

Article

# A Documental Theory Based Approach towards Digital Public Infrastructure

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**Abstract:** Digital Public Infrastructure (DPI) emerged as an ecosystem that intends to permit the delivery of goods and services through digital means. It is the result of an attempt by various stakeholders, both private and public entities, who had used digital technologies with that intention. Several factors that influence DPIs lack a proper definition since DPIs are new systems that are in the phase of development. This conceptual ambiguity regarding various factors reduces the efficiency of DPIs. One among such factors is data whose explanation as information obscures its nature as a social object. The exponential growth of data driven initiatives cannot be explained based on information theories; instead it requires a theory which explains the social nature of data. The *documental theory* of social ontology explains the nature of data as social object, and its influence on DPIs. The understanding of data as social object can inform the design, development, and implementation of DPI in a way it can better deliver public benefit and social welfare.

**Keywords:** Data; Social Object; *Documental Theory*; DPI; Public Benefit

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## 1. Introduction

Innovation and development in digital technologies have significantly increased in the past two decades. Public and private organizations have initiated several projects to facilitate digital transformation in various sectors. The efficiency of digital technology in delivering goods and services for public benefits is an impetus to continue in that direction. There are multifarious paradigms for the digital transformation happening around the globe. The advent of digital public infrastructure (DPI) is one among them. Analogous to the classic infrastructures like roadways, buildings, canals, railways etc..., DPI enables the delivery of goods and services, but through digital platforms. The design, development, and implementation of DPIs have no one size fit all nature, but it is increasingly context dependent. However, a common point of agreement between all DPI initiatives is to assure public benefit or to increase the socio-economic welfare. It is necessary to understand the components of DPIs in order to deliver the public benefit. This paper seeks to investigate the role of data in the working of DPI, and a theoretical background for the former's curation for bettering the latter. The widespread success of initiatives based on digital technologies is largely due to their data driven nature. Data, in its turn, manages to become that force because of its nature as a social object. Unlike the information theories which limits the understanding of data as pieces of information, the *documental theory* captures the social nature of digital data (Adriaans, 2024). The understanding of data as a social object would oblige a multistakeholder participation in design, development, and implementation of DPI; user centric approach; data empowerment and privacy of data subjects; institutional intervention to address inequities emerging from data driven initiatives.

In its ambition to provide a theoretical advice for the practical implementation of DPI on the basis of a broader understanding of data, this paper is divided into four sections. The first section investigates the importance of data for DPIs around the globe. The second section focuses on the interpretation of digital data from the viewpoint of the *documental theory*. The third section further elaborates the *documental theory* of social ontology to prove the way by which it justifies viewing data as a social object. The fourth section outlines how the conception of data can help DPIs to deliver its promise to increase public benefit or socio-economic welfare.

## 2. Data and DPI

Digital public infrastructure (DPI) refers to an ecosystem of technical and non-technical components that facilitate diverse kind of digital activities in human society (Clark et al. 2025). The technological components can be further divided into hardware and software parts as found in information technology sector. The hardware part includes electronic gadgets, databases, fibre optic cables, energy supply etc..., while the software part includes various applications, data, computer languages, digital services & products etc... The non-technical aspect of DPIs include laws, regulations, institutions, & governance frameworks, public oversight, accountability, feedback loops, digital skills & literacy, ICT industry etc... A right combination of all these components would bring benefits to the public as the way traditional infrastructure brings benefits to the society.

Most of the prominent definitions of DPIs agree on the fact that its fundamental purpose is to deliver goods and services for public benefit (Eaves & Rao, 2025). They argue that the technological and non-technological aspects of DPIs should converge to result in public benefit. The insistence on interoperability, privacy by design, inclusion, sustainability etc... found in various definitions are on account of DPIs responsibility towards public benefits. Digitalisation of goods and services has been beneficial for public all around the world. Governments around the globe have delivered several services like e-serviceportals, e-gov applications; digital registries for social protection, business, credit, agriculture; health-sector interoperability and data exchange standards; information systems for digital tax or human resources etc... (Yang et al. 2024; Ozili et al. 2025) Consequently, they have increased the well-being of the general public.

However, implementation of DPI is different from digitalisation of the delivery of goods and services. DPI has the wider ambition of facilitating digitalisation of numerous sectors while 'digitalisation' may refer only to digitalizing any specific sector (Clark et al. 2025). DPIs should, therefore, be conceived as the foundational building blocks that drive digitalisation in several sectors. The building blocks of DPI require to be interoperable, open, modular and minimalist design. As a result, DPI will be able to scale up to most possible sectors with more beneficiaries.

An unavoidable requirement for DPIs to scale up for delivering public benefits is digital data. Data in the context of DPI refers to the information about the individuals and organisations for whose benefit the former is created. Data reflects the needs and interests of the subject because they show their needs and aspiration. The success of DPI adoption depends on the public trust over it in the context of data sharing. Therefore, it becomes an imperative for DPIs to take care of the technical, legal, and operational aspects of data (Eaves et al. 2024).

Data sharing is a fundamental aspect for DPIs. Unlike sector wise digitalisation initiatives, DPIs aim at the transformation of goods and service delivery in benefits all sections of society. It does not limit to specific sectors like health, education, taxation, etc... but the greatest number of sectors possible. It is about improving the general welfare of the society. And the success of the DPI depends on the inclusion of most possible sectors.

Successful DPIs managed to bring in more stakeholders to accelerate their net benefit to the society. For instance, the Uruguay Digital Agenda of Uruguay was a multi-stakeholder process with representatives from government, academia, the private sector, and civil society organizations which allowed the initiative to accommodate most possible sections of the society (Desai et al 2022). Similarly, the Smart Nation and Digital Government Group of Singapore too took the holistic approach necessary for the DPI that culminated in its success (Woo, 2018). More the number of beneficiaries, more will be the success rate of DPI since it manages to cover a greater number of sections of the society. It also implies higher volumes of data and consequent requirements for responsible data stewardship. The DPI ecosystem namely X-tee platform covers more than 1700 services which implies that data of individuals and organisations in 1700 contexts should be managed (World Bank, 2022). Similarly, multi-country frameworks such as the European Union's eIDAS and EU Digital Identity Framework (EUDIF) implies the creation of interoperable data sharing frameworks without which transactions will not take place among individuals and organisations.<sup>1</sup>

The need to deliver benefits to society at scale explains the reason behind the omnipresence of the three most common factors found in any DPI – digital identity; digital payment; data sharing (Clark et al. 2025). They are essential to include all members of the society under the welfare promoting initiatives of DPIs. All of the three factors, especially the last one in particular, are closely associated with data. Data, by virtue of its content, fulfils the need for digital identity for safe and secure interactions of various subjects in the society. For instance, the e-signature carries a fourfold function – (1) identifying the signer, (2) attributing the signature to the signer, (3) recording intent to sign, and (4) assuring the integrity of the signed data and protecting against tampering – without which a transaction would not be safe and secure (Tullis et al. 2024). Digital identity includes cards with chips or QR codes; PINs, passwords and one-time-passwords (OTPs); digital certificates; biometrics; and mobile applications and wallets etc... Similarly, the digital payments are also essentially transaction of data in a more ontologically informed way (de Soto, 2003).

Digital data essentially represents the activities take place in the society. In other words, it creates the *digital twin* of the society by virtue of the data about the social entities involved in transactions using DPIs (Inter-American Development Bank, 2024). The aspect of data sharing receives particular attention in the context of this essentiality of data for DPIs. Successful DPI models have managed to establish robust data sharing mechanism to sustain their DPI ecosystem. In India, for instance, the DEPA outlines the guidelines for data sharing that promote varied uses of data as well as the protection of data privacy (NITI Ayog, 2023). It includes provisions like the creation of a framework for third party “data fiduciaries” to facilitate consent-based data sharing on behalf of an individual, and with the legal obligation. The design and development phase of DEPA involved lengthy and complex procedures with the participation of stakeholders from government entities, private sector, academia, and civil society organisations (CSOs) working on technology, privacy, rights, and development. The European Union's Data Governance Act is also an example for a well curated data regulation framework (Bravo, 2022).

Data is important for DPI for delivering its potential to provide multiple development outcomes in terms of public benefit. DPI has a mandate to substitute the traditional siloed approach to digitalization that excludes several parties (both individuals and groups). Digitalization was heralded as a solution to make the life of citizens easier, but the siloed approach has prevented its effective functioning (OECD, 2024). DPI based digitalization, on the other hand, has succeeded in making digital services in various sectors to serve the respective population better by leveraging on their data without compromising security, privacy, and transparency. For instance, in the finance sector, the G2P payments –

financial transfers from government to people – has been revolutionized to permit more than 865 million people to open their first financial institution account to be served by the government fund worldwide (Demirgüç-Kunt et al. 2022). Data played a vital role in implementing the DPI based G2P payments while saving both time and costs. On a same note, in Singapore, the the Singpass consented data-sharing service facilitated the eKYC procedure that reduced the time to complete digital transactions by 80 percent.<sup>ii</sup> Health sector of various countries, especially, during the time of COVID has benefitted from the DPI based initiatives (Kumar & Veer 2021; Silva et al. 2022)

The success of DPI in fragility, conflict, and violence (FCV) affected countries also owe a lot to the role of data. Data driven interventions on society leveraging the capacities of technology give efficient results. Data allows policy makers to get a more realistic picture about the needs of the population under their target intervention. In Mozambique, a combined birth registration and ID registration exercise for internally displaced persons across the conflict-ridden province of Cabo Delgado allowed the target population to access better social services.<sup>iii</sup> So as the Diia app and ecosystem in Ukraine which leverage DPI to provide a single access point for nearly 120 public services.<sup>iv</sup> The mobile money has been instrumental in delivering social assistance payments in the Grande Anse in Haiti.<sup>v</sup>

The nature of the most essential standards like ISO 8583, ISO 20022, SWIFT MT etc... which used for the working DPI too underscores the importance of the data (Clark et al. 2025). These standards are necessary to carry out the exchange of electronic information between various domains. Policy makers pay much attention in choosing the standards according to which smooth and secure exchange of information can be taken place in a DPI ecosystem. Although exchange of data between domains in a DPI ecosystem follows the rules created on the basis of information exchange principle found ICT, data in itself has much more to it than mere pieces of information. The following section seeks to investigate the actual nature of data that makes them important for DPIs. Evidently, data plays a significant role in the betterment and utility of DPI but it is necessary to identify the 'force' that permits data to do all that it is doing in the DPI eco system.

### 3. Data and Document Theory

Data has proved to be an important component for several initiatives way before it has been used in the context of DPI. Data driven initiatives have found more success in various sectors in comparison with their non digitalized versions (Allen et al. 2025). The plethora of sectors ranges from agriculture, health, education, small scale businesses to space exploration, advanced manufacturing, complex service sector industries etc... The growing interest of enterprises to transform their activities as data driven, paved way to the emergence of consultation services for data management and governance to permit the most possible efficient use of data (Machlankin, 2024).

The capacity of data to bear recorded information assumes the nature of documents than mere pieces of information. Documents are recordings of human acts they have voluntarily or non-voluntarily created. The popular understanding of document consists in seeing document as any piece of paper which bear some sort of information. However, the studies centred around the '*document theory*' that gained academic interests discuss the complex nuances of documents (Buckland, 2018). Consequently, document got an interpretation that is complex enough to cover all the things it represents. Suzanne Briet, for instance, has described document as evidence in support of a fact and could be any physical or symbolic sign, preserved or recorded, intended to represent, to reconstruct, or to demonstrate a physical or conceptual phenomenon (Briet, 2006).

Therefore, beyond the shallow understanding of documents as pieces of paper containing some sort of information, document theorists brought to light the actual nature of documents. Not only books, articles, and letters, but also music, pictures, and sound recordings etc... can be considered as documents. In a wider canvas, museum objects, animals in a zoo, or a landscape could be categorised as some kind of documents (Greneresen, Kemi and Nilsen 2016). Documents bear information of several kinds which are useful for human beings. The capacity of documents to store information allowed human beings to inscribe the information that manages their collective living on documents. They started recording their agreements and activities on various kinds of documents which became the ontological basis for their societies. Ferraris formulates this way of creating social reality by recording human activities on documents as:  $SO = IA$  i.e. social objects are inscribed acts (Ferraris, 2012). For the same reason, any social object like the President of a Republic, an academic title, an organ of a Government etc... can be traced back to a document which permits its existence. Section four contains more detailed description on how documents ontologically accounts for the existence of social objects

Data is among the recent types of documents in human society. Data satisfies the three essential aspects of a document proposed by N. W. Lund – physical, cognitive, and social (Lund 2004). Documents cannot exist without a physical medium which bears the information that it represents. It could range from clay tablets, papyrus, paper, microfilm to any medium that bear digital information. The nature of documents to exist on some physical medium is the fact that provides it with functions that mere information cannot achieve. It allows documents to be used in many ways like writing, printing, copying, digital manipulation etc..., and consequently letting people to do things with documents. Data requires a physical medium to exist and resembles the nature of a document in that regard. Secondly, the information contained in data represent entities or state of affairs of interest to its creator or perceiver. Consequently, it satisfies the cognitive condition for being a document. Data produces meaning with respect to the context in which it is created or evaluated. Thirdly, data fulfils the social aspect criteria for being a document. Documents are ontologically related to society since the latter may not exist in the absence, so as the former does not make sense in the absence of the latter (Ferraris, 2012). The information contained in the data becomes useful for the data users by virtue of its social aspect. If the information has been detached from the society, no one would have used data for making interventions in the sector which the respective data represented.

The foundational blocks of DPI include the physical layers like data centres, internet connections, gadgets etc... as essential factors because it has to support data storage and data exchange. This underscores the documental nature of data from the standpoint of its physical nature. Meanwhile, the information provided by data for carrying out various data driven initiatives satisfies the cognitive criteria of documents. Digital identity is among the three essential pre-requisites for any DPIs for being functional. Digital identity validates the individual who bear it in the particular social context. It is the entry point for any individual who needs to be a beneficiary of the advantages brought in by DPI. Apart from digital identity, the variety of data types across different sectors provide the respective information which becomes information for planning for the corresponding sector. Data exactly replicates the cognitive value found in documents in this regard. Finally, the cumulative value of data testifies for its social aspect. The value of a unit of data increases when it is compared or put together with several other data. The value dynamics behind big data lies in this possibility of data to be compared with other numerous units of data to derive insights. The dependence of data on other data for its value generation in a DPI ecosystem proves the social nature of data. The cumulative value of data in turn is dependent more explicitly on the fact that the information bore by data is about the social reality it represents. Even if the content of data is not about a person or a group, the fact that the content of data is of interest for a person or a group

adds the social value to data. For instance, the data about climate change issues contain information about the nature, but human beings are interested because it is something that matters to human race. As long as data contains the information that is of interest to human race, it will continue to satisfy the social criteria for being a document.

Similarly, data in the DPI system satisfies the interpretation of documents by the document scholar group Roger Pédaque as well. According to Pédaque, a document is a mediation device—an informational object whose significance is constructed and maintained through its use in social contexts (Pédaque, 2003). They are not merely static objects but dynamic entities situated within social practices. It is articulated that any document involves three primary dimensions – seen (form), read (content), and understood (medium). The physical aspect of document includes its layout, structure, and material support. Digital data may not be very pronounced as the classic entities that assumes the status of document. However, the differences in the perception of digital data owing to its respective nature justifies an attempt to outline its ‘physical’ nature. The form of data changes according to the format in which it is stored. The data held by platform x, may not be perceivable to platform y, and therefore, not perceivable. In this case, data assumes the form of physical objects that offer some kind of resistance that let perceiver to perceive the latter’s objectivity (Ferraris, 2014). One among the hurdles that prevents the smooth exchange of data is the differences in their form that does not let all perceivers to perceive them. The read (content) aspect of document is very evident in data as no data exists without some kind of information it represents. The understand (medium) aspect of document refers to ways in which documents function as media within societal frameworks, encompassing how they are used, interpreted, and the roles they play in communication and meaning-making. Data in DPI very well suits this category since society is the factor that define purpose for data. It has been used for delivering goods and services in a better way to people and thereby improve the public benefits.

Documents have these three aspects by virtue of the fact that they are created by human beings, although the platforms on which they exist are not necessarily so. A document can be created intentionally by an agent or it could be created by attributing the nature to a material platform (Tricot, Sahut and Lemarié 2016). This aspect of creation gives documents perceivability, readability, and interpretability. On the same way, data is also created by the activities of human beings on various online digital platforms. They may not be created intentionally, but as a by product of the activities someone does on the web. However, the use of data unintentionally produced on the web for the sea of several other purposes shows that data assumes value contextually as in the case of several documents. For instance, the energy bills paid online by the users could become a data which can tailor the efficient energy use practices for them. The users may never have an intention for improving their energy use behaviour while paid their bills online. On the other hand, the e-signature created by an individual using a PKI (public key infrastructure) is purely intentional. Likewise, the data in DPI falls in either of the two categories resembling the intentional and attributional aspects of documents.

Documental nature of data is the factor that allows the conception of meta data, anonymisation, techniques like adding noise to preserve the privacy etc... Paul Otlet isolated facts from authorial discourse so that each item of information “has its own identity,” enabling granular citation, recombination, and cumulative science across disciplines (Frohmann 2008). He conceptualized documents as representations of facts about the world, serving as elements within a vast and organized system that could collectively mirror the world itself. Data need not necessarily connected with its authors for making use of it. Moreover, the projects which use data in a way not permitting to trace back to the individual represented by it is more appreciable in DPI ecosystem. The nature a possible detachment between the author and his/her document resembled in data

allows better data use in several instances. There are, however, exceptions as in the case of digital identities.

The capacity of documents to bear information by virtue of recording human activities is explicit in data as well. Documents have the capacity to both create social reality and bear information, or simply bear information about social reality. Data satisfies all the essential characteristics of documents discussed by several documental theorists as mentioned before. Therefore, data contains the trait of the documents that played an essential role in the creation of social reality. A more vivid description of the social ontology based on the documental theory is discussed in the next section.

#### 4. Documents and Society

The documental nature of data allows DPIs to use them for delivering goods and services efficiently. DPIs are different from other traditional infrastructures like roads, building, water canals, railways etc... because of its use of data which is documental in nature. The capacity of data to bring both positive and negative disruptions in society by virtue of its documental nature requires an interpretation based on the *documental theory* of social ontology.

*Documental theory* of social ontology explicates the role played by documents in the creation of the society. Thinkers have spent considerable amount of intellectual labour to identify the ontological basis of society as evident from the myriads of theories in the field (Epstein, 2025). Earlier thinkers like Thomas Hobbes proposes the idea of social contract as the basis for the emergence of society. People come together to agree upon certain shared ways of life which culminates into society. Meanwhile, Samuel Pufendorf of the same period notes that it is not necessary to have an explicit agreement from the side of members of society to be part of it or form it. People could be unaware of the practices they are involved while acting as members of a society. There has been also attempts to draw parallel between natural order and social order in a way that social order is an imitation of the natural order or identifying God as the source of the former who's also the creator of the latter.

More refined attempts to investigate the ontology of social reality is found in later thinkers who tend to base it on the mental states of individual persons. For instance, J S Mill considers society as an aggregate of human minds. Similarly, several scholars based their theories on mental properties of individual persons as the ontological base for society. However, this 'individualistic' approach has been challenged by the 'holistic' view of social ontology. For instance, the idea of World Soul proposed by Hegel leads to identifying social entities as fundamental, independent, or autonomous entities than something resulting from the aggregation of individuals. The nature of debate between the 'individualistic' approach and the 'holistic' approach seems to assume the nature of the problem which may not let to arrive at some concrete conclusion (Epstein, 2024).

On the other hand, the intentionality theory proposed by John Searle offered a better explanation although it tends to fall into the category of 'individualistic' approach. The theory of intentionality sees social reality or society as the aggregate of social objects. Social objects follow the rule – any natural object Y becomes a social object X, in the context C, which is determined by the collective intentionality of a group. However, it fails to account for social objects that does not have a corresponding natural object as in the case of debts (Smith, 2012).

The *documental theory* of social ontology overcomes the problem of social objects which do not fit into the category of Searlean theory (Ferraris, 2012). Human beings started to live in groups since they find it easy to meet various kinds of their needs. They used to keep

track or record of their activities which allowed them to realise or satisfy their various needs and better them as the population grew. The complexities of the recordings and traces increased along with the timeline of the species, their population, varieties of their needs and activities grew. These traces or recordings are essentially the documents that defined the formation of human societies. The habit of human species to document their activities, especially the ones they did collectively, provided them with a reference point which kept them together in groups. It was not the collective intentionality of the people but the externalization of it in the form of documents led to the emergence of society. Moreover, the documentality theory does not seek to arbitrate between the 'individualistic' approach and the 'holistic' approach. Society is neither a 'given' as instructed by the holistic vision, nor a collective of individual human minds as instructed by the individualistic approach. Society is the result of documents which records the activities of human beings on course of realising their myriads of needs, and according to which they started to organize their individual and collective way of life.

The concreteness of the documents in terms of form, content, and medium allows the creation of social objects which account for the social reality. The absence of documents would have rendered human race in continuous beginnings without history, progress or functionality, both in collective and individualistic terms. The being of a social object is accounted by the document underpinning it. For instance, an individual person who fulfils the criteria to be a natural object with the blood and flesh transforms into a social object like a citizen by virtue of a document issued by any nation state which in turns depend on another hundreds of documents for its existence. Undeniably, there is a collective intention involved in the formation of any social object like a state or a citizen. However, the collective intention will not be realised if they are not externalized into certain documents. This is evident from the fact that any entity that falls into the category of social objects will have its being dependent on some sort of document. A counterfactual would prove the case. No entity which is identified as 'social' would exist in the absence of a document validating its existence. It applies to both individuals and collectives that are qualified as social objects. All of them are essentially tied up to a document, and any change to them cannot be brought in without making a change to their respective document. However, not all documents actively engage in producing social objects.

Ferraris distinguishes between strong documents and weak documents (Ferraris, 2012). Strong documents have constitutive value since they actively create social reality, while weak documents have registrative value since they merely contain information about the social reality. DPIs contain both strong and weak documents by virtue of the data involved in it. Digital money as data is a strong document since it creates the social object, money, while the the data about the transactions done by digital money is a weak document. Information theory fails to distinguish between this difference between data and applies the logic of computing for their processing. Meanwhile, documental theory recognizes this constitutive and registrative differences between data by virtue of being documents.

The capacities of DPIs for creating far reaching consequences than the classical infrastructure is due to the presence of data with the documental nature. For instance, the direct benefit transfer (DBT) initiatives which are part of the government to people (G2P) transaction of government aid has proved better for delivering social welfare (Gandhi, 2025). The traditional means of benefit transfers had several drawbacks like leakages, corruption, malpractices etc... The digital identity and digital payment methods of the DPI painted a more accurate picture of social reality. Consequently, the DBT reached to the target groups who are in most need of it, overcoming the traditional hurdles like leakages that prevented the transfers. DBT is one among the several instances which shows how DPI system can fulfil one of the basic mandates of human societies – need

satisfaction. DPIs, by virtue of their data driven approach furnishes the actual status of the social reality representing it most closely possible. Although the problems like bias persist in data driven system, it is apparently a better way of bringing changes to social reality.

### 5. Documentality and DPIs

Social reality is directly related to functioning of DPIs and DPIs shape the nature of social reality. The *documental theory* of social ontology becomes a bridge between the two things when it explains the documental nature of data. Social reality here refers to the rules, regulations, institutions, governance practices etc... that constitute the society. A proper organization of the social reality is necessary for developing DPIs that can deliver public benefits efficiently. These non-technological factors play an important role in the designing of the technological aspects. For instance, a revised law on access to information, the adoption of a law against cybercrime, and the new data protection law were crucial in the implementation of DPI in Jordan.<sup>vi</sup> The civil society organizations (CSOs) were important in realisation of the digital transformation initiative. Meanwhile, Commission Report on Data Availability and Use that preceded the Consumer Data Right framework was crucial in Australia.<sup>vii</sup> Further, unlike the development of traditional infrastructure, DPIs require more close user participation during its design and implementation phase. Participatory design mechanisms are necessary for ensuring user adaptation which is essential in deciding the success of the DPI. Shaping of the social reality in tone with DPIs is a common trait found in successful DPIs around the world. Mauritius' National Open Data Policy, which mandates the creation of Open Data teams within each ministry; Singapore's Digital Readiness Blueprint for enhancing digital skills and better compensation for digital talent; Australia's Consumer Data Right (CDR) which gave better agency for data subjects are examples of non-technological interventions that led to the creation of digital infrastructures that improved welfare of their citizens (Desai et al. 2022). There are several other instances where right political interventions supported by strong political will has brought public benefits (World Bank, 2024). In any case, shaping of social reality has been pivotal in deciding the successful implementation of DPIs.

On the other hand, there has been tangible impacts on the society by DPIs. People have extensively benefited from services built on DPIs more efficiently in comparison with their respective traditional modes. It can bring in desirable changes like inclusion, equity, welfare etc... to the social reality. It would tune the nature of society in a way making it better living space for people. For instance, the GOV.UK OneLogin allowed over 6.2 billion to access over 50 types of government services and rated the app with a 4.8 star in app stores.<sup>viii</sup> It shows that people are satisfied with the services on contrary to the usual dissatisfaction that people undergo while receiving traditional bureaucratic procedures. Similarly, the EU Digital Identity Wallet allows EU residents to store and share a wide range of attributes held by public bodies, for example, name, address, tax information, the right to apply for social benefits, student qualifications, and the right to drive in more efficient ways.<sup>ix</sup> The government-based registry Cadastro Único of Brazil has allowed the government to support low-income households by several government welfare schemes (OECD, 2024). The Big Data Platform at the Kenya Agricultural and Livestock Research Organization (KALRO) of Kenya has served over 6.5 million farmers access diverse digital services, and has fostered several innovations, including location-crop-growth stage specific digital climate advisory services, crop-livestock-pasture selector, and digitized Good Agricultural Practices (GAP) advisory services.<sup>x</sup> Similarly, several other interventions from the side of the DPIs have render societies better place to live in terms of the welfare.

The two-way influence between social reality and DPIs seem to increase in the course of time given current state of affairs. The numerous digitalization missions initiated by governments and other organisation signals this probable increment (Yang, 2024). The current research gap in the field of DPIs in relation to data governance fill the sector with issues related to privacy, data silos, data monopolization etc... (OECD, 2024). One of the reasons for the issues in the sector of data governance and DPI stem from the inadequacy of information theories to capture all aspects of social reality. Information theories employs the tools and methodologies of mathematics to permit the storage and exchange of information (Adriaans, 2024). They effectively function in the context of digital reality, but proves to be inadequate to interpret the blend of digital reality and social reality. Information theories consider data as information risking the hiding of the social aspect of data. Interpretation of 'data as information' does not necessitate the evaluation of data driven initiatives on the social fabric. Tech companies and other enterprises can make use of data for achieving their vested goals in a 'data as information' perspective. Regulators do not find a reason to intervene proactively to design data driven initiatives for the welfare of the society. Meanwhile, interpretation of data as documents brings to light the social significance of data. The 'data as document' perspective recognises the context of the actors and their activities which makes up the information contained in data. Data driven initiatives perform better with respect to their non data driven counterparts because of data capturing the context of the actors and activities whose information make it up. If the effective functioning of data driven initiatives stems from the documental value of data than informational value, then it should be governed according to 'data as document' perspective. Further, the latter provides good reason for regulators to proactively intervene in regulating data driven initiatives in a way that it increases social benefits. The inadequacy of 'data as information' perspective upheld by information theories for data governance is more evident in DPI sector.

There are DPIs which have employed the 'data as document' perspective as in the case of Open Network Digital Commerce platform which is part of the Indian DPI, India Stack. Although the initiative does not explicitly recognise data as document, the treatment of data is based not on its informational value but on its documental value as a social object. Consequently, it created a level playing field for SMEs in the e-commerce sector to compete with tech giants like Amazon (Mahajan, 2025). The 'data as document' perspective adjusted the social reality (rules, regulations, institutions etc...) to create the DPI (ONDC), and later, the effective functioning of the latter brought in constructive changes to the social reality (eg. benefits to SMEs, more choices for consumers etc...).

Information theories fail to contain the mutual influence between DPIs and social reality permitted by data. Information theories focuses on the exchange of data between various systems while documental theory investigates the purposes and results of data exchange. Information theories may be efficient in designing and running data driven initiatives but fails to address the problems resulting from data exchange. Moreover, it cannot manage to redress the issues related to technological fix or techno-solutionism. For instance, the use of differential privacy has been heralded a method to overcome the issue of privacy risks. However, it has not found success due to the necessity to protect the contextual nature of data in conceiving efficient data driven initiatives (Schneider et al. 2025). Differential privacy system fulfills the norms of information theory but produces undesirable effects by limiting the utility of data. Documental theory, on the other hand, can combine the qualitative aspects like transparency, inclusion, participation etc...with the quantitative aspects of information theories to produce the desired effects. Interpretation of data as social objects obliges stakeholders to conceive data driven initiatives that produce social value. And people are more open to share their data in more transparent systems for the initiatives that produce more social value (Silber et al. 2023;

Oslen et al. 2025). Therefore, documental interpretation of digital data as social object solves the issue that informational theories cannot solve.

The understanding of data as social objects by virtue of its nature as document explains the two way relation between DPIs and social reality. Information theories can facilitate the mutual influence between the DPIs and social reality but cannot provide sustainable solution for the problems found in the system. The ontology of data as a social object necessitates more transparent and close collaboration with individual person and groups (companies, institutions, governments etc...). Information theories does not obligates this collaboration, but instead, sides with the easiest and most efficient way of data use and exchange.

DPIs can continuously ensure the right dynamics between the individualistic and holistic aspect of society. It explains how the needs of individuals require them to work in groups for its satisfaction, and recording their collective and individual actions to create social reality. However, in functional terms, the tension between the individual and group persists. The tension between individual privacy and use of data for socially beneficial purposes is a paradigm for this tension. *Documental theory* recognizes the role of each individual in shaping the social reality, and at the same time the necessity for the individual to contribute to shape social reality which he/she constitutes. The current data governance models simply replicate the already existing whole-and-part tension by taking sides – either too much with the part or with the whole (Evren et al. 2022). *Documental theory* recognizes the continuum of the part-whole reality that influence and inform each other to constitute the social reality. Consequently, it recognises the need for continuous institutional interventions with participatory methodologies for the preservation of that continuum. The success of DPIs to a large extend will be determined by its capacity to strike the right balance between the part-whole continuum. Therefore, it would be ideal for DPIs to be streamlined on the basis of documental interpretation of social reality. It does not subsume the role of individual under the shadow of society because without the individual data, no data driven initiatives would exist. At the same time, it make use of data value for increasing social welfare because a contrary situation would lead to the misuse of data that will cause negative disruptions in the society.

The regulatory frameworks that govern the creation of digital identity, digital payments, core data registries, data sharing systems, digital notifications, digital post, and single digital gateways could be streamlined in the light of *documental theory*. It obliges and justifies prioritising the bottom to top approach over the top to bottom approach. The latter has been proved a less efficient method of policy making in terms of the outcomes in several scenarios (Hudson et al. 2019). DPIs in particular, are more prone to fail if policy makers adopt a top to bottom approach while would emerges as successful in case of a bottom to top approach. *Documental theory* can inform guidelines for the nature of interaction between these stakeholders so as to decide the importance given to each of them. Moreover, it decides the principles according to which decisions should be made in terms of privacy protection, equity, inclusion, openness.

*Documental theory* can fulfil the mandate of DPIs to remain user centric. Integration of human centric design into DPIs will make it effective, efficient, and user-friendly, and consequently encourages its adaptation. The importance given to data subjects in *documental theory* by virtue of the former's role as social subjects encourages human centric design. The actual state of affairs that see data as information sidelines data subjects to give undue importance to data users and data regulators. While data users are interested in promoting their own interests such as profit maximization using data, data regulators limit their role in conceiving frameworks that protect privacy. *Documental theory*, on the other hand, introduces data subjects as agents who has more say on the question of data

governance. They are neither considered as data producers for data users, nor reduced as vulnerable population to privacy breaches as seen by data regulators. Instead, they are given active role in data governance systems where they can decide the purposes of their data's use, and equitable recipients of their data's benefits. There are already paradigms of this kind as in the case of data-based credit lending which allow data subjects to gain financial benefits based on their data (Leonardo et al. 2024; Chioda et al. 2025). A more holistic and wider view of data under the documental view would permit the scaling up of such initiatives to scale up to other sectors than their limited application in the financial sector. It provides a user centricity where the delivery of goods and services will be conditioned in the best interest of the society because the basic constituent of the society – data subject/individuals – are empowered.

Further, the *documental theory* offers a point of reference to decide the nature of scalability of DPIs. Scalability is an important feature for all types of DPIs both qualitative and quantitative terms. On the same note, international co-operation is very important for DPIs for improving their capabilities. Digital co-operation becomes a common point for nation-states to collaborate between them as in the issues like tackling down problems like climate change, global poverty, nuclear energy etc... Constructive use of digital data would allow the socio-economic welfare of every nation-state. Cross border collaboration for data exchange can increase that socio-economic welfare (Campmas et al. 2022). Consequently, it becomes necessary for having a common theoretical ground agreeable for nations of various socio-cultural, political, and economic contexts to interact each other. The *documental theory* suits the purpose since it provides the basic interpretation of the social reality which is common regardless of the differences between nation-states. This would enable to streamline the rules of data exchange between countries which often poses a hurdle for DPIs to scale up cross borders. The fact that data is a social object and it should be used for the benefits of the society in the best way possible without compromising individual interests seems to be agreeable for all social contexts as a starting point for policymaking in international context.

*Documental theory* can also offer a solution for finding strategic investment and funding for DPI design, development, operation, and maintenance. Governments and private parties would require invest large amount of money for building and maintaining DPIs (Clark et al. 2025). A probable way to find out funding would be to create debt to find credit for financing DPIs. However, the debt driven development turns out to less sustainable, and adding up to the global issues of the decade (IMF, 2022). Although debts are not disadvantageous in itself, it would be better to set it aside if there are some other means for finding capital. The documental interpretation of data offers means to conceive strategies that allow to use data for funding DPIs. The inequitable business model in the data driven sector let a few tech companies to earn huge amount of money while the data subjects, whose data fuels the growth the tech companies, are left behind. The perception of data as a social object would obliges the social systems to put in place mechanisms to overcome this problem (Ferraris, 2025). Investment of resources on data driven initiatives shouldn't be limited to private sector businesses but extend to more social welfare initiatives. For instance, the lack of interoperable data system costs a loss of EUR 3.3 bn for Italian health sector (The Lancet Regional Health – Europe, 2025). If the standardisation of health data through the optic of social object create interoperable data across the state, the lost money can be saved in order to finance more DPIs.

A practical solution to realize the two ambitions – equitable distribution of data value and funding for DPIs – would be to conceive entities that can put in place effective data management. There are already entities like data collectives, data cooperatives, data unions, data trusts etc... which act as stewards of data management. An idea to create a similar entity which could both generate monetary value and promote social equity is not

far from reality. Platform cooperatives and data cooperatives can be considered as the forerunners in this regard (Loi et al. 2023). A strong political will and right institutional intervention would allow for the creation of such entities that can provide sustainable financial resources for the DPI than debts. The capital generated through these means may not be as high as traditional investments like venture capital, crowd sourcing, angel funds etc... However, the conception of non-traditional investment sources based on data would encourage the fine tuning of data management practices and sustainable source of capital formation.

The documental interpretation of data makes the improvement of social welfare using data an imperative than an option. The novel approaches like the *webfare* are pioneers in this line (Ferraris, 2024). The emergence of various kinds of data intermediaries signals the need for reframing the current data governance and data management practices. However, they are considered as desirable practices to address the inequitable and inefficient practices in data exchange, but not as mandatory obligation to promote equity and efficiency in data use. The members of the society have the right to receive welfare benefits on account of the *prosumption* activities that they have done in the web (Ertz et al. 2025). Any failure to recognise this right would eventually culminate in wealth inequality and power imbalance as seen in the present status quo of data driven sectors. DPis need to be designed in a way to redress such problems, and makes the improvement of welfare based on digital data an obligation, not an option.

## 6. Conclusion

The success of a digital public infrastructure is not solely dependent on data governance. However, it plays a significant role in deciding the successful designing, development, and implementation of DPis. Therefore, it is necessary to have a proper understanding of data in its role to assure public benefit. *Documental theory* interprets data in a way that it can realize the goal of public benefit by shaping DPis for socio-economic welfare. It fills the research gap which obscures the real nature of data under veil of information theories. Although data contains the information about the individuals and groups it represents, the factor that allows multiple use of data is its social nature. Recognition of the social nature of data provide a theoretical foundation for the standardisation of data across diverse range of organisations.

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