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Review



Citizen-centricity in digital government: A theoretical and empirical typology

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ABSTRACT

Putting citizens as the cornerstone of a policymaking or service design process is usually referred to as citizen-centricity and is often considered a key practice in the context of digital government transformation. Nevertheless, the lack of a common comprehension of what citizen-centricity entails leads to practical and theoretical difficulties, among which the confusion generated by the multiple heterogeneous definitions and the difficulty of measuring the level of citizen-centricity of a digital initiative, to cite only two. As an answer, this study characterizes citizen-centricity by suggesting a typology grounded in theory and practice. It does so by surveying the recent scientific literature using a systematic literature review of 58 studies, combined with 14 qualitative interviews with public agents. The key contribution from our citizen-centricity typology is threefold. First, by emphasizing four understandings of citizen-centricity, sometimes referring to an end-result, a design process, a governance mode, or a way of identifying the user, we demonstrate that the concept has the potential to encompass a multitude of disparate realities. Furthermore, it provides a crucial lens through which to comprehend the concept, thereby facilitating alignment between stakeholders engaged in the pursuit of citizen-centricity. Second, we identify the characteristics given by the literature and practitioners for each understanding. Finally, we suggest that the four understandings of citizen-centricity cannot be sequenced, even iteratively, since they interact continuously. These contributions should guide future research and facilitate communication between research and practice about this concept.

1. Introduction

At a time of increasing digital government transformation, most of the initiatives lean towards improving the digital services offered to citizens and promote this trend (Pawlowski & Scholta, 2023; Ravšelj et al., 2022) by using terms such as "user-centricity" (Eurocities, 2022), "citizen-centricity" (European Commission, 2023a) or even "human-centricity" (European Commission, 2023b). For example, the European Single Digital Gateway Regulation requires the member states digital service platforms to be "user-centered" (European Parliament & Council, 2018) without defining it clearly. Although these terms are not new (Bertot et al., 2008), several government initiatives show there is no consensus on the meaning of these terms, i.e., each initiative claiming to be citizen-centric is often very different in terms of the methods used, and the results obtained or sought (Lim et al., 2018a).

In the absence of a legal definition of this concept, or of a legally imposed measure, the rules of interpretation of legal texts require seeking a common agreement on the meaning of the concept, for example in the scientific literature. However, as pointed out by many authors (Kamaruddin & Johari, 2023; Lee & Lee, 2014), there is currently no clear and consensual comprehension of the concept, and many different definitions are proposed (Anthopoulos et al., 2023; Dopp et al., 2019). For example, in Sundberg and Holmström (2023), the authors propose an integrative framework that leads to citizen-centricity, without providing a clear comprehension of the concept. This raises several problems from both the academic and practitioners' point of view. From an academic point of view, the absence of a clear comprehension prevents theories from being built on this consistent foundation (Dopp et al., 2019; Kamaruddin & Johari, 2023). There are many theories that use the term "citizen-centricity" or similar terms to measure the extent to which the actions implemented by a government are citizen-centric (Kamaruddin & Md Noor, 2017). However, the lack of certainty regarding shared understanding of this concept poses a risk of compromising the accuracy of subsequent research (Dopp et al., 2019).

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From a practitioner's perspective, several risks have been reported in the literature. First, the lack of a clear and consensual comprehension prevents the creation of indicators to measure the citizen-centricity of a project (Costales, 2022; Pacheco Rocha et al., 2022). Second, the assumption is often made that, if projects aim at improving the daily life of citizens in some way, they are citizen-centric (European Commission, 2017; European Parliament, 2013, 2018) at the risk of committing an illogical shortcut, since this does not indicate the citizen-centric nature of the result (Costales, 2022; Dopp et al., 2019). Sometimes the result is even negative, for example when it induces the manipulation of behavior through unethical uses of data (Ahmad et al., 2022). This assumption could lead to (i) a mismatch between the needs of citizens, and the solutions provided by the government (Costales, 2022; Valdez et al., 2018), (ii) poor adoption by the citizens (Costales, 2022), and thus inefficient resource consumption (Pacheco Rocha et al., 2022).

Considering the elements presented above, it appears that both public administrations and research could benefit from a typology of citizen-centricity, i.e., a set of "*categorizations that explain the fuzzy nature of many subjects by logically and causally combining different constructs into a coherent and explanatory set of types*" (Cornelissen, 2017, p.5). We thus define our research question as "**How do researchers and practitioners characterize citizen-centricity in a digital government context?**". We characterize citizen-centricity by suggesting a typology articulating the four understandings of citizen-centricity: End-result, Design, Governance, and Users. To do so, this paper conducts a Systematic Literature Review (SLR) of 58 studies and 14 interviews to collect both academic and practitioner insights on (1) the definitions and understandings of citizen-centricity, (2) the characteristics of those understandings of citizen-centricity, and (3) the continuous nature of the concept.

This paper is structured as follows. In section 2, we review the attempts at conceptualizing citizen-centricity, underlining the need for our work. We then address the methodology followed in section 3. Section 4 presents the results of the SLR and interviews following the different dimensions analyzed, to allow building the typology. Based on this, we discuss the findings, research directions, and contributions of this study in Section 5 and conclude in section 6.

2. Research background

Before exploring further the scientific literature on citizen-centricity, it should be noted that the United Nations has attempted to define the concept while remaining vague about what it includes in practice. According to the UNO (ECOSOC) (2015), citizen-centricity requires the redesign of institutions to be more flexible and responsive to citizens' needs, which is essential to improving public service delivery. This transformation involves developing public service capabilities through targeted training, fostering a culture that prioritizes citizens' needs. Promoting transparency is another key component, achieved by making information easily accessible, raising awareness about relevant policies, and empowering citizens to effectively utilize this information. Additionally, streamlining processes is crucial to enhancing citizen engagement in monitoring and providing feedback. This ensures that robust mechanisms are in place to analyze and respond to citizen input, creating a more responsive and accountable public service. Although these principles provide food for thought, they do not conceptualize citizen-centricity; rather, they present it as an ideal to be achieved. The Organization for Economic Co-operation and Development (OECD) endeavors to provide a definition, but remains cautious in its conceptualization, confining itself to the following: "Citizen-centricity is about making the appropriate policy and expenditure decisions that respond to and anticipate the needs of citizens" (OECD/Asian Development Bank, 2019).

In order to address this lack of conceptual clarity, it would be beneficial to examine the scientific literature. Three trends emerge from it, regarding the conceptualization of citizen-centricity. Firstly, current models do not provide a comprehensive explanation of citizen-centricity, making it impossible to produce an adequate understanding. Secondly, a range of disparate techniques are referred to as "citizen-centric", but this does not allow us to understand the concept as such. Finally, citizen-centricity is sometimes used as an approach, a philosophy or a context. However, mentioning that a study is citizen-centric, or

Table 1
List of secondary studies collected via the systematic review process.

	Study	How does it address Citizen-centricity	Application domain
Models	(Azma Kamaruddin & MdNoor, 2017)	Transparency and openness; citizen-driven services; participatory democracy; co-creation of value.	Governmental websites
	(van Velsen et al., 2008)	Attitude and experience; actual use; system adoption; system output.	Adaptive and adaptable systems
	(Abu Bakar et al., 2021)	Citizen needs; needs satisfaction.	Legacy Systems
	(Wilkens et al., 2021)	Trustworthiness and explainability; regulation; Protecting individuals, Personality enhancing, compensating deficits, enhancing potential.	Artificial Intelligence
	(Unruh & Junior, 2021)	Various User/human-centered design techniques	Physical Product Development Processes
	(Christiaanse, 2023)	Governance principle	Civil Society Actors
	(Sundberg & Holmström, 2023)	Qualifier of government types shaping citizen-centricity	Digital Government
Techniques	(Beux et al., 2018)	Scrum; XP; TDD; DSDM	Agile Design Processes
	(Bharosa, 2022)	Design thinking; user journey mapping; value sensitive design; moral impact assessments	GovTech
	(Duque et al., 2019)	Learning; adjusted design; increased sense of participation	Elderly use of UCD techniques
	(Machado et al., 2020)	Models to assess the combined use of user centered design techniques and Lean Start-up techniques	IT companies
	(Zorzetti et al., 2021)	Models to assess the use of user centered techniques and Lean techniques and Agile techniques	IT companies
Research context, approach or philosophy	(Costales, 2022)	Techno-centricity vs. human-centricity	Smart Cities
	(Martin et al., 2018)	Techno-centricity; digital-centricity	Smart Cities
	(Ahmad et al., 2022)	Techno-centricity vs. human-centricity	Smart Cities
	(Ghareeb et al., 2019)	eGovernment adoption	Digital Government
	(Dixit et al., 2022)	N.A. (Approach of the paper)	Blockchain & Smart Contract
	(J. Scott et al., 2021)	N.A. (Approach of the paper)	Employees retention
	(Kolesnichenko et al., 2021)	N.A. (Context of the study)	Smart Cities
	(Mortaheb & Jankowski, 2022)	N.A. (Context of the study)	Smart Cities

that it is based on the emergence of citizen-centricity, does nothing to help us understand the concept of citizen-centricity. In Table 1 we show all the reviews found in the literature during our two SLR iterations and how they treat citizen-centricity. Since they are reviews, these studies are not included in the studies collected by the SLR (since they are not primary), as suggested by Gupta et al. (2021) or Chua et al. (2024). Inclusion of these sources would have resulted in the generation of redundant content through the process of snowballing, and would not have yielded any additional pertinent material, given that they pertain to disparate fields of application or adopt a distinctive methodological approach, as detailed in Table 1 and the subsequent text. We thus present them in the background section to highlight the heterogeneity of the extent of synthesis work (Stermieri et al., 2023).

Current explanatory models do not allow for defining the concept of citizen-centricity, as authors proposing models also argue that citizen-centricity lacks a clear and unique definition (Kamaruddin and Noor, 2017). An attempt to systematize the concept of citizen-centricity, considered from the demand perspective only, has been proposed in Kamaruddin and Noor (2013), in which a citizen-centric service allows the citizen to play a role at least at some point in the value chain, with the government being more responsive, transparent, and adaptive. Nevertheless, authors readily admit that there is a strong need for research to focus on the definition of this concept, both for practitioners and academics. Still, other authors limit themselves to mentioning one dimension of the citizen-centricity concept, without revealing the meaning they give to this same concept (Ravšelj et al., 2022). Others view citizen-centricity as merely one of the numerous attributes of a transformational government, characterizing it as a "one-stop service delivered over multiple channels » (Borras, 2012). Another explanatory model produced by (van Velsen et al., 2008) divides the concept of citizen-centricity into four main sets of variables: (1) attitude and experience, (2) actual use, (3) system adoption, and (4) system output. This model does not consider user involvement nor the satisfaction of the requirements, although several authors put forward these characteristics (Abu Bakar et al., 2021; Kamaruddin & Noor, 2013). Another more recent model suggested in the introduction to a recent special edition is based on (1) openness, (2) empowerment, (3) inclusiveness, and (4) engagement, after defining citizen-centricity as "a multi-stakeholder approach to digital transformation that ensures sustainability, inclusion, prosperity and human rights for the benefit of all" (Anthopoulos et al., 2023, p.10). The same conclusion holds for a review of the literature that covers the meanings of artificial intelligence described as "human-centered" (Wilkens et al., 2021). Abu Bakar et al. (2021, p.6) state that the citizen-centricity concept is recent and that there is no "model or framework that can extensively explain" it. Unruh and Junior (2021) study the evolution of the concept of Human and User-centricity in the private sector when creating tangible products. However, such literature reviews do not allow an understanding of the concept of citizen-centricity applied to the public sector, particularly to the digital transformation of governments, as indicated by the limitations of Unruh and Junior (2021). Indeed, whereas in the private sector it is used to attract and satisfy customers, public service users are often forced to use services.

Finally, a recent systematic literature review focuses on the creation of an integrative framework for understanding the types of government that shape citizen-centricity (Sundberg & Holmström, 2023, p.12). The article concludes that "*citizen-centricity is shaped by multiple logics ranging from efforts to increase service levels to participatory ideals with the aim of including citizen in the design of these services and government decision processes*". This suggests, like the integrative framework produced, that it essentially explains how governments move from traditional to citizen-centricity, i.e. what precedes or makes citizen-centricity possible, rather than what citizen-centricity is.

The concept is used to qualify a disparate set of techniques. A significant number of authors talk about citizen-centricity in the context of the well-established techniques of User-Centered Design or User-Centered Innovation, implicitly considering that the concept of citizen-centricity is at most a set of disparate techniques aiming to understand the user, involve the user, and prevent the user from harm related to digital transformation (Beux et al., 2018; Bharosa, 2022; Duque et al., 2019; Machado et al., 2020; Zorzetti et al., 2021). Nevertheless, a set of techniques is not enough to constitute a concept, and the research agenda proposed by Bharosa (2022) shows that it is necessary to understand the concept of User-Centered Design in more depth to study the impacts on the daily life of users.

The concept is a qualifier to describe a particular research approach, philosophy, or context. A large body of scientific literature uses research approaches or philosophies (Saunders et al., 2019) in their analyses, which they describe as "citizen-centric". This is often done in contrast to more technological or bureaucratic approaches (Costales, 2022; Martin et al., 2018). Some dimensions qualified as citizen-centric then include everything that cannot be qualified as technological or bureaucratic, such as security, robustness, interpretability, ethics, health, education, needs, behaviors, roles, etc. (Ahmad et al., 2022; Ghareeb et al., 2019; Huang et al., 2022). Nevertheless, it happens that only the approach or the philosophy is citizen-centric, without any given dimensions of the citizen-centricity concept (Dixit et al., 2022; J. Scott et al., 2021). It also happens that the concept is only used to set the context, as opposed to a techno-centric or bureaucratic context (Huang et al., 2023; Kolesnichenko et al., 2021; Li et al., 2024; Mortaheb & Jankowski, 2022). As the latter meanings are of no use in defining citizen-centricity, we will not take them into account in the remainder of this study. Indeed, we cannot produce a typology from no expressed dimension or characteristic.

To conclude, it should be clear that existing synthesis works do not designate the same concept, or at least designate different dimensions of a global concept yet to be defined, as Abu Bakar et al. (2021) pointed out. Current models do not seem to be able to consider all possible different meanings of citizen-centricity completely because it is still recent according to Abu Bakar et al. (2021), and because many dimensions of this concept have been described separately (van Velsen et al., 2008). This makes it difficult to take all possible meanings into account unless we carry out the most complete review of the literature possible. This systematic literature review combined with interviews, are intended to offer a more systematic perspective rather than to be normative.

3. Methodology

3.1. Methodologies selection

In order to answer the research question, and thus enable the construction of a typology to characterize citizen-centricity, we have used a combination of methods based on complementary data (empirical and secondary data), a combination that can be described as mixed methods. (Leech & Onwuegbuzie, 2010; Morse, 2010). The association of an SLR with interviews was already used recently to study in more depth the digital transformation of governments (Arshad et al., 2023). The use of a mixed methods approach allows us, as Greene et al. (1989) show, to achieve several objectives necessary to meet the typology quality criteria (Scott & Davis, 2015) (Table 2), including:

- Triangulation: interviews help corroborate and establish convergence with the SLR results.
- Complementarity: interviews enhance, illustrate and clarify the SLR results, with the end-goal of building a typology.
- Development: the SLR results are used to define the questions to be asked in the interviews, with a view to making them more relevant to the research question.
- Expansion: using an SLR and interviews broadens the scope and the diversity of the research by adding definitions, characteristics and sequencing.

Table 2
Contributions of the SLR and the interviews to the typology quality criteria.

Typology quality criteria	SLR	Interviews
Collectively exhaustive The typology accounts for all understandings of citizen-centricity	The SLR made it possible to collect all the data in the literature	
Conceptually elegant The typology relies on a limited number of dimensions	The SLR collected data which, once analyzed, revealed the existence of 4 understandings	Interviews confirm the existence of understandings, but suggest another terminology
Construct validity The typology defines characteristics associated to each understanding	SLR was used to collect all the characteristics associated with understandings.	Interviews confirm the association of those characteristics with the understandings
Intuitively sensible The typology captures the variables intuitively associated with citizen-centricity		The interviews collected the intuitive conceptualization of practitioners
Mutually exclusive The typology provides mutually exclusive understandings which are not necessarily independent		The interviews enabled us to articulate the understandings in time

In this section, we present the use of SLR and semi-structured interviews in turn (Fig. 1). We then present an analysis of the data collected using these methodologies, stressing the importance of the complementarity of this research with regard to the quality criteria for constructing typologies (Scott & Davis, 2015), in addition to the empirical validation of the SLR results.

This section details how we implemented the SLR methodology based on the guidelines of (Kitchenham & Charters, 2007). The main steps of this method, namely (1) identification of studies, (2) selection of studies, (3) study relevance and quality assessment, (4) data extraction are successively addressed. Finally, we explain how the interviews were conducted and how we combined the extracted data with the SLR data to develop a typology based on quality criteria.

3.2. Data collection

3.2.1. Systematic literature review

3.2.1.1. Step 1: identification of studies. To address our research question about the characterization of citizen-centricity, we selected digital article databases to retrieve the relevant literature. We first explored SCOPUS, then the Digital Government Reference Library (DGRL), since they are considered to contain most of the publications relevant to digital government transformation (Alcaide-Muñoz et al., 2017; Scholl, 2022). In a third phase, the search was extended to other databases through backward and forward snowballing, notably via Google Scholar (Wohlin, 2014). All data is available online.[1]

3.2.1.2. Step 2: selection of studies. In this second step, we defined the keywords and the associated query, to explore the selected databases. For this, the dimensions of the Population Intervention Comparison Outcome Context (PICOC) framework were used (Petticrew & Roberts, 2006), except for the "comparison" dimension, which was not relevant since there is no theory, no alternative method, and no null hypothesis to consider. To select the keywords, we started with a set of keywords from the articles consulted for section 2 of this article, and then iteratively refine them until we obtain all the relevant keywords.

For the Outcome axis, by focusing on evaluations of the citizen-centricity of a process or outcome, we ensure that we do not capture documents that use the term citizen-centricity too vaguely or without really considering the citizen-centricity.

- Population: ("user-centricity" OR "user-centered" OR "citizen-centricity" OR "citizen-centered" OR "user-oriented" OR "citizen-oriented" OR "user-focused" OR "citizen-focused" OR "human-centricity" OR "human-centered" OR "human-oriented" OR "human-focused")
- Intervention: ("definition" OR "characteristic" OR "taxonomy" OR "classification" OR "model" OR "framework" OR "strategy" OR "determinant")
- Outcome: ("evaluation" OR "assessment" OR "index" OR "measurement" OR "indicator")
- Context: ("e-government" OR "egovernment" OR "digital government" OR "electronic government" OR "e-service" OR "eservice" OR "digital service" OR "electronic service" OR "public service" OR "smart city" OR "smart government" OR "public sector" OR "e-governance" OR "digital governance")

Applying the corresponding query in November 2022, we found 281 results on SCOPUS and 19 additional results on DGRL, resulting in 300 results in total.

To avoid including irrelevant articles, it was decided to keep only recent, English-language, peer-reviewed articles. Although the construction of a typology may require knowledge of the state of the art since the origin of the concept, we did not keep any articles older than ten years, since several authors consider that the citizen-centricity concept and its applications suffer from taking too much into account older theories, developed in a social and technological context different from the one we know today (Elsheikh & Azzeh, 2014; Lee & Lee, 2014). We also kept articles that were relevant to the public sector, including smart cities, since cities are managed by city governments and can therefore be considered as part of a broader digital government context (Lee & Lee, 2014).

Other more complex exclusion criteria were constructed to account for the relevance of the articles with regard to the research question. The abstracts of the articles were therefore analyzed to ensure that they were relevant to the public sector, that they developed dimensions of citizen-centricity instead of using the concept only in opposition to what they describe as bureaucratic or technological approaches, philosophies or contexts (Saunders et al., 2019). Finally, only primary studies were considered, and duplicates were removed. Studies consisting solely of literature reviews are excluded but used to fuel the theoretical background of this paper and underline its relevance.

After applying these exclusion criteria, 44 relevant results from SCOPUS and 3 from DGRL remained, for a total of 47 unique results. This can be explained by the fact that SCOPUS has a larger database and is interdisciplinary. Also, articles already obtained through SCOPUS are not counted in DGRL (Scholl, 2021), although they were sometimes also obtained in this database.

To ensure the completeness of this study, we updated the search in November 2023 on DGRL and Scopus. This additional search recommended by Zuiderwijk et al. (2021) identified 39 additional studies, of which 5 from Scopus were selected.

To ensure that all relevant sources have been captured in the search, we implemented snowballing, which refers to "using the reference list of a paper or the citations to the paper to identify additional papers" (Wohlin, 2014, p.1). To ensure the completeness of this strategy, it was implemented forward and backward, until the results were saturated, i.e. no new article could be obtained. This captured 6 new relevant results, so that the final set consists of 58 studies.

[1] https://zenodo.org/records/10214031

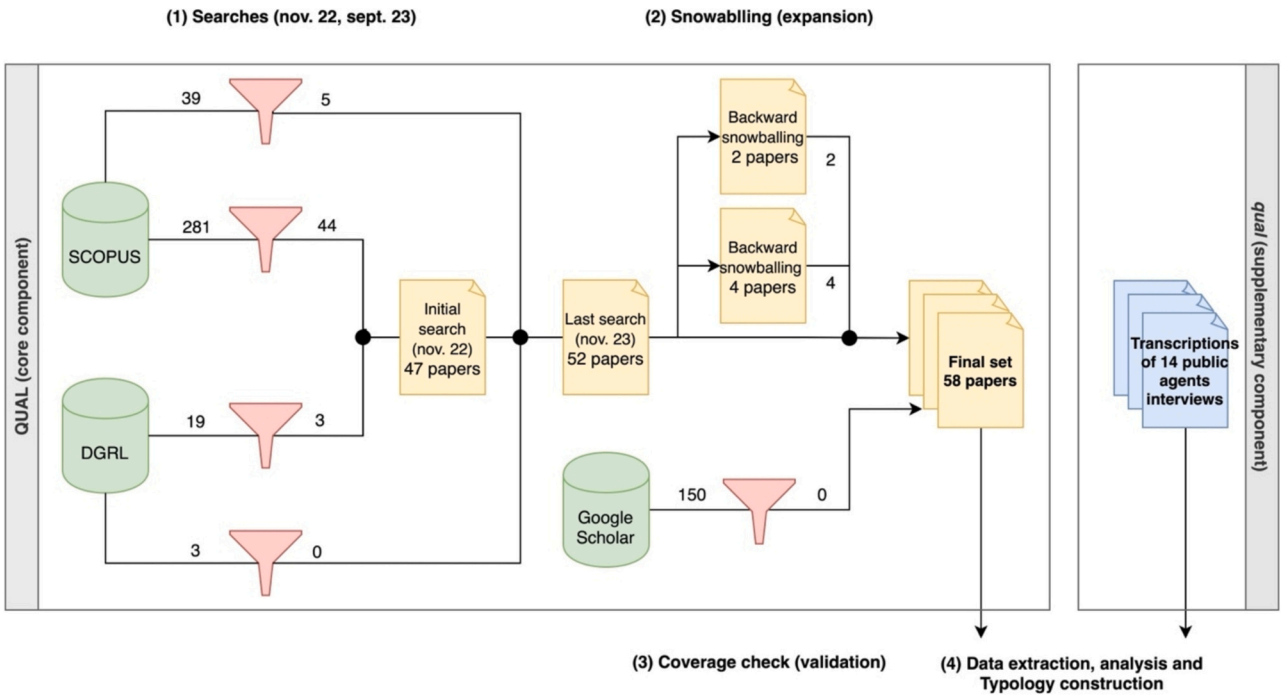


Fig. 1. Methodology followed to conduct the study.

3.2.1.3. Step 3: study relevance and quality assessment. This step consists of ensuring the relevance and quality of the selected studies with respect to the research questions. (Zuiderwijk et al., 2021) consider that the quality of articles can be estimated based on four main dimensions:

- Accuracy: the objectives and methodology of the study are adequately described
- Consistency: the study design is appropriate for answering the research questions, and the questions are actually answered
- Completeness: the study approach is adequately described
- Timeliness: the study is recently published.

The first three dimensions are generally assessed at the time of a peer review, our exclusion criteria based on the peer-review process thus seem to be sufficient to ensure that these dimensions are met, or at least considered by the scientific community. As for the fourth dimension - timeliness - it corresponds to the publication date (Zuiderwijk et al., 2021). To ensure that all relevant sources have been captured in the search, even if we already performed both forward and backward snowballing, we implemented a coverage check with a broader database. For this, we used simplified queries in Google Scholar to obtain all the results related to citizen-centricity, by checking a broader database, using less restricted queries. We analyzed the first 50 articles sorted by relevance by the database for each query:

- "user-centricity" OR "user-centered" OR "user-focused" OR "user-oriented"
- "citizen-centricity" OR "citizen-centric" OR "citizen-focused" OR "citizen-oriented"
- "human-centricity" OR "human-centered" OR "human-focused" OR "human-oriented"

No new relevant source appeared, so we consider that our search strategy collected all the relevant sources (Zuiderwijk et al., 2021).

3.2.2. Interviews

The interviews were conducted between June and August 2023 in Belgian administrations in charge of digital transformation projects. The interview questions were designed to stimulate discussion around the conceptualization of citizen-centricity, based on the background and the SLR. They were designed on the basis of the SLR results in particular, seeking to understand how citizen-centricity was envisaged by agents to empirically validate understandings, what makes something citizen-centric to empirically validate the characteristics of understandings, and how they perceive the implementation of citizen-centricity over time (in particular) to see if there is a sequencing of understandings, and if so what is it. This led to questions investigating, for example, which projects in their experience are citizen-centric and why, how they conceptualize citizen-centricity, which stages they distinguish if any, why some projects are not citizen-centric, … The interview guide and all collected data are available online[1]. Since the extent literature did not provide insights about the sequencing of possible steps in citizen-centricity, we added a question concerning this particular point, in order to understand whether sequencing should exist or whether its absence in the literature is validated in practice. Interviewees came from the federal, regional, community and municipal levels (Table 3). Each has managed at least one digital transformation project aimed at citizens and described as citizen-centric. To ensure privacy, we mention here only the position of the interviewees. The interviews were transcribed

Table 3
Interviewees and their position.

Interviewee	Position	Experience
I1	Managing Director	Senior
I2	Project Manager Digital Transformation	Medior
I3	Communication Specific Attaché	Medior
I4	Webmaster Attaché	Medior
I5	Consumer Experience Strategic Advisor	Senior
I6	Project Manager	Medior
I7	Customer Relations and Service Project Manager	Medior
I8	Advisor, Project Manager	Senior
I9	Digital Content Creator	Junior
I10	Communication Quality Service Copywriter	Junior
I11	Head of Communication Quality	Senior
I12	Consultant on a Federal Digital Transformation Project	Junior
I13	Consultant on a Federal Digital Transformation Project	Senior
I14	Webmaster Attaché	Medior

and made available online[1], but no notes were taken, so as not to influence the answers.

All interviews were conducted via online teleconferencing, mainly in French, but also two in English. When the interviews were conducted in English, neither the researcher nor the interviewee were native speakers, so a degree of nuance could be lost. Each interview began with a short presentation of the research project, its context and the researcher, as well as some clarification about the anonymization and use of the interview data.

3.3. Data extraction and analysis

To extract the relevant data from the selected studies and the interviews, we used a spreadsheet based on the following dimensions. The list of selected studies and their data is available in the online supplementary material[1]

- Definition: does the study/interview explicitly or implicitly define the concept of citizen-centricity, and if so, how?
- Semantical focus: does the study/interview mobilize the concept of citizen-centricity using the prefix User, Citizen, Human or a combination of these?
- Characteristics: does the study/interview associate characteristics with the concept of citizen-centricity, and if so, which ones?

Once the spreadsheet was completed, we analyzed and synthesized the data to present it in a condensed, comprehensive form[1].

The first reading of the extracted data revealed different perspectives on citizen-centricity, sometimes showing elements related to services already implemented, services in the process of implementation, or user-centric government actions with the aim of knowing and responding as well as possible to various and difficult-to-determine characteristics of citizens, regardless of the stage of implementation or public availability of the service. This seems to be quite close to the People, Technology and Process (PPT) framework proposed by Soja & Soja (2017). Indeed, this analytical framework allows the understanding of complex systems by recognizing the importance of each of the aspects revealed in the first reading. Moreover, this framework has already been used in the past to study risk mitigation in digital transformation projects (Maruping et al., 2019).

Nevertheless, in order to provide the best possible description of the phenomenon under analysis, we considered it necessary to use the methodological proposal of Edwards (2019), which distinguishes, within the PPT framework, the different types of people at work within a phenomenon. In our case, it seemed necessary to distinguish government and administrations from citizens.

To perform the final analysis of the selected studies, we used axial coding (Gioia et al., 2013), distinguishing citizen-centric service creation methods (process), citizen-centric services already implemented (technology), characteristics of citizens (people #1), and characteristics of administrations (people #2). At the end of this phase, we obtained four codes that revealed four different conceptions of citizen-centricity. For greater conceptual clarity and to better match the terms used in the selected studies, we decided to rename these four understandings, as described in Table 4, as Design, End-Result, Users, and Governance, respectively. The most notable change is from People #2 to Governance, which corresponds to the fact that most definitions that emphasize government actually depict a mode of governance, a kind of logic that requires attention to citizens (Abu Bakar et al., 2022; Berntzen et al., 2016; Lim et al., 2018b).

The same methodology was used to analyze the interviews, which were first read several times to gain a thorough understanding of the content. They were then coded by identifying and coding relevant passages without imposing predefined categories. A second analysis then organized these codes into broader categories. A third analysis consisted in axial coding by linking the broader categories more precisely to the modified PPT framework, using the four understandings discovered at the SLR stage (Gioia et al., 2013).

Table 4
PPT framework and its use in this study.

PPT Titles	PPT definition	Use in this study	Titles adapted for this study
Process	All tasks that an organization must execute to achieve a certain goal.	All tasks necessary to create a digital public service	Design
Technology	The equipment that enables and supports an organization's ability to perform its necessary functions.	The digital public service that enables and supports an administration ability to provide its necessary functions	End-result
People #1	The people and traits or attitudes that must be fostered within these people for success.	The users and traits or attitudes that must be fostered within these users for success.	User
People #2	The people and traits or attitudes that must be fostered within these people for success.	The public agents and traits or attitudes that must be fostered within the administration for success.	Governance

4. Results

In this section, we present the results as a typology consisting of the different understandings of citizen-centricity, the characteristics of these understandings, and then the sequencing. In line with the mixed methods methodology, we present the findings of the SLR, followed by how the interviews complement them.

4.1. Four competing understandings of citizen-centricity

4.1.1. Insights from the SLR

Only 22 articles from the selected studies explicitly or implicitly define citizen-centricity. Table 5 lists those definitions and how they map to the coding scheme of the adapted PPT framework. Different terms to refer to citizen-centricity are used in the surveyed papers. They use the terms "citizen-centricity" (25 studies), "user-centricity" (13 studies), and "human-centricity" (5 studies), or sometimes a combination of "user-centricity" and "citizen-centricity" (10 studies). When reading the corresponding articles, it is clear that these terms are used interchangeably, and some articles even use several terms interchangeably (Bhattacharya et al., 2012). We note, however, a peculiarity with the term "human", which is often used to (1) highlight a significant shift away from a techno-centric perspective, and (2) reflect the authors' affiliation with the Human-Computer Interactions community, where this term is prevalent.

As far as citizen-centricity is concerned, understood first as a mode of governance, it is mobilized in the context of the study of factors influencing the digitization of public services, and in particular legacy systems, by Abu Bakar et al. (2022) who see it mainly as the fact that the government is inclined to digitize. Kamaruddin and Johari (2023) mobilize the concept in the sense of government behavior that intends to put itself in the user's shoes. Finally, Lim et al. (2018b, p. 166) make notable use of this understanding of citizen-centricity, noting that " *the main idea of citizen-centricity is the establishment of a collective mindset in both public sector employees and decision makers*". We can therefore observe an initial understanding of citizen-centricity, which can be summarized as follows: **the Governance understanding of citizen-centricity relates to an administrative mindset and a shared organizational culture.**

However, not all authors mobilize citizen-centricity in this way, since

Table 5
Definitions and their focus sorted by semantical focus.

[Semantic] Definition	Focus				Reference
	USER	GOVERNANCE	DESIGN	END-RESULT	
[Citizen-centricity] "A government's endeavor to increase the use of technology in providing excellent services to the citizens."		X			(Abu Bakar et al., 2022, p.2)
[Citizen-centricity] "Viewing the government from outside-in where understanding the needs and expectations of citizens became the main principle for government policies and services."		X			(Kamaruddin et al., 2018, p. 8171)
[Citizen-centricity] "The establishment of a collective mindset in both public sector employees and decision makers to learn from the users of services in order to make these better cities which can shape the people's interests."		X			(Lim et al., 2018b, p.166)
[Citizen-centricity] "Refocus the agencies involved to deliver a product that would tightly meet user requirements".		X			(Smith & Cranefield, 2017, p.942)
[Citizen-centricity] "Form of service logic, but also (…) educational digital inclusion activities for vulnerable groups."		X			(Sundberg, 2019, p.1)
[Citizen-centricity and User-centricity] "Widely heralded tenet of t-government."		X			(Pfister & Schwabe, 2015, p.4)
[Citizen-centricity] "Outstanding innovation oriented internal management coupled with intense and high quality collaboration with citizens." "(…) knowing what citizens want and responding to it."		X	X		(Barrutia et al., 2022, p.1)
[Citizen-centricity] "(…) Viewing the government from outside-in where understanding the needs and expectations of citizen became the main principle for government policies and services.", "targeting of e-services to provide tailor-made services to be benefit segmented citizen groups."		X		X	(Kamaruddin & Md Noor, 2017, pp. 3, 4)
[Citizen-centricity] "a mindset" "Implies putting the citizens in the center and building services around the citizens"	X	X			(Berntzen et al., 2016, p.1)
[Citizen-centricity] "Citizens and other stakeholders are treated as key assets for developing and implementing smart cities"			X		(Paskaleva et al., 2017, p.4)
"T-government takes the needs of citizens as a starting point for the redesign and transformation of organizations, processes and facilitating infrastructure in order to provide flexible services for citizens and other organizations."			X		(Pedersen & Tjørnehøj, 2017, p.2)
[User-centricity] "Way to facilitate value-in-use through the creation of a new process - or an improvement of old processes - and a new outcome."			X		(Felix & Rubalcaba, 2022, p.43)
[Citizen-centricity] "Promotes the importance of citizens' political and social participation for implementing a smart city project based on planning, management, and stewardship". "concerns the importance of supplying sustainable smart city services in response to citizens' demands to improve their quality of life."			X	X	(Oh, 2020, p. 1)
[User-centricity] "Could mean e.g. User focus, work-centeredness, or user-participation."	X		X		(Raatikainen & Pekkola, 2020, p. 224)
[Citizen-centricity] "A web-based semantic government incentive providing smart services."				X	(Alguliyev et al., 2018, p. 107)
[Citizen-centricity] "Just-in-time information and services to citizens based on their needs, circumstance, personal preferences, life events and location."				X	(Linders et al., 2018, p. 69)
[Citizen-centricity] "Supply technology, facilities and services for citizens"				X	(Oh & Seo, 2021, p.3)
[Citizen-centricity] "The provision of services from the consumer's point of view, rather than the attitude of the government entity"				X	(Saleh & Alyaseen, 2021, p. 3463)
[Citizen-centricity and Human-centricity] "ensure the individual level or quality of life of a citizen"				X	(Debeljak & Dečman, 2022, p.3)
[User-centricity] "weighted average of online accessibility, usability, and mobile-friendliness".				X	(Ha, 2023)
[Citizen-centricity] "Looking into government service delivery through citizen's perspective where their needs and expectations are the primary concerns".	X				(Kamaruddin & Johari, 2023, p. 376)
[User-centricity] "Focus on the activity and experiences of the users" "(…) focused on the needs of the user, not the provider"	X				(Mutambik et al., 2021, pp. 2, 9)
[Citizen-centricity and User-centricity] "Anticipating actual service and resource needs of citizens who can be residents, businessmen, government employees and other stake holders.", "result of three main contributing factors: improved quality of service, anytime accessibility, anywhere availability of service, transparent, efficient and secured delivery."	X			X	(Bhattacharya et al., 2012, pp. 250, 253)

Saleh & Alyaseen (2021, p. 3463) consider it to be "*the provision of services from the consumer's point of view, rather than the attitude of the government entity*", which contradicts the previous understanding. In fact, citizen-centricity is also often used by authors as an end-result. For example, Alguliyev et al. (2018) demonstrate methods for evaluating digital public services in Azerbaijan, and propose to measure the quality to be achieved on the basis of the use of web 2.0 technologies, the satisfaction of user needs, the impact on human lives and the increase in user satisfaction. Similarly, many other authors propose other criteria of the same ilk (Bhattacharya et al., 2012; Debeljak & Dečman, 2022; Linders et al., 2018; Oh & Seo, 2021), which we will detail in Section 4.2. So, to sum up, **the End-result understanding of citizen-centricity relates to achieving determined characteristics of a digital public service.**

Similarly, many authors mobilize citizen-centricity in the context of creating digital public services (Barrutia et al., 2022; Paskaleva et al., 2017; Raatikainen & Pekkola, 2020) and mention criteria for evaluating these processes rather than the service itself. These criteria often focus on participation (Felix & Rubalcaba, 2022; Oh, 2020). According to this, **the Design understanding of citizen-centricity relates to a set of processes and techniques that are, in themselves, considered citizen-centric, regardless of the outcome.**

Finally, other authors mobilize citizen-centricity in the sense of a very fine-tuned comprehension of the users of digital public services (Madariaga et al., 2019), giving rise to considerations of users' ICT capabilities or their level of educational attainment, for example (Alverti et al., 2020; Young et al., 2021). So, **the User understanding of citizen-centricity relates to the very detailed comprehension of users at every stage of digital government transformation.**

4.1.2. Insights from the interviews

The value of the 14 interviews with Belgian public agents lies in particular in the intuitive conceptualization of citizen-centricity which, as in the case of the definitions collected by the SLR, reveals a wide disparity. Indeed, although qualitative interviews cannot serve as a statistical basis, we can see that all four meanings are mentioned, without one being particularly predominant (Table 6). On the other hand, it is clear from the definitions given that all four meanings are present, but with nuances.

As for the participants who mobilize the concept in its Governance understanding, they generally do so in the form of a certain way of working, a mindset, and I12 goes so far as to speak of an organizational culture as such, which confirms the results from the SLR: "*User centricity is a culture more than a specific set of tasks that you perform or a checklist that you follow*".

As in the SLR, the interviewees who mobilize citizen-centricity in its End-result understanding mention various criteria they consider important or necessary to be able to qualify a service as citizen-centric. As with SLR, these criteria vary from accessibility for the visually impaired, to taking feedback into account, and some of those criteria depend essentially on the objective pursued by the digital public service, which explains a big disparity.

While I1 considers citizen-centricity in its Design understanding, she sees it essentially as working to create and improve services, without necessarily placing co-creation at the heart of the necessities, as other interviewees do. A nuance in relation to the literature is put forward by I7, who perceives that participation must be seen as a democratic outcome and that, in this sense, the Design understanding of citizen-centricity is an opportunity in terms of democratic actions: "*For me, it's also a democratic issue*".

Finally, other participants mention citizen-centricity in the context of identifying or understanding users, seeking to understand their experiences, fears or the life-events that drive the use of digital public services. The interviews reveal a nuance in relation to SLR, in that the identification or comprehension of the citizen is limited to what is perceived as rationally feasible in terms of the objective pursued: "*these themes* [i.e. categories of information on a website of the Belgian administration] *were chosen precisely on the basis of the most frequently recurring concerns*" (I14). We also note that some interviews mentioned the fact of starting from the user, and that the interviews show *a fortiori* that it's a question of identifying the needs, fears, frictions, or other feelings and obligations of the user towards the government.

Table 6
Definitions of citizen-centricity given by the interviewees.

Governance	"Another way of looking at things, where the main concern is the end user."	I2
	"Focus on what citizens are looking for, rather than on municipal services"	I3
	"User centricity is a culture more than a specific set of tasks that you perform or a checklist that you follow. (…) it's a business capability for an organization that can be developed like any other kind of business capability and that can grow immaturity over time. So as you adopt certain practices and then professionalize those practices and then institutionalize them. So that's the way I see them. It's a growth path for organizations that can start really low level with some really ad hoc specific things. But as it grows larger, you need to start managing those practices.	I12
End-Result	"The fact that everything is done to put the user at the center of our preoccupations, that he finds himself in what we offer him, all the facilities for the user."	I4
	"Make sure that the voice of the user is heard and to see how services or products or whatever can be improved in order to make them more user friendly."	I13
	"So there's content and accessibility, that's the big ones, both aspects."	I14
Design	"Transformation […] to improve services to citizens […] by starting from life, from the practical reality of people in situations […] to build, rebuild or improve, to change our procedures, our way of working."	I1
	"Your starting point is the citizen's need, not the administration's need. And if you have this key question of the citizen, answer it holistically."	I5
	"It's about improving digital tools for people who are on the digital scene, for people who are going to be able to, like us for example. But it's also for those who don't have the opportunity."	I6
	"Involve the user as much as possible in the way the administration builds its service or device. […] It is very close to the whole idea of citizen participation. For me, it's also a democratic issue."	I7
	"Put the user at the center, think about the user when you do something."	I10
User	"It is to start from the user's life, to really start from the user's experience, from his context, instead of the context of us as administration, and therefore really put the user in place."	I8
	"I'm thinking of citizens, really anything that's user-centric, […] but in our case, I'd say independent citizens, because we have several targets."	I9
	"We try to take the audience into account as much as possible, because we know very well that we won't reach a consumer, especially one who may be a little underprivileged, in the same way we'll reach the academic world or businesses."	I11

4.2. Characteristics of citizen-centricity

4.2.1. Insights from the SLR

All but one of the selected studies detail characteristics of citizen-centricity. The one that does not give any characteristics, gives a brief description and points to the absence of a definition (Kamaruddin et al., 2018). The 32 studies that did not provide definitions nevertheless provided relevant characteristics.

We observe that most studies mention characteristics that relate to End-result or Design. Very few studies address characteristics related to governance that promote citizen-centricity, and even fewer studies focus on features related to the user.

It is possible to group the collected characteristics into subcategories of the framework to obtain characteristic families within the four understandings. These groups of characteristics are shown, along with their occurrence in the selected studies, in Fig. 2, which shows that no article mentions every characteristic, and no characteristic is mentioned in all the articles.

Table 7 gives a more detailed description of each characteristic family.

Two major groups of characteristics concern the Governance understanding of citizen-centricity: organizational culture and actions taken by the administration. The first calls for organizational culture to be aligned with the project to be created and the users involved, but also for the project to fit into the organizational culture of the administration concerned (Berntzen et al., 2016). It also calls for the administration to be transparent, as specified by Bhattacharya et al. (2012), who evaluate Indian egov portals. The second family of characteristics concerns certain actions to be implemented, notably knowledge management and customers (Linders et al., 2012), as well as the Once-Only Principle, as shown by Buyle et al. (2016), which proposes semantic alignments for this purpose.

The characteristics associated by the authors with the End-result understanding are numerous. The most frequently cited characteristic (31 iterations) concerns the service's consideration of its contextual environment, in a very broad sense encompassing users, the administrative context and society as a whole. For example, Wirtz and Kurtz (2017) analyze the factors influencing intention to use in smart cities, and highlight the service's knowledge and satisfaction of user needs. Other authors consider service-user interactions, notably through feedback mechanisms, such as Sun et al. (2015), who seek to assess the integration of digital public services. A very general characteristic of citizen-centric services seems to be the increase in service quality, based for example, on the fact that the information provided is up-to-date

	END-RESULT							DESIGN				USER	GOVERNANCE	
	Context aware interface	User interactions	Quality improvement	Sustainability of the service	Centralization	Digital technologies	Adoption	User Needs	Sustainability of the design process	User participation	Process management	User type	Organizational culture	Actions
TOTAL	34	14	12	11	6	6	5	14	7	24	5	5	10	2
(Abu Bakar et al., 2022)	■	■						■		■			■	
(Alguliyev et al., 2018)	■			■		■								
(Alverti et al., 2020)												■		
(Barrutia et al., 2022)	■				■	■		■	■	■	■			
(Bennati et al., 2018)			■	■										
(Berntzen et al., 2016)	■	■			■	■		■		■			■	
(Bhattacharya et al., 2012)	■	■	■			■							■	
(Bracci et al., 2021)	■		■						■	■			■	
(Buyle et al., 2016)														■
(Debeljak & Dečman, 2022)										■				
(Elsheikh & Azzeh, 2014)	■													
(Felix & Rubalcaba, 2022)										■				
(Ha, 2023)	■	■												
(Hosseini et al., 2022)	■													
(Hung et al., 2023)	■													
(Kamaruddin & Johari, 2023)	■													
(Kamaruddin & Md Noor, 2017)					■			■		■				
(Kamaruddin et al., 2018)														
(Lim et al., 2018b)	■	■			■		■	■		■			■	
(Linders et al., 2018)	■		■		■								■	■
(Liu & Wei, 2022)	■			■										
(Luterek, 2020)				■						■				
(Madariaga et al., 2019)	■		■									■		
(Marsal-Llacuna, 2016)	■			■								■		
(Mechant et al., 2012)										■				
(Mendybayev, 2022)														
(Misra, 2014)	■									■				
(Mohamudally & Armoogum, 2019)								■		■				
(Mokhsin et al., 2019)	■		■											
(Mulder & Snijders, 2022)	■						■	■			■			
(Mutambik et al., 2021)	■	■												
(Oh & Seo, 2021)	■	■	■					■		■				
(Oh, 2020)				■					■	■				
(Opromolla et al., 2016)	■			■										
(Panori et al., 2019)	■	■		■										
(Paskaleva & Cooper, 2018)								■	■	■				
(Paskaleva et al., 2017)									■	■				
(Pedersen & Tjørnehøj, 2017)	■													
(Persaud & Persaud, 2013)	■	■	■				■							
(Pfister & Schwabe, 2015)								■		■				
(Pham et al., 2017)	■	■												
(Pihlajaniemi et al., 2016)	■	■	■							■			■	
(Pisár et al., 2022)	■					■								
(Raatikainen & Pekkola, 2020)								■		■		■		
(Ranerup & Henriksen, 2019)	■		■			■							■	
(Saleh & Alyaseen, 2021)								■						
(Simonofski et al., 2020)										■	■			
(Smith & Cranefield, 2017)								■		■	■			
(Sun et al., 2015)	■	■			■								■	
(Sundberg, 2019)								■	■	■	■			
(Sweeting et al., 2022)									■	■				
(Tsohou et al., 2013)	■	■	■	■			■						■	
(Waseem et al., 2019)										■				
(Wirtz & Kurtz, 2017)	■	■												
(Wu, 2020)	■			■										
(Yıldırım et al., 2021)	■						■							
(Young et al., 2021)												■		
(Zhu et al., 2022)			■	■										

Fig. 2. Collected characteristics of citizen-centricity, sorted by article.

(Linders et al., 2018). From a sustainability point of view, the service must not only fulfill social criteria, such as inclusiveness (Luterek, 2020), but also environmental or innovative economy criteria, as Zhu et al. (2022) do, investigating the smart city from the point of view of its citizens' happiness. Centralization is also a characteristic of a citizen-centric service, regardless of whether the service is included at a point of single contact (Berntzen et al., 2016), or is itself a point of single contact (Pfister & Schwabe, 2015). Although the SLR's request to select studies only concerns digital services, it has to be said that the characteristic "digital technologies" requires that services can be provided entirely in a digitized way (Pisár et al., 2022), but also in a non-digitized version, as suggested by (Ranerup & Henriksen, 2019). A final

Table 7
Characteristics and their description for each understanding.

	Group of characteristics	Description	Number of studies mentioning those characteristics
Governance	Organizational Culture	The organizational culture is adapted to the project, and the administration is collaborative, open, transparent, available, responsive, and proactive.	10
	Actions	The administration implements customer management, knowledge management, and the Only Once Principle.	2
End-Result	Context Aware Interface	The service addresses the needs, is accessible, usable, user-friendly, satisfies, integrated into the existing environment, is enjoyable, flexible, and provides a neutral interface and language.	31
	User Interactions	The service allows the user to communicate constraints, preferences, and favors active participation, feedback, control, and interactions.	13
	Quality Improvement	The service is effective, efficient, secure, up-to-date, and the information is understandable.	12
	Sustainability of the Service	The service is socially sustainable, inclusive, favors labor friendly and innovative economy, saves human fundamental rights and environment.	11
	Centralization	The service provides or is included in a point of single contact.	6
	Digital Technologies	The service uses interactive technologies, allows an all-digital use and non-digital uses.	5
	Adoption	The service is known, accepted, and trustable.	5
Design	User Need	The design is oriented towards the user needs, demands, fears, worries, and problems. It is life-event based.	14
	Sustainability of the Design Process	The design is socially sustainable, inclusive.	7
	User Participation	The design involves the user in the design, creation, evaluation, at least once. The design phase allows feedback and is democratic. It allows active participation with various stakeholders and empower them.	23
	Process Management	The design involves collaboration within administrations or with various stakeholders, is effective, efficient and legal, e.g. for example, compliant with laws that impose a certain way of creating services.	5
User	User Type	The type of user is taken into account, based e.g. on ICT skills, educational attainment, …	5

characteristic to be able to say of a service that it is citizen-centric, is that it is adopted by citizens, i.e. known, accepted (Yıldırım et al., 2021) and trustable (Tsohou et al., 2013).

As for the characteristics associated with the Design understanding of citizen-centricity, it is the consideration of user needs that is most cited (14 iterations), with some variation such as the consideration of fears (Pfister & Schwabe, 2015), but still on a life-events basis (Sundberg, 2019). It is interesting to note that the sustainability of service creation is considered from a social point of view only, inclusivity in particular (Barrutia et al., 2022), which echoes another characteristic: citizen participation on a democratic basis, which is investigated by Simonofski et al. (2020) in the case of smart cities. Also, the creation of services must meet certain criteria of efficiency (Bhattacharya et al., 2012), effectiveness (Mokhsin et al., 2019) and legality (Sundberg, 2019), since the service must be completed, within certain timeframes, according to budget, without infringing the law.

The User understanding of citizen-centricity comprises just one group of characteristics, namely the identification of the type of user (Madariaga et al., 2019). For instance, the criteria for distinguishing users are discussed by Alverti et al. (2020), who investigate the factors to be developed in a Cypriot city for the development of a smart city.

4.2.2. Insights from the interviews

An analysis of the interviews reveals that no new citizen-centric characteristics are mentioned, thus consolidating the SLR results. In this respect, it's worth noting that all SLR characteristics are mentioned at least once, but never all by a single interviewee. As with the SLR, there is always a predominance of one or more understandings over the others within an interview (See Fig. 3).

The interviews also show that the characteristic categories used to describe the understandings are associated with those understandings and not with other understandings. This confirms that the understandings, while not independent, are mutually exclusive (Scott & Davis, 2015). Although the interview results largely confirm the SLR results, some nuances are highlighted below when needed.

With regard to the Governance understanding of citizen-centricity, the organizational culture seems to be a decisive element for the participants: "*We try to have a little coordinated thinking with other public interest organizations*" (I7), particularly with a view to improving the proactivity of services through data sharing: "*if we know that person X or company Y is entitled to something, we can also allocate it automatically*" (I8). From I8's point of view, administrative actions should be as limited as possible, in line with the Once-Only Principle.

Regarding the End-result understanding of citizen-centricity, context-aware interface is sometimes mitigated by rationalism to concern only the main needs (I7). External events take on their full importance, since as I9 says, "*The covid crisis, the energy crisis,… Now we have to change everything*". User involvement is again seen mainly from a feedback point of view, for example by installing "*a big button *give your opinion* or a big button *what do you think of us**" (I10). While the SLR showed that the improvement in service quality was understood as an

	End-result							Design				User	Governance	
	Context aware interface	User involvement	Quality improvement	Sustainability	Centralization	Digital technologies	Adoption	User Needs	Sustainability	User participation	Process management	User type	Organizational culture	Actions
Total	8	4	9	8	4	6	8	6	4	7	2	7	8	1
Interviewee 1	■		■	■				■		■		■		
Interviewee 2					■		■	■	■			■	■	
Interviewee 3	■		■		■	■	■	■		■		■		
Interviewee 4	■				■	■	■	■		■				
Interviewee 5			■		■		■		■	■			■	
Interviewee 6		■		■			■							
Interviewee 7	■	■	■	■		■		■			■	■	■	
Interviewee 8	■						■			■	■	■	■	■
Interviewee 9	■		■	■		■						■	■	
Interviewee 10		■	■	■		■			■				■	
Interviewee 11	■	■	■	■					■					
Interviewee 12												■	■	
Interviewee 13			■	■			■	■		■			■	
Interviewee 14	■		■	■		■	■			■				

Fig. 3. Characteristics of each understanding cited by the interviewees.

increase in public value, in practice it is assessed more in relation to the previous version of the service, which is a notable nuance. I13 asks: "*are they really improved?*" It's also interesting to note that social sustainability, although envisaged as the aim of inclusion as in the SLR, is more often analyzed by practitioners as an attempt to solve problems of exclusion, reversing the logic of this characteristic: "*to avoid them [users] falling into a form of social exclusion*" (I6). This is probably the most important nuance in terms of characteristics. Centralization, on the other hand, is envisaged for the front end only, not for internal departmental processes (I2, I3). Digital technologies here seem to encompass two main notions: digital by default, with the possibility of non-digitalized services, and multi-channel digitalized solutions, which could have a positive impact on adoption.

The Design understanding of citizen-centricity shows that, at the service creation stage too, consideration of needs is important, but also of fears and frustrations according to I2: "*understanding what their situations are, understanding what their friction points are, understanding what doesn't work*". In principle, this requires user participation from the outset: "*making sure that users are involved with the process, preferably as soon as possible, even before you start building*" (I13). This participation needs to be inclusive: "*we've been through it all with the different target groups*". This even if this inclusion is not direct, but indirect: "*we can use intermediaries or representatives, for example*" (I1) and socially sustainable, for example via real-life experts with experience of precariousness or social exclusion. In terms of service creation management, only respect for the law is mentioned.

Finally, the User understanding of citizen-centricity suggests the need to "*sort, classify and prioritize*" users (I2). Two possibilities emerge, the first being based on data "*what we've already done is analyzing data set and trying to cluster them based on behavior to see who would the data put together and what differentiate one persona or one cluster from another one, and trying to do some interpretation on*" (I12). A second possibility lies in basing ourselves on the skills of the administration creating the service: "*the different sectors are also interesting for us. Hospitality is a specific sector, then industry, then construction*".

4.3. Sequencing the typology

4.3.1. Insights from the SLR

The SLR does not suggest any particular order for the different understandings. As they are generally processed in different contexts, mobilized for different reasons and at different stages, no chronological order can be given, corresponding the different understandings to stages, for example. We can only hypothesize a logical order in which End-result is the last attainable element and Design the penultimate, but analysis of the data extracted from the SLR does not allow us to give sufficient substance to this hypothesis. As far as the construction of the typology is concerned, the execution of the SLR is not sufficient to provide information on the relationships between the various understandings.

4.3.2. Insights from the interviews

The interviews confirm that the **continuous nature of citizen-centricity** makes it impossible to arrange understandings in a precise order corresponding to project management. Indeed, "*it's a cross-functional approach to the entire public service we're putting in place*" (I2), so that, "*in the end, [the user] may be with me from start to finish*" (I9). The absence of logical order or steps within citizen-centricity helps to abandon the assumption that understandings can be arranged in some logical order: "*I don't think there's like a one, two, three, four, five number of steps that you can do in that sense, like stages*" (I13).

Nevertheless, **the User and Governance understandings are generally considered to be necessary premises for the other two** (Design, End-result), **which are seen as achievable extensions.** In fact, several of the interviewees demonstrate the extent to which a detailed comprehension of users is a necessary, albeit not sufficient, condition to attain the understandings Design or End-result, or both. For example, I8 mentions the need to "*first meet our users, understand the context in which they need our service, what their starting point is for using our service, and define their customer journey to fully understand their vision of our service*". Other interviewees consider the same thing, e.g. I9, who posits as a necessary condition the knowledge of the user, i.e. "*who am I communicating with?*", or I11: "*that's why we always need to know beforehand who our target audience is. Because, of course, we have to adapt to this audience*". The same applies to understanding Governance, since, according to I7,

"the ambitions must be clear", and there must be "*understanding and adoption of the project's ambitions by all those working on it*". These two premises remain continuously needed, once implemented, regardless of the fulfillment of the other two understandings: "*we try to keep this in mind throughout the process, right from the creation of the content*" (I14).

The interviews, on the other hand, show that the Design understanding is not a necessary and sufficient means of achieving the End-result understanding, so we don't consider it a premise, but an achievable extension, since I8, for example, shows that the design of the digital public service is continuous, and implemented even after the service has been considered as end-result, thanks in particular to feedback: "*call on this user again to see if it still satisfy him or if there are other needs. So it's not a one-shot deal, it has to be something that continues*". This quote also shows that it's not because the Design understanding is met that the End-result understanding will be, and vice versa.

Analysis of the interviews shows that User and Design understandings are generally regarded as directly actionable variables, i.e. ones that can be acted upon by the practitioners within the administration. For example, I4 considers that, to achieve greater citizen-centricity, agents should "*first listen to people, to see what their needs are. Based on these needs, try to develop what is required to meet them*".

By contrast, Governance and End-result understandings are considered indirectly actionable variables, i.e., ones over which the practitioners feel very little control. To illustrate this, note I7's assertion on the governance: "*the brakes are very little on the field agents, because they are often confronted with all this themselves, so they are quite aware of the difficulties. On the other hand, in terms of management, once again, it's sometimes a little difficult to get things moving, because it's all about new ways of thinking*". As far as the End-result understanding is concerned, I3 notes that this is often beyond its capacity for direct action, since "*typically, in digital […], when it comes out after two years, two years of work, the project is already obsolete*".

Based on this sequencing, Fig. 4 summarizes how the four understandings of citizen-centricity can be organized around two sequencing axes: premise/extension and direct/indirect.

	Direct	Indirect
Premise	**User** Identification of the user in terms of knowledge, IT skills, environmental awareness, energy transition, digital inclusion, and social plurality.	**Governance** Administration whose organizational structure is responsive, open, transparent, cooperative, available, proactive, and which implements knowledge management, customer management, and the Once Only Principle.
Extension	**Design** Sustainable process that takes into account the user, that is participative, and that must be conducted in an efficient, effective, legal, and collaborative way, oriented towards results.	**End-Result** Sustainable technology that can be digital, centralized, and that takes into account and respects the characteristics of the user, of the society, and of its context by allowing the participation of the user and the increase of the overall service quality.

Fig. 4. Typology of citizen-centricity in digital governments.

5. Discussion

5.1. Typology positioning and theoretical contributions

To the best of our knowledge, the citizen-centricity typology presented in this paper is the first to mix secondary (58 studies) and empirical data (14 interviews). In this section, we begin by situating the first two theoretical contributions of this typology in relation to the literature highlighted in section 2: the four understandings and their characteristics. We then proceed in the same way for the third theoretical contribution: the sequencing of the typology.

The Governance understanding, which designates a mode of organization of the administration, echoes the elements proposed by Kamaruddin and Noor (2013), who explain that a citizen-centric service allows the citizen to play a role at least at some point in the value chain, that the government is more responsive, transparent, and that it adapts its services to the citizen. This similarity is not surprising, since primary studies by the same authors were included in the selected studies. Generally speaking, Sundberg and Holmström (2023) formulation of the integrative framework is closer to this meaning, since it essentially concerns evolutions from one form of government to another.

The End-result understanding clearly emphasizes the fit of the solution with users, society, and context. This is largely aligned with the definition given by Nikitas et al. (2020), which considers that the solution should satisfy the user, society, and the market. It should be noted, however, that the technological understanding is broader, in that it considers the market only as an element of context, but more restrictive, in that other conditions are given by the definition. It also shows the role that the user must play in the use of an e-service, which cannot be limited to a passive role. The quality of the solution is increased compared to a solution that would not be citizen-centric, but an important condition is set by the definition: a solution will only be citizen-centric in fact if it is known, trustable, and accepted by the user, which is reminiscent of two of the four variables produced by van Velsen et al. (2008) regarding actual use and system adoption.

The Design understanding designates processes that take into account the users' needs, but also their fears and anxieties. It should be noted that the participative aspect is very important, which was identified by some authors and interviewees emphasizing one or another participative method designated as citizen-centric, or more broadly by the scientific literature dealing with citizen-centric design (Beux et al., 2018; Bharosa, 2022).

It should be noted that both End-result and Design understandings share a same group of characteristics: sustainability. So, while social sustainability, in particular inclusion, is common to both understandings and particularly cited in the selected studies and interviews, other characteristics are only used for the End-result understanding: its ability to (1) have a positive effect on the labor market and innovation and (2) safeguard or promote fundamental human rights and (3) the environment.

The concept of citizens, which refers to different types of users, shows that knowledge of the characteristics of citizens increases citizen-centricity, since it allows all types of users to be taken into account. However, it seems that the identification of users of public services is complex, which is logical since all citizens can be users. It is surprising that there are so few characteristics concerning users, whereas many authors describe the importance of knowing users to promote citizen-centricity in the studies selected by the SLR. This lack of characteristics is all the more surprising since knowing the user is a necessary premise for the creation of citizen-centric solutions (Lim et al., 2018b) using citizen-centric processes, within an administration whose organizational culture favors citizen-centricity. Yet the same observation can be drawn from the interviews, which show just how much the User understanding is an unfulfilled ideal. In this respect, Sundberg and Holmström (2023) also call for a finer understanding of users, this time distinguishing their status more broadly: citizen, stakeholder, …

Nevertheless, Schelings et al. (2023) present a prospective avenue for advancement, employing three variables to construct personas of citizens utilizing digital public services within the Walloon context of Belgium: perceptions of smart cities, intended behaviors, and preferred methods of participation.

Sequencing the typology is a major contribution of this paper since to our knowledge, only Sundberg and Holmström (2023) propose one in their integrative framework, albeit without empirical validation. Their framework considers that citizen-centric government is shaped by transformative dynamics, which are themselves constituted of service-dominant and participatory dynamics. Our results rather show that the comprehension of the user and citizen-centric governance are necessary premises both for participation in citizen-centric service creation, and for the achievement of a citizen-centric service.

Although numerous terms are employed to designate the same phenomenon (e.g., user, human, citizen, etc.), we have elected to retain the term "citizen". Firstly, this term is the most prevalent in the literature on the phenomenon under observation, with a significant advantage over other terms, as demonstrated in the results section. Secondly, as has been demonstrated, the term "human" is frequently employed in the context of the Human-Computer Interactions community. However, the objective of our study is to examine the phenomenon within the context of the digital transformation of governments, rather than within the confines of a particular community. It is also noteworthy that some authors advocate for a focus on the distinctiveness of citizens and digital governments in comparison to the private sector (Erkkilä & Kostas, 2023). We argue that this distinction can be effectively addressed by the term "citizen".

5.2. Research directions

Based on the identified results and shortcomings, we suggest in this section five research directions to move the citizen-centricity concept forward within the digital government literature.

Research Direction 1: Towards analyzing the impact of one understanding's realization on others. Although the interviews show a sequencing of citizen-centricity, both in terms of premise/extension and internality/externality, we have not empirically measured the effect of the completion of one understanding on the others and the SLR data did not provide any further information. This would however be beneficial to practitioners in the implementation of citizen-centricity, and could be investigated by means of a multiple case study, for example. It would be particularly fruitful to examine the influence of these different understandings on the various categories of digital public services. One potential avenue for investigation would be to conduct case studies to assess the impact of enhanced citizen understanding (User) on the other understandings and their constituent components, or on other critical elements essential to digital public services, such as trust or engagement.

Research Direction 2: Towards the creation of a citizen-centricity measure combining the four axes: technology, process, users and government. After identifying the characteristics of the citizen-centricity concept, it is essential to measure this concept from the four highlighted axes, in order to avoid a mismatch between the needs of citizens, and the solutions provided by the administrations, to avoid poor adoption by the citizens (Costales, 2022) and thus inefficient resource consumption (Pacheco Rocha et al., 2022).

Research Direction 3: Towards a better understanding and consideration of user types. The analysis of the results shows that, although difficulties with the user axis are mentioned by many studies, few studies mention characteristics related to the identification of the user (Lim et al., 2018b; Madariaga et al., 2019; Young et al., 2021). It would be interesting to study more precisely how to characterize the users from the point of view of digital service provision. Few studies mention characteristics of the citizen-centricity concept related to the identification of the user (Barrutia et al., 2022; Madariaga et al., 2019; Raatikainen & Pekkola, 2020; Young et al., 2021). In this context, the use of design science methodologies (Hevner & Chatterjee, 2010) could be adequate to build artifacts that allow to answer the mentioned difficulties, for example by creating artifacts that allow understanding the context experienced by the user.

Research Direction 4: Towards greater social sustainability of processes. It seems that few articles address the inclusiveness of user participation, which is probably due to the cost inherent to processes achieving such completeness (Barrutia et al., 2022; Zhu et al., 2022). Yet many of the agents we interviewed mention sustainability as a necessary characteristic of citizen-centricity. To address this challenge, processes that maximize inclusiveness at constant costs or minimize costs at constant inclusiveness should be studied. This research direction is related to the third one, since it is only after identifying the different types of users that we can ensure that they are all included in the processes.

Research Direction 5: Towards better integration of global sustainability issues.

Beyond inclusiveness, our study reveals that the other pillars of sustainability are only mentioned in relation to the End-result understanding. What's more, considering the impact of digital service on the labor market and innovation, on fundamental human rights, as well as on the environment is underdeveloped and does not allow for a holistic view of citizen-centricity's impact on sustainability, at the risk of only claiming its merits, as Martin et al. (2018) observe for Smart-cities. The development of solutions integrating or measuring the impact of the digital transformation of governments could be envisaged by means of action design research methodology, guaranteeing the contextual relevance of artifacts.

Research Direction 6: Towards a better understanding of the interactions between digital transformation and citizen-centricity.

Although this work has been carried out in the context of digital transformation, it appears that the interactions between government digital transformation processes and citizen-centricity have been little explored in the literature. We believe that exploring the impact of this transformation on government's ability to be citizen-centric, or vice versa, for example using ethnographic methods, could help identify useful levers of action for practitioners in their quest for greater citizen-centricity. For academics, it would also provide a better understanding of the phenomena at play.

5.3. Limitations of the study

This SLR makes it possible to define the concept of citizen-centricity in a positive way (i.e. not only by opposing to another concept), while the existing definitions could not convey the concept in a global, complete, and clear way. Nevertheless, the selection of studies has some limitations.

First, the selection only includes studies dealing with the public sector, in order to restrict the scope of this article to a particular domain. This avoids the generalization of considerations valid only for the private sector (Unruh & Junior, 2021) to our research, but also prevents elements specific to the private sector from being included in our study.

Also, using only two databases to search for relevant articles may limit the scope of the study as we did not use other databases such as Web Of Science. Nevertheless, this limitation is counterbalanced by the coverage check performed on Google Scholar (Zuiderwijk et al., 2021), and by snowballing in both directions, which allows for the capture of articles from databases other than SCOPUS and DGRL (Wohlin, 2014).

A final limitation concerning the selection of studies for the SLR lies in the absence of an in-depth analysis of their quality. Nevertheless, we are basing our analysis on the criteria presented by Zuiderwijk et al. (2021), and have included a file mentioning all the studies selected for the SLR, together with their origin, in an online appendix, so that anyone can form an opinion on the quality of these publications.

Finally, the use of interviews to ensure that the quality criteria of a typology are met entails limitations specific to qualitative methodologies, such as the absence of possible generalization due to the use of a

sample only. However, the use of a strict collection and analysis protocol, as well as the fact that saturation of results was reached by the 8th interview, and that there were 14 in all, allows us to argue that our study is valid, from this point of view.

6. Conclusion

Several authors express the need to conceptualize and define citizen-centricity, since this lack has negative consequences for practitioners and research. To address this need, we conducted an SLR to analyze all definitions and characteristics of citizen-centricity, which assures a high level of completeness (Kitchenham & Charters, 2007).

Based on the analysis of 58 selected studies, and of 14 interviews we created a **typology of citizen-centricity** in the context of Digital Government. Indeed, citizen-centricity can refer to an End-result, a Design process, a Governance type, or a way of identifying the User. We then identify the characteristics of these four understandings in the literature, before validating them empirically and nuancing them at least through interviews. Finally, we analyze the sequencing of the concept, and our results show that the concept of citizen-centricity is neither stepwise nor iterative, but continuous, and can be sequenced as follows:

- User and Governance understandings are necessary but not sufficient premises for Design and End-result understandings.
- User and Design understandings are directly actionable by public agents, while Governance and End-result understandings are perceived as only indirectly actionable.

From a theoretical point of view, this study contributes to the characterization of citizen-centricity, by defining a typology based on the existing literature and positioned within it, empirically. This typology now provides a common foundation for studies that will aim to investigate citizen-centricity in governments and allows to situate the existing literature on a spectrum based on the People-Process-Technology framework, in order to understand the implicit meaning that the authors give to citizen-centricity. This allows us to contextualize and put into perspective the different existing and future studies.

From a practical point of view, the characteristics collected would constitute the basis for the future creation of indicators measuring the citizen-centricity of a project and could improve the communication between practitioners and academics, since until now, the implicit conceptions could be different or contradictory, as we have shown. We argue that our typology permits, at the very least, the demonstration and acknowledgment of the diversity of viewpoints and conceptions that underpin a common concept: citizen-centricity. This communication improvement, in addition to avoiding misunderstandings and therefore negative results (Ahmad et al., 2022), could lead to beneficial advances, both in practice and in the scientific literature (Lindblom & Cohen, 1979).

CRediT authorship contribution statement

Simon Dechamps: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Anthony Simonofski:** Writing – review & editing, Validation, Supervision, Project administration, Methodology. **Corentin Burnay:** Writing – review & editing, Validation, Supervision, Project administration, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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