. PDOK consists of some different components. The design and availability of the webservices are delivered by PDOK, complying with international standards (OGC and INSPIRE) and enabling interoperable use of the available information even as a geocoding service.

Also a metadata portal called Nationaal Georegister (NGR) is used. It has been developed to search, find and deliver metadata about all available spatial Open GEO-Datasets and services in the Netherlands

(<http://www.nationaalgeoregister.nl/geonetwork/srv/dut/catalog.search#/home>).

In addition to this goal, it also provides in serving INSPIRE metadata catalogue and discovery service. For extract, transform and load Open GEO-Data there are some necessary techniques and tooling in the PDOK environment such as the PDOK viewer (<https://www.pdok.nl/viewer/>) to get an impression of an Open GEO-Dataset's content and useful to combine different layers also PDOK Map to create easily maps for users with existing PDOK Open GEO-Data.

3.1.4 Legislation and standardisation

The start of the INSPIRE directive in 2007 had an impact on the Netherlands national legislation, which had to be revised in order to meet new international standards surrounding environmental policies. By supplying PDOK with their Open GEO-Datasets, Public Administrations comply with Dutch policies for providing Open GEO-Data from the government. PDOK is also the distribution channel of INSPIRE datasets. The availability is 99,5% INSPIRE proof.

Every Public Administration that houses Open GEO-Datasets had to make their data available. All Public Administrations together comprise a whole system of governmental information. Every Public Administration has its own legislation, all in a different form with different owners and stakeholders. Some meta-level information is recorded in the law and some are indicated

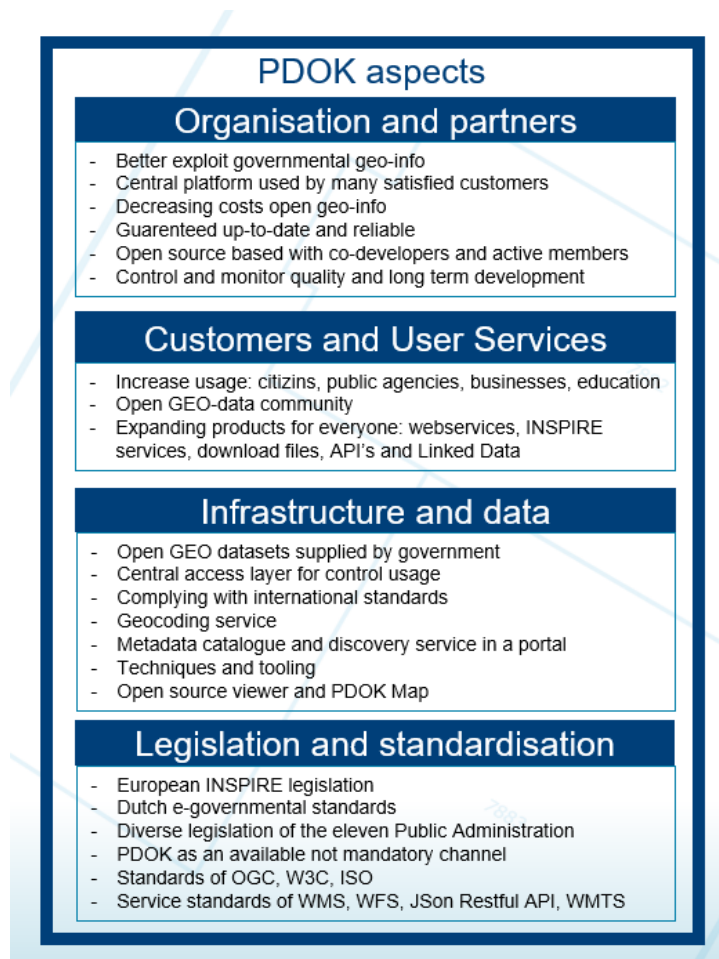
as open information. PDOK is, in relation to the Public Administrations, an available platform but not a mandatory channel. However, as of late 2017, almost all Public Administrations did join PDOK for distributing their Open GEO-Data.

To enable and improve the re-use of components and resources, standardisation is very effective. In all cases, standards of Open Geospatial Consortium (OGC, <https://www.opengeospatial.org/>), standards of the World Wide Web Consortium (W3C, <https://www.w3.org/Consortium/>) and the International Organization for Standardization (ISO, <https://www.iso.org/home.html>) have been implemented. Currently Web Mapping Service (WMS), Web Feature Service (WFS), Json Restful API and Web Map Tile Service (WMTS) are available, while Web Coverage Service (WCS) is being developed.

3.1.5 PDOK aspects

The PDOK aspects in the investigation model is expanded with the knowledge of the PDOK insights. All these detailed aspects are more or less the PDOK essentials at this moment.

To ensure that governmental GEO-data is used more and more and that it will boost the Dutch Digital Government, some aspects are more or less important.



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3.2 Dutch Digital Government

In the Netherlands and in Europe, the business community as well as government are driving the use of data in society. The national and decentral government, wish to grasp those opportunities and focusses on digitalisation. Digitalisation impacts society as a whole and is therefore a cabinet-wide topic. In the digital government factsheet of the Netherlands, it is mentioned that the value driven Digital Government Agenda was published and connected to the broader Dutch Digitalisation Strategy. It is aimed at making optimal use of digitalisation, and at the same safeguarding public values, like autonomy of the individual citizen, and promoting inclusion retrieved on https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Netherlands_2019_0.pdf.

The Netherlands is going digital and that offers huge opportunities to do things in a smarter way. As part of the cabinet coalition agreement, the government will develop an ambitious, cabinet-wide Digital Government Agenda for continued digitalisation of the various levels of the public sector. It was launched in 2018 by NL DIGIbeter. They puts into practice the Dutch Digitalisation Strategy for the public sector and states that the government must fulfil an exemplary role in dealing effectively and responsibly with data.

Also other initiatives delivered policy documents. Closely related to the Digital Government Agenda are "the Dutch vision on data sharing between companies", "the vision shared by the municipalities on taking a data-driven approach" and "the National Cyber Security Agenda". Besides this, also the Digital Government Act (wet Digitale Overheid) is expected to be published and operational by mid-2020. The proposed law has as objective to ensure a safe login for the Dutch citizens and businesses to the (semi) government entities. The law also arranges the competence to appoint mandatory standards.

Nowadays, the Digital Government Agenda is the vehicle used by the Ministry of the Interior and Kingdom Relations to set out the government's ambition to maximise the opportunities offered by data while respecting public values. It refers to all public sector bodies that have committed themselves to the various activities set out in this Digital Government Agenda. Central and local government are jointly responsible for implementing the Digital Government Agenda. The Ministry of the Interior and Kingdom Relations plays a coordinating role in this respect, based on its responsibility for digital government and the safeguarding of fundamental rights. Information on Dutch Digital Government and Agenda has been retrieved on <https://www.nldigitalgovernment.nl/digital-government-agenda/>.



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3.2.1 Dutch Digital Government investment in innovation

Innovations can help solve important societal problems. Through new experiments, the government can improve services to citizens or entrepreneurs and broaden the knowledge of (the possibilities of) digitisation among civil servants. Additional resources and funding for innovation are essential to realise the innovation agenda drawn up by partners, governments, implementing organisations, municipalities, provinces and water boards. More freedom in tendering rules is needed to stimulate innovation, so smaller market parties and start-ups can participate in joint innovations. To stimulate innovation and investment in the public and private sectors, open data with open source software and mandatory standards are required. All retrieved on <https://www.nldigitalgovernment.nl/digital-government-agenda/we-invest-in-innovation/>.

3.2.2 Dutch Digital Government protecting fundamental rights and public values

The fundamental rights and public values of citizens and entrepreneurs must be protected when they are threatened by new developments. The immense amounts of 'big data' can be filtered and used ever faster with adapted algorithms. With investments in new technological possibilities, the rights and values require more attention.

The government also uses (big) data and algorithms for decision-making, service provision, supervision and enforcement. This increasing usage still has to comply with the requirements of the General Administrative Law Act. It is necessary for good public administration to adequately supervise the integrity of data in algorithms, which also gives citizens and businesses more confidence in the Dutch digital government. All retrieved on <https://www.nldigitalgovernment.nl/digital-government-agenda/protecting-fundamental-rights-and-public-values/>.

3.2.3 Dutch Digital Government for everyone

The Dutch Digital Government puts service provision for everyone at the heart of its concerns. It is important to be accessible and understandable for everyone, the so-called digital inclusion. The government's starting point is autonomy for citizens and entrepreneurs. This means that the government ensures that people are able to arrange all those things that concern them as a person digitally in one place. To achieve this, the recent gateway for citizens and entrepreneurs must be transformed into a place where everyone can manage their own (personal) data. Courses and support (also offered by other parties) should help people struggling with digitisation.

In the digital society, the role of digital identification applications is also increasing. Incorrect information must be corrected quickly and it must be possible to deal with government-related matters on behalf of others. Communication with the government must always be in an understandable and secure way. Public services need to be align as close as possible with the wishes, expectations and practical situations of citizens and entrepreneurs. Trust in a digital government will increase by asking them to think along about the improvement of services.

As far as possible, the government's data collections will be made available to society in the form of open data, so that the relevant data can be used at multiple locations. Open data offers everyone the opportunity to develop related services, but access to the central open data

gateway (data.overheid.nl) needs to be further improved and expanded. Open geographical data has already more than proven its value to society. Further development and better coordination in making registrations available to the various types of users is taking place.

Open source software increases transparency about the operation of government systems. In order to be less dependent on certain software suppliers and to gain more insight into the way in which certain software is structured, the government stimulates its use. In order to operate more in accordance with open source principles, new agreements must be made. As far as possible, any obstacles to the use and release of open source software will be removed. All retrieved on <https://www.nldigitalgovernment.nl/digital-government-agenda/accessible-understandable-and-intended-for-everyone/>.

3.2.4 Dutch Digital Government and more personal services

Thanks to digitalisation, governmental services can be more user-friendly, personal and proactive. Citizens and entrepreneurs often have to deal with different service providers who cross the boundary between public and private life. The Dutch Government wants to provide these services as a package when needed. A uniform range of services, even if they are provided in collaboration with various governmental organisations, is necessary. To tailor services to individual needs, a central point is needed where citizens and entrepreneurs can take control of their interaction with the government. Centralization can be achieved if government organizations exchange more data, collaborate more closely and ensure that systems and architectures are equipped for this task.

With 'integrated services' the services must be recognizable, but which government organization they provide is less important for the individual citizen; much more important is the quality of the help they receive. Accessibility, safety and reliability play a greater role in the increasing exchange of data. Information security, privacy and other rights must be guaranteed in a good legal basis. This legal basis is absolutely necessary for, i.e. the exchange of personal data. In addition to existing legislation, a new legal basis for the exchange of data between cooperating government institutions is being worked on. After all, citizens must have confidence in these organizations.

Integrated services also require the sharing of information and cooperation between the various parts of the government, sector organizations and private parties. New agreements are also needed for this. For example, a number of basic agreements have been made to enable citizens and entrepreneurs to take control of their own data, the so-called standardization with a focus on supervision and enforcement. It is known that administrative burdens are reduced if frameworks are clearly defined, which makes it easier to do business with the government. All retrieved on <https://www.nldigitalgovernment.nl/digital-government-agenda/making-our-services-more-personal/>.

3.2.5 The Dutch Digital Governmental aspects

The Netherlands is going digital and that offers huge opportunities to do things in a smarter way. The aspects in the investigation model is expanded with the knowledge of the Dutch Digital Governmental agenda. All mentioned aspects can be helpful in defining more use of PDOK and a possible boost to a more Dutch Digital Government.



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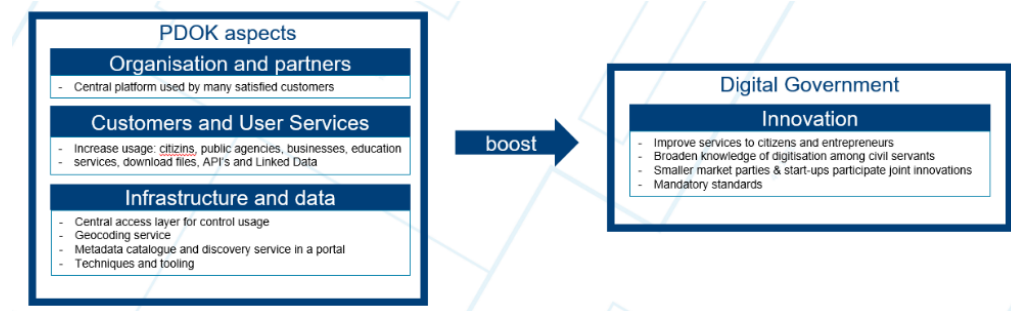
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3.3 How PDOK can boost the Dutch Digital Government

Analysing how PDOK as a cost-effective or viable, innovative and multi-purpose system can support the digital Dutch government, turns out that all the mentioned aspects are more or less relevant. Further research is needed to make a more specific contribution and possibilities into turning the right buttons. For the time being, the analysis produces the following results.

3.3.1 PDOK boost the “innovation” aspect of the Dutch Digital Government

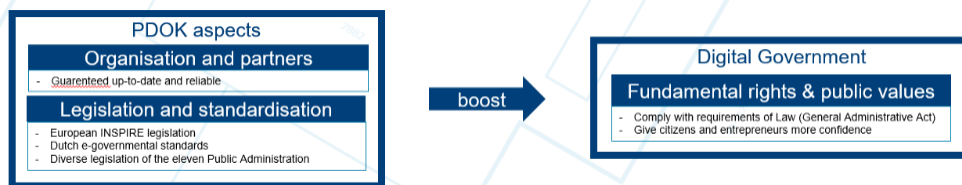
The contribution can be found in delivering a central platform used by many satisfied users, to increase usage and expanding products (central access layer, API's, Linked Data, new techniques and tooling) and new services (geocoding service, geo services and common services) for everyone and not only the geo-community.



3.3.2 PDOK boost the “fundamental rights and public values” aspect of the Dutch Digital Government

To guarantee an up-to-date and reliable state of the information and system the developments in relevant legislation, such as the European legislation, diverse legislation of the Public Administrations, Dutch e-government standards and the Digital Government Act, give citizens and entrepreneurs more confidence.

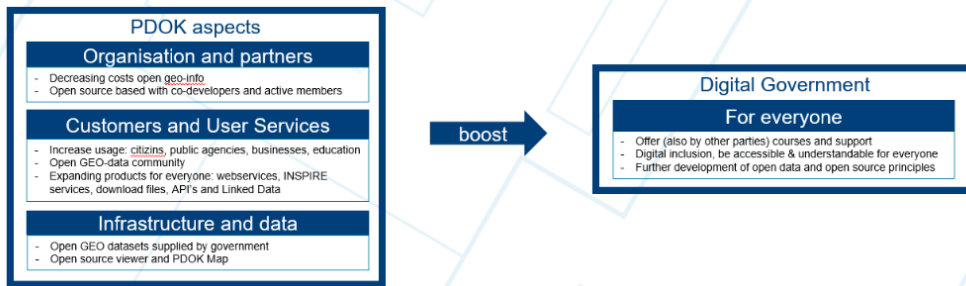
PDOK is adapting more and more new techniques and technologies into its tools and products/services, in this manner PDOK is investing in new technological possibilities mentioned as indicator for boosting the Dutch Digital Government.



3.3.3 PDOK boost the “for everyone” aspect of the Dutch Digital Government

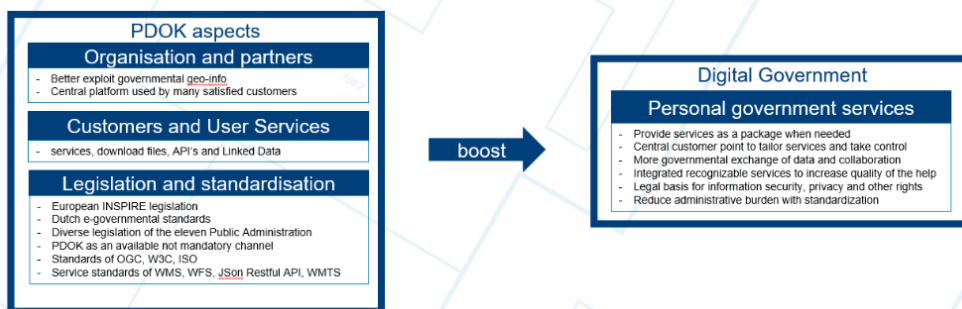
If we take a closer look it is obvious that PDOK not contributes to managing one's own digital information and identification. It is even quite irrelevant, because PDOK is ultimately the platform for open GEO-data where users don't own information. We can conclude that PDOK is in an advanced stage of the application of open data (datasets and services) and open source, usable by everyone. Even the open GEO-data community, which contributes to knowledge sharing and co-creation amongst developers and active members.

When looking at digital inclusion, PDOK takes initiatives such as providing clear information about data sources and metadata in a separate portal. By offering practical cases for inspiration (i.e. youtube films, tutorials, instructions), everyone can be given ideas on how to get started with PDOK. The increase of usage by citizens, public agencies, businesses and educational organizations ask for expanding products for everyone and that are the necessary developments.



3.3.4 PDOK boost the “personal government services” aspect of the Dutch Digital Government

The Dutch Digital Government would like to exchange more governmental data. The focus of PDOK is to better exploit high quality governmental GEO information (and data), whereas PDOK can be used as a central platform, an available not mandatory channel. The growth in the use of the PDOK channel gives an indication of the exchange of data. To reduce the administrative burden with standardization PDOK applies the aforementioned legislation in its entire platform of products and services. The most common OGC, W3C and ISO standards are framing and the services WMS, WFS, Json Restful API, WMTS are available at this moment in a package when needed. Some of the services are already integrated in a recognizable way which helps users. The platform as a whole brings a central customer point to tailor services and take control, a perfect match to the Dutch Digital Government.



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4. ARGUMENTATION AND EVIDENCES

To make the Netherlands ready for the future, Dutch Digital Government sets out that what the government as a whole is going to do to improve its handling of personal data, open data and big data. The analysis and combining of government data can benefit policy-making and provide solutions to social issues, it will make better use of the possibilities offered by data and also take into account everyone's rights and values. The aspects of Digital Government Agenda lays the foundation for the government's data policy for the coming years, retrieved on <https://www.nldigitalgovernment.nl/wp-content/uploads/sites/11/2019/04/data-agenda-government.pdf>.

PDOK highly stimulates innovation and the (re-)use of governmental geo-information in the Netherlands. Expanding products and new services result in a more easily used public Open GEO-Data provided by PDOK and used by others without having a geo background. An increase from 10 to 14 billion hits in 2019, makes PDOK by far the most used Dutch Geo platform, but caused an upgrade of infrastructure, a new method of user communications and data supply. The Open GEO-Datasets are supplied by government and Public Administrations and used by official partners to deploy their Open GEO-Data via the PDOK platform. Other partners are beneficiaries as well, like the body of all 24 Waterboards, ProRail infrastructure, Chambre of Commerce, Central Statistics Unit and Provinces of the Netherlands. All those parties don't have to build and maintain their own infrastructure, they can use the PDOK platform. All these facts were mentioned by the PDOK expertise team.

The increasing success of PDOK as a central platform has been measured in customer satisfaction and usage in hits, both periodically measured over several years by Dutch Kadaster. The main goal of PDOK and Dutch Digital Government is to stimulate the usage of free Open GEO-Data. The fact that all data in PDOK is Open GEO-Data and usage is anonymous, also meant that user-knowledge was missing. To face this issue and to share knowledge, the PDOK organisation created an active open GEO community. This includes a forum, for which PDOK contracted high level skilled users and professionals, to make sure that every question is answered correctly within a short period of time. In an application, users are able to ask for feature requests and vote the most wanted request. A special budget was reserved for developing these voted requests.

Now 3D data is deployed and 3D viewers are developed. Also sensor data from Government sensors are shared real-time with the public, so environmental data from municipalities can be used in applications. Crowd sourcing is also been used by the PDOK expertise team to further involve the users and improve the quality of the Open GEO-Data and maps. Users can report errors in our maps providing feedback on the map itself. Earlier feedback and status of actions undertaken are visible on-line. PDOK is constantly further developing itself and can guarantee an up-to-date and reliable state of the information and system. The development and using of W3C standards in particular. The two worlds of standardization, OGC and W3C, will more and more merge into one standard and can so be used by everyone.

Let us tempt everyone to purchase their Open GEO-Data.

5. CONCLUSION

This study contributes to sharing knowledge about PDOK, Dutch Digital Government and the impulse PDOK gives to this as a central platform for Open GEO-data. It also gives insights in future challenges. The experience gained in the Netherlands is universal. The way in which PDOK as a central platform for Open GEO-data contributes to a digital government can be re-used. The specific Dutch situation, such as legislation and government ambition, must be taken into account. Previous studies in relation to PDOK have shown that PDOK, has already proved its worth in the geodomain and providing answers to current and future societal questions. The benefits are reached in using standardization for a common language in the exchange of data.

At this moment PDOK is ready to take the next step, namely reaching everyone outside the Geo-domain and further development inside the Geo-domain. To stimulate this usage new standards (such as W3C with Json restfull API's and vectortiling) should be implemented. It is not only about technology, it is about expanding usage and keeping adding value to the society with attention to digital inclusion. With the introduction of new standards like W3C, developers all over the world can be reached and new domains will be provided in Open GEO-data. Also more challenges arises, in promoting PDOK amongst newcomers everyone's needs should be meet. If we see everyone as a PDOK user, how does PDOK manage to take digital inclusion into account and also give the so-called digibites access to geo information? What is really meant by digital inclusion, which target groups are included and must be reached in what way? More research about digital inclusion related to PDOK may be required.

Government is actively interested in cooperation with the scientific community, entrepreneurs and societal organisations. The aim is to solve problems, to learn from one another and to discuss setting priorities. In the rapidly changing world with all its challenges, PDOK has a greater need for interaction and cooperation between all parties involved. PDOK is always looking for the best quality for their users, together with them and with partners a better understanding of the actual use and desired added value should be obtained. The consequences of an expansion of use, caused by the diversity of users, can be major. This will result in adjustments to existing services and the creation of possible new services. New users must be reached and must be well facilitated by PDOK, which is not automatic. A well-designed marketing campaign cannot be postponed and adjustments will have to be made on all fronts of the central PDOK platform. With the arrival of many non geo-domain users, PDOK will be visited even more as is already the case. This is not expected to have consequences for the infrastructure and the organisation.

Facilitating geo-domain users will of course continue. Legal changes (update of the national geo-data register according to ISO standards) are to be expected. International relations with Belarus, Northern Macedonia and Saint Lucia must be maintained and a necessary addition of 27 new Open GEO datasets will take place. In order to create and maintain an environment with Open GEO Data for all, everyone should remain facilitated. It is important to continue to make a good contribution to a Dutch Digital Government and thus offer solutions to social problems.

PDOK, as a player in this field, places high demands on itself.

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