ENVIRONMENTAL DATA MANAGEMENT: AN APPROACH USING THE ACTIVE DATA MANAGEMENT METHOD.

Calvin Stefan Iost[a,b], Willian Derek Ruiz[a], Rodrigo Cunha[a]

[a] *Centro Universitário SENAC*
[b] *CETREL*

Abstract: In reports phase of environmental projects it is important the exchange of information between stakeholders, sometimes compromising the data usefulness which ends up reworking throughout process. This study aims analyze the 'active data management' method in environmental management projects. This method considers data as the main deliverable and the reports only with purpose of documenting and interpret the result. The analysis method considered the creation of a plan workflow validated with technical experts to guidance in terms of data management. We observed these practices can improves the way data is used and enables the use of new data interpretation tools and methods.

Keywords: data; management; environment.

GESTÃO DE DADOS AMBIENTAIS: UMA ABORDAGEM SEGUNDO O MÉTODO DE GERENCIAMENTO ATIVO DE DADOS.

Resumo: Na fase de relatórios de projetos ambientais é importante a troca de informações entre as partes interessadas, por vezes comprometendo a utilidade dos dados que acaba retrabalhando ao longo do processo. Este estudo tem como objetivo analisar o método de 'gestão ativa de dados' em projetos de gestão ambiental. Este método considera os dados como entrega principal e os relatórios apenas com o objetivo de documentar e interpretar o resultado. O método de análise considerou a criação de um plano de workflow validado com especialistas técnicos para orientação em termos de gestão de dados. Observamos que essas práticas podem melhorar a forma como os dados são usados e possibilitar o uso de novas ferramentas e métodos de interpretação de dados.

Palavras-chave: dados; gerenciamento; meio ambiente.

1. INTRODUCTION

Data is a relevant asset within a project. Their good management is aligned with the good quality of the entire context, since they are the input for interpretations and decision making [1].

This study aims analyze the 'active data management' method in environmental management projects, seeking an alignment with corporate strategies of relevance, completeness, consistency, transparency and accuracy of data and proposes to enable the correct management of environmental data from the collection, storage and consumption of data in a safe, efficient and economical way considering the active data management method [1].

Using KPIs (key performance indicators) and absolute values, it is possible to obtain automated insights and reports from each of the thematic areas of a project, such as 'Groundwater', 'Superficial Water', 'Sediment', 'Soil', 'Vapors and Gases', 'Limnology', 'Ecotoxicology', among others.

This method considers good practices, as shown below, in terms of data management aligned with the main areas of knowledge related to data management and governance, according to DAMA INTERNATIONAL [2].

- Active data management / Governance
- Data Architecture
- Modeling and Data Design
- Data Storage and Operation
- Data Security
- Data Integration and Interoperability
- Documentation and Content Management
- Master Data and Reference
- Data Warehousing & Business Intelligence
- Metadata
- Data Quality

Therefore, active data management arises in the context of environmental programs in which, during its planning and design, the collection of a large volume of information regarding environmental parameters and indicators is expected. Given this scenario, it is necessary to adapt the traditional project management processes, through the adoption of new technologies and data processing premises.

2. METHODOLOGY

The method considered was adapted from those presented by EPA [1], DAMA INTERNATIONAL [2], WBCSD and WRI [3] and CETESB [4]. EPA recommends that conditions should be provided to enable data versatility, in order to allow changes in conditions and new information that arise during the design, construction and evaluation of environmental projects to be provided during data management. In addition, according to the WBCSD and WRI, it must be ensured that the data are relevant and complete, that consistent methodologies are applied and documented,

adequate transparency conditions regarding the data process and that the indicators are calculated accurately.

This study involved project's technical staff and determined that the active data management should include the survey of environmental impacts, define indicators and variables to be collected. Data structure and data models for each thematic area are necessary to allow defining the technological resources necessary to implement the data collection procedures and the storage of the database effectively, as well as the consumption format of data by end users. From the interaction with the technical staff, the different sets of users who must have access to the data generated at managerial, technical and general levels are also defined.

Documentation, quality assurance and quality control (QAQC), archiving and data security activities are provided throughout the procedure.

3. RESULTS AND DISCUSSION

The active data management method, as well as its interfaces with the indicator calculation processes, are dynamic and continuous improvement processes that must be periodically reviewed and refined in relation to the basic data.

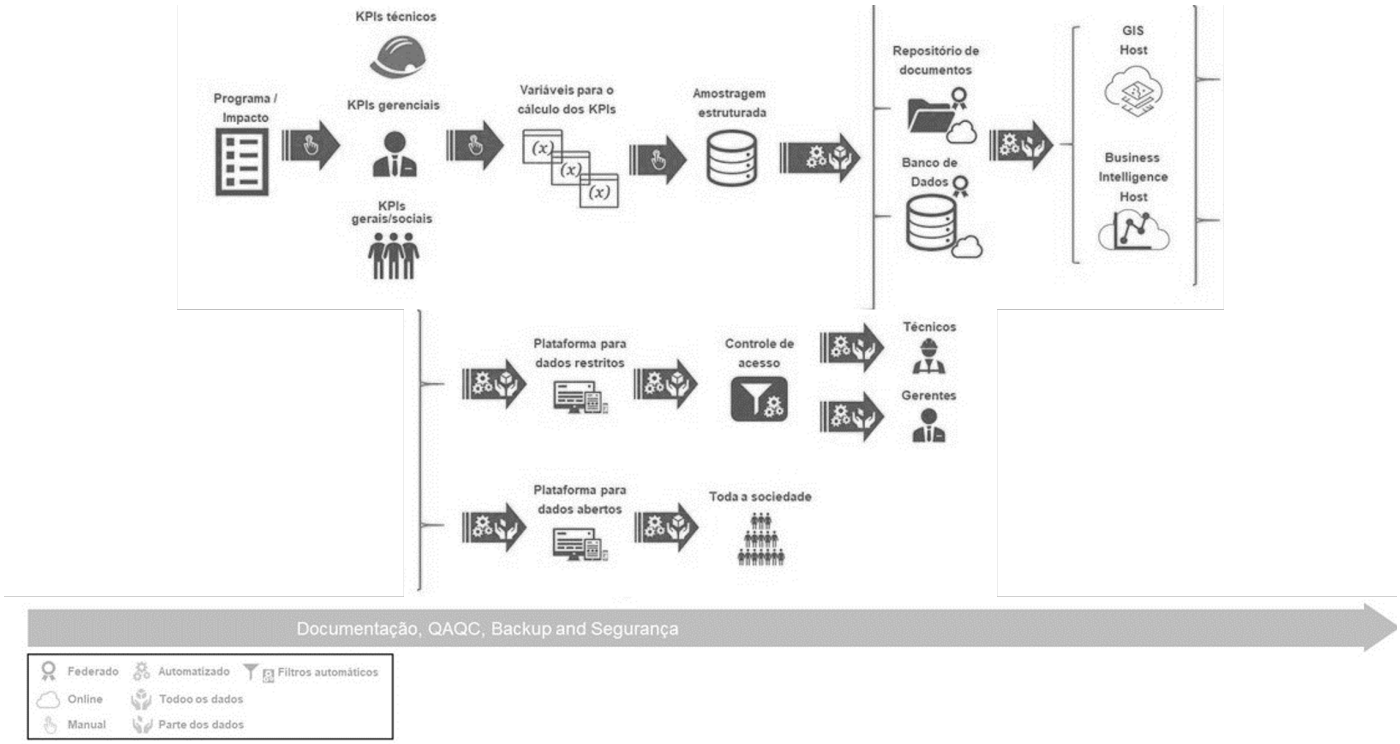
Figure 1 presents the general overview of an active data management plan. Such approach provides a better interoperability and transparency of the data management process in order to limit the costs of environmental agencies and interested parts during the review and interpretation of results, allowing all parties, access to information, supporting interpretation and collaborative use, leveraging tools and methods of analysis developed in a comprehensive way and, thus, enabling to provide scale economy.

To guarantee its correct implementation, as well as data communication and transparency for all interested parties, the following will present a proposal for the implementation and operation of the active data management plan.

First, it appears that it is of fundamental importance that the team responsible for implementing the active data management plan has technical skills and the production of digital solutions and innovations focusing on technology, data management, environmental data storage, production of environmental reports on business intelligence platforms and online maps.

ISSN: 2357-7592

Figure 1. Construction of the environmental data management plan.



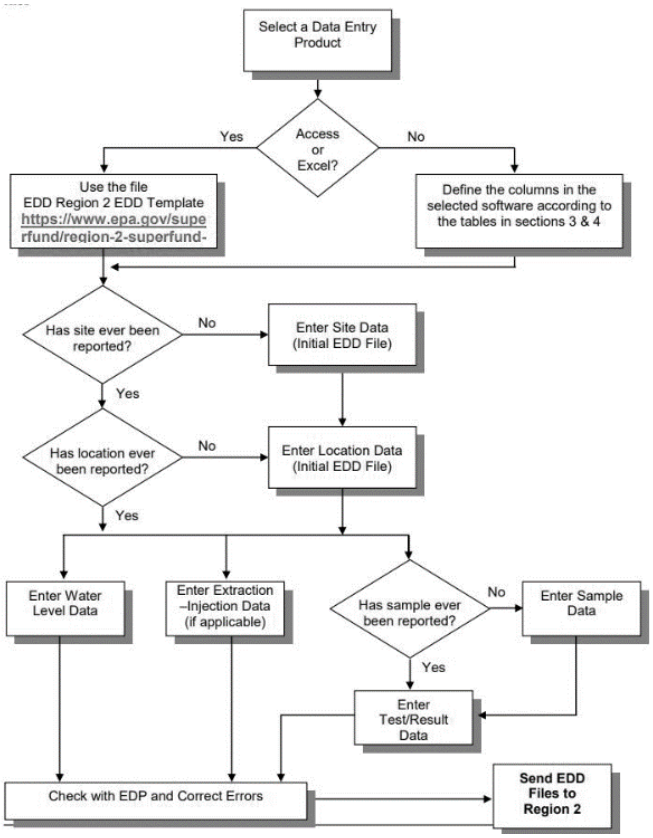
The necessary steps for achieve a adequate implementation of flowchart presented above considering active data management method, must consider the following activities:

- Prototyping: Availability of prototypes to be validated with the technical areas and with the interested parties for the presentation and results and their respective histories and results.
- Online Database: Inclusion of database structures in 'data warehouse' to receive technical environmental information from multiple sources.
- Legacy data acquisition procedure: Creation of data extraction, transformation, and loading (ETL - extract, transform and load) procedures for legacy (historical) data in each of the identified databases.
- Data acquisition: Elaboration of a procedure to define the requirements and conditions for receiving the data to be collected.
- Provision of platform: Provision of centralized platform for management of subcontractors, document repository, data download and presentation of results and stories.
- Elaboration of online reports: Elaboration of a procedure for online access to dashboards, maps, and reports to provide the compilation of data, metrics and indicators.
- Documentation: Preparation of platform documentation and data models used in the scope of the project.
- Assisted operation: Training and maintenance of the proposed solution to employees and users of procedures and tools; adaptations of the platform and training are also included in these activities.
- Governance and data quality: Elaboration of procedures to guarantee data governance and the required technical, legal, security and privacy quality.

ISSN: 2357-7592

A practical application of the method presented in that article can be seen in the environmental management of the superfunds elaborated by six regions presented by the EPA [1], which can be seen in Figure 2.

Figure 2. Flowchart of the process for creating and verifying deliverable electronic files for field parameters and laboratory analysis.



Source: EPA [1].

It is recommended that during the implementation of the data management plan, current legislation and the technical standards applicable to the execution of activities be considered, aiming at the elimination of any form of report in unstructured formats (for example, Word documents, PDF or printed material), since the data is considered the main asset of the plan.

4. CONCLUSION

To meet the basic premise related to the active data management method, an approach was developed that considers good practices for the aspects of planning, collection, processing, storage, decision making and data communication, as proposed by this guideline.

Considering a basic premise of building resilient infrastructures, promoting inclusive and sustainable industrialization and fostering innovation, an approach to using cloud computing was developed, which is a category of resilient information technology infrastructure and with less demand for inputs, as well as the availability of data on open platforms for the whole society.

The management method based on indicators and targets, as well as the transcription for the structures of data models ensure that the bases are created for the implementation of environmental programs considering the basic 'Data-Driven' premise.

This method also provides devices to comply with the 'General Law for the Protection of Personal Data', which is under discussion in the Brazilian legislature, and some articles of that law have been in force since December 2018 and other articles will come into force throughout the year 2021 [5].

In light of the above, the information generated by this study contributes to the management of data throughout the life cycle of environmental projects, increasing the effectiveness and efficiency of the response action towards the interested parts as well as increasing the usefulness of the data and allowing the use of new data interpretation tools and programs.

5. REFERENCES

[1] EPA. **Best Practices for Data Management - Technical Guide**. 2018. Available in:< https://semspub.epa.gov/work/HQ/100001798.pdf>. Acessed om: 09/Sep/2019.

[2] DAMA-DMBOK: **Data Management Body of Knowledge (2nd Edition) by DAMA International.** Technics Publications; Ed: Second (4 de jul. 2017). 2017.

[3] WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT – WBCSD; WORLD RESOURCES INSTITUTE – WRI. **A Corporate Accounting and Reporting Standard - Revised Edition**. Washington, USA and Conches-Geneva, Switzerland. 2004.

[4] COMPANHIA AMBIENTAL DO ESTADO DE SÃO PAULO – CETESB. **Decisão de diretoria nº 038/2017/c, 07 feb 2017**. 2017.

[5] BRASIL. **Lei Nº 13.709, de 14 de agosto de 2018. Lei Geral de Proteção de Dados Pessoais (LGPD).** 2018.