Article

Data for Sale: Uncovering public procurement of private sector data in The Netherlands

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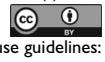

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Abstract

To address complex societal challenges, governments increasingly need to make evidence-based decisions and require the best available data as input. As much of relevant data is now in the hands of the private sector, governments increasingly resort to purchasing data from private sources. There is, however, scant empirical evidence and a lack of understanding of how governments go about data purchasing. Therefore, we develop a new conceptual-analytical framework to analyze three models of data purchasing by governments: purchasing raw or aggregated data, data analyses, and data-based services. Next, based on Dutch data purchases, we explore the utility of our framework and create an evidence base detailing what data, data analyses, and data-based services Dutch governments purchase from whom, how, and for what purposes in the context of societal challenges. Our results map buyers and sellers of data in the Dutch context, as well as the types of data sold and in which policy domains. We expose a serious lack of transparency in government reporting on data purchasing. We further discuss our results in view of possible archetypes of data purchases and what purchasing strategy implications they have. Lastly, we propose several recommendations to practitioners and a research agenda for academics.

Keywords

data purchasing, data monetization, business-to-government data sharing, public procurement, the Netherlands

1 Introduction

For addressing societal challenges, public management increasingly seeks access to relevant data. Data is expected to provide necessary insights, and support evidence-based decision making and the measurement of policy impact. For instance, to be able to maintain and use infrastructure more efficiently, governments might use satellite data. Municipalities might use data about litter, the quality of plants and trees, and social care, to name a few examples. The problem, however, is that relevant data is no longer solely in the domain of the public sector, but increasingly in the hands of the private sector (Mayer-Schonberger & Ramge, 2022). Although governments, such as national statistical offices, have long been using private sector data and are often dependent on it, due to the growing 'datafication' and 'platformization', businesses now hold more and more of key relevant data and advanced governance capacities (Ruppert et al., 2017; Sharon, 2020; Van Dijck et al., 2018). At the same time, there is a wide range of opportunities where private sector data could become useful to governments in the EU (see e.g., Signorelli et al. (2024) for an overview of potential topic areas). Thus, business-to-government (B2G) data sharing has become a phenomenon of growing practitioner and academic interest.

To gain access to private sector data potentially valuable for addressing societal challenges, governments can follow several routes: (i) engage in voluntary B2G data sharing, (ii) impose data sharing obligations on businesses to share data

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for public interest in certain situations, and (iii) purchase data from the private sector. Much experimentation, in the EU and beyond, has followed the first voluntary route of B2G data sharing. There seems to be a consensus, however, that voluntary B2G data sharing has achieved limited results due to a number of barriers, such as a lack of incentives to contribute to the public interest (EC, 2020). More recently, the EU has taken steps to institutionalize some forms of data obligations mandating B2G data sharing under specific circumstances (e.g., in the Data Act). Our research, however, focuses on the last route, and we will introduce the generic term 'data purchasing' for further use.

Both academic and grey literature have primarily focused on voluntary B2G data sharing (George et al., 2020; Susha, 2020; Verhulst & Sangokoya, 2015), while data purchasing by governments has been completely overlooked in most B2G data sharing research. Similarly, public procurement literature does not specifically address how data is purchased from the private sector. At the same time, an exploratory case study by Micheli (2022) signals that purchasing business data may be one of the most commonly used approaches by local governments for gaining access to data in the EU and it poses several challenges, such as lack of control and risk of introducing inequalities among municipalities. Another challenge mentioned in the literature relates to the access governments can obtain to personal data about residents from the private sector and the associated legal and ethical issues (e.g., Simmons, 2009). Other few existing studies offer narrowly focused insights, primarily from the US and limited to certain types of data, for instance location data or satellite data (Borowitz, 2019; Shenkman et al., 2021). Meanwhile, the market for data is rapidly emerging, including in the B2G domain, as businesses are becoming increasingly interested in the potential of data monetization (Wixom et al., 2023). Certain types of data may be in higher demand, such as telecom data, online payment data, sensor data, and data from IoT devices (VNG Realisatie, 2017). Researchers warn that this market poses unique challenges, such as for instance the risk of monopolistic data suppliers (Martens & Duch-Brown, 2020). However, empirically we know little about the characteristics of such a B2G data market in any given country and how it should be managed by buyers. We do not know who is selling what kind of data to whom, how, and what for. Additionally, we do not know well how buyers should approach data markets. Data purchasing might be fundamentally different from most other types of purchasing. A lock-in situation is easily created, there might be relatively many niche suppliers, and the payment model can also differ significantly from other purchasing categories. For instance, once the data exists, in some cases, it can easily be resold by the supplier, even more so than with standard software procurement, which often involves additional services. This raises the question of whether standard purchasing models and theories, such as the portfolio strategy theory developed by Kraljic (1983), are still applicable.

Hence, we find ourselves in a niche where there so far has been no systematic research focusing on data purchasing by governments and any empirical account characterizing this phenomenon is missing. We find this problematic and an urgent issue to address, because the way governments handle data purchasing determines the extent to which public interests are safeguarded or potentially compromised. Given that there are so many unanswered questions, the first step is to assess the state of play as regards data purchasing by means of mapping and to empirically investigate which government organizations are purchasing what, from whom, how, and what for, for addressing societal issues. The second step is to discuss what this could mean for buyers regarding how they purchase data. Hence, in this paper, we pose the following research questions:

1. How can we map the purchasing of data by governments for addressing societal issues?
2. What implications does this have for buyers in terms of their data purchasing strategies?

To answer these questions, we develop a conceptual-analytical framework to analyze data purchasing and conduct an exploratory study, using the Netherlands as an example, to identify cases of government organizations purchasing private sector data for addressing societal issues. We further analyze these cases based on the parties involved, the content of the purchase, the purpose, the procedure used (who, what, how, and what for). Finally, we develop several possible archetypes of data purchases and discuss their implications for purchasing strategies.

The Netherlands presents an interesting case study due to the quite developed nature of its public procurement function and several instances of governments utilizing data from providers. The insights gained from this country are likely to hold relevance for many others as well. Thereby, we aim to close the gap in the literature on digital government and on public procurement by contributing insights characterizing the phenomenon of B2G data purchasing.

2 State of the Art and Data-x Purchasing Framework

The literature on data purchasing is limited to a few previous studies (cited in the Introduction), hence our knowledge on the government/buyer perspective is very limited. There also appears to be a larger gap pointing to the lack of knowledge about how not just governments but organizations in general (including companies) acquire external data (Jarvenpaa & Markus, 2020). In the Information Systems literature, the terms purchasing, sourcing, procuring, or buying are often

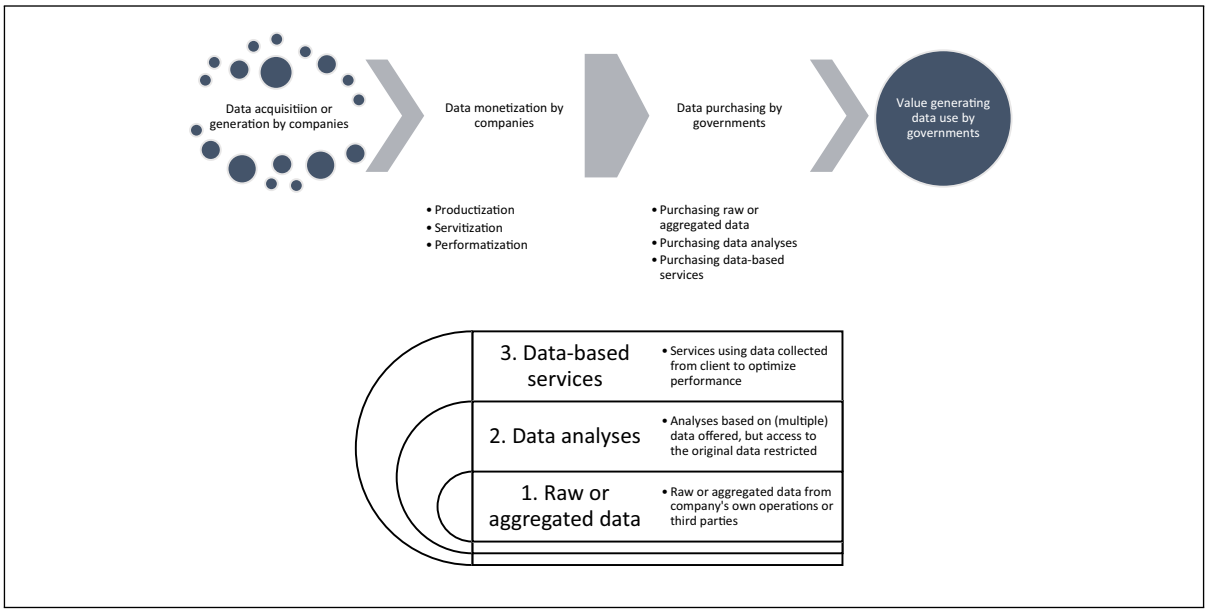

Figure 1. Conceptual-analytical framework of data-x purchasing by governments from companies (authors' elaboration based on Ritala et al., 2024).

used as synonyms referring to a transaction where a particular good, service or building project is provided by one or more supplying organizations to one or more buying organizations (based on Schneider et al., 2013). As pointed out by Krasikov et al. (2022), using external data is not new to organizations and has been on the rise since the 1990s, but in the literature, this has been associated with simply "getting the data" and any systematic inquiry into how this is or should be done has been lacking.

Since deeper knowledge on the buyer perspective is lacking, we turned to the seller perspective. There is more that can be learnt from the literature on **data monetization** which has been expanding in recent years. Data monetization goes beyond selling the data directly for money, it also occurs when companies use data to create value driven products, convert data and analytics into financial gain or other tangible benefits (Ofulue & Benyoucef, 2022). Taking this literature as a basis, we propose a **conceptual-analytical framework of data-x purchasing**, Figure 1, which captures the data value chain of B2G transactions and distinguishes among three models: (1) purchasing raw or aggregated data, (2) purchasing data analyses, and (3) purchasing data-based services. In the development of this framework, we drew on Ritala et al. (2024) and the three data monetization mechanisms of productization, servitization, and performatization proposed by these authors. The framework of Ritala et al. focused on data monetization in business-to-business (B2B) markets, while our study zooms in on the B2G domain. We build on the three data monetization mechanisms of Ritala et al. (each explained in the following paragraphs) to conceptualize offerings which companies provide to governments in the B2G context. In addition to that, albeit in a simplified manner, our framework depicts the process: from data generation/acquisition by companies towards data monetization and purchasing with the ultimate goal of value generating use of the data by governments.

Purchasing raw or aggregated data (1) is acquiring ownership of (or access to) raw or aggregated data from company's own operations or third parties. This can also imply data generated as part of company's normal operations and then marketed for a purpose other than that for which it was collected (Schroeder, 2016). This practice can also be referred to as data repurposing (Günther et al., 2022). An example is telecoms offering call details records for population movement analytics and related new purposes. In the literature, this model is also termed as Data-as-a-service, whereby raw or aggregated data (including data combined from various sources) is delivered (Hunke et al., 2022). This route can also include data intermediaries (e.g., data brokers) who sell data acquired from external parties (Christl & Spiekermann 2016). Ritala et al. (2024) discuss this route as productization of data. This model can also evolve into subscription-based data access, whereby clients (governments in our case) "subscribe to a data provider for a specific period and pay for data access based on the selected subscription plan" (Ofulue & Benyoucef, 2022). The literature does provide guidelines on how buyers should purchase raw materials (see for instance Kraljic, 1983). However, much of this literature focuses on supply chain management, such as determining lot sizes, reducing transportation costs, or forecasting supply (see for instance Cunha et al., 2018; Dong, 2022). Yet, these matters are less relevant or not relevant at all when it comes to purchasing data. For

example, it is unclear how a buyer should deal with a monopolistic supplier with unique national datasets who, in theory, can sell their datasets an infinite number of times.

Purchasing data analyses (2) is acquiring analyses based on data (in the form of insights, interpretations or benchmarks) while access to the original data remains restricted. This embodies the servitization of data (Ritala et al., 2024). Data analyses can be offered based on the client's data or based on third party data by connecting, aggregating, and modelling data from multiple sources (e.g., social media, mobile devices and apps, etc.) and making them available for further uses and users (Beer, 2018 cited in Helmond & van der Vliest, 2023). In this category, we exclude 'traditional' consultancy services (see for instance Roodhooft & Van den Abbeele, 2006) such as reports, advice and benchmarks, which are widely in use by governments. Instead, we mainly focus on the purchase of (big) data analytics services. Previous research primarily focuses on how (big) data can be used to support procurement decisions (see for instance Zhang et al., 2022), but not on how the analyses themselves should be procured.

Purchasing data-based services (3) is acquiring services using data collected from the client to optimize performance. Through this model a new data-based service is created that can provide customers with relevant signals on the environment, help scale how data is delivered using multi-sided business models and can help customers act on insight (Ofulue & Benyoucef, 2022). In this case, companies create new services, usually implemented via dashboards or other digital interfaces, whereby the data comes from the service user (Parvinen et al., 2020). An example is a customer relationship management platform that uses customer data. The literature also mentions cases where companies provide clients with means to collect new (object) data (typically sensor-based IoT data) integrated into the customer's workflow (Hunke et al., 2022) as part of a new service. Ritala et al. (2024) discuss this trend as performatization of data where products, services, and data are combined into intelligent and smart solutions that deliver optimized process outcomes to the customer. An example of Google Nest is provided in the literature, whereby Nest offers insights to electricity utility companies on users' energy consumption (Parvinen et al., 2020). The literature contains extensive writings on the procurement of services (see for instance Heinis et al., 2022), but as far as we know, there is no specific focus on the procurement of data-based services, even though there are unique properties. For example, the operational execution of services such as cleaning is an important element in their procurement, whereas for data-based services, other aspects are more important, such as security measures, interfaces, and keeping the provided solution (i.e., the technology) up to date.

The three aforesaid routes or combinations of routes are examples of direct data monetization by companies where a commercial transaction occurs for monetary rewards (Ofulue & Benyoucef, 2022). Data monetization also occurs *indirectly* in the case of data bartering (Wixom, 2014 cited in Ofulue & Benyoucef, 2022) and data wrapping (Hunke et al., 2022; Ofulue & Benyoucef, 2022). We, however, exclude these models from our investigation as we focus on direct spendings of governments.

Taking this framework as a starting point, our study is the first systematic effort to collect empirical evidence on the practice of data purchasing by governments. Academic research on B2G data sharing has so far mostly overlooked the data purchasing model and almost solely focused on voluntary access to private sector data. This is problematic due to the growing importance of data for governments and the unique characteristics associated with different forms of data purchasing. We fill in this relevant research gap by conducting an exploratory mapping of data purchasing by Dutch government organizations and by discussing how governments could act upon this knowledge.

3 Methodology

In this research we conducted an exploratory embedded case study (Yin, 2009) of one EU country – the Netherlands. We assume that the Netherlands presents a typical and interesting case, due to several factors: its EU membership, its data infrastructure and data policy, and the fact that it faces multiple societal challenges that require public organizations to obtain data from private companies. We consider it a typical case because other EU countries also face similar societal challenges which can be potentially addressed with data. All EU countries are also bound by the EU public procurement directives. We consider it an interesting case because the data infrastructure in The Netherlands is rather advanced to support B2G data sharing. Moreover, since 2021, the Dutch national data strategy[1] puts strong emphasis on leveraging the potential of data for addressing societal challenges. Finally, researching the Netherlands is also motivated by pragmatic reasons of the authors having access to this case and possessing advanced background knowledge. The embedded nature of the case study implies that we include a number of sub-cases (cases of data purchases) from different levels of government. Given that this is the first systematic mapping study, we find the case study approach well suited.

To collect the data, we conducted a deep dive into the (open) government data relevant to government spending to collect publicly available information on our research question. To do so, we collected data on data purchasing 'cases' and focused on mapping which governments purchase private sector data from whom, what type of data is purchased, for what purpose, and how. We used publicly available information provided by two platforms to assemble our dataset: TenderNed[2],

and OpenRaadsinformatie[3]. Two other platforms, OpenSpending and Findo, were consulted but did not deliver results at the required level of granularity. The data collection took place between August 2023 and December 2023.

The first platform TenderNed serves as the Dutch government's official procurement platform, facilitating the dissemination of tender notifications by public authorities. Tenders exceeding certain monetary thresholds are subject to European procurement procedures as outlined in the Tender Act of 2012. For central authorities, such as ministries and judicial bodies, the threshold for service supply is *e*143,000, while for decentral authorities like municipalities, provinces, and water boards, it is €221,000 . Below the European threshold, governments may follow a national procedure. The publicly available database, TenderNed 2016–2023 (Q1-Q2), provides all European and national tenders published between 2016 and 2023. We analyzed the dataset using several Common Procurement Vocabulary (CPV) codes, these codes are assigned to all sorts of public contracts for services, supplies, and works. We collaborated with a data analyst from TenderNed to select the following codes for conducting our query: data processing (72300000-8), database and operating software (48600000-4), database services (72320000-4), data processing services (72310000-1), data collection services (72313000-2), and data transmission services (72318000-7). The search yielded 259 tenders. Subsequently, to assess whether the tender falls within the scope of our research (contains a data-x purchase), we manually screened all provided documentation of the 259 tenders. This resulted in 14 tenders on a national, regional, and local level.

The second platform, OpenRaadsinformatie, is an initiative provided by the NGO Open State Foundation in collaboration with the Association of Dutch Municipalities (VNG). The platform provides information by extracting governmental board meetings and other documents from information systems of decentral authorities. The platform functionality did not allow us to conduct a systematic search to identify cases of data purchasing. Therefore, we used a workaround technique and conducted a search based on a list of 95 potential providers of data or data services. This list of providers was manually compiled based on:

- Insights gathered during our talks with experts in the field,
- Input from previous research activities,
- A search for potential providers among the private sector participants at various GovTech conferences, and
- The TenderNed dataset.

The list is made available in the Appendix. Like the search within TenderNed, an in-depth and manual review of all provided documentation was necessary to ascertain whether the cases fall within the scope of the research. The search eventually resulted in 15 additional use cases.

Finally, we have collected several additional use cases through an open call advertised in several relevant professional networks, such as the knowledge network of VNG on data and society (Kennisnetwerk Data & Samenleving), and through talks with 8 experts in our network (e.g., municipal privacy officers). This resulted in 4 additional cases. In total, we ended up with 33 cases.

In terms of data analysis, for each case we extracted information and categorized each case based on a number of attributes (see Table 1 below): who (buyer, seller), what (type of offering), for what purpose (policy domain), and how (procedure). In addition, we created concise summaries of each case. The type of offering was determined based on our conceptual-analytical framework. The policy domains were assigned based on Vermeulen's (2015) categorization of social policy decentralization in the Netherlands[4] in combination with our expertise. The information about the remaining attributes was extracted as it appears in the two platforms we used (TenderNed and Openraadsinformatie). To determine the type of offering, the research team went through all the cases and based on the case summaries and where needed underlying documentation, reached consensus about the appropriate type of offering (data-x purchasing model). We encountered that categorizing some cases proved to be challenging due to the insufficient level of detail about the cases that we could derive based on publicly available documentation. Cases that involved provision of a dashboard or monitor were categorized as selling data analyses, or servitization.

The same procedure was used to determine the policy domain.

As a validation step and to enrich the research findings with additional qualitative input, initial results of our research have been presented in a workshop setting to an audience of government practitioners attending an Overheid 360 congress[5] (held on 19 June 2024) and a Binnenlands Bestuur congress[6] (held on 3 December 2024) in the Netherlands, complemented by a preparatory interview with an experienced data purchaser. We used these opportunities to receive feedback on our approach to the mapping and on our initial results. No gaps were identified, and the participants recognized a number of findings, especially concerning dominant players. In addition, we also presented our results to over 80 Belgian civil servants during the Study Day Data in Local Governance[7] (held on 10 December 2024) in Ghent, Belgium. Many of the participants voiced agreement with our findings based on their experience, emphasized the need for a more effective

Table 1. Case Analysis Matrix.

Analysis attributes	Extracted	Categorized
Government organization (who buyer)		National Regional Local
Company (who seller)		-
Type of offering (what)	<Contents of the purchase>	Purchasing data (model 1) Purchasing data analyses (model 2) Purchasing data-based services (model 3)
Policy domain (what for)	<Use purpose mentioned>	Economic affairs (ECON) Social domain (SOC) Employment (EMP) Spatial planning (SP) Law enforcement (LAW) Mobility (MOB)
Procedure (how)	<Procedure mentioned>	
Case summary		

market for data and data products, and expressed interest in sharing good practices and collaborating in joint acquisitions. This leads us to suggest that our findings can be relevant to other EU countries as well.

4 Results

In this section, we first present some general observations regarding our collection of cases, such as who the buyers and sellers are and in which policy domains data purchasing occurs. Next, we discuss the case analysis results relative to the three models of data-x purchasing. Full analysis of the cases, including all analysis attributes from Table 1, is presented in the Appendix.

4.1 Who: Buyers and Sellers

Based on our analysis, we identified local government authorities, regional authorities, as well as national level agencies, as buyers of data, data analyses, data-based services or combinations in our sample. Table 2 illustrates which governments were identified and gives an overview of the cases.

Table 2 shows that **local** governments (municipalities) are the most frequent buyers of private sector data, analyses or services. Twelve municipalities are present in our sample as individual buyers. These are both large municipalities (Amsterdam, Eindhoven, Utrecht) and small municipalities with a population between 25 000 and 60 000 residents (Stein, Vijfheerenlanden, Noordwijk, Lingewaard). We also identified four collaborative initiatives where governments join efforts with other governments to make a collective purchase. In one case, this involved acquisition of mobile phones' location data from a data broker (DataProvider.com). In another case, it concerned procurement of a data-based service, namely automatic number plate recognition camera systems, by three municipalities from a data and image company (Connection Systems) to monitor license plates of passing vehicles for safety reasons. At the local level, data purchasing is usually realized by means of direct awards or multiple private tenders for amounts lower than European public procurement thresholds, which is currently €221,000 for goods and services for local governments.

At the **regional** level, the majority of the cases we identified concern mobility. A few provinces seem to be active buyers of data, analyses or services, such as the province of North Brabant and the province of Utrecht, with several cases of data purchases represented. In several cases, regional organizations represent the interests of local level organizations engaged in data purchasing, like the cases of collaboration of municipal tax authorities (GBTwente, Sabewa Zeeland).

We also identified two projects involving and partially funded by Dutch government organizations (at regional and local levels) which involved data purchasing (marked with * in Table 2). For instance, the LIVE project (which received initial funding from the EU) concerned multiple digital solutions for spatial insights into the redevelopment of the Leindert district in the municipality of Amersfoort, using various data sources. These included data provided by Geomaat, drones and mobile mapping, a WaterMonitor by NEO and Hydrologic, BoomPlus by NEO, 3D – CityPlanner by Strategis and NEO. The other case was the CityPulse project which received initial funding from the Dutch Research Council and aimed to provide an incident prediction dashboard and data analysis based on various sources.

At the **national** level, we identified several ministries and other agencies that purchase private sector data or analyses. Several cases are connected to the National Road Traffic Data portal (NDW) by the Ministry of Infrastructure and Water Management (IeW). Other cases feature the Ministry of Health, Welfare and Sport (VWS), the Ministry of Foreign Affairs (BZ), and the Ministry of Justice and Security (which Central Judicial Agency, CJIB, is part of). At the national (and regional) level, data purchases are usually conducted through a European tender procedure.

Table 2. Cases of Data-x Purchases Sorted on Level of Dutch Government.

Level of government	ID	Buyer	Seller	Domain	Data-x purchasing model
A – National	6	Ministry of Health, Welfare and Sport	PFZW	EMP	Data
	33	CJIB	Experian	LAW	
	3	Ministry of Infrastructure and Water Management (I&W) (NDW)	Multiple providers	MOB	
	9	Same	Same	MOB	
	14	Same	Same	MOB	
	2	Ministry of I&W	HRGroep	MOB	Data analyses
	13	Same	Matrixian Group	MOB	
	5	Ministry of Foreign Affairs	ECA International	EMP	
B—Regional	4	Province of North Brabant	Stichting LISA	EMP	Data
	12	Province of North Brabant and Limburg	Dat.mobility	MOB	Data analyses
	25	Province of Utrecht	TomTom	MOB	
	27	Same	Resono	CM	
	24	Sabewa Zeeland	Cyclomedia	SP	
	17	GBTwente	Cyclomedia	SP	
	7	Province of North Brabant	Vialis	MOB	Data-based services
	10	Province of Utrecht	Connection Systems	MOB	
	22*	Province of Gelderland	Multiple providers (Netmobil)	MOB	Multiple
C—Local	30	4 municipalities	DataProvider.com/KvK	ECON	Data
	8	Municipality of Amsterdam	Kwiz	SOC	Data analyses
	20	Municipality of Lingewaard	Mezuro/Dat.mobility	MOB	
	21	Municipality of Leiden	Locatus	SP	
	23	Municipality of Noordwijk	City Traffic	CM	
	26	Municipality of Hilversum	Atos/Esri	CM	
	29	Municipality of Stein	Zorg-lokaal	SOC	
	28	Municipality of Hattem	VIA/HERE	MOB	
	19	Municipality of Vijfheerenlanden	Cyclomedia	SP	
	18	9 municipalities and 1 waterboard	Kavel 10/Cyclomedia	SP	
	11	3 municipalities	Connection Systems	LAW	Data-based services
	15	Municipality of Haarlemmermeer	Vialis-Infoplaza	MOB	
	16	Municipality of Utrecht	LumiGuide	MOB	
	31*	Municipality of Eindhoven	Atos/Intel (City Pulse)	LAW	Multiple
	32*	Municipality of Amersfoort, RIVM	Multiple providers (LIVE)	SP	
	1	Municipality of Hilversum	Atos	MOB	

EMP: employment; LAW: law enforcement; MOB: mobility; ECON: economic affairs; SOC: social domain; SP: spatial planning; CM: crowd management.
Initiatives only partially funded by government are marked with a *.

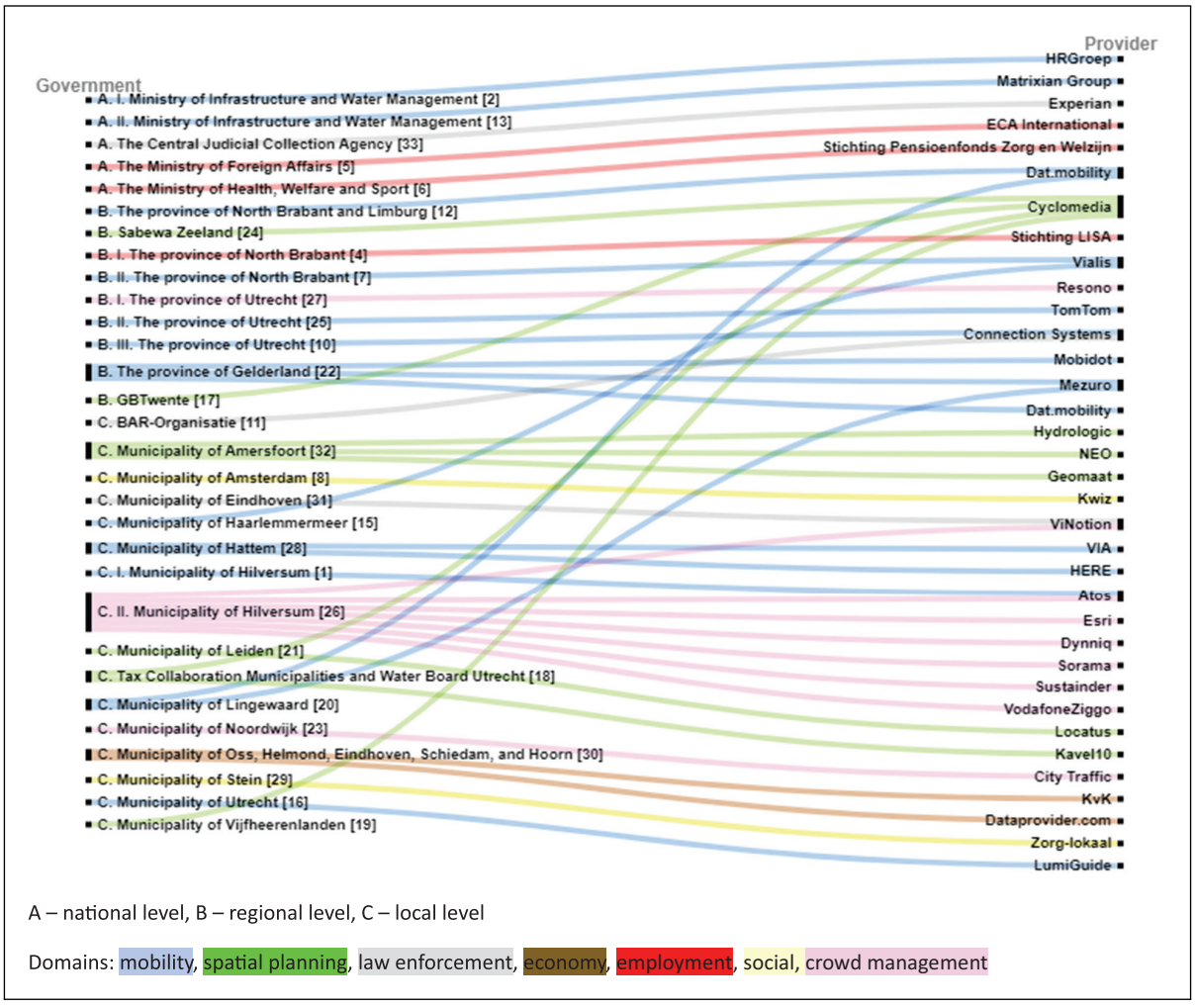

Figure 2. Company providers and government buyers of data, data analyses, and data-based services in the Netherlands.

Having discussed the buyers, we now turn to the sellers. Figure 2 captures per case from whom the Dutch government organizations at different levels purchase data, analyses or services. The connectivity between governments and providers is visually depicted by lines, denoting the procurement from certain providers. Each governmental entity represents a single case; where multiple providers are connected to a single entity, it signifies the extent of provider involvement within a case. The colors assigned to entities denote the policy domains to which the data, analyses or services belong within governments. Figure 2 excludes three cases connected to National Road Data Portal (NDW) to maintain readability of the figure. NDW is a collaborative initiative with its dedicated implementation body, facilitating governmental cooperation in the acquisition, dissemination, and utilization of data aimed at addressing challenges in mobility and public infrastructure. Each case connects to numerous data/service companies (29 providers identified).

Looking at the right side of Figure 2, the landscape of private sector providers of data and data services in the Netherlands appears to be rather versatile, including data science/analytics companies (e.g., Dat.mobility, Resono, Mezuro), providers of data, software, consultancy services (e.g., Atos, Bureau de Groot Volker, ECA International), and foundations (e.g., Stichting LISA, Pensioenfonds Zorg en Welzijn). The multiple lines connected to some companies in Figure 2 signify that these companies (e.g., Cyclomedia, Dat.mobility, Connection Systems, Vialis) have an established relation with a number of governments (e.g., Municipality of Vijfheerenlanden, Province of North Brabant, Province of Utrecht, NDW) and that these providers seem to have established a solid position on the data market.

A notable example is the company Cyclomedia. It collects visual data in public spaces for many governments using patented vehicle-mounted camera systems, producing 360° panoramic images and LiDAR data, alongside additional services like aerial photography. Their services are in demand among numerous governments, who sometimes opt for joint

Table 3. Cases Analysis Sorted on Data-x Purchasing Model.

Data-x purchasing model	Number of cases	Common level of government	Types of providers	Typical examples
Data	7	Primarily national	Data brokers (Experian), foundations (Stichting LISA), data aggregators (Dataprovider.com)	Labour market data, sensor data, call detail records, floating car data
Data analyses	17	Primarily local	Data analytics companies (ECA International, Dat.mobility), specialized data firms (Mezuro)	Crowd monitors, customer analytics, mobility dashboard, aerial photo's
Data-based services	5	Mostly regional and local	Integrated solution providers (e.g., Vialis, LumiGuide)	Traffic signal analysis service, traffic behavior service, parking optimization service
Combination	4	Various levels	Multi-provider collaborations	Safety incident prediction system, smart city platform

procurement to leverage cost efficiencies (e.g., BGTwente). However, in recent years, competitors like Kavel10 have also entered the market, this company is also represented in our sample.

Another example is Dat.mobility which has provided data and/or related services to multiple governments (e.g., the Municipality of Lindewaard, Province of North Brabant and Limburg). Interestingly, the company collaborates often with other providers within a certain project, including data providers like Mezuro and Mobidot.

Another interesting finding in our sample is the presence of non-profit organizations. For instance, the foundation Stichting LISA provides a database containing information on all establishments in the Netherlands where paid work is conducted. They offer access to both open data and data for a fee. Our sample reveals that North Brabant purchased data from Stichting LISA to inform the development and improvement of economic policies.

4.2 What and How: Data-x Purchasing Models

Table 3 presents our analysis based on the three data-x purchasing models and shows what kind of government organizations purchase what from what kind of providers.

Overall, we were able to identify seven cases of purchasing data, seventeen cases of purchasing data analyses, five cases of purchasing data-based services, and four cases of combination of models. The category of purchasing data analyses was most represented in our sample, which might suggest that this is the most popular model.

In terms of **purchasing data**, we observe seven cases in total. The model is most common among national level government organizations. We identified just one regional level case and one local level case where four municipalities collaborated on the purchase. Three cases we identified concern the NDW. Each NDW case connects to numerous data/service companies (29 providers identified). These cases present examples of productization of mobility data, such as floating car data, cycling and sensor/telraam data. Besides mobility, we also identified cases of data purchasing in employment, economic affairs, and law enforcement domains. In terms of providers, we find various players selling data: data brokers (Experian), foundations (e.g., Stichting LISA), and data aggregators (e.g., Dataprovider.com). For example, four Dutch municipalities collaborated on purchasing location data of mobile phones from DataProvider.com and Netherlands Chamber of Commerce and utilizing it to construct a heatmap of economic connections. Another example is the Dutch Central Judicial Agency (CJIB) which developed an algorithm predicting individuals who are likely to benefit from a personal phone conversation to facilitate payment. Through a contract with the supplier Experian, CJIB received access to additional phone numbers, allowing it to call more individuals within the target audience.

In terms of **purchasing data analyses**, we identified seventeen cases illustrating the sertivization of data (selling analyses, instead of data). This model is found across government organizations at all levels; municipalities are largely represented in this category. Purchasing data analyses typically means data analytics products, monitors, and dashboards. This category of cases demonstrates that, alongside data, governments are procuring data analytics solutions to, for instance, address such societal issues like crowd management, managing tourism, population growth and spatial development. Cases in mobility, spatial planning, and crowd management domains seem to be more represented in our sample, which again might suggest that this is a popular avenue for servitization of data. Other cases in this category fall under such domains as

social and employment. For instance, ECA International provides data analysis on the cost of living across diverse global locations and assists organizations in devising equitable compensation packages for their employees stationed abroad, which they provided to the Dutch Ministry of Foreign Affairs (BZ). In many cases, the analyses are based on data combined from various sources (e.g., offerings by companies like Locatus). For instance, the company Mezuro, specialized in geospatial data, provides data collections based on Internet of Things (IoT) sensors, satellite imagery, GPS data from mobile devices, open data sources, and crowdsourced data (e.g., location-based information). Mezuro data is often used by data analytics companies, such as Dat.mobility. Purchasing of dashboards or monitors appears frequently in this category, especially among regional and local level government organizations.

In terms of **purchasing data-based services**, the five cases we identified are mostly found among regional and local governments. Here we observe that almost all identified cases belong to the mobility domain. This could point to the existence of an active data ecosystem but could also result from our search strategy (partly based on a predefined list of providers). In this category, we find a number of cases where a private provider offers a product-service-data solution and, in some cases, helps the government to act on insights. For example, the province of North Brabant contracted the company Vialis to provide traffic signal installations together with data analytics solutions analyzing traffic signals. Another example is the Schwung-app, marketed by Vialis and Infoplaza (known for Weerplaza), which collects data to optimize traffic signal timing for cyclists based on GPS data while using the app. Subsequently, this data is transmitted to Vialis for further mobility analysis. Another example is the purchasing of automatic number plate recognition camera systems at two locations by three municipalities (Barendrecht, Albrandswaard, and Ridderkerk) in order to record and monitor relevant data of license plates from passing vehicles and thereby enhance security. We also observe that municipalities often establish long-term contracts with data services companies, allowing them to access various services for pertinent projects within the municipality. As an illustration, the Municipality of Haarlemmermeer utilized the Schwung app and its associated services (e.g., the conversion of nineteen traffic signal installations) under an already existing contract with Vialis.

We also categorized a number of cases as **combinations** of models. In these cases, we note that different providers deliver different offerings. Specifically, within such cases certain providers are responsible for data provision, while others provide data analysis or the infrastructure. An example of such a case is project LIVE in the municipality of Amersfoort, where multiple providers are involved. Geomaat, for instance, supplies various forms of geospatial data, whereas NEO and Hydrologic are tasked with delivering monitoring systems and conducting analyses based on a range of data sources. Another example is the CityPulse-project which is a collaboration between the companies Atos and Intel, the municipality of Eindhoven, and the Dutch Institute for Technology, Safety & Security (DITSS). The project aims to create a comprehensive understanding and prediction system for incidents by providing a dashboard and data analysis based on various sources, such as sensor data, social media, WiFi tracking, weather conditions, air quality, visitor flows, and beer delivery.

4.3 What for: Policy Domains

Table 4 provides an overview of the various domains for which we could identify purchases of data, data analyses or data-based services. The domains where most of our identified use cases are concentrated are mobility, spatial (planning) domain, law enforcement, crowd management, employment. We added the crowd management domain to our categorization based on the identified cases.

Mobility is one of the domains where there is an active data market. In general, mobility challenges arise at local, regional, and national levels. However, it is most common that mobility challenges are addressed by regional and national governments, which is also reflected in our sample. Based on our sample, we found various types of data purchasing: data-based services, such as smart city platforms, data insights, such as traffic analyses or calculation models, as well as datasets, such as probe vehicle data, floating car data, and crowd-sourced data are prevalent. Providers that specifically offer many services in this domain are the aforementioned Dat.mobility and Vialis; they provide both data-based services and data analyses as well as datasets, and sometimes in combination.

The *spatial (planning)* domain represents another domain where an active data market exists. This domain involves tasks, such as the oversight of public spaces, including the maintenance, management, and regulation of amenities, as well as the control of visitor flows and the upkeep of cleanliness. These responsibilities are usually undertaken at the local level, which is also reflected in our sample. Based on our sample, we found various types of data purchasing, however, the most common is the procurement of data analyses and insights. A prevalent provider catering to various local governments in this domain is the aforementioned Cyclomedia. For purposes such as spatial planning, Cyclomedia offers, among other services, street view imagery and aerial photographs.

Within the domain of *employment*, several cases have been identified. The oversight of employment is a collaborative effort between central and decentralized authorities. At the municipal level, employment is predominantly categorized

Table 4. Case Analysis Sorted on the Policy Domain.

Domain	Number of cases	Common model	Common level of government	Typical examples
Mobility	15	All	National, regional	Smart city platforms, traffic signal analytics, and floating car data
Spatial planning	6	2	Local	Street view imagery and aerial photographs
Employment	3	1 and 2	National, regional	Labor market or employment data and cost of living analytics
Law enforcement	3	All	National, local	Automatic number plate recognition systems and phone number data
Crowd management	3	2	Local	Crowd monitor and crowd density data
Social domain	2	2	Local	Dashboard social domain and customer data analytics
Economic affairs	1	1	Local	Call detail records

The three models are 1) purchasing data, (2) purchasing data analyses, and (3) purchasing data-based services.

under the social domain. On a national level, these responsibilities are assigned to ministries, such as the Ministry of Health, Welfare, and Sport. Within our sample, predominantly regional and national governmental bodies have been represented in this domain. Our sample underscores the significance of procurement of datasets and data analyses within this domain.

Within the *law enforcement* domain, several cases have been identified. The oversight of public order and safety constitutes a shared responsibility between central and decentralized authorities. Within municipalities, this jurisdiction is specifically allocated to the domain of public order and safety. At the national level, this entails the involvement of implementing agencies, such as the Central Judicial Collection Agency (CJIB) and law enforcement agencies (e.g., the police, and customs), operating under the Ministry of Justice and Security. Both governmental levels are reflected in our sample. Our analysis reveals the presence of both data-based services and the procurement of datasets within our sample, as well as a combination of models. An illustrative example of a prevalent service within this domain, drawn from our sample, includes the procurement of automatic number plate recognition cameras for the enforcement of traffic regulations. A predominant provider of this service is the firm Connection Systems.

Crowd management is in fact not formally recognized within governmental structures or domains. Nonetheless, for this study, we have grouped these cases due to their significant overlap and prominence. Typically, such cases would fall within various established domains, depending on the objectives of a project. Crowd management entails the analysis of visitor flows within a specific area, such as festival grounds, sports stadiums, or commercial districts. This underscores why crowd management activities primarily occur at the local level. The objectives of crowd management initiatives can vary widely, ranging from ensuring public safety and order to stimulating economic activity or enhancing marketing strategies. Within our sample, the predominant offerings are data analyses. An example is the crowd monitor implemented by the Municipality of Hilversum and provided by Atos, generating data through sensors and GPS data to map visitor flows. Another example is the company Resono, which provides location data generated through various apps, such as weather apps, to map visitor numbers and crowd density, among other services.

The *social* and *economic* domains represent the lowest number of cases in our sample. The cases are at the municipal level and involve the purchasing of data or data analyses.

5 Discussion

Data reuse by organizations is seen as essential to the development of data economy in the EU, and it is argued that it must be economically reasonable and socially accepted (Custers & Bachlechner, 2017). The fact that data is being monetized by companies is old news, but little is known about the cases when such monetization occurs towards governments as buyers. Our study is the first to shine a light on the B2G data market from an empirical standpoint and interrogate the phenomenon from the perspective of government as buyer of data, data analyses, and data-based services.

5.1 Mapping Data Purchasing

Our research first aimed to provide deeper insights into which governments are purchasing what, from whom, how, and what for, for addressing societal issues. We found that local governments, particularly municipalities, are the most frequent data purchasers. In terms of providers, the landscape of private sector providers of data and data services in the Netherlands is versatile, including data science/analytics companies, providers of data, software, product-service-data-solutions, and foundations. The policy domains include mostly mobility, spatial planning, law enforcement, crowd management, and employment. In summary, our research highlights the diverse landscape of data purchasing by governments in the Netherlands, spanning multiple levels of government and various policy domains. This is facilitated by a range of providers, each contributing to the evolving data ecosystem.

Our mapping exercise enriches the current limited knowledge on B2G data market (Martens & Duch-Brown, 2020) by providing an empirical account and characterization of it using the example of one EU country. In this way, we provide a further indication, alongside earlier work by Micheli (2022), that purchasing business data is a commonly used approach by governments to gain access to data in the EU. In addition, we show that the data-x purchasing framework we developed is well applicable in practice. All forms of data purchasing included in the framework are observed, with most purchases involving data analyses. The purchasing of raw data or data-based services, as well as combinations of models, occurs less frequently.

5.2 Archetypes for Data Purchasing

The previous section provides insight into how the data purchasing market has developed so far, but it does not indicate what governments can do with this information. The second aim of our research was therefore to analyze the implications of our mapping exercise for buyers in terms of their data purchasing strategies.

Based on our data sample, we were able to formulate **five archetypical cases of data purchasing** in different domains and markets. These archetypes illustrate that there is a difference between more 'traditional' domains like social domain or employment and domains where digitalization and datafication give rise to new opportunities for companies, like mobility and spatial domain. To formulate the archetypical cases, we observed the patterns present in the majority of cases found in each policy domain. In total, about three-quarters of all cases can be assigned to an archetype, which indicates that the archetypes cover a wide range of data purchasing situations. Table 5 illustrates the different configurations of type of provider and data purchasing model that governments deal with (with regards to buyers, no clear patterns were observed, hence this was excluded), as well as extrapolates considerations concerning the origin of the data and the purchasing implications for the government. This analysis thus links with the top tier of our conceptual-analytical framework and taps into the data acquisition/generation aspect. Drawing on earlier work on purchasing strategies, such as Kraljic's portfolio theory (1983), Schotanus and Grandia (2023), Hesping and Schiele (2016), and Schotanus (2007), a few purchasing implication examples are highlighted in Table 5 as well and are explained in more detail below the table.

The first group of archetypical cases is labelled as *traditional markets*. For instance, in the social domain, we mainly identified purchases of data analyses from domain-specific providers of consultancy services to governments (like Zorglokaal and Kwiz specializing in the social domain). These offerings are often based on client's data, possibly enriched with data from other sources. We label these cases as **consultancy-reliant archetype**. For this archetype, we propose that a competitive procurement strategy can be helpful to governments with attention to the knowledge and relationship of the provider to the local context. After all, there are multiple providers interested in selling their data analyses, and a competitive tendering process seems to be an appropriate procurement method for governments to determine which provider offers the best tailored solution. However, attention to knowledge of the local context, or at least sufficient understanding of it, is important given the customized solutions that governments appear to require.

Another archetype of cases, labelled as **not-for-profit data stewards archetype**, is mainly found in the employment domain where we identified offerings of datasets by domain-specific not-for-profit actors (e.g., foundation, pension fund). These actors typically acquire the data from their members, may play a data stewardship role, and offer some datasets for free. For this archetype, we observe that intense competition may be less necessary given the nature of the providers.

The second group of archetypical cases is labelled as *emerging markets*. Namely, in the domains of crowd management, spatial planning, and mobility, we observe that governments deal with a different type of players. For the crowd management domain, for instance, we notice that governments purchase datasets or data analyses (dashboard or monitors) from specialized niche providers – in this case, location intelligence companies (e.g., Resono, CityTraffic, Esri). Similarly, in the mobility domain, it also seems to be common for governments to purchase datasets (e.g., Mercedes, Nira) or data analyses (dashboards, monitors) from digital companies specializing in different types of location analytics (e.g., Mezuro, Dat.mobility, Here, TomTom). We label these cases as **multiple data (analysis) specialists archetype**. The data analyses are typically based on data acquired from third parties and/or proprietary techniques. For this archetype, we propose that

Table 5. Archetypes for Data Purchasing in Different Domains and Markets Based on the Sample.

Archetype	Domain	Type of provider	Data-x purchasing model	Origin of the data examples	Purchasing implications examples	Example cases [ID number]
Traditional markets						
1. Consultancy reliant	Social	Domain-specific consultancy providers to governments	Data analyses	Often based on client's data enriched with other sources (e.g., historical)	Competitive procurement with attention to local knowledge	8, 29
2. Not-for-profit data stewards	Employment	Domain-specific not-for-profit actors (e.g., foundations)	Datasets	Data from members stewarded by the provider	Intense competition less necessary	4, 6
Emerging markets						
3. Multiple data (analysis) specialists	Mobility, crowd management	Specialized niche providers (e.g., location intelligence), data brokers and aggregators	Datasets and data analyses (dashboards, monitors)	Data acquired from third parties and/or collected by GPS, GSM, apps and infrastructure	Competitive procurement, functional requirements	2, 3, 9, 12, 13, 14, 20, 23, 25, 26, 27, 28
4. Single specialist	Spatial planning	Single dominant provider	Data analyses	Data collected by proprietary infrastructure, third parties, and/or field research	Joint procurement and functional requirements	17, 18, 19, 21, 24
5. Integrated solution specialist	Mobility	Traffic infrastructure providers	Data-based services (e.g., cameras/ sensors and data analyses)	Data collected by infrastructure products sold together with data analyses	Joint procurement, functional requirements, competitive procurement	7, 10, 15, 16

using competitive sourcing can be a suitable procurement strategy, similar to the consultancy-reliant archetype, as there are multiple providers in the market likely to be interested in a government contract. However, it is important to specify the procurement needs as functionally as possible. For example, if technical specifications prescribe the exact type of data required for the analysis, the market will be much smaller than if the focus is on the (functionally described) objective for which the data analysis will be used. In addition, demand management is important. For instance, it is important to determine how large and detailed the dataset really needs to be, as well as the required level of data timeliness. Data timeliness not only affects the price but can also impact sustainability, for instance, if additional flights are needed to update the data.

In contrast to this, another group of cases is labelled as **single specialist archetype**. Namely, for the spatial domain, we observe that typically municipalities would contract one and the same company (in this case, Cyclomedia) offering data analyses based on data collected by proprietary infrastructure (e.g., especially equipped cars). For this archetype, it is more challenging to procure using traditional public procurement methods. An open tender is likely less effective because the single specialist might assume there is no competition, allowing them to dictate their own terms and demand a high price. From a procurement perspective, there are ways to address this—for example, by exploring whether functional requirements can broaden the scope and allow more suppliers to qualify. We also propose that joint procurement can be a helpful solution. If several governments that require the same or a similar service provided by the single specialist negotiate collectively, buyers can increase their purchasing power, create economies of knowledge, and reduce transaction costs for both buyers and the provider (based on Schotanus, 2007). If this also proves ineffective, the option (or the threat) of collecting the data themselves or outsourcing its collection, or even government intervention, can be used as leverage to put pressure on the provider. Finally, it is particularly important to stay alert to acquisitions in this market to avoid increasing dependence on a single provider. A recent acquisition of Locatus [case 21] by Green Street illustrates that such scenarios are not unlikely.

The final archetype is the **integrated solution specialist archetype**. For instance, in the mobility domain, we find that for this archetype, the provider typically supplies the infrastructural component for data collection (e.g., camera, sensor) combined with data analysis services. Because the specialized infrastructural component carries the risk of limited competition, it might be less effective to conduct a traditional public procurement procedure. For this archetype, we propose that joint procurement and functional requirements can be a suitable strategy, similar to the previous archetype.

In summary, distinguishing among these archetypes can be of value in determining the optimal purchasing strategy for governments engaging in data purchases, also beyond the Dutch context. For instance, joint procurement may be an appropriate strategy when dealing with a monopolist (Schotanus, 2007). Once there is a healthy market with private providers, competitive sourcing becomes more evident. In contrast, when governments procure data from non-profits, intense competition is less likely to yield optimal results.

With the insights described above, we complement the existing academic literature, which, as noted in the literature review, does not specifically address the purchasing implications of different types of data needs and lacked a systematic investigation. Our findings also reveal that, looking at the example of the Netherlands, governments at all levels (national, regional, local) utilize the three data-x purchasing models and acquire data, data analyses or data-based services. Although our sample does not allow for any conclusions regarding why certain governments choose to buy data, data analyses, or data-based services ('sourcing decision'), we suggest that it might depend on the policy domain (e.g., data-based services might be more popular in the mobility domain) and/or the level of government (e.g., purchasing data could be more common among national or regional level government organizations). Thereby, our conceptual-analytical framework has proven to be a useful tool connecting the previously disjointed knowledge on data monetization and public procurement of data. Furthermore, our findings open a new chapter in research on ICT procurement (see e.g., Ghezzi & Mikkonen, 2023) which has not yet paid attention to procurement of data or data products.

5.3 Lack of Transparency

In this final subsection of the discussion section, we address an overarching problem that posed a challenge for both of our research questions. This concerns the lack of transparency regarding which data is bought by whom, how, and for what purpose. For instance, there is no central database tracking which entities purchase what data, hindering a comprehensive understanding of the scope and expenditure of data procurement. A large portion of such transactions of interest are scattered at the level of project invoices and thus difficult to uncover in a systematic way. This finding also means that the open government data made available by Dutch governments was insufficient to meet our research needs which signals that the information disclosure strategies need revision to address this gap. As far as we know, this problematic lack of transparency regarding data purchasing is also present in many other countries.

The lack of transparency is especially important to address because, in our research, we encountered several niche players and markets that sell data or data services to many governments. To effectively counterbalance data sellers, it

might be helpful if governments (and departments within governments) are aware of what data they are purchasing, for how much, and from whom. With better data, governments can better align their purchasing efforts, for example, by purchasing jointly or learning from one another. The latter seems particularly important in data purchasing because many data purchases are spread across the organization. There is often no single expert responsible for data purchasing, even though some types of data purchasing—though not all—can indeed be complex (e.g., privacy issues, ownership, etc.), while all sellers of data are likely to be experts in their field. Therefore, learning from one another and scaling up where possible seem important for gaining better control over data purchasing. Finally, transparency can also contribute to better demand management. For example, it might be sufficient to perform certain data analyses for one municipality, allowing other municipalities to reuse these results. Increased transparency can also help assess whether all purchased data and analyses truly add value, provided a central database also records how useful specific data purchases have been according to the users.

6 Conclusion

In this exploratory study, our objective was to map the state of play as regards data purchasing from the private sector for addressing societal issues (who, what, how, and what for) and to indicate what implications this has for buyers in terms of their data purchasing strategies. To answer this question, we investigated data purchasing in the Netherlands as a typical case and collected 33 cases of such purchases at national, regional, and local levels of government. We proposed a conceptual-analytical framework of data-x purchasing which, as demonstrated in our study, can be useful as an analysis tool for uncovering governments' purchases of data from private companies. Furthermore, we developed five archetypes and indicated, among other things, the purchasing implications of each archetype. Our study was the first systematic attempt to map data purchasing at the level of a country and to indicate purchasing implications and we encourage other researchers to replicate this effort in other countries, be it in or outside the EU.

Our main conclusions are that data are purchased in different forms. There is however no comprehensive overview of what governments purchase, which makes this a rather opaque area of public spending. Such knowledge could be relevant for reducing information asymmetry in this particular marketplace, controlling public spending, and considering possible vendor dependencies.

We propose the following **recommendations for practitioners** based on our research. As this is the first systematic study of data purchasing in the EU, we believe these recommendations can be relevant to other EU countries as well.

- *Increasing transparency around data-x purchases*. We call for enhancing transparency about government data (service) procurement practices. The significance of these themes in public procurement has been underscored in broader literature (e.g., Bauhr et al., 2020; Schotanus, 2022; Titl & Schotanus, 2025), and also seem particularly relevant to procurement of data, data analyses, and data-based services. It would be beneficial for taxpayers and public organizations to critically review practices of such purchasing. The lack of transparency also seems like a missed opportunity because many governments likely have the same or similar procurement needs. A central database could create, among other things, learning opportunities.
- *Be more alert to (changing) market situations*. During our research, it became clear that the markets for data, data analyses, and data-based services are dynamic. One of the providers we examined was acquired. This happened in a market where we already encountered little competition. In a context where data is becoming increasingly important for governments, these developments are increasingly important for purchasers to be aware of, to monitor closely and respond to, as previously discussed (e.g., through more functional requirements or more joint procurement), but also for IT departments and regulators. For IT departments, the policy of contracting as few additional providers as possible is an understandable choice in terms of coordination costs, but not always when it comes to dependency and innovation. For regulators, it is crucial to be extra vigilant regarding acquisitions and mergers that could make governments overly dependent on a single party. In markets with only one or a few providers, a central database could also help make this market situation more transparent and facilitate in improving the balance of power between the government and the monopolist or oligopolists.
- *Facilitating knowledge exchange and joint procurement*. We call for more joint initiatives, knowledge sharing, and professionalization of this practice, especially among local governments. The practice of data purchasing may put smaller local governments, which typically have limited IT and procurement capacity, in a disadvantageous position vis-à-vis the private sector, especially when emerging markets are involved. With an eye to public spending and sovereignty of public institutions such as municipalities, provinces or the national government, more insights into procurement practices and an overview of the marketplace could support collective bargaining (Carrera et al., 2021), and the curtailing of monopoly positions. Ideally, this would extend to a European level where cities, regions,

or member states could work together in sharing information, advertising their tenders, jointly procuring data and related services, and making these data available on national levels.

Our research also makes a **theoretical contribution** by conceptualizing the practice of B2G data transactions from the perspective of government procurers (the data-x purchasing framework and the archetypes). Our analysis contributes the first effort to characterize the practice of data purchasing by governments. It enriches the exploratory findings of Micheli (2022) by conceptualizing and empirically mapping data purchases by different levels of government in one EU country. Our research, and especially the identification of the archetypical cases of data purchases, makes an important connection between the literature on data monetization by businesses and public procurement drawing parallels between how purchasing strategies may depend on the characteristics of the provider, the offering, and the origin of the data. Thus, our work further opens the debate about B2G data market.

The **limitations** of our study have to do with the search strategy which we were forced to employ under the conditions of low transparency and absence of granular data. Thus, our results should be interpreted as an exploratory overview, rather than an exhaustive mapping of purchases. For instance, it may be surprising that we did not find any cases where a Big Tech company would be a supplier which once again signals the limits of relying just on publicly available evidence. Although it is a limitation that we build our archetypes based on 33 cases that are not fully complete, it is not uncommon to work with such numbers. For example, Gelhaar et al. (2021) and Diniz et al. (2019) also developed archetypes or a taxonomy based on fewer than 33 cases.

Future research can investigate the collected cases in more depth and broaden the data collection to identify more cases. Studying how other EU member states procure data and assessing the impacts of any notable differences in market approaches would also be insightful. For the digital government community, we would like to propose the following research agenda.

- *Responsible data-x purchasing*. Data-x purchases may raise ethical issues, as some data originate from questionable practices, such as for instance data collected from a service to warn automobilists of speeding cameras. Should governments purchase data that were collected with the intention to support circumventing the law? Other services might thrive on originally public data and generate profits by selling them back to public organizations. We welcome research shining the spotlight on such cases and stimulating discussion on this issue.
- *Challenges and implications of data-x purchases*. We call on future research to dive deeper in the processes and challenges experienced by government organizations when it comes to purchasing data, data analyses, and data-based services and how these practices can be further professionalized. It is important to understand better how government procurers make purchasing decisions when it comes to data-x purchasing and how they engage with company providers.
- *Evaluation of data-x purchases*. There is little known about the outcomes of data-x purchases and how government procurers assess the added value of these products/services. It might lead to the conclusion that not all datasets or dashboards are used and could be falling short of providing actionable information. Such an evaluation and comparative overview of costs and benefits of data, insights from data and data-based services could inform expected quality, applicable use cases, and procurement and governance. Additionally, it might stimulate innovation and competition in the marketplace.

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CRediT Authorship Contribution Statement

Iryna Susha: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Validation, Visualization, Writing – original draft. **Sofie de Wilde de Ligny**: Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft. **Fredo Schotanus**: Methodology, Validation, Visualization, Writing – original draft, Writing – review and editing. **Mirko Tobias Schäfer:** Formal analysis, Investigation, Methodology, Supervision, Validation, Writing – review and editing.

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Notes

1. https://www.rijksoverheid.nl/documenten/rapporten/2021/10/31/nl-digitaal-interbestuurlijke-datastrategie-nederland
2. https://www.tenderned.nl/
3. https://zoek.openraadsinformatie.nl/
4. Economic affairs (which encompasses matters spanning the economy, culture, and the labor market), the social domain (in charge of youth care, long-term care, and income support), employment (addressing labor market issues, sometimes overlapping with economic or social affairs), spatial (planning) domain (responsible for maintaining, upholding, and managing the physical environment for citizens and businesses), law enforcement (ensuring public order and safety), and mobility domain (handling road management, traffic regulation, parking, and transportation).
5. Overheid 360 is a national congress for government practitioners at all levels in The Netherlands focusing on digitalization and government.
6. Binnenlands Bestuur is an independent platform for civil servants in the Netherlands which organizes yearly congresses.
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Fredo Schotanus holds the chair of Public Procurement, Utrecht University's School of Economics. He is also part of the management team of the Utrecht University Centre for Public Procurement (UUCePP). This is an interdisciplinary research centre in the field of public procurement both from a legal and economic perspective. For the chair of Public Procurement, he studies procurement that takes price, quality, people and the environment effectively and efficiently into account.

Appendix

Table A. List of GovTech Providers Used to Identify Data Purchases.

Seller	Netherlands Chamber of Commerce KVK (Number)/Commercial Register	URL
odg	27227223	https://www.ogd.nl/
WebIQ	68115946	https://www.webiq.nl/
Argaleo	76223612	https://www.argaleo.com/
Oddity	76539024	https://oddity.ai/product/
Clappform	76516687	https://clappform.com/
Panteia	27199369	https://panteia.nl/
Resono	61445606	https://reso.no/
8ting	65103793	https://www.8ting.nl/
Vektis	30230118	https://www.vektis.nl/over-vektis/datawarehouse
Geofluxus	77425324	https://www.geofluxus.com/
Camen.ai	77732332	https://www.camenai.com/?cn-reloaded=1
OBI4Wan	53021029	https://www.obi4wan.com/nl/
Imagem	08211828	https://www.imagem.nl/
Centric	24181890	https://www.centric.eu/nl/
LinkSight	82552002	https://www.linksight.nl/
Mezuro	14092383	https://www.mezuro.com/
Coosto	58880771	https://www.coosto.com/nl
New Media	08138956	https://new-media.nl/
Berenschot	30046663	https://www.berenschot.nl/digitalisering-en-technologie
Company info	33302047	https://companyinfo.nl/
Locatus	27129168	https://locatus.com/
ARS Traffic & Transport Technology B.V	27168565	https://ars-traffic.com/
Mercedes-Benz Connectivity Services	727792	https://connectivity.mercedes-benz.com/
Vialis	34117661	https://www.vialis.nl/nl
Kavel10	58894969	https://kavel10.nl/
Mobidot	71668950	https://mobidot.nl/
Lumiguide	60094443	https://lumi.guide/
City Traffic/Bureau RMC	29033906	https://www.citytraffic.nl/
Cyclomedia	16063843	https://www.cyclomedia.com/nl
Empaction	17081349	https://empaction.nl/over-ons/
Infoplaza	09123864	https://www.infoplaza.com/nl/mobiliteit
Monotch	61837628	https://www.monotch.com/

(Continued.)

Table A. *Continued.*

Seller	Netherlands Chamber of Commerce KVK (Number)/Commercial Register	URL
Locatienet	10145534	https://locatienet.com/
Digicampus	x	https://digicampus.tech/
BlueGen	87618109	https://bluegen.ai/nl/
Bi-Xperts	65295471	https://www.bi-xperts.nl/overheid/
Zicht op Overheid	77886445	https://zichtopoverheid.nl/
Peacock AI	87488434	https://peacock-ia.nl/
Axians	16076454	https://www.axians.nl/marktsegment/centrale-en-lokale-overheid/data-analytics-voor-centrale-lokale-overheid/
Solvinity	59597291	https://www.solvinity.com/nl/
Detron	30085813	https://www.detron.nl/
TomTom Traffic Stats	34076599	https://www.tomtom.com/products/traffic-stats/
IGG bouweconomie	27272187	https://www.igg.nl/
HR Groep	84153474	https://www.hrgroep.nl/Diensten/Intelligent_Public_Space_management.html
Ockto	66060923	https://ockto.eu/
Spotr	74781707	https://www.spotr.ai/
Zig	64027902	https://www.zig.nl/informatieplatform/
Jobdigger	70318638	https://www.jobdigger.nl/
Sigmax law enforcement	08176862	https://www.sigmax.nl/
Regent Connecting mobile assets	68687354	https://regentmobile.nl/
De data miner BV	57134898	https://www.datam.nl/
Nederland Schoon	55611192	https://www.supportervanschoon.nl/alle-aanpakken/monitoring/#slide-3
Strava	x	https://labs.strava.com/
Stichting LISA	41093475	https://www.lisadata.nl/
The Matrixian Group	68792271	https://matrixiangroup.com/
Smartwayz	x	https://www.smartwayz.nl/nl/infrastructuur/
ECA International	1030127	https://www.eca-international.com/services/data/allowances-benefits/cost-of-living
HEAD Aerospace Group	x	https://www.head-aerospace.eu/
Move Mobility	56161719	https://movemobility.nl/
Data provider	37142377	https://www.dataprovider.com/
ViNotion	17198507	https://vinotion.com/nl/
Atos Group	30132762	https://atos.net/nl/nederland
Nira Dynamics	556600-3413	https://niradynamics.se/
ABFresearch	27310558	https://abfresearch.nl/
Stichting Pensioenfonds Zorg en Welzijn	41179049	https://www.pfzw.nl/particulieren.html
Moody's Analytics UK Limited	1950192	https://www.moodysanalytics.com/regions/europe

(Continued.)

Table A. *Continued.*

Seller	Netherlands Chamber of Commerce KVK (Number)/Commercial Register	URL
NEO	39061153	https://www.neo.nl/
Kwiz BV	02088769	https://www.kwiz.nl/
Connection systems BV	18059499	https://www.connectionsystems.nl/index.php/en/
Decisio	33297044	https://decisio.nl/
Ortec	29047703	https://ortec.com/nl-nl
HERE	17070436	https://www.here.com/
VORtech B.V.	27239958	https://www.vortech.nl/
MAP traffic management	27373103	https://www.maptm.nl/nl/digital/
Lynxx B.V.	52713296	https://www.lynxx.com/
d-fine GmbH	74508172	https://www.d-fine.com/en/expertise/public-sector/
DAT.Mobility B.V.	27103813	https://www.goudappel.nl/nl/dat-mobility
Geodan B.V.	33293593	https://www.geodan.nl/
Connection Systems B.V.	18059499	https://www.connectionsystems.nl/index.php/en/
Cycle Data B.V.	69575525	bankrupt
DoubleSense	27300248	https://www.doublesense.nl/mobiliteit/
Gaiyo B.V.	57151466	https://gaiyo.com/
HaskoningDHV Nederland B.V.	56515154	https://www.royalhaskoningdhv.com/
HIG Traffic Systems BV	30065420	https://hig.nl/traffic-systems
Mobycon B.V.	27195561	https://www.mobycon.nl/
Nationwide Data Collection B.V.	66038413	https://www.ndc-nederland.nl/
Siemens Mobility B.V.	71002693	https://www.mobility.siemens.com/nl/nl.html
Sweco Nederland B.V.	30129769	https://www.sweco.nl/diensten/mobiliteit-en-infrastructuur/
Technolution B.V.	29031050	https://www.technolution.com/move/nl/
TriOpSys B.V.	32070271	https://triopsys.nl/
Be-Mobile NV	BE0881959533	https://be-mobile.com/
Bureau De Groot Volker Verkeersonderzoek B.V.	71773266	https://verkeersonderzoek.nl/
INRIX UK Limited	14614599	https://inrix.com/
Mobility sensing	67261396	https://www.mobilitysensing.com/

Table B. TenderNed Cases.

#	Case (=tender title) and date	Buyer	Seller	Domain	Summary	Model	Procedure
1	Smart City Platform Municipality of Hilversum (2020)	Municipality of Hilversum	Atos Nederland B.V.	Mobility	The Municipality of Hilversum procured the development of the Smart City Platform to be used for the collection and making available data about the city, including externally purchased data (Talking Traffic Data), and facilitate development of new data services.	3	Competitive dialogue
2	Provision of data on RVV traffic signs (2019)	Ministry of Infrastructure and Water Management	HRGroep B.V.	Mobility	The Ministry of Infrastructure and Water Management has commissioned the acquisition of data analytics regarding traffic signs with the objective to collect updated information on traffic signs across all roads in the Netherlands and organize it into an optimized database.	2	Open procedure
3	Traffic data from non-road-bound systems (2022)	National Road Traffic Data Portal (NDW)	NIRA Dynamics AB, INRIX UK Limited, Locatienet B.V., ARS Traffic & Transport Technology B.V., Dat.mobility B.V., Mobidot bv, Be-Mobile NV, CycloMedia Technology B.V., Mercedes-Benz Connectivity Services GmbH, Bureau De Groot Volker Verkeersonderzoek, HaskoningDHV Nederland B.V.	Mobility	The tender concerns a framework agreement with multiple contractors for the supply of traffic data (in the broadest sense) from non-roadside systems. The data includes probe vehicle data, floating car data, cellular data, and crowd sourced data.	1	Open procedure

(continued)

Table B. Continued

#	Case (=tender title) and date	Buyer	Seller	Domain	Summary	Model	Procedure
4	Providing information on employed individuals per location in North Brabant (2022)	Province of North Brabant	Stichting LISA	Employment	The province of North Brabant procured data on employed individuals in the province at the lowest level of business establishments for monitoring and researching employment.	1	Negotiated procedure without prior publication
5	Data delivery services for cost of living, location rating and housing (2020)	Ministry of Foreign Affairs	Employment Conditions Abroad Limited (ECA International)	Employment	The Ministry of Foreign Affairs procured data delivery services for cost of living, location rating, and housing. The acquired data ensures that posted employees can maintain a similar lifestyle to what they were accustomed to at home.	2	Open procedure
6	VWS EVO Labour Market Data by Job Function (2022)	Ministry of Health, Welfare and Sport	Stichting Pensioenfonds Zorg en Welzijn	Employment	The Ministry of Health, Welfare and Sport procured structural data on national and regional numbers of individuals/FTE per industry and job levels and mobility.	1	Negotiated procedure without prior publication
7	The monitoring of the Traffic Light Installations (VRI's), along with the provision of a reporting and analysis tool (2019)	Province of North Brabant	Vialis B.V.	Mobility	The province of North-Brabant procured the monitoring of traffic signal installations, which includes providing a reporting and analysis tool.	3	Open procedure

(continued)

Table B. Continued

#	Case (=tender title) and date	Buyer	Seller	Domain	Summary	Model	Procedure
8	Announcement of voluntary transparency regarding the continuation of the poverty alleviation contract (2022)	Municipality of Amsterdam	Kwiz B.V.	Social	The Municipality of Amsterdam announces that it will continue the agreement with Kwiz B.V. for the collection of customer data for a period of up to 2 years. The data includes different types of socio-demographic data.	2	Negotiated procedure without prior publication
9	Framework Agreement for Supply of Bicycle and Pedestrian Data (2023)	National Road Traffic Data Portal (NDW)	Data Count B.V., ARS Traffic & Transport Technology B.V., AbelLeisure, Localyse, Mobility Sensing B.V., HIG Traffic Systems BV., Rear Window BV., Vialis B.V., Technolution B.V., Nationwide Data Collection B.V., Connection Systems B.V., JENOPTIK Benelux B.V.	Mobility	The tender concerns the assignment for a framework agreement for the supply of bicycle and pedestrian data (e.g., intensities, point speeds, travel times, categories, etc.) measured with roadside-bound data collection using camera and sensor technology.	1	Open procedure
10	Framework agreement for collecting traffic data for mobility behavior campaigns (2020)	The province of Utrecht	Connection Systems B.V.	Mobility	The Province of Utrecht procured an online and real-time service that generates traffic-related data based on automatic number plate registration, including vehicle counts per configurable measuring point and time unit, the traveled route based on these points, duration between measuring points, etc.	3	Open procedure

(continued)

Table B. Continued

#	Case (=tender title) and date	Buyer	Seller	Domain	Summary	Model	Procedure
11	Automatic number plate recognition camera's – The municipality of Barendrecht (2022)	BAR-Organisatie (Barendrecht, Albrandswaard, Ridderkerk)	Connection Systems B.V.	Law enforcement	The municipality procured the installation of camera systems at two locations to record and monitor relevant data of license plates from passing vehicles and thereby enhance the security.	3	Open procedure
12	Travel data (2023)	The province of North Brabant and Limburg	Dat.mobility B.V.	Mobility	The province of North Brabant (and Limburg) procured the gathering, processing, storing, and sharing GPS travel data from all modes of transportation from a representative group of participants traveling in the area, that are delivered via a dashboard with specific insights.	2	Open procedure
13	Delivery of Logistics Data (2019)	Ministry of Infrastructure and Water Management	Matrixian Group B.V.	Mobility	This tender involves acquiring, processing, and distributing logistics data, which is vital for logistics service providers in planning routes for trucks. The logistic data, includes restrictions on vehicle dimensions, preferred routes, time windows, environmental zones, hazardous substances guidelines etc.	2	Open procedure

(continued)

Table B. Continued

#	Case (=tender title) and date	Buyer	Seller	Domain	Summary	Model	Procedure
14	Acquisition of bicycle and pedestrian data (2019)	National Road Traffic Data Portal (NDW)	Technolution B.V., Sweco Nederland B.V., Siemens Mobility B.V., Nationwide Data Collection B.V., Mobycon B.V., Lumi Guide Fietsdetectie B.V., Innovactory International B.V., HIG Traffic Systems BV., HaskoningDHV Nederland B.V., DoubleSense, Cycle Data B.V., Connection Systems B.V., ARS Traffic & Transport Technology B.V.	Mobility	The NDW tender involves acquiring traffic data, specifically focusing on bicycle data and related software systems. The data includes intensities, point speeds, travel times, and categories, collected through various technologies like axle sensors, detection loops, cameras, infrared detectors, radar, etc.	I	Open procedure

Table C. Openraadsinformatie Cases.

#	Case (document source) and date	Buyer	Seller	Domain	Summary	Model
15	Progress Report on Mobility, Smart Mobility, and the Schwung App (2023)	Municipality of Haarlemmermeer	Vialis (Infoplaza)	Mobility	The municipality of Haarlemmermeer generates location data through the Schwung app for cyclists. The GPS data communicates with the Traffic Light Controller (VRI), enabling it to request green lights in the preferred direction.	3
16	Smart bicycle routes (2015–2019)	Municipality of Utrecht	LumiGuide	Mobility	Through sensors in bicycle parking facilities, software determines whether a bicycle parking space is occupied. The company LumiGuide is the supplier of the system and gathers the data for the municipality of Utrecht. The latter utilizes the data to inform cyclists about the availability and location of parking spaces and to monitor and/or adjust policy objectives.	3
17	Aerial photography (Councils of the participating municipalities of GBTwente council secretariats) (2024)	GBTwente (Almelo, Berkelland, Borne, Bronckhorst, Enschede, Haaksbergen, Hengelo, Losser, Oldenzaal, and Twenterand)	Cyclomedia	Spatial (planning)	Cyclomedia delivers oblique aerial photographs to the 10 participating municipalities through the Cyclomedia viewer (access via Cyclomedia service). In 2022, a collaborative evaluation involving these municipalities was conducted to assess the extension of the existing framework agreement for imagery, including aerial and oblique photos.	Multiple
18	Gathering visual data with the participating municipalities (2022) (Annual report 2022)	Tax Collaboration Municipalities and Water Board Utrecht (BghU), including the municipality of Bunnik, De Bilt, Houten, Lopik, Nieuwegein, Stichtse Vecht, Utrecht, Utrechtse Heuvelrug, Zeist, and the water board Hoogheemraadschap De Stichtse Rijnlanden.	Kavel10 and Cyclomedia	Spatial (planning)	There is a framework agreement between Kavel10 and Cyclomedia and participating municipalities for the delivery of imagery, encompassing aerial, oblique, and 360-degree panoramic photos.	Multiple

(continued)

Table C. Continued

#	Case (document source) and date	Buyer	Seller	Domain	Summary	Model
19	Cyclomedia Cycloramas and Street Lidar (decisions list of the Mayor and Aldermen of Municipality Vijfheerenlanden) (2019)	Municipality of Vijfheerenlanden	Cyclomedia	Spatial (planning)	Municipality of Vijfheerenlanden granted Cyclomedia an assignment to provide the Premium package with regards to Cycloramas and Street LiDAR (point cloud).	Multiple
20	Origin-Destination Data of Lingewaard (2021)	Municipality of Lingewaard	Mezuro and Dat.mobility	Mobility	This project entails examining and analyzing the road infrastructure of Lingewaard, encompassing all forms of traffic, including public transport and cyclists data (FCD and ODiN data). The analysis is based on mobile data provided by Mezuro, among others, and is carried out by Dat.mobility.	2
21	Leiden Service Map (Urbanization Note Leiden) (2018)	Municipality of Leiden	Locatus	Spatial (planning)	To map neighborhood facilities in Leiden, a facilities map has been developed based on Locatus data which gives an overview of all social and commercial amenities, including shops, hospitality establishments, healthcare practices, service providers, recreational and sports facilities, housing development plans, offices, etc.	2
22	Netmobil project plan (2016)	(Netmobil) Regio Twente (a collaboration of Saxion University of Applied Sciences, HAN University of Applied Sciences, University of Twente, Gelderland Province, Achterhoek 2020, Spectrum, Dirk III Foundation, Association of Community Centers and Small Villages Gelderland, Mezuro, DAT.mobility, Mobidot, Beamrz, Infostructure, and Plannerstack Foundation)	Mobidot, DAT.mobility, and Mezuro are involved in the realm of mobility data	Mobility	The project develops a demand-driven digital mobility systems (platform) which integrates various services like shared bikes, taxis, public transport, and carpooling, with a focus on analyzing individual transportation needs and available supply based on various data sources (GPS data, mobile providers/app data).	3

(continued)

Table C. Continued

#	Case (document source) and date	Buyer	Seller	Domain	Summary	Model
23	Application Economic Development & Innovation Fund, City Traffic) (2018)	Municipality of Noordwijk	City Traffic	Crowd manage-ment	The municipality of Noordwijk collaborates with City Traffic to systematically measure visitor numbers and flows (collected by combining measurements from WiFi sensors, stereo detectors, infrared counts, Google measurements) in order to analyze the impact of its marketing activities and enable more effective municipal and regional policy formulation.	2
24	Cyclomedia cyclorama's (Sabewa Zeeland - 1st Budget Amendment) (2021)	Sabewa Zeeland (this is an organization responsible for managing the assessment and collection of taxes for the Scheldestromen water board and municipal taxes for municipalities Borsele, Goes, Hulst, Kapelle, Reimerswaal, Sluis, Terneuzen, and Tholen)	Cyclomedia	Spatial (planning)	Sabewa Zeeland procures access to cycloramas (360° panoramic images with ultra-high resolution) from Cyclomedia stored in their online database which are used to generate property valuation reports for the WOZ (Valuation of Immovable Property Act) value for the participating municipalities.	Multiple
25	Report on Stationsweg Oost (N224), Woudenberg (2021)	Province of Utrecht	TomTom	Mobility	TomTom provided floating car data and road analytics products as input for a mobility report scrutinizing the cumulative duration of trips and speeds of vehicles traversing a specific highway.	2
26	Automatic number plate recognition camera's (Answering Art. 41 questions from Democrats Hilversum about measuring visitor flows) (2021)	Municipality of Hilversum	Atos and Esri are the main providers. The other collaborating partners include Dynniq, Sorama, Sustainder, ViNotion, and VodafoneZiggo.	Crowd manage-ment	The project in Hilversum involves implementing a crowd monitor to measure visitor flows (through location data gathered by 17 outdoor Wi-Fi sensors (provided by Cisco, Meraki type) in the city center, which receive signals from mobile phones), in the context of Covid-19. The digital map helps residents choose safe times to visit the city center and aids enforcers in monitoring visitor flows.	2

(continued)

Table C. Continued

#	Case (document source) and date	Buyer	Seller	Domain	Summary	Model
27	Further development of the Crowd monitor (memorandum) (2020–2023)	Provincie of Utrecht	Resono	Crowd manage-ment	Province of Utrecht procured a crowd monitor dashboard from Resono in order to effectively manage and monitor crowd levels, ensuring the safety of public spaces, optimizing resource allocation, and facilitating informed decision-making regarding crowd control measures and spatial planning. The location data is gathered through various (Dutch) apps, such as weather apps, and mobile providers	2
28	Floating Car Data monitoring (Question from VVD Hattem regarding the use of location data in speed measurements) (2022)	Municipality of Hattem	VIA (HERE data provider)	Mobility	The municipality of Hattem is currently subscribing to VIA, a platform developed for analyzing anonymized accident data and speed data provided by HERE. The objective is to provide information to residents, address inquiries, and initiate further investigations or measures if necessary based on floating car data.	2
29	Dashboard social domain (2022)	Municipality of Stein	Zorg-lokaal	Social domain	The municipality of Stein developed in collaboration with Zorg-Lokaal a social domain dashboard in order to be able to predict and benchmark future costs and healthcare needs in real-time. It uses data from the administrative processes of the municipality enriched with historical, regional, and sometimes national data.	2

Table D. Expert-Sourced Cases.

#	Case and date	Buyer	Seller	Domain	Summary	Model
30	Cooking with Data - Recipe 2: Convergence of Economic Activities in the Modern Economy (2017)	The Association of Dutch Municipalities (VNG) and the collaborating municipalities of: Oss, Helmond, Eindhoven, Schiedam, and Hoorn	Dataprovider.com and the Netherlands Chamber of Commerce (KVK)	Economic affairs	This project involves gathering mobile phone location data and utilizing it to construct a heatmap illustrating economic connections by connecting all data points.	I
31	CityPulse-project (a collaboration between the companies Atos and Intel, the municipality of Eindhoven, and the Dutch Institute for Technology, Safety & Security (DITSS) foundation) (2017)	Municipality of Eindhoven	Atos and Intel	Law enforcement	To create a comprehensive understanding and prediction system for incidents, the CityPulse project provides a dashboard and data analysis based on various sources (sensor data, social media, WiFi tracking, weather conditions, air quality, visitor flows, beer delivery, etc.).	Multiple
32	LIVE project (a collaboration between Geomaat, Future City, AeroVision, Hydrologic, Neo, National Institute for Public Health and the Environment (RIVM), StrateGis Group, and Municipality of Amersfoort) (2020-present)	Municipality of Amersfoort	Geomaat, NEO, and Hydrologic	Spatial planning	The project concerns multiple digital solutions for spatial insights into the redevelopment of the Leindert district in Amersfoort, using various data sources (data provided by Geomaat, drones and mobile mapping, a WaterMonitor by NEO and Hydrologic, BoomPlus by NEO, 3D – CityPlanner by Strategis and NEO.).	Multiple
33	Telephone collection (Wet Wahv) (present)	The Central Judicial Collection Agency	Experian	Law enforcement	CJIB has developed the 'Telefonisch innen (Wet Wahv)' algorithm, which predicts individuals likely to benefit from a personal phone conversation to facilitate payment or establish a payment agreement. Through a contract with the supplier Experian, the CJIB has access to additional phone numbers, allowing it to call more individuals within the target audience.	I