



## **Data circulation and migration governance: A social-network-analysis method to track shifts in responsibilities.**

**Abstract:** Does the circulation of data of third-country nationals crossing the digitized and securitised EU border affect the distribution of responsibilities among institutions and organizations involved in EU migration governance, and, if so, how? This article proposes an innovative methodology based on social network analysis and cluster analysis to study data circulation throughout EU information systems and its effects for governance and applies it to the case of data circulation foreseen by the regulations that define the operation of five EU database systems. We show that data circulation shifts pre-existing distributions of responsibilities in EU migration governance, in three ways. First, it requires new actors. Second, new functions are assigned to pre-existing actors, which modify existing functional differences. Third, some actors are granted access to data unrelated to their specific areas of responsibility. Security actors are provided access to several types of data unrelated to security, which reveals important ‘securitizing’ effects.

**Keywords:** data; European Union; migration governance; data circulation; securitization; social network analysis; STS; security studies.

## 1. Introduction

Migration studies scholarship has increasingly interrogated developments in digitization since the early 2000s. While humanitarian, political and legal concerns about the digitization of the border score high in the migration studies agenda, the long-term implications of digitization and in particular of data circulation for migration governance and its institutional relations seem to feature a less pressing concern for migration studies proper. However, high institutional stakes come with migrants' data circulation, and analyzing it is a much-needed exercise to understand the transformations of contemporary multi-actor and multi-level governance of migration in Europe. Data circulation is expected not only to provide key information about power dynamics in migration governance in the European Union (EU) and its transformation (Balch and Geddes 2011), but also to perform such dynamics de facto. After all, data circulation has been one of the main drivers of institutional ordering over centuries. Who can access which data for which purposes has often been an important source of redistribution of power, functions and responsibilities among governance actors (Maguire and Winthereik 2021).

An emergent scholarship at the intersection of Critical Security Studies (CSS) (Bellanova and Glouftsios 2022; Bellanova et al. 2022) and Science and Technology Studies (STS) (Broeders and Dijkstra 2015; *Author2 and Co-Author* 2023b; Pollozek 2020) is set to address the nexus between digitization and migration governance in a longer-term perspective. From a different perspective, they aim to problematize the dynamics at play in the re-ordering of modern institutional relations and the design and use of digital data infrastructures.

This article aims to contribute to this scholarship by resorting to the STS concept of 'geographies of responsibility' (Akrich 1992; Oudshoorn 2011), to wonder how data circulation creates novel interdependencies and alters the distribution of roles and responsibilities among actors involved in the contemporary multi-actor and multi-level governance of migration in Europe. With this framework, the main goal of this paper is specifically that of providing a method to study whether and how data circulation alters the distribution of roles and responsibilities among migration

governance actors. Eventually, such method should allow devising the longer-term implications of data circulation for migration governance.

The method we develop is based on social network analysis and cluster analysis, and it allows us to map data circulation throughout EU information systems, analysing which data circulate, between which actors, and through which databases, but also to identify actors' roles associated with information sharing, such as those of data inputters and data users. We apply this method to map data circulation as foreseen by the regulations that define the operation and circulation of data in five EU database systems – the main ones used at the European border, namely Eurodac<sup>1</sup>, the Schengen Information System (SIS-II)<sup>2</sup>, the Visa Information System (VIS)<sup>3</sup>, the Entry-Exit System (EES)<sup>4</sup> and the European Travel Information and Authorisation System (ETIAS)<sup>5</sup> – and to explore the implications of data circulation in these five EU information systems for migration governance. We therefore specifically aim to develop what is – to the best of our knowledge – the first comprehensive mapping of data circulation among actors involved in the management of the digital European border and to assess whether and how data circulation through these database systems leads to any shifts in actors' functions within the EU migration governance system. Finding that data circulation entails

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<sup>1</sup> REGULATION (EU) No 603/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2013 on the establishment of 'Eurodac' for the comparison of fingerprints for the effective application of Regulation (EU) No 604/2013 establishing the criteria and mechanisms for determining the Member State responsible for examining an application for international protection lodged in one of the Member States by a third-country national or a stateless person and on requests for the comparison with Eurodac data by Member States' law enforcement authorities and Europol for law enforcement purposes, and amending Regulation (EU) No 1077/2011 establishing a European Agency for the operational management of large-scale IT systems in the area of freedom, security and justice (recast). Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32013R0603>.

<sup>2</sup> REGULATION (EC) No 1987/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 December 2006 on the establishment, operation and use of the second generation Schengen Information System (SIS II). Available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:381:0004:0023:EN:PDF>.

<sup>3</sup> REGULATION (EC) No 767/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 July 2008 concerning the Visa Information System (VIS) and the exchange of data between Member States on short-stay visas (VIS Regulation). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008R0767>.

<sup>4</sup> REGULATION (EU) 2017/2226 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 November 2017 establishing an Entry/Exit System (EES) to register entry and exit data and refusal of entry data of third-country nationals crossing the external borders of the Member States and determining the conditions for access to the EES for law enforcement purposes, and amending the Convention implementing the Schengen Agreement and Regulations (EC) No 767/2008 and (EU) No 1077/2011. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32017R2226>.

<sup>5</sup> Regulation (EU) 2018/1240 of the European Parliament and of the Council of 12 September 2018 establishing a European Travel Information and Authorisation System (ETIAS) and amending Regulations (EU) No 1077/2011, (EU) No 515/2014, (EU) 2016/399, (EU) 2016/1624 and (EU) 2017/2226. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32018R1240>.

shifts in the roles and distribution of competences and responsibilities of actors involved in migration governance – this is our rationale – would support our claim about the importance of looking at data circulation and its longer-term implications for EU migration governance.

Our findings show that data circulation shifts pre-existing distributions of functions, roles and responsibilities among institutions and organizations (actors) involved in EU migration governance, in three main ways. First, data circulation requires new actors. Second, it assigns new functions to pre-existing actors, which modify existing functional differences. Third, it grants some actors access to data that are unrelated to their specific areas of responsibility. In particular, we find that ‘security actors’ (see Wolff 2021) emerge as both the main ‘inputters’ and the main ‘users’ of data, and that they are granted the responsibility to update and access different types of data, including types that are not strictly related to security. We therefore conclude that these de facto shifts in actors’ functions have important ‘securitizing’ effects (Jeandesboz and Pallister-Wilkins 2014; Pallister-Wilkins 2016; *Author and co-author Forthcoming*), which are not necessarily in line with the aims (originally) ascribed to actors. These findings contribute to the emergent body of literature across CSS and STS interested in the implications of data circulation for migration governance.

The paper proceeds as follows. The second section reviews the existing literature on the link between digitization of migration management, European migration governance and data circulation better identifying the research gap that the paper aims to fill. Section 3 describes our SNA methodology in detail. Section 4 analyses the findings and Section 5 develops some final remarks.

## **2. Digitization of migration management, European governance and data circulation**

Since the early 2000s, migration studies have increasingly interrogated and analysed developments in digitization. In the aftermath of 9/11 attacks, biometrics and bodily surveillance led to an increased digitization of borders, which raised questions about their legal implications for human rights (Beduschi 2018; Franke 2009; Nalbandian 2022) and about their ethical-political consequences (Ajana 2013; Amore 2006; van der Ploeg 2000). In the last years these concerns have been

revitalized by efforts at the securitization of mobility by means of emergent technologies like artificial intelligence (AI) and interoperability (Aradau 2023; Curtin 2017; Curtin and Bastos 2020; Beduschi 2021; McAuliffe 2022; Van der Ploeg and Pridmore 2016; Radziwinowiczówna 2022). This section reviews the existing literature on the links between digitization of the EU border, EU governance and data circulation: it starts by reconstructing debates in migration studies and then moves to emerging debates in CSS and STS.

### *The digitization of the border, governance and data circulation in migration studies*

While humanitarian, political and legal concerns about the digitization of the border score high in the migration studies agenda, the long-term implications of digitization for migration governance and its institutional relations seem to feature a less pressing concern for migration studies proper. Jeopardized by the necessity to adapt to the regime of emergency characterizing the field, up to now the existing literature in migration studies journals has not systematically addressed institutional and organizational transformations prompted by digitization. Research has mainly investigated the organizational and institutional rationales shaping information technologies and their adoption (Broeders and Hampshire 2013), or the bureau-political dynamics that, on the contrary, impede their adoption (Micinski and Jones 2022). Less attention has been given, up to now, to the opposite movement of digital data infrastructures shaping the institutional order and migration governance. Still, one implicit reference to implications of digitization for migration governance can be found in Beduschi (2021), when she argues that artificial intelligence (AI) can affect international migration governance by deepening the existing asymmetries between states.

Digitization and in particular data circulation (for instance, throughout EU information systems for migration management) are expected to provide key information about power dynamics in EU migration governance and its transformation (Balch and Geddes 2011). Not only: they are also expected to *perform* such dynamics de facto. Takle (2017), for example, has shown that the production of statistical data about migrants (and the European Migration Statistics Regulation specifically) plays

a central role in the management of external border controls in the Schengen area. Her analysis highlights how attempts at harmonizing migration statistics trigger tensions between EU member states (MSs) and argues that measurement techniques are not simple tools, but they exert agency in impeding harmonization. The idea that the circulation of data can have implications for migration governance has been considered in studies of EU home affairs, as well. Curtin and Bastos (2020) have recalled that ‘information exchanges between authorities located at different levels of administration (...) have always constituted a central feature of EU governance’, which is largely defined by ‘the pervasiveness of mechanisms through which information is gathered, processed, and distributed’. Lascoumes and Le Gales (2007:3) have similarly admitted that EU information systems are not neutral: ‘they produce specific effects, independently of the objective pursued (the aims ascribed to them), which structure public policy according to their own logic’.

Following these insights, we hypothesize that data circulation *can de facto*, if not *de jure*, affect the constellation of institutions and organizations involved in EU migration governance, and the division of competences and responsibilities between them. By including or excluding institutions and organizations from data access, data circulation can have performative effects on migration governance: it can reproduce extant relations, but can also alter them, creating interdependencies and re-distributing responsibilities among the actors involved (i.e., governmental bodies, inter-state agencies, international organizations and NGOs). As we will see below, Science and Technology Studies (STS) have provided the concept of ‘geographies of responsibility’ to account for *de facto* redistribution of responsibilities, roles and tasks prompted by emergent technologies and infrastructures. Before proposing our framework, however, we should deepen our dialogue with an emerging scholarship at the intersection of CSS and STS that is trying to address the nexus between digitization and migration governance in a longer-term perspective.

*CSS, STS and data circulation*

CSS scholars have been long active in exposing how governments, including the EU, ‘transform the schemes of information exchange [i.e., databases] into securitizing tools’ (Balzacq 2008: 83). While it is well-known that human mobility is increasingly framed as a security issue (Bigo 2002; Huysmans 2006; Zureik and Salter 2005), data production and circulation is seen as having a key role in this framing (Bigo et al. 2020; Perret and Aradau 2023). Data processing techniques at the border attempt to govern security, while also facilitating economy (Leese 2016). According to Bigo (2020), ‘security stakes have been technologized’, and this crucially entails a reconfiguration of the actual actors in charge of deciding the limits between security and insecurity, risk and fate: not the judicial, but a transnational guild of security professionals made of data analysts and civil engineers on IT systems.

The securitization of mobility by means of technological apparatuses has similarly been pointed out by studies in STS (Trauttmansdorff 2022). They have framed securitization as the result of infrastructuring (Dijstelbloem 2021); they have recorded a shift from migration control to crime control in the use of biometric data to limit the mobility of people (Amelung 2021); they have analysed in detail the database models that enact people on the move as alterity, and therefore risky and suspicious subjects (*Author2 and Co-Author* 2023a). Given their focus on technologies and infrastructures that make relationships durable, these studies have tended to foresee the implications of digitization and more specifically data circulation for migration governance and the institutional order. Follis (2017), for example, has contended that data circulation can transform the nature of national borders. *Author2* (2020) has shown that identification and registration of people on the move shape the European order(s) by eliciting a competition between diverse institutional chains of actors, data and metadata. Amelung and Machado (2019) have introduced the concept of bio-bordering to apprehend how the territorial foundations of the nation state are partially reclaimed and, at the same time, partially suspended when establishing biometric data exchange. Crucially, different logics of creating permeable bio-borders in the EU derive from the Union’s attempts at integrating legal, scientific, technical and organizational dimensions.

De facto institutional re-ordering linked to data circulation in migration governance is not limited to the state but affects the boundaries between governments and non-governmental actors. For Broeders and Dijstelbloem (2015) the datafication of mobility and migration management has entailed a new role for the state as mediator of non-state actors' relationships. Through a minute analysis of the steps needed to identify and register people on the move on European databases, *Author2* (2021) has revealed the plethora of business actors involved in data circulation at and across Schengen borders. Pollozek (2020) has furthered this trend by showing that data circulation has effects on interorganizational forms of coordination and knowledge production at the border, as well as on border work in the field of European migration and border control, suggesting further research on the implications of migrant data circulation for interinstitutional re-ordering. This invitation has been taken up by *Author2 and Co-Author* (2023b), who have analyzed how the International Organization for Migration (IOM) assumed a role in mediating relocations between European member states by overcoming an implementation gap in health data circulation. By re-using its existing transnational data infrastructure, IOM in Italy was able to prompt data production, harmonize administrative standardization and build data exchange continuity in time among member states, thus gaining the organization a pivotal role in the European de facto interinstitutional re-ordering.

In CSS, transformations in the order of governance entailed by data circulation have overlapped with the emergent debate on digital technologies and infrastructures in the making of European security (Klimburg-Witjes and Trauttmansdorff 2023; *Author2* 2023). Already in 2018 Jeandesboz advocated an attention to the technical dimension of information and data processing in order to overcome the limitations of conventional accounts that explain EU home affairs data circulation as merely a matter of norm incorporation and adaptation. In investigating the co-constitutive nexus between data infrastructures and European security integration, Bellanova and Glouftsios (2022) have illustrated how what they call security authorities' 'database anxieties' inform the European security policy of interoperability. In turn, interoperable mechanisms are expected to shape the novel conditions of possibility for European security integration. What is relevant in this

study towards our goal is the performativity of databases on policy visions: ‘A focus on database anxieties reminds us that European security visions are rooted in rationalities that see threats emerging not only beyond and within European borders but also, and crucially, from the world that has been already recorded – or that should have been recorded – in databases’ (p. 469). What the authors call ‘the formatting power of European institutions’ (p. 470) refers to the power of specific interoperability designs to influence the use of databases by authorities. While this formatting power affects the broader dynamics of European security integration, it should be noted that it lies at the design level, and research is needed on how data actually circulate.

More focused on the performative agency of data circulation, Glouftsios and Scheel (2021) suggested that the digitization of border security and migration management produced new actors. The Visa Information System (VIS) is seen as assembling a set of previously unconnected actors into a group of end users who coordinate their work through data sharing. This insight is relevant, as it shows that new actors can emerge from efforts at data production and circulation. Investigating ‘who produces and controls digital infrastructures and how data processing practices are regulated’ (Bellanova et al. 2022: 338) lies also at the core of a recent special issue on digital sovereignty and European security integration published on *European Security*. The issue’s focus on sovereignty *through* digital features is expected to allow this emergent scholarship ‘to better grasp not only specific policies but the deeper dynamics at play in the reconfiguration of modern power relations, which can be hardly separated – in practice – from the design, use and control of digital technologies’ (p. 338).

#### *Methodological challenges in studying the performative agency of data circulation.*

These studies suggest the importance to analyse the performative agency of infrastructures of data production and circulation. In particular, we need concepts, methods and tools to track which new actors emerge in order to respond to the new needs, responsibilities and tasks triggered by data circulation, and which roles are redefined by such needs. Social studies on emergent technologies are

traditionally well-positioned to map potential and actual actors and users . In particular, the concept of ‘geographies of responsibility’ (Akrich 1992; Oudshoorn 2011) was introduced to address the changes in distribution of functions entailed by technological innovation. Oudshoorn (2011) offers an insightful deployment of this concept in her analysis of how telecare technologies move tasks and responsibilities in contemporary healthcare organizations. Geographies of responsibility refer to ‘the ways in which technical objects modify existing and create novel connections and interdependencies between the people and the technological objects involved in providing healthcare’ (p. 30). More extensively, for the purpose of this article we borrow this concept to wonder how data circulation (seen not as an object, but as an infrastructure) creates novel interdependencies and alters the distribution of roles and responsibilities among actors in the contemporary multi-actor and multi-level governance of migration in Europe.

Once the main question of this paper is so defined, the problem arises about the availability of methods and tools to answer it. While the literature debate reported above is starting to see the interplay between digitization and the reconfiguration of modern institutions, methodological solutions mostly rely on pre-digital methods like document analysis, interviews and in some cases observation. The lack of any proper mapping of migrants’ data circulation among national, supranational and non-governmental actors involved in EU migration governance indeed constitutes one of the major obstacles for researchers to approach this research area (see Curtin and Bastos 2020; *Author2 and Co-author 2022*).The main goal of this paper is therefore providing a method to study whether and how data circulation alters the distribution of roles and responsibilities among migration actors. Such method should allow us to detect emergent actors, and novel tasks allocation to old and new actors. Eventually, it should allow devising the longer-term implications of data circulation for migration governance. Finally, the method should serve the purpose of contributing to the debate on digitization and institutional re-ordering above reported, and of opening up new empirical pathways, rather than pursuing some universalistic attempt to map data circulations.

Our method to map data circulation is based on social network analysis and cluster analysis, and it is illustrated in the next section. As already mentioned, we apply this method to study data circulation as foreseen by the regulations that define the operation of five EU database systems (EURODAC, SIS-II, VIS, EES, ETIAS). SIS II, VIS and Eurodac have been defined as ‘the primary digital surveillance systems’ in the EU, developed to target ‘irregular’<sup>6</sup> migrants (Fragapane and Minaldi 2018: 905). Eurodac is a repository collecting fingerprints of asylum seekers to avoid multiple applications in diverse countries, and it is now used also for policing purposes. SIS-II collects data about criminal offenses. VIS allows cross-checking visa validity. The EES and ETIAS systems, which focus on ‘regular’ entries, are not effective yet, but the regulations that define their operation have been approved, respectively, in 2017 and 2018.

### **3. Methodology**

This section illustrates the research method that we developed to analyse the circulation of data through EU databases for migration management in a way which can potentially provide information about de facto shifts in actors’ functions created by data circulation and other long-term institutional implications. The method entails three key steps: creation of the dataset, grouping of categories into metacategories, social network analysis (SNA).

The first step was the creation of the dataset. With the support of a software for qualitative data analysis and using an in vivo approach, we identified in the five regulatory texts information about data exchanges, notably the type of data to be exchanged, ‘data subjects’ (i.e., categories of people about whom data are collected) and ‘actors involved’ (i.e., agencies and bodies involved in data circulation either as inputters or users). Thirty types of data or ‘data categories’, eight data subjects and sixteen actors involved in data circulation were identified (Table 1). Remarkably, two

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<sup>6</sup> European regulations define ‘irregular’ migrants those third-country nationals who entered the EU without the required documents. In this paper we emically adopt the term as it is used in the policy. This does not mean that we share a commitment to use the term outside the policy discourse analysed.

data subjects were also included in the list of actors, as according to some regulations they are mandated to upload their own data in the systems. The identification of actors required some methodological choices. For example, the regulations often refer to actors broadly defined by the functions they perform (e.g., ‘law enforcement authorities’ etc.), then leaving to national governments the option to designate the specific bodies in each MS that are mandated to perform these functions.<sup>7</sup> In line with the emic approach adopted, we decided to code the actors using the labels retrieved from the regulations.<sup>8</sup>

Additionally, we identified three types of data exchange: *direct*, *conditional* and *exceptional*. *Direct* access to data by the receiving actor is automatic, meaning that a database automatically sends data to the receiving actor, or that the receiving actor can directly access any data uploaded in a system without preliminary request. This type of exchange is very rare, and mainly characterises ETIAS. In the case of *conditional* access, receiving actors have access to data uploaded in a system ‘upon hit’, i.e. upon the existence of a match between some data that they themselves purposefully transmit to the system (e.g. fingerprints) and those recorded in the computerised central database<sup>9</sup>. In the case of *exceptional access*, actors can access data stored in the databases only under exceptional circumstances and pending specific approval granted by a verifying authority. Figure 1 shows an extract of the dataset (the full dataset is available in the supplementary material).

*Table 1 here*

*Figure 1 here*

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<sup>7</sup> See co-author and author 2 (forthcoming) for an analysis of this gap that values its rhetorical implications.

<sup>8</sup> The Eurodac regulation broadly refers to ‘member state authorities’. Exceptionally in this case, we derived information from other sources to identify the actors involved in data circulation (because our methodology requires working with actors defined at the same level of granularity).

<sup>9</sup> A different type of conditional access, foreseen by the SISII Regulation, was also included in this category.

As a second step, we grouped categories together to obtain metacategories. This step was aimed at defining homogeneous areas of responsibility within the governance system by gathering together data categories that are more frequently exchanged among the same actors, and keeping separate those which are less frequently exchanged among them. We applied a cluster analysis method to identify homogeneous groups of data categories. More specifically we applied the iterative, rigorous clustering method for relational data developed by Blondel and colleagues (2008), which relies on a community detection algorithm called ‘modularity’ applied in a software for social network analysis (*Gephi*).

The method required us to create a network, described in figure 2, which included circles (or *nodes*) representing the actors (in capital letters) and the data categories (in small letters), and arrows (or *edges*) representing the existence of links between agencies and data categories (because the data category is uploaded by an actor or because it can be accessed by that actor as user). The weight of the arrows was set as equal to the number of exchanges reported in our dataset: a weight of ‘3’, for instance, means that the link between the actor and the data category recurs for 3 times in the dataset (e.g. because the exchange takes place across different database systems or with reference to data of different data subjects).

*Figure 2 here*

By applying the modularity community detection algorithm, the Gephi software split the data categories and actors into different clusters (our ‘metacategories’), which were assigned a specific colour. In particular, the algorithm grouped together data categories that are more frequently exchanged among the same agencies. Importantly, however, the partition of the network that can be obtained through this algorithm is not unique. By running the algorithm many times, setting different

resolutions, it was possible to split the network into a higher or lower number of modularity classes, and the boundaries of clusters could consequently change. Running the algorithm several times also allowed identifying boundary categories, i.e., those nodes that, lying at the boundaries of two or more clusters, might be assigned to different clusters. The division in clusters that was more frequently generated by the software is the one described by figure 2, where the modularity has a resolution of 0.9. The algorithm generated four different clusters, to which we added a fifth one which comprises four boundary categories.

The resulting clusters can be interpreted as follows. The orange cluster groups together most of the data categories that are related to ‘identification’. The green cluster includes data categories that are related to the settling of third-country nationals such as ‘residence’, ‘occupation data’ and others. The blue cluster contains data categories that are related to the entry of third-country nationals into the EU: we call this metacategory ‘entry data’. The pink cluster includes data categories that are related to the outcome of the processing of migrants’ status within the EU, and therefore concern migrants’ relocation, the granting of international protection or the exit of third-country nationals from the EU: we call this metacategory ‘end of processing data’. Finally, we have ourselves coloured in red four boundary categories: considering their very boundary nature and the fact that they are all related to the operation of the databases for migration management, we have included them in a fifth metacategory which we call ‘metadata’.

The third step utilized a social network analysis method to map data circulation and assess which roles are assigned to which actors across the five databases in the areas of responsibility previously identified. Compared to what we did in our second step, here we partially redefined the nodes, edges and edges’ properties. For the purposes of our analysis, we conceptualised the EU data management system as a network of actors that interact with one another, exchanging data through databases (see Figure 3). More specifically, we assumed that:

- Nodes in our network are the actors among which data circulate, identified in Table 1.

- Edges represent the circulation of data among two nodes. If two actors in our network are connected by an edge, this means that some data uploaded in the databases by one actor are accessed (or can be accessed) by the other actor. We do assume that these edges are ‘directed’, meaning that we also take into consideration which actor sends data as inputter and which actor accesses data as user. In other words, edges are again conceived not as mere lines but as arrows, which start from the data inputters and reach the data users.
- We assume that the ‘weight’ of edges has a value which is equal to the number of data exchanges that according to the regulations can take place starting from actor A and reaching actor B. This aspect is of primary importance for our analysis since, in order to study the implications of data circulation for EU migration governance, we are not merely interested in knowing that data circulate between two actors, but also in which and how many types of data circulate among two different actors. This requires us to define what counts as a ‘data exchange’. We define a ‘data exchange’ as *the exchange of a specific data category, associated to a specific type of data subject, through a specific database*. For instance, let us assume that two actors exchange two different data categories (‘fingerprints’ and ‘citizenship/nationality’), related to different data subjects (‘fingerprints of asylum-seekers’, ‘citizenship/nationality of visa holders’ and ‘fingerprints of visa holders’), and that the ‘fingerprints of visa holders’ category is exchanged through two databases (e.g. ETIAS and EES). In this case, four different ‘data exchanges’ can take place among the two actors, and therefore the edge that connects them in our network has a weight of 4.

*Figure 3 here*

We conducted our analysis twice: initially we merely focused on data that can be accessed by the ‘data users’ in a ‘direct’ or ‘conditional’ way, while later we also introduced data that can be accessed by actors in ‘exceptional circumstances’. This methodology has allowed us to create two

networks which represent data circulation through our five databases (respectively, excluding and including exchanges of data under exceptional circumstances). The networks are illustrated in figure 3, where the size of nodes is proportional to their ‘betweenness centrality’, a standard centrality measure used in SNA, which quantifies the number of times a node acts as a bridge along the shortest path between two other nodes. In addition to these broader networks, we also created more specific networks representing the circulation of the five different metacategories (figure 4).

Finally, to analyse actors’ roles and functions in data circulation, we calculated two different statistical measures associated to actors in each of the above-mentioned networks. The first statistical measure is commonly referred to in SNA as nodes’ ‘weighted out-degree’ and corresponds to the sum of the weights of all the edges/arrows that generate from a node (Hafner-Burton, Kahler, and Montgomery 2009:564). Actors with a high weighted out-degree value in a network perform the role of ‘data inputters’ in that network. The second statistical measure is nodes’ ‘weighted in-degree’, which corresponds to the sum of the weights of all the edges in the network directed towards a node (*Ibid.*). Actors with a high weighted in-degree value in a network are those that perform the role of ‘data users’ in that network. Figures 5 and 6 below identify agencies performing the role of data inputters and data users in networks representing the circulation of different types of data.

In addition, we also calculated networks’ *total* weighted degree, which reveals the total number of different data exchanges foreseen by the five regulations for each metacategory. If a network A (e.g., the network representing exchanges of ‘identification data’) has a higher total weighted degree compared to a network B (e.g., the network representing exchanges of ‘settling data’) this means that in network A more different categories are exchanged, of more subjects, through more databases

*Figure 4 here*

*Figure 5 here*

*Figure 6 here*

#### **4. Discussion: data circulation and shifts in actors' functions**

After having illustrated our method, in this section we discuss the findings produced in the case of the five EU systems analysed, with the specific aim to assess whether and how data circulation had effects on the distribution of roles and functions among institutions and organizations within the EU governance system.

First and foremost, and not surprisingly, our evidence suggests that MS actors – which include so-called border control authorities, immigration authorities and law enforcement authorities – perform the function of main and often unique data inputters within the data circulation network. This function is delegated to migrants themselves only in those cases in which the subjects at stake are treated as ‘regular’ (the visa-exempt third-country nationals and third-country nationals with the right of free movement that request entry to the EU through the ETIAS system), and are therefore endowed with trust. Actors controlled by national Interior Ministries act as main data users. Interestingly, EU agencies are largely excluded from data circulation, with the only, important exception of Europol and its own ‘designated authorities’, which are granted conditional access to a significant number of data categories. As to the involvement of other actors, our findings suggest that carriers and third countries are granted access to a very limited number of data and mainly under exceptional circumstances, i.e. through complex procedures that require specific authorizations.

More importantly, our analysis suggests that data circulation did contribute to shift the distribution of roles and functions among actors within the governance system, at three different levels. First, some actors are established anew by the five regulations. Not only did the regulations establish new data systems (such as the ETIAS information system), but they also established a few institutional actors (e.g., the SIS II and VIS management authorities) which include both new units within pre-existing institutions and new bodies created by aggregating staff and members of pre-

existing institutional actors. Among them, the Sirene Bureau – defined by the Commission Implementing Decision (EU) 2017/1528 as a ‘national body responsible for international police cooperation’ (presumably, therefore, under the control of Interior Ministries) – acts as the main data inputter within the data circulation network. Given these functions, the Sirene Bureau qualifies as a key actor of European migration management.

Second, regulation on data circulation distributes new responsibilities to pre-existing actors by referring to actors with broad, tasks-based definitions. As already mentioned in section 4, EU regulations create categorisations and labels which were not necessarily used before, such as ‘designated law enforcement authorities’ or ‘designated immigration authorities’. This has important implications. Analyses of the few ‘notices by MSs’ (i.e., the official documents that list the specific authorities designated by MSs to perform the different tasks) that are publicly available suggest that these definitions lead to an increasing blurring of boundaries between diverse authorities that were traditionally in charge of distinct activities. Despite some considerable degree of variation among MSs, in particular, the function of ‘law enforcement’ is assigned not only to police authorities but also to other actors that are competent to conduct criminal investigations, such as intelligence services.

This ambiguity therefore broadens the scope of information-sharing and leads to an increasingly blurred distinction between police authorities and intelligence services (despite intelligence-sharing not formally falling within the EU competences and despite intelligence services not being subject to the scrutiny of independent judicial authorities; see also Galli 2020: 122). The ultimate result is that intelligence services are designated to acquire new tasks and responsibilities, and are therefore referred to with different, new labels (Ibid.). Another example is that of the regulations that require MSs to create ‘verifying authorities’, e.g., the Eurodac regulation requires MSs to create ‘verifying authorities for law enforcement purposes’. Again, extant actors undergo a re-articulation of their previous tasks, and acquire new ones. Policing authorities, for example, might be nominated ‘verifying authorities’ in the context of Eurodac.

Third, our analysis suggests that the five regulations on data circulation assign to diverse actors the roles of inputters and users of data about third-country nationals. In particular, while originally Eurodac and other databases were intended for the use of national immigration, asylum and border management authorities (Galli 2020 127), they are now to a large extent tools used for the exchange of data among security actors. As a matter of fact, MSs' law enforcement authorities rank second in the list of main data users provided in Figure 6. Europol, as already mentioned, is the only European agency that is involved in data circulation by the European regulations. The Sirene Bureau, another (new) security actor, emerges as the main data inputter in the whole network (Figure 5).

Finally, we identified some relevant correlations between the actors involved in data circulation, their communication roles and the types of data exchanged. As far as the role of data inputting is concerned, this is largely performed by traditional migration and border control actors (i.e., border control authorities, immigration authorities, visa authorities) in the case of entry and end of processing data. In the case of identification data (which cover 55 percent of all data exchanges, as suggested by total weighted degree measures in Table 2) and metadata, the main data inputter is the Sirene Bureau, which can be considered a new security actor, following the reflections developed above. Settling data, instead, are mostly collected about migrants who are assumed to enter regularly within the EU (third-country nationals with the right of free movement and visa-exempt third-country nationals) and these migrants are given the function of data inputters, i.e., they are themselves asked to upload their data within the information systems.

As Table 2 shows, security actors are the main data users of identification data but also of settling data, while traditional migration and border management actors are the main users of entry data and end of processing data (the picture is more mixed in the case of metadata). Overall, it should be also noticed that MS agencies linked to Interior Ministries perform the function of main data inputters and data users for exchanges of the diverse types of data. Only access to settling data is less monopolized by Ministries of Interior with Europol and its designated authorities emerging, together, as the main data user of these data.

## 5. Conclusion

This article was meant to provide a methodology to study the implications of data circulation for migration governance and longer-term institutional re-ordering. It has done so by proposing a method based on cluster and social network analyses to analyse data circulation, thus overcoming a major obstacle in this research field, and by applying this method to data circulation as foreseen by five European systems – Eurodac, SIS-II, VIS, ETIAS and EES. By doing so, this article has illustrated the value of the method developed to systematically keep track of data circulation among authorities involved in EU migration management. The method does not only allow analysing which data circulate, how, between which actors, through which databases, but it also allows identifying actors' roles associated with information sharing, such as those of data inputting and data usage. This SNA-based method makes it possible for migration governance studies to systematically explore data circulation and the de facto shifting of responsibilities among institutional actors that it entails.

In particular, thanks to the method we have shown that data circulation in fact has contributed to reshuffle responsibilities between different authorities involved in EU migration management. These shifts take place, first, through the creation of new actors involved in data circulation. Second, the regulations explicitly assign of new functions to pre-existing actors, which modify existing functional differences. This is for instance an effect of the very vague definition of these actors made by the regulations. In most regulations, law enforcement authorities (as other authorities) are merely defined by their functions, which broadens the scope of information-sharing leading to increasingly blurred distinctions between police authorities and intelligence services.

Third, the regulations grant some actors access to data that are unrelated to their specific areas of responsibility, implicitly shifting their functions within the governance system. For instance, security actors such as designated law enforcement authorities, Europol and the Sirene Bureau emerge as both the main 'inputters' and the main 'users' of data stored in the five databases analysed. We show that these actors update and have access to different types of data, including types that are not

strictly related to security, such as settling-related data; this raises the question of when (if ever) migrants stop being considered security subjects. Despite access to these databases by law enforcement authorities having become increasingly controversial in the past decades, our research shows, intelligence and law enforcement have become the primary purposes of the five information systems analysed.

We therefore conclude that data circulation, operating these shifts in actors' functions, has important 'securitizing' effects (Jeandesboz and Pallister-Wilkins 2014; Pallister-Wilkins 2016; *Author and co-author Forthcoming*), which are not necessarily in line with the aims (originally) ascribed to them, if we consider that VIS and Eurodac were established 'for purposes other than security, primarily as border management tools' (Galli 2020:127). These findings connect with arguments raised by security studies about the ever increasing role of (in)security production practices (Ibid.).

More broadly, these findings suggest that, as already shown by Science and Technology Studies, information systems 'are not neutral devices' and that they can produce specific effects independently of the aims ascribed to them (Lascoumes and Le Gales 2007:3). This evidence supports the central claim of the paper related to the need for migration governance studies to analyse the long-term institutional implications of data circulation throughout the European digital border.

We hope that the method that we developed will be applied in future research to explore long-term institutional effects of data circulation, in the migration policy field as well as in other policy fields. Importantly, the method has been applied in this article to an analysis of EU regulations ('the policy'), and future research should complement this analysis looking at actual practices, which might reveal different de facto patterns of data circulation which do not emerge from the legal script (Trauner 2016).<sup>10</sup> Future research should also consider possible developments related to the

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<sup>10</sup> This is a direction of research currently pursued by co-author and author 2 under review, for example.

interoperability of the five information systems with other systems, which might lead to a more central position of Europol in the data circulation network (Galli 2020:127).

### **Disclosure statement**

The authors report there are no competing interests to declare.

### **Data availability statement**

The data that support the findings of this study are publicly available.

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Table 1. List of data categories, data subjects and actors inductively identified from the European Regulations

<p><b>Data categories:</b> birth data; border crossing point and authority that authorised the entry; citizenship/nationality; contact details (email address, phone n°); criminal offence data; date/place of exit; date/time of the entry; destination country; education; family members' data; fingerprint; immigrant status/type (family member, holder of residence card); info about application for IP; intended stay data (duration, address...); linking data; name and surname; National Facilitation Programme; occupation; operator/officer data; personal ties; photographs; physical characteristics; procedure data; relocation data; residence (in country of origin); sex/gender; system native data; travel data (intended date of arrival/departure, destination, purpose); travel document data; visa-related data.</p>
<p><b>Data subjects (in italics the data subjects whose data are not involved in any data exchange):</b> applicants for international protection (AS); irregular migrants crossing external border (IMCEB); irregular migrants within member states (IMWMS); <i>regular temporary migrants (RTM)</i>; <i>rejected visa applicants (RVA)</i>, <i>beneficiaries of international protection (BIP)</i>; <i>suspected terrorists (ST)</i>; third country nationals expelled or whose entry has been refused (3CNSIS); third country nationals subject to a restrictive measure (3CNSRM); third-country nationals with the right of free movement (3CNRFM); visa applicants and visa holders (VA/VH); visa-exempt third country nationals (VE3CN).</p>
<p><b>Agencies (in italics those not involved in any data exchange):</b> <i>Ees Central System</i>; <i>Etias Information System</i>; Carriers; <i>Etias Central Unit</i>; <i>Etias Fundamental Rights Guidance Board</i>; <i>Etias National Unit of Member States</i>; <i>Etias Screening Board</i>; <i>eu-Lisa</i>; <i>Eurodac Central System</i>; <i>European Commission</i>; <i>European Data Protection Supervisor</i>; <i>Europol</i>; <i>Europol Verifying Authorities</i>; <i>Europol's Designated Authorities</i>; <i>International Organizations</i>; <i>Member States' Border Control Authorities</i>; <i>Member States' Asylum Authorities</i>; <i>Member States' Designated Authorities for Law Enforcement</i>; <i>Member States' Immigration Authorities</i>; <i>Member States' Judicial Authorities</i>; <i>Member States' National Access Point</i>; <i>Member States' National Public Sector Bodies</i>; <i>Member States' Verifying Authorities for Law Enforcement</i>; <i>Member States' Visa Authorities</i>; <i>N.SISII</i>; <i>N.SISII Office (Designated by Member States)</i>; <i>National Supervisory Authority (established by Directive 95/46/CE)</i>; <i>National Uniform Interface</i>; <i>NI-SIS</i>; <i>Sirene Bureau</i> <i>SISII (Designated by Member States)</i>; <i>Sis Management Authority</i>; <i>Supervisory Authorities established by regulation 2016/679</i>; <i>Third Country</i>; <i>Third-country nationals with the right of free movement</i>; <i>Vis Central System</i>; <i>Vis Management Authority</i>; <i>Vis National Authority</i>; <i>Vis National Interfaces</i>; <i>Visa-exempt third-country nationals</i>.</p>

Figure 1. Extract of the dataset (the full dataset is available in the supplementary material).

Source Agency	Data Category	Data Subject	Type of Access	Target Agency	REGULATION
Visa-exempt third-country nationals	birth data	VE3CN	CONDITIONAL ACCESS	ETIAS CENTRAL UNIT	ETIAS
Third-country nationals with the right of free movement	birth data	3CNRFM	CONDITIONAL ACCESS	ETIAS NATIONAL UNIT OF MS	ETIAS
Visa-exempt third-country nationals	birth data	VE3CN	CONDITIONAL ACCESS	ETIAS NATIONAL UNIT OF MS	ETIAS
Third-country nationals with the right of free movement	birth data	3CNRFM	CONDITIONAL ACCESS	EUROPOL	ETIAS
Visa-exempt third-country nationals	birth data	VE3CN	CONDITIONAL ACCESS	EUROPOL	ETIAS
MS BORDER CONTROL AUTHORITIES	birth data	VA/VH	CONDITIONAL ACCESS	EUROPOL'S DESIGNATED AUTHORITIES	EES
MS IMMIGRATION AUTHORITIES	birth data	IMWMS	CONDITIONAL ACCESS	EUROPOL'S DESIGNATED AUTHORITIES	EES
MS BORDER CONTROL AUTHORITIES	birth data	VE3CN	CONDITIONAL ACCESS	EUROPOL'S DESIGNATED AUTHORITIES	EES
MS VISA AUTHORITIES	birth data	VA/VH	CONDITIONAL ACCESS	MS ASYLUM AUTHORITIES	VIS

Figure 2. Findings of cluster analysis.

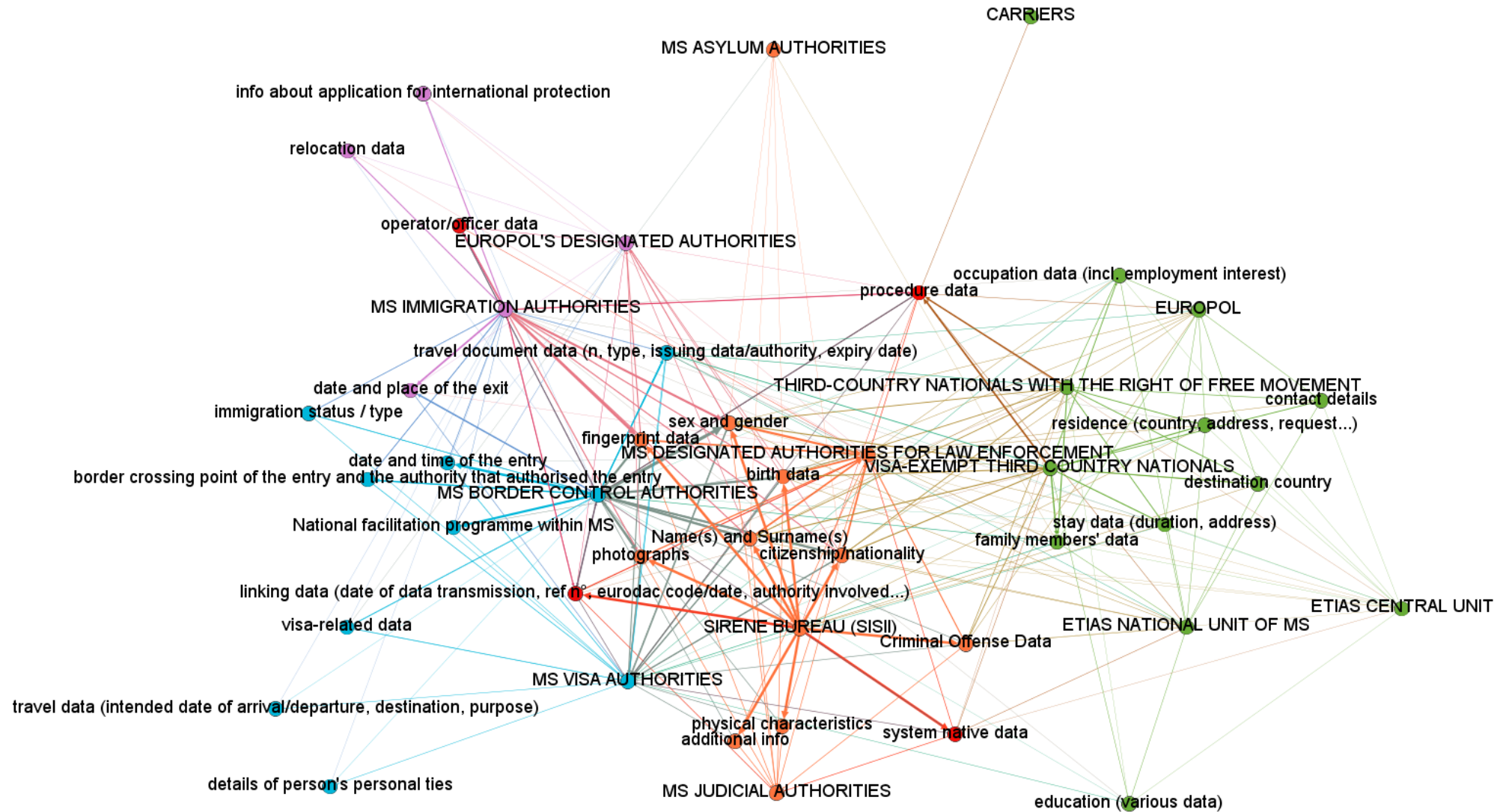
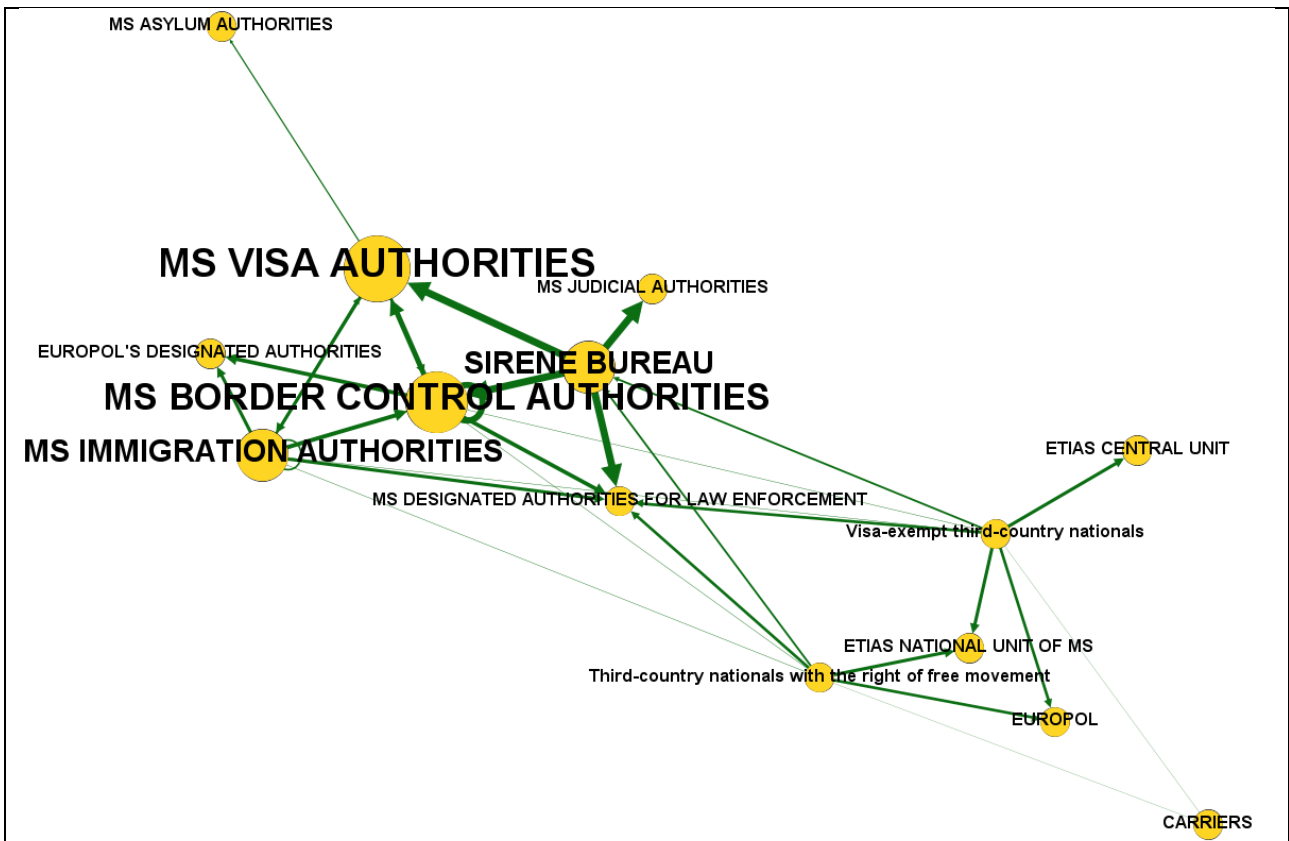
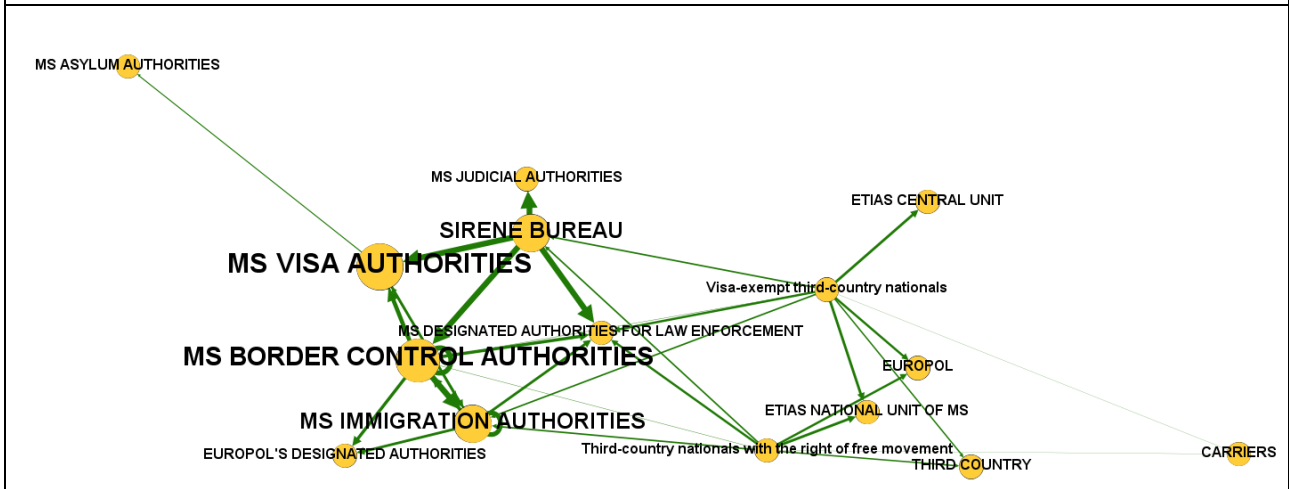


Figure 3. Network of data circulation through the five databases for migration management analysed.



Panel a. Direct and Conditional access only (excluding exceptional access)



Panel b. All types of access (including exceptional access)

Figure 4. Networks representing circulation of specific groups of data categories or metacategories (exceptional access excluded from the analysis).

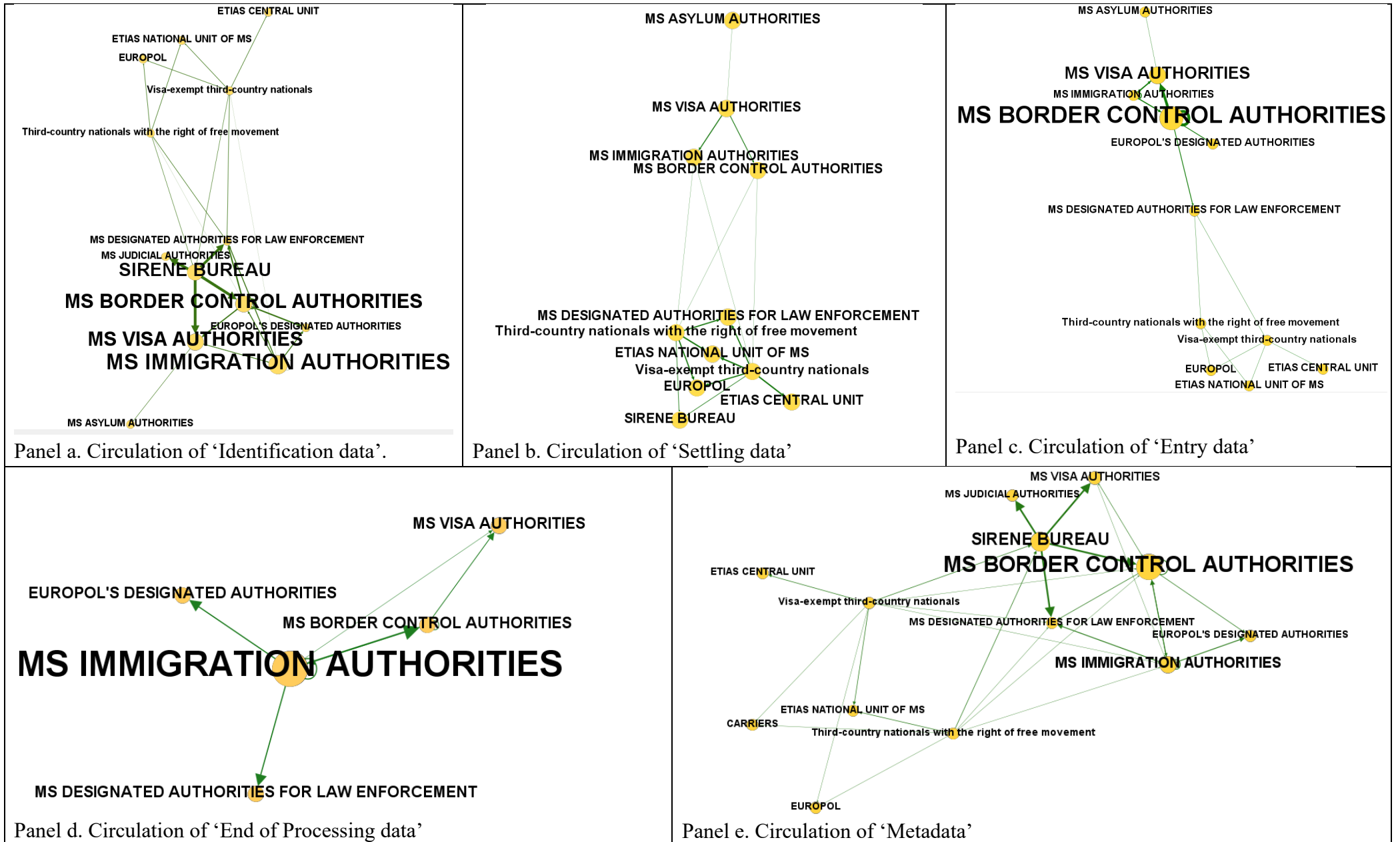
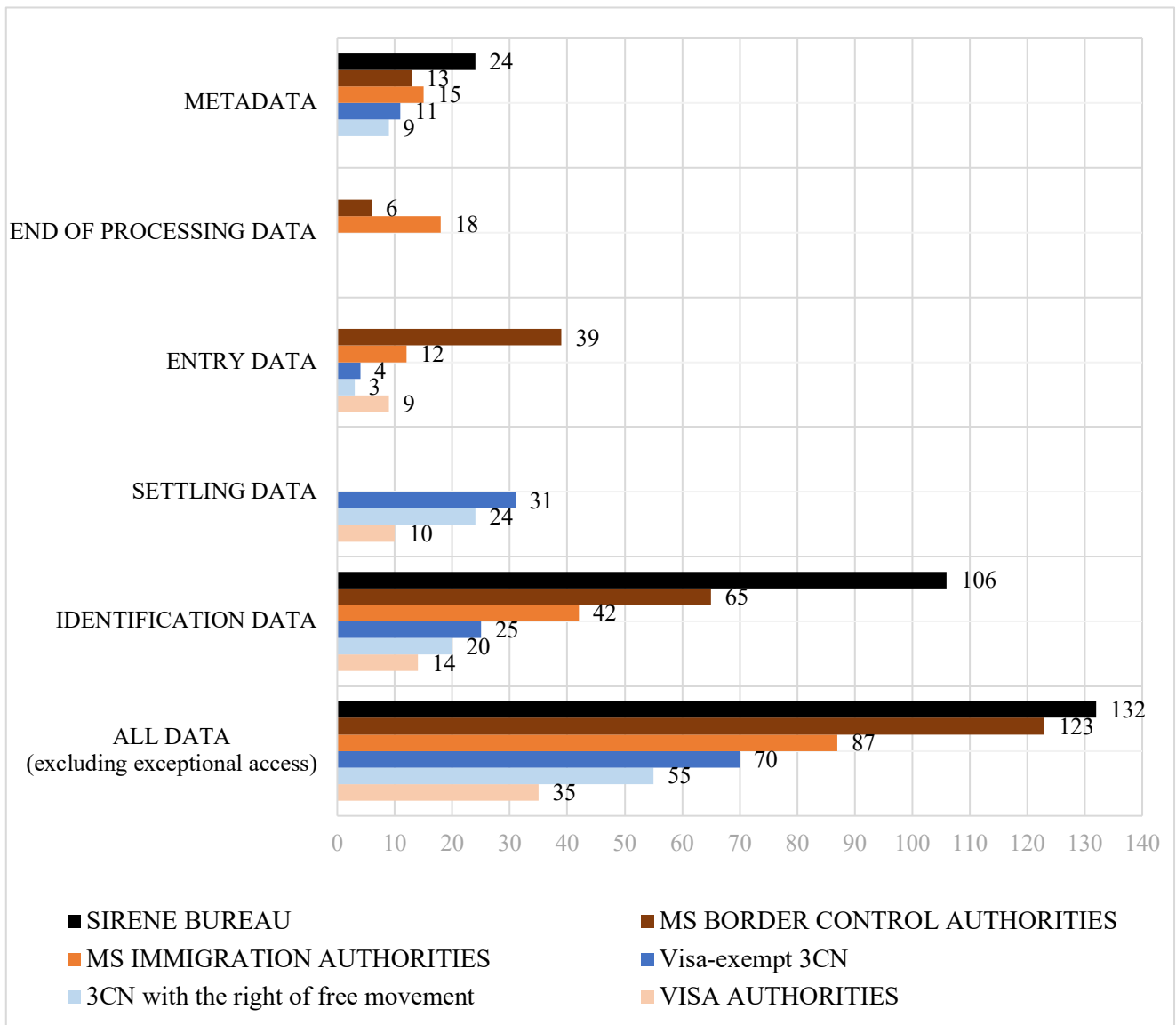
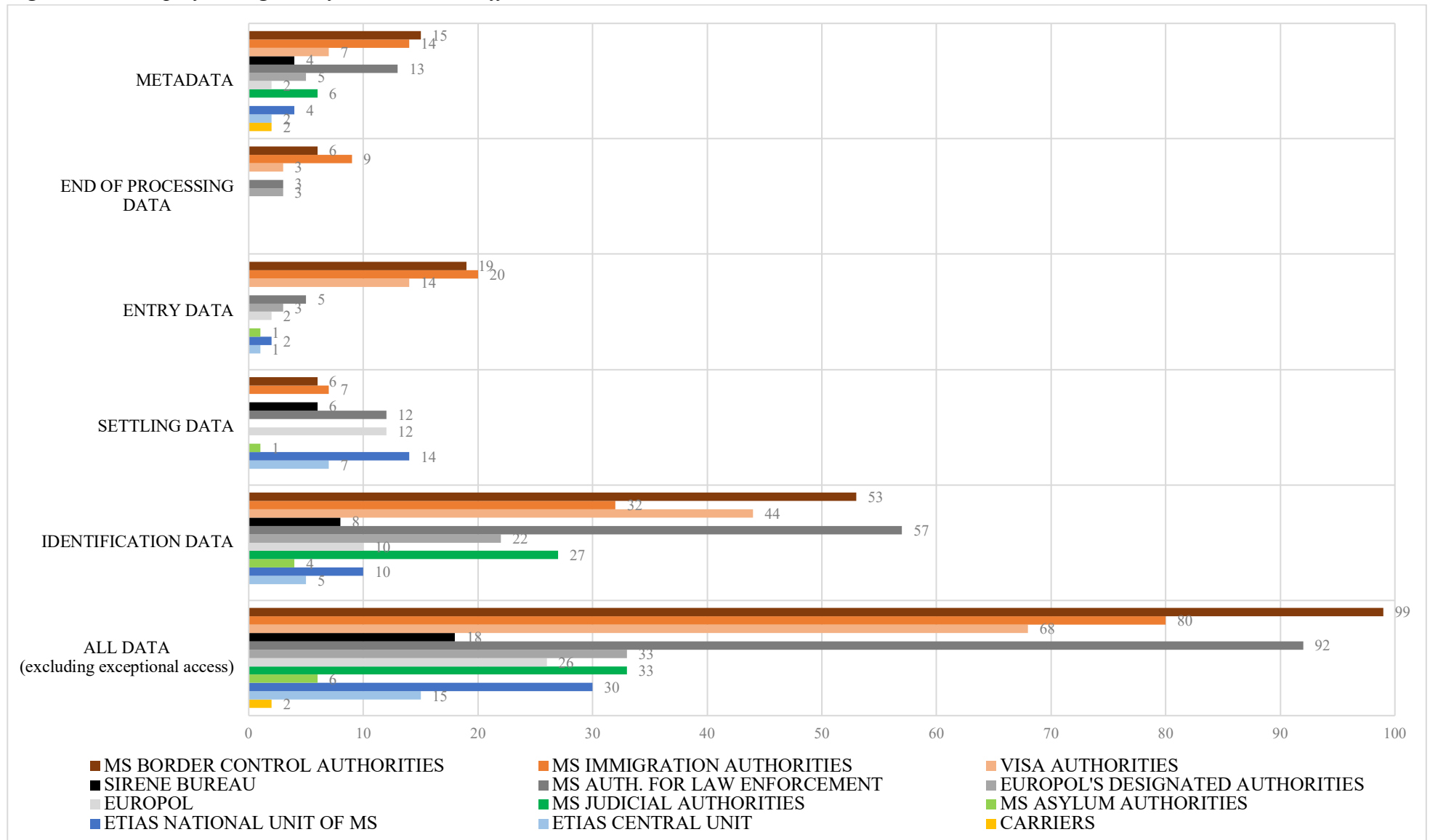


Figure 5. Actors performing role of data inputters, in different networks.



Notes. Numbers indicate actors' weighted out-degree.

Figure 6. Actors performing role of data users, in different networks.



Notes. Numbers indicate agencies' weighted in-degree. Red scale: traditional migration agencies; Grey scale: security agencies; Other colours: other agencies

