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DIGITAL CURATION FOR OPEN GOVERNMENT DATA:
A PROPOSAL TO GOVERNMENTAL INFORMATION MANAGEMENT

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ABSTRACT
Open Government Data is part of initiatives that seek to promote transparency, participation, and collaboration between governments and society. Among the challenges that emerged from this movement are the growing volume of information generated or held by governments, and the urgency of information management. In this work, we investigate the Governmental Information Management that subsidizes the publication of Open Government Data and propose a Digital Curation model aimed at the specificities of the public sector. With a qualitative approach, we adopted the case study and the harmonization between different models to propose a new curation model. The results comprise the case study, the harmonized Digital Curation model, and the validation carried out through use scenarios. We conclude that the fast technological evolution, the dynamics of public management, the lack of public policies, and low popular support heighten the difficulties governments face. The harmonized curation model for Government Open Data contributes to addressing some of these challenges, in particular by prioritizing the strengthening of interaction between the community and the government, in addition to offering a set of theories and practices aimed at the selection and arrangement of data, aiming at its preservation, use, and future reuse.

Keywords: Open government data. Digital curation. Transparency. Models harmonization. Information management.

CURADORIA DIGITAL PARA DADOS ABERTOS GOVERNAMENTAIS:
UMA PROPOSTA PARA A GESTÃO DA INFORMAÇÃO GOVERNAMENTAL

RESUMO
Os Dados Governamentais Abertos fazem parte de iniciativas que buscam promover a transparência, a participação e a colaboração entre governos e sociedade. Entre os desafios que surgiram deste movimento estão o crescente volume de informação gerada ou detida pelos governos e a urgência da gestão da informação. Neste trabalho, investigamos a Gestão da Informação Governamental que subsidia a publicação de Dados Governamentais Abertos e propomos um modelo de Curadoria Digital voltado às especificidades do setor público. Com abordagem qualitativa, adotamos o estudo de caso e a harmonização entre diferentes modelos para propor um novo modelo de curadoria. Os resultados compreendem o estudo de caso, o modelo harmonizado de Curadoria Digital e a validação realizada através de cenários de uso. Concluímos que a rápida evolução tecnológica, a dinâmica da gestão pública, a falta de políticas públicas e o baixo apoio popular agravam as dificuldades enfrentadas pelos governos. O modelo harmonizado de curadoria de Dados Abertos Governamentais contribui para enfrentar alguns desses desafios, em especial ao priorizar o fortalecimento da interação entre a comunidade e o governo, além de oferecer um conjunto de teorias e práticas voltadas à seleção e organização de dados, visando sua preservação, utilização e reutilização futura.

Palavras-chave: Dados abertos governamentais. Curadoria digital. Transparência. Harmonização de modelos. Gestão da Informação.

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1 INTRODUCTION

In recent decades, according to Castells (2013), corruption scandals, political and economic crises have compromised society's trust in governments and the political class. As a consequence, society began to show greater interest in public transparency, which, to some extent, contributed to the emergence of initiatives aimed at open government by national, regional, and local governments in several countries (Altayar, 2018; Matheus; Janssen; Janowski, 2021; Souza; D'Angelo; Lima Filho, 2022). The development of national and international policies aimed at opening up government data was also increasing, in addition to the emergence of organizations such as the Open Government Partnership (OGP), responsible for establishing the necessary principles for open government, with the adhesion of several countries, including Brazil (Costa Pinho; Silva, 2019).

Therefore, the origin of Open Government Data (OGD) is related to the greater demand for advertising in government acts; the transparency of public management; and the promotion of popular participation. Previous studies indicate that OGD make it possible to decree the degree of government openness; form the basis for analysis, manipulation, and combination of commercially valuable data sets; and works as an element of control by organized groups aimed at social change (Janssen, 2012; Ribeiro; Almeida, 2011; Ubaldi, [201-?]).

In Brazil, the process of making government data accessible has been uneven and remains ongoing. Both the federal government, state, and municipal governments have made data available using varied, more or less advanced technologies, and present heterogeneous data in both form and content, and show low compliance with the principles for OGD (Braga; Gouveia, 2022). Over the past two decades, these deficiencies and weaknesses have been more consistently overcome following the implementation of the Access to Information Law (Brasil, 2011).

In this context, the new challenges to public management are focused on the processing and publication of a large volume of government data, as the flow of administrative information is complex and grows at an accelerated pace, which requires systematic and dynamic management of information produced (Costa Pinho; Silva, 2019). The thousands of documents created and processed

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in public management cause an overload of information (Gusmão; Souza, 2021), which leads us to consider that "public data and information must precede an efficient form of management to meet the growing modernization of the State and society" (Paulo; Gama; Caliman, 2020, p. 192).

There is consensus for the opening of government data, whether for political or economic purposes. However, there are no major discussions about the processes involved in opening the data, being treated as a purely technical issue. However, these processes are complex and face several problems, highlighting the need to understand information management in public administration, so that all stages, from planning to data availability, are conducted through a well-defined strategy that leads to achieving your objectives. Among the efforts necessary to produce and maintain datasets we can mention selection, preparation, representation, and quality assurance (Currie, 2016). All this, with limited resources which depends on making decisions that can impact on the quantity and quality of data, as well as the frequency of supply and its permanence (Janssen; Charalabidis; Zuiderwijk, 2012).

This complex scenario motivated the present research, aimed at developing a new approach to government information management from the perspective of digital curation, as government information management lacks models that meet its specificities. We corroborate Currie (2016), stating that the growing number of initiatives focused on open data place open government as a new paradigm in the relationship between government and society. However, until then, research on OGD publishing from a data curation perspective is limited.

1.1 Research Question and Methodology

The investigation we conducted in this work seeks to answer the following question: How can Digital Curation be applied to OGD? Our objective is to investigate the dynamics involving the management of government information based on a case study with the government of the state of Goiás and propose a harmonized digital curation model that takes into account Brazilian legal requirements regarding the processing of public information, and the principles for OGD. We validated the proposed model based on use scenarios identified with the General Comptroller of the State of Goiás.

We adopt a qualitative approach that we conduct through empirical investigation (Minayo, 2014; Prodanov; Freitas, 2013). To typify the research, from the point of view of nature, objectives, and technical procedures, we use the classification adopted by Prodanov and Freitas (2013), in which we outline a conceptual and operational model, called outline, aimed at achieving the objectives of the work. In Table 1, we described these technical procedures, used in combination that made it possible to reach the results. We conducted the harmonization of multiple models using integration, comparison, unification and combination techniques to maximize the quality of the developed model (Pardo *et al.*, 2013). In corroboration with Carroll (2003), we adopt scenarios as a way of representing, analyzing and planning how a computer system can affect user activities and experiences.

Table 1 – Research Design

Objectives	Technical procedures	Results
Investigate the dynamics involving the management of information that gives rise to OGD based on a case study with the government of the state of Goiás.	Bibliographic and documentary research, Observation, Interviews (Minayo, 2014; Prodanov; Freitas, 2013); Case Study (Yin, 2015).	Case Study
Propose a harmonized model based on information management and digital curation models considering legislation and principles for OGD.	Model Harmonization (Carrasco, 2019; Pardo *et al.*, 2013). Bibliographic and documentary research (Minayo, 2014; Prodanov; Freitas, 2013).	Governmental Information Management Process Model; Harmonized digital curation model.
Validate the harmonized model with use scenarios identified within the General Comptroller of the State of Goiás.	Usability validation and usage scenarios (Ávila; Santos, 1988; Benyon, 2011; Carroll, 2003; Pressman, 2011).	Validation by usage scenarios.

Source: elaborated by authors (2024).

The article is structured as follows: After introducing the topic and detailing the research, Section 2 presents related work. Section 3 presents the case study and model development. We validate the model in section 4 with real usage scenarios. Finally, in section 5 we bring the final discussions and conclusion of the article.

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2 RELATED WORKS

Digital curation is a recognized field of theory and practice in Galleries, Libraries, Archives, and Museums (GLAMs), with recent expansion into areas such as Information Science and Digital Humanities (Higgins, 2018). It has a strong relationship with open data in institutional archives and repositories, including those linked to universities and research institutions, which face difficulties in extending their preservation capabilities from analog materials to digital records (Prom, 2011). In this way, the dialogue between open data and digital curation provides the opportunity for the development of research that contributes to both fields (Lee *et al.*, 2016).

Outside the academy, digital curation is essential to support open government goals (Oliver; Harvey, 2016), given that governments collect a large amount of high-quality data as part of their normal work activities (OGP, 2011; Wirtz; Birkmeyer, 2015). However, there is a gap when it comes to preserving OGD to ensure their future use and reuse, and the absence of preservation considerations in OGD curation can become a problem for open data initiatives, as, to the extent that they mature, existing datasets age, and the volume of available OGD increases (Moles, 2019). Furthermore, requirements such as integrity and reliability are essential, so certain legal, administrative and technical requirements must be met and can only be achieved through data curation (Oliver; Harvey, 2016; Nayek, 2018). Curation processes directly influence datasets and their viability in providing useful information for a variety of objectives (Currie, 2016).

The initiatives observed in the last two decades have been focused on promoting the openness of data, developing its technologies, understanding its uses, ensuring data quality, knowing and implementing policies, expanding participation and transparency (Costa Pinho; Silva, 2019). Digital curation is not directly referenced, although aspects related to digital curation or that are part of its scope are extensively investigated (Ham; Koo; Lee, 2019; Janssen, 2012; Lim, 2021; Alves Neto *et al.*, 2018; Pirannejad; Ingrams, 2022; Xiao *et al.*, 2019). One of the most investigated aspects of OGD curation concerns users (Nayek, 2018), as well as the preservation and reuse of OGD (Lim, 2021; Xiao *et al.*, 2019).

User-related investigations consider their diverse user base, as merely providing data does not guarantee that it can be used for any of the social,

political or economic objectives that motivate its disclosure. In this context, previous studies highlight the relevance of considering the people for whom digital information is directed, their knowledge base, set of skills, their requirements and uses, so that the information is adequate for their demands (Currie, 2016; Janssen, 2012), and there is no risk of favoring some user groups over others (Gurstein, 2011).

The use of OGD differs from the traditional one, as they can be combined with other data sets, proprietary or not, for a multitude of operations, technologies, and platforms. Therefore, OGD curation contemplates the real, direct and final uses of the data, as well as the potential uses made by developers, researchers, companies, *etc*. (Dallas, 2016). In this sense, the access provision functions of digital curation guarantee new forms of interaction with and between users, in addition to the discovery of data and associated metadata. This variety of interaction mechanisms demands the active involvement of interested parties, from institutional leaders to technicians, as well as those involved in marketing and dissemination (Lee *et al.*, 2016).

When it comes to technical issues related to OGD curation, we find studies that refer to metadata, usability, interoperability, privacy, and security; which bring considerations about the quality of OGD and their relationship with transparency, collabo-ration, and public participation (Dawes; Vidiasova; Parkhimovich, 2016; Siebra, 2021; Siebra; Borba; Miranda, 2018). We also identify advocacy for the legacy of previous activities as models and sources of ideas through existing tools and systems (Lee *et al.*, 2016). Furthermore, according to the latter author, professionals involved in public access initiatives should learn about the work of developing and implementing data management plans and inserting digital curation methods into the information life cycle as early as possible (Lee *et al.*, 2016).

3 DEVELOPMENTS

The executive branch of the State of Goiás has the State Comptroller General (SCG) as the organizational structure responsible for managing the information that feeds the portals *Goiás Transparente*[1], and the *Open Data*

[1] Access the site: https://transparencia.go.gov.br/

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Portal[2], which is the object of investigation of our case study. Among the biggest perceived difficulties are the changes occurring in the government caused by the entry of new political groups and technological innovations that place management in constant disarray with technology. The state has a recent Open Data Policy and is implementing an Open Data Plan, to be adopted in the next years by all other bodies linked to the executive branch.

SCG faced problems in convincing and engaging other government sectors, in addition to a reduced team and low investment, a situation exacerbated by the reduced volume of access to open data. Another factor is the outsourcing of portal development work combined with the use of proprietary technologies that left a challenging legacy for the current government. There is great complexity in information management in this environment, which, in addition to the scenario already presented, also has a series of heterogeneous systems used by other departments, bodies, agencies, and institutions linked to the state executive power. It is up to SCG to manage the information that comes from different sources and feed the portals. Currently, the task is partially automated using business intelligence tools and the portals are based on the CKAN[3] tool.

Also, a specificity cannot be neglected about the ODG in Goiás: data from almost two decades is available, which, even with some inconsistencies, represents a relevant historical series of the past governments' acts. Their conservation and preservation are a concern due to the risk of being lost during migration processes, technological obsolescence, or other factors that put data at risk.

3.1 Data Curation Model

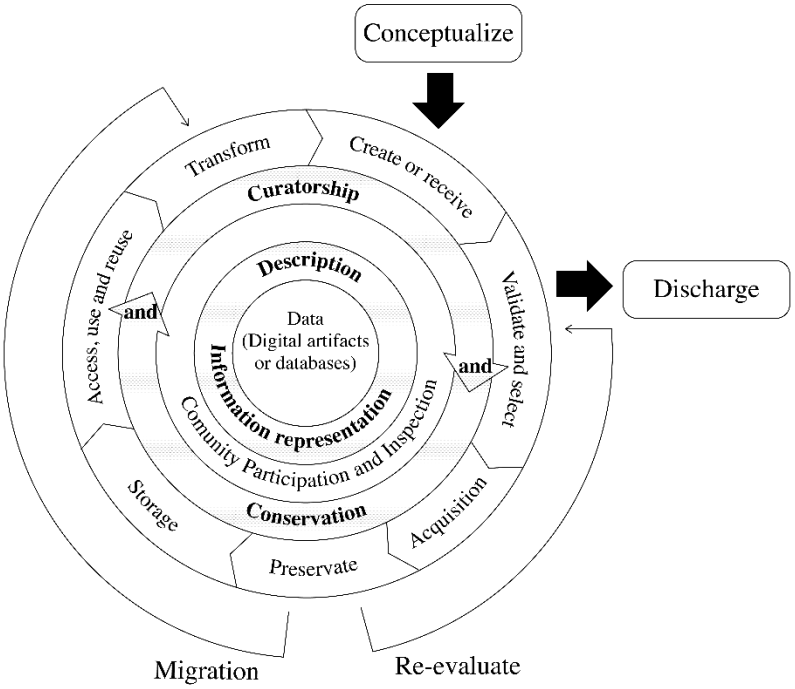
All information generated by public management, or received externally and held by governments, is subject to the same principle that defines information management as a cycle of interrelated activities, which require efforts in planning, involve projects and need to be coordinated (Choo, 2002). Because of this, the specificity of government in-formation demands an information management model in levels, which considers the information

[2] Access the site: https://dadosabertos.go.gov.br/
[3] Access the site: https://ckan.org/

environment (with its political, legal, regulatory, social, economic, and technological forces) and the information contexts that involve the user (Rowley, 1998).

In this sense, we take as elements for the formulation of the curation model for OGD: the information management model (Rowley, 1998); the information management cycle (Choo, 2002); the information life cycle (Floridi, 2010); the digital curation lifecycle model shown at Figure 1(Higgins, 2008); and the Access to Information Law regarding the processing of public information (Brasil, 2011). The principles of digital curation constitute the basis on which we think about government information management, harmonizing previous concepts related to other models and cycles as well as legislation.

Figure 1 – Digital Curation Centre curation model



Source: Adapted from Higgins (2008).

We found a complex reality in the public sector due to factors such as the organizational dimension (secretariats, agencies, institutions); the regulatory system (laws, norms, decrees, normative instructions); distributed and poorly trained teams; and the political will that can directly influence or compromise information management. In this scenario, the model needs a granular structure

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to mitigate complexities and favor management tasks. We divided the work into two stages that we describe in the sequence.

The first stage is the harmonization between the information management model (Rowley, 1998) and the information management cycle (Choo, 2002). These models were not born in the context of public management. Still, we found an indication of applicability to the public sector as specific models have few references or adaptations in the literature (Paulo; Gama; Caliman, 2020). Next, we selected the elements of these models and justified our choice (Table 2).

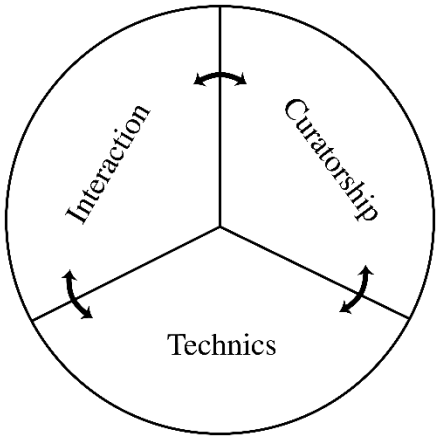
Table 2 – Preliminary harmonization stage

Reference	Chosen Element	Justification
Information management model (Rowley, 1998)	Information environment	Political and regulatory forces are central to the management of government information.
	Manage individual, systemic, conceptual and social levels.	Understanding the different levels involved enables the coordination of activities and articulation between different sectors and interested parties.
Information management cycle (Choo, 2002)	Interrelationship between activities involving planning, design and coordination.	It reinforces the importance of planning, the division of tasks, the project at a macro level and its articulation in different directions.
	Process Model	It allows recognizing and categorizing technical activities and their relationships with other activities.
	Activities that put users into perspective (information needs, information products/services, uses of information).	Not neglect users and effective communication with them, not just as information consumers but also enable their participation and collaboration.

Source: elaborated by authors (2024).

The harmonization technique for this stage consists of combining the previous models into a new model, which we call the Process Model for Government Information Management with three phases: Curation, Technical, and Interaction (Figure 2). We seek to define the competencies and boundaries of action of each phase, also considering that their processes interrelate and collaborate in a bidirectional way, without establishing a phase as the initial one.

Figure 2 – Process Model for Government Information Management



Source: elaborated by authors (2024).

The model assumes that government information management must be planned considering its three phases interrelated and interdependent. The separation favors planning and coordination by allowing the model to be adapted to different realities, with teams of different sizes, more or less structured, which may be outsourced, and with varying financial resources. Planning activities represents a starting point that must consider six dimensions: infrastructure, financial resources, human resources, actions related to digital preservation, legal and ethical issues, and issues related to access and use of digital objects (Siebra, 2021). There is a recommendation for the creation of a digital preservation policy with a digital preservation plan that will serve as an instrument to guide its activities (Nonato; Aganette, 2022). Digital preservation is a prominent aspect of the field of digital curation and must consider physical, logical, and intellectual aspects (Fermann; Lima; Chardulo, 2020). We consider that an important part of planning involves the policies (digital preservation, open data policy, *etc*.). If they exist, this may be the time to evaluate or improve them, otherwise they may be proposed. Next, we detail the phases of the Government Information Management Process Model.

3.1.1 Technical phase

The technical phase is related to digital technologies, at three levels – physical, logical, and personal. The separation of this phase is justified because there are different realities, budgets, and organizational structures, which are elementary in management and directly influence how much it can be done.

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Another factor to consider is that these teams can be external, outsourced, partners, or government employees. Each level is described below:

- Physical: Hardware infrastructure, networks, peripherals, and any equipment that may be used;
- Logical: Development of systems, pages, applications, and other tools that will process information and present it;
- Personnel: Teams that will work on both the physical and logical sides and that will establish the specifications for your purchases and hiring.

It is not possible to predict or determine the characteristics related to the technical phase. Depending on the organization, maturity, or even the budget allocated to the technical phase, we can find different realities. It can be segmented into different sectors or bodies, concentrated in a specific sector, organized by a central committee or any other kind of organization. The fundamental aspect of the technical phase is that it is responsible for managing the information life cycle.

3.1.2 Interaction phase

The interaction phase is responsible for all mediation between the OGD and society, establishing a route of active communication with society whose principles are observation and community participation. This step is crucial because it comprises the aspects of selection, arrangement, exhibition, presentation, participation, collaboration, evaluation, and community feedback. It deals with defining which information products should be developed, their formats, and media. It aims to bring the community closer together and promote the use of OGD.

Interaction needs to ensure adaptation to various screen and device formats (responsiveness) as well as different operating systems. It should especially explore media and social networks, establishing new forms and languages that are close to the public to establish a dialogue. It must develop mechanisms to understand information needs, intermediating communication between the government and society, prospecting new information products from this.

Digital curation demonstrates special consideration for the community of information users, known as direct or indirect users of OGD. Direct users are related to the various information products offered and indirect users search for data in raw for-mats intending to develop their information products. This classification allows us to propose the following categories of users:

- Citizens/public/community at large;
- Private companies and organizations, specialized public (public transport companies, media, application developers, *etc*.);
- Teaching and research institutions, non-governmental organizations;
- Government partners, suppliers, agencies and other bodies.

Interaction is the boundary between government and society, which can be implemented in different ways with digital technologies. It is concerned with networks, media, semiotics, language, and the continuous improvement of communication channels with citizens. It is responsible for designing evaluation, feedback, participation, and collaboration mechanisms. It assumes dialogue with society, represented by its various actors with the premise of considering uses and users.

3.1.3 Curation phase

The curation phase is the key element in our proposal as it brings together in its scope items related to the technical and interaction phases, which, based on our proposal, can be thought of in whole or in part, according to the need or interest of the management. Again, the task involves harmonizing multiple models to build a new model. They are: the digital curation lifecycle model (Digital Curation Centre (DCC) model, Figure 1) (Higgins, 2008); the information life cycle (Floridi, 2010); and the Access to Information Law (Brasil, 2011).

In line with what Daisy Abbott (2008) advocates, we understand that the responsibilities involved in digital curation can be shared between different actors, institutions and communities; incorporating organizational and cultural as well as technical is-sues. In this sense, to establish a disambiguation that the author argues is necessary, we incorporated the idea that there are specific roles

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for each interested party, which we distribute among the three phases in the process model for government information management (Figure 2).

Initially, we divided the DCC model into two parts, the first being the complete life cycle, which brings the set of actions that need to be performed throughout the life cycle of digital objects, represented as the four internal cycles that cover the data. The second part comprises sequential and occasional actions that cover information management actions as part of the digital curation life cycle, improving or updating some of its activities. The division can be seen in Table 3.

Table 3 – Harmonization initial phase with DCC model division

Full lifecycle actions	Sequential and occasional actions
• Description and Representation of information; • Preservation plan; • Community observation and participation; • Curation and preservation.	• Create and receive; • Evaluate and select; • Acquisition; • Preservation action; • Store; • Access, use and reuse; • Transform; • Reevaluate; • Migrate; • Discard.

Source: elaborated by authors, (2024).

Full lifecycle actions comprise everything that concerns digital curation per se. Sequential and occasional actions refer to the information life cycle. In this part, harmonization takes the model as a guide and starting point, as it deals with curation, an aspect not addressed in the other models. At the center of the model are the collections selected for curation (data sets, digital objects, and various digitized or native digital files). In this aspect, we must consider that the AIL (Brasil, 2011) classifies information as:

- Information: data, processed or not, that can be used for the production and transmission of knowledge, contained in any medium, support, or format;
- Document: information recording unit, whatever the support or format;
- Confidential information: information temporarily subjects to restricted public access due to its indispensability for the security of society and the State;

- Personal information: that is related to the identified or identifiable natural person.

This classification is relevant to understanding the scope of the curation and brings elements to the process of describing and representing information. Here, there is an interrelationship between the technical and curation phases, as the process involves developing and managing descriptive, structural, administrative metadata, *etc*. We propose a new nomenclature for this process that encompasses the task of classifying, foreseen in the AIL. In this way, the process receives the name "Classification, description, and representation of information". The next process is the preservation plan, which depends on collaboration between the three phases (technique, interaction, and curation). The particularity comes again from the AIL, which presents four elements in this process: availability, authenticity, integrity, and primacy (Brasil, 2011).

Next, we have community observation and participation that involves interested parties who use, evaluate, and comment on the collections. It is related to access, use, and reuse that is in the information life cycle (outer circle of the model). In our proposal, it is linked to the interaction phase as it considers elements that go beyond the DCC model, such as presentation, publication, dissemination, transmission, distribution, sharing, user experience, collaboration, *etc*. Furthermore, we emphasize the need to record and maintain how information is used and accessed by users through their queries and interactions. We therefore propose a change in the nomenclature of this process, which we now call "Observation, interaction, and community participation".

The processes that follow are curation and preservation. Curation is not explicitly identified in the AIL, but references in this direction can be observed throughout the text in terms such as information protection, guarantee of availability, authenticity, and integrity. It also echoes in information life cycles when processes refer to archiving, storing, recycling, collecting, *etc*. We do not propose a change in the terminology, but we note the omission of the conservation process, which is associated with preservation.

We noticed the presence of the information management life cycle in the outer circle of the DCC model, with the addition of elements such as preservation over time, guarantees of use and reuse, conservation and migration of data. The

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model, in addition to managing information, involves specific aspects of digital curation such as selection, arrangement, refinement, categorization, exhibition, presentation, presentation and protection. Therefore, the curation perspective guides the harmonization of the second part of the DCC model with sequential and occasional actions.

Again, we adopted the harmonization of multiple models with elements received from heterogeneous sources as per Kumar *et al.* (2020) and Pardo *et al.* (2013). Initially, we list the elements we selected from the models and the set of actions for each model (Table 4).

Table 4 – Selected elements and actions from models

Selected elements	Set of actions/steps
Information management activities of the digital curation lifecycle model	Conceptualize; create or receive; evaluate and select; acquisition; preservation action; store; access, use and reuse; migrate; transform, reevaluate, discard.
Floridi's information life cycle	Create/generate, collect, store, process, distribute, use, recycle/dispose.
Treatment of public information, Article 4 of the Access to Information Law	Production, reception, classification, use, access, reproduction, transport, transmission, distribution, archiving, storage, elimination, evaluation, destination or control of information.

Source: elaborated by authors (2024).

We classified the actions of the three models and grouped them into sets of actions with similar aspects or that cover complementary processes. Other actions were discarded, combined, or incorporated according to the assessment of each one. Actions classified as similar are present in all three models, except archiving, which appears only in the AIL. Archiving is an optional activity, but archiving an information object implies compromising its preservation by removing it from the migration and trans-formation processes, necessary for the conservation and preservation of information. So, we decided to combine the possibility of archiving with the storage process.

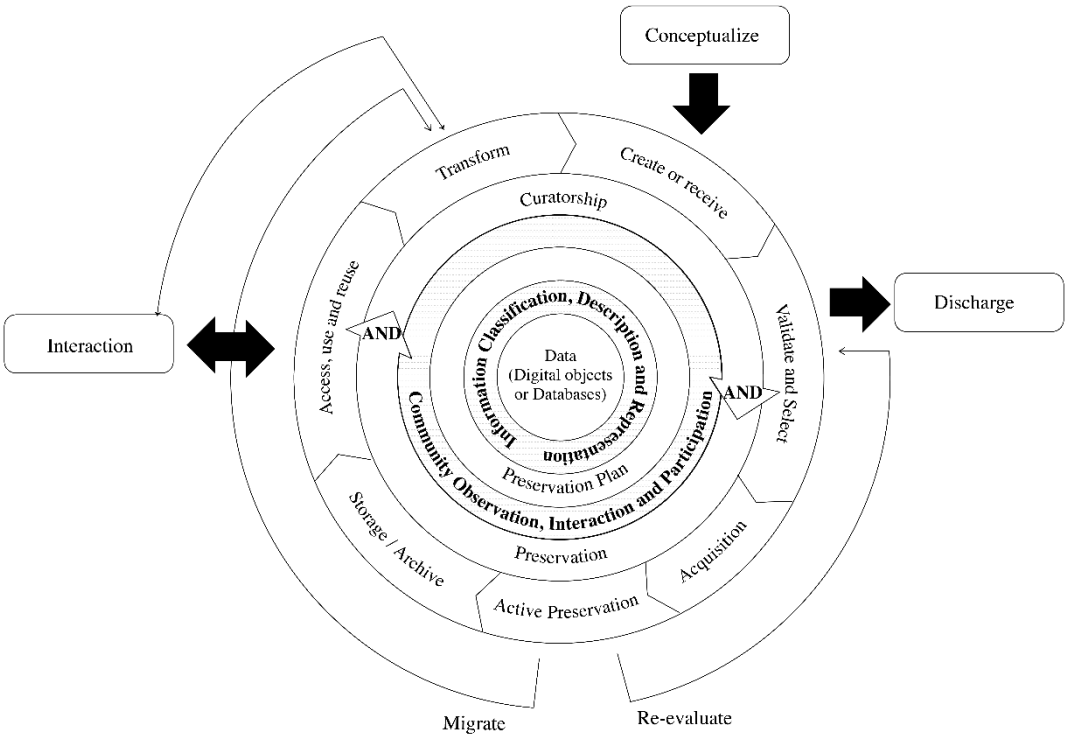
As the other groups do not present any particularity, we remain with the nomenclature of the DCC model – create or receive; access, use, and reuse; and discard. The actions that we group in the set called Interaction Actions are present in the AIL and portray the possibilities foreseen in the curation life cycle process called interaction, observation, and community participation and in the access, use, and reuse process. However, we consider that the latter should

trigger a new process that we call interaction to contemplate the actions of mediation between users and information.

The DCC model has an input in conceptualizing and an output in discarding. This allows us to interpret that the cycle repeats itself (including occasional actions) until the information is inevitably discarded at a certain point. In this sense, we propose a second way out of the model through interaction with users, along with access, use, and reuse. New possibilities of interaction with the user allow us to contemplate actions of reproduction, transport, transmission, distribution, evaluation, destination, or control of information, in addition to sharing, which is an everyday action on social networks.

Only Floridi's information life cycle (Floridi, 2010) brings the processing action, but in current reality, the processing is involved in other actions, so we decided to eliminate it during harmonization. We then brought together the elements to recompose the digital curation model resulting from the harmonization of previous models preserving the original form of the DCC model which can be seen in Figure 3.

Figure 3 – New Digital Curation Model



Source: elaborated by authors (2024).

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The new model, based on harmonization, compared to the original model contains:

- A modified life cycle with the addition of classification to the description and representation of information;
- A modified life cycle with the addition of interaction to community observation and participation;
- The addition of archiving to the sequential action of storing;

The addition of the occasional action of interaction with dual direction between the model and the action to represent the mediation that is intended to be achieved.

4 VALIDATIONS WITH SCENARIOS

We considered a validation process based on usage scenarios perceived during the case study. They reflect real situations in which the harmonized model can be adopted. We established two distinct scenarios: the curation of DAGs already published on the current portal and the curation of data obtained from internal systems and sources linked to direct administration.

The scenarios present possible perspectives for applying the harmonized digital curation model, and we consider that other visions and possibilities can be adopted so that the described usage scenario represents one possibility among several others related to the situations analyzed.

4.1 Scenario 1 – Curation of open data currently available in the Open Data Portal

Description: our first scenario deals with the collection of data currently available on the Open Data Portal, which can be accessed and downloaded from an FTP directory. During the case study, we mapped this directory and received information from SCG that this historical series will be preserved and will continue to be available. This will, therefore, be an opportunity to test the model, validating its practical use.

Curator actions: Starts the curation life cycle with curation planning for this set of data, defining the team that will work on the activities and their roles, identifying which digital objects will be curated and the technologies needed for the actions (storage and transport units, computers and software that may

be needed). The preservation plan for these files must consider aspects such as their current and future formats, the integrity of the files and the data contained in them, and the interested parties involved in conservation activities and preservation. As these are data that represent a historical series, representatives from different segments of society can be indicated to analyze the data set and reflect on how they can be used to devel-op products and services of interest to the community. These activities can trigger new events in the preparation of the preservation plan, lead to new curatorial arrangements, and modify the conceptualization with new team members, partners, and schedule changes.

Results: Collections of selected, cataloged, organized, and documented data, which allow the development of new products and services, such as applications, reports, research, investigations, and sharing.

4.2 Scenario 2 – Curation of data obtained from systems and internal sources linked to direct administration

Description: the second scenario refers to the set of information about suppliers of products and services to the state in its various bodies and entities. These data are obtained from the financial management system of the state of Goiás. These data include details about suppliers, what they provide, dates, amounts received, contracts, and locations where these products will be delivered or services performed.

Curator Actions: Starts the curation life cycle with curation planning for this set of data, defining the team that will work on the activities and their roles, identifying which digital objects will be curated and the technologies needed for the actions (see technical phase). The preservation plan must consider aspects related to the source of data, transfer, and replication mechanisms, the integrity of the data, the linked data and their updates, and interested parties involved in conservation and preservation activities. Curate data through the selection and arrangement of data sets, proposing data exposure, and presentation mechanisms while at the same time establishing ways to protect and preserve this data set. This type of data needs to be part of a context to make sense (how the suppliers were selected, what the products and services are, for what purpose, where they are being used, for how long, *etc*.).

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Results: Supplier datasets, cataloged, organized, and documented, that enable the development of new products and services, such as applications, reports, research, investigations, and sharing.

5 CONCLUSIONS

The OGD have an important role in promoting transparency, but data openness initiatives do not achieve the desired levels of collaboration and participation. We identified this reality in the state of Goiás, and it is a recurring report in the literature that investigates the topic. The harmonized model of digital curation that we propose takes into account all the particularities that involve the management of government information. Furthermore, it does not compete with any technologies or structures that exist or will be adopted, but incorporates in this universe, OGD preservation strategies to guarantee their use and reuse, sensitizing government managers to reflect differently about their users, and strengthening interaction between government and society. We established real usage scenarios to validate the model, which served satisfactorily, but we recognized that practical tests would be ideal to identify the model's potential or its weaknesses. In any case, whether supported by previous studies or the research we have conducted so far, we indicate that the model meets the demands involving OGD.

Curation can help governments assume their leading role as information vectors in various segments, such as universities and research institutes; with statistical, climatic, meteorological, traffic data and especially those that portray the status of services offered to the public. Work related to the context of this research showed a consensus on the need for a framework or standard model for making government data available, intending to bring greater uniqueness and respect for internationally accepted criteria.

Our work contributes to presenting, based on the Goiás case, a portrait of a reality that also concerns transparency portals and open data portals in other locations. In this sense, it is possible to think that the work offers contributions to the management of government information in Brazil, whether at the federal, state, or municipal levels; but that does not prevent the model from being applied to other governments, as it is compatible with different realities.

The work also contributes by taking a look at OGD users, the need to strengthen interaction between users and portals, the demands for spaces that allow more effective communication between users and governments, the unexplored possibilities with social media, session logs, traces produced by interaction with resources, annotations, and social tags. There is a need to develop information products from OGD, so that these data can effectively comply with the principles that led to their opening. Finally, we contribute to digital curation, bringing it to the center of the debate, and seeking a practical application in government organizations.

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