Free/Libre and Open Source Software in the Social Sector: Towards a Maturity Model

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Abstract

The advantages of Free/Libre and Open Source Software (FLOSS) in creating accessible, sustainable, and community-oriented technological solutions have captured the attention of the social sector. However, security issues, licensing, training, maintenance, and insufficient use cases require new tools to assist these organizations. This paper identifies which dimensions can be used to develop a FLOSS maturity model for the social sector. Design science research was selected, starting with a systematic literature review on FLOSS maturity models. The study involved four partner organizations from the social sector in Portugal and Angola. Leveraging these findings, we developed a conceptual framework that aligns services usually offered by the social sector with the dimensions that support FLOSS adoption. The evaluation used the system usability scale questionnaire, and the results were further assessed through semi-structured interviews. Our research can contribute to expanding FLOSS adoption in a mission-critical sector struggling to define the best digital transformation strategy.

Keywords: Open source software, maturity model, social sector.

1. Introduction

There is a growing trend of incorporating Free/Libre and Open Source Software (FLOSS) across various industries for multiple purposes, such as advancements in technology (e.g., machine learning, mobile applications, artificial intelligence) and the establishment of digital infrastructure (e.g., operating systems, databases, web servers) [35]. The diverse range of information systems (IS) offerings and their role in promoting innovation in rapidly changing markets require frameworks, processes, and relational mechanisms that support and assess their integration at various organizational levels [4].

The social sector encompasses organizations that improve the well-being and advance community welfare [21]. It has arisen in response to the evolving relationship between the public and private sectors. The social sector covers several services for society as "beneficiaries", like health, education, culture, human rights, and social services [36]. Moreover, it is a core component of societal transformations, cooperation, and social innovation [17]. Digital transformation is also a priority for the social sector [40], which sees a low-cost, community-based solution in FLOSS [29].

Although adopting FLOSS can be advantageous for social sector organizations, the task is challenging due to factors such as a lack of technical expertise, awareness, licensing issues, compatibility problems, inadequate support, or insufficient documentation [26]. Therefore, maturity models have recently been proposed to help organizations adopt FLOSS [13], [34]. A maturity model includes different maturity levels relevant to understanding the current state and the improvement paths [4]. This may entail (1) comparing the "as-is" state, (2) identifying external requirements, guiding improvement measures, and regulating the progress toward achieving the desired "to-be" state [4], [18]. However, none address the particularities of FLOSS in the social sector.

The collaboration of four social sector organizations in two countries with different levels of maturity, Portugal (organizations A and B) and Angola (organizations C and D) revealed the need to adopt FLOSS for internal process optimization and transforming social services (e.g., elderly care and rehabilitation, support service delivery, publish aid events, etc.). Yet, there is a complete lack of guidance on how to do it. Additionally, when addressing an emerging economy like Angola, it would be challenging to identify paths for improvement solely from the perspective of local experts. An international cooperation effort in the design of a maturity model was found promising. Thus, we formulated the following research question (RQ):

- *RQ1. What trends in publications related to the social sector and FLOSS maturity models can be observed?*
- *RQ2. Which dimensions may be used in the FLOSS maturity model for the social sector?*

The rest of this paper is structured as follows: Section 2 explains the research approach. Subsequently, Section 3 presents the results of the systematic literature review. Section 4 includes the artifact description, and Section 5 includes the demonstration and evaluation jointly made with the practitioners. The discussion follows, and the paper closes in Section 7 with the main conclusions, limitations, and future work opportunities.

2. Research Approach

This paper adheres to the Design Science Research (DSR) paradigm. It is an iterative approach to obtain knowledge from the design of relevant artifacts, consisting of six primary steps: (1) identifying the problem and its motivation, (2) outlining the objectives for a solution, (3) designing and developing, (4) demonstrating, (5) evaluating, and (6) communicating [32]. DSR tackles real-world issues by offering techniques, algorithms, best practices, and instantiations for integrating constructs, models, or methods into a system [8]. Fig. 1 summarizes our research approach.

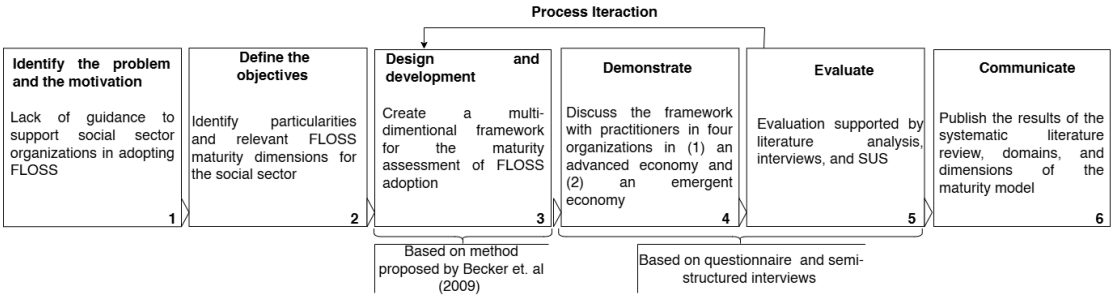

Fig. 1. Research approach (adapted from [4], [32]).

Social sector organizations often rely on technological solutions to support their mission. FLOSS can be a flexible and attractive option due to its collaborative nature, cost-effectiveness, and customizability. However, many of those organizations face challenges in effectively evaluating, implementing, and maintaining these solutions due to a lack of specific guidance and resources tailored to their needs. This can result in underutilization of technology, wasted resources, and difficulties in adapting FLOSS solutions to meet the unique demands of the social sector (step 1 - problem and motivation).

Our objective (step 2) is to develop a framework that captures the domains (relevant groups of services offered by this sector) and dimensions (the fundamental structure of a maturity model that practices will describe according to levels of maturity), to be used in the FLOSS maturity model for the social sector. A systematic literature review offered the foundations for the objective and the subsequent DSR steps.

The design and development of the artifact (step 3) are based on the method proposed by [4], suggesting seven steps in the development of maturity models aligned with DSR: (1) problem definition, (2) comparison of existing models, (3) development strategy, (4) iterative maturity model development, (5) conception of transfer and evaluation, (6)

implementation, and (7) evaluation. Subsequently, the artifact was demonstrated and evaluated (steps 4 and 5) based on the SUS questionnaire and semi-structured interviews in four organizations, and published in a scientific paper (communication).

2.1. Literature Review Strategy

Fig. 2 summarizes the systematic literature review process.

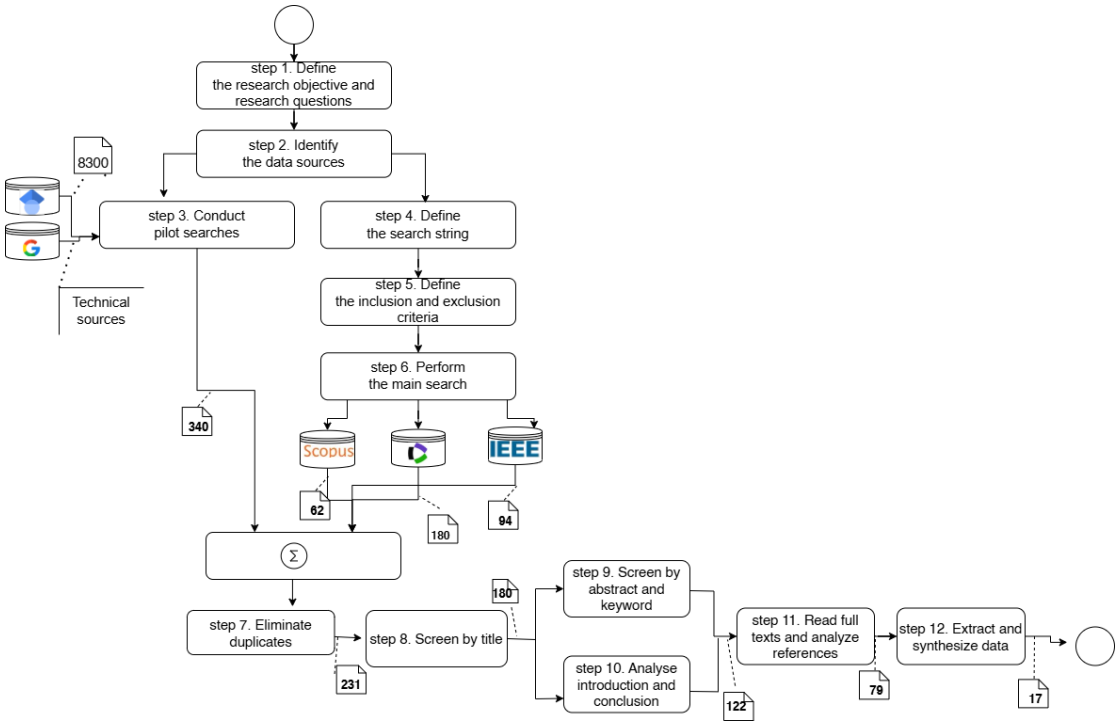

Fig. 2. Literature review process.

The literature review is a mandatory starting point for DSR in steps 1 and 2, enabling the subsequent DSR steps to be carried out. Thus, we have conducted a multi-vocal literature review [15]. The process started in June 2024, in Google and Google Scholar (to find grey literature that is common in FLOSS contexts). Several specialized websites and tools, such as The Open Source Maturity Model for the financial sector [13], the guide to open source for the social sector [10], the report on the state of open source [33], and Apache Project Maturity Model [14] were reviewed at this initial stage. Afterward, we defined the search string using the keywords *("floss" OR "oss" OR "open" AND "source" AND "maturity" AND "model") and ("maturity" AND "model" OR "maturity" AND "models" AND "third" AND "sector" OR "social" AND "sector" OR "nonprofit" AND "organizations")*. We searched for peer-reviewed papers published in English and indexed in Scopus, Web of Science, and IEEE databases (Fig. 2).

The inclusion criteria included documents that outlined models to assess maturity and social sector/FLOSS-related topics. After combining all samples, removing duplicates, and screening the title and abstract, 17 sources were selected.

2.2. Questionnaire and Interview Process

Our fieldwork began in two social sector organizations in the center of Portugal. A is a religious institution with over 500 years of social service, currently supporting over 5000 people in all social sector domains (e.g., health, culture, education). B is a foundation supporting 680 children, 80 of whom are immigrants (education, culture, health, and human rights), over 300 elderly people (health and culture), and 117 individuals at risk of exclusion (training, social services, and human rights). In Angola, two organizations are participating in our research, C supporting culture and human access of scientific material

online library and repository the capital Luanda, and D, non-governmental in three large regions (Luanda, Huambo e Benguela), intending to reduce poverty and hunger, improve education and community infrastructures in the region.

The System Usability Scale (SUS) [9] was adapted to evaluate the perceived usability of the proposed dimensions of the FLOSS maturity model. The questionnaire comprises five sections. The initial section outlines the questionnaire and its structure. The second section illustrates a specific use case within the social sector for FLOSS adoption, related to online training of staff and patients. The third section concentrates on gathering personal information from participants, including their age and professional experience. The fourth section discusses the usability assessment of the proposed dimensions based on an adapted version of the SUS (see Table 1).

Table 1. SUS questionnaire adapted within the social services domain.

Question Number	SUS Question adapted
Q1	I think that I would like to use these dimensions to assess and guide FLOSS adoption
Q2	I found the dimensions unnecessarily complex
Q3	I think the dimensions are easy to evaluate
Q4	I think that I would need the support of a technical person to be able to assess these dimensions in my organization
Q5	I found the various functions in these dimensions were well integrated
Q6	I thought there was too much inconsistency in these dimensions
Q7	I would imagine that most people would learn to assess these dimensions very quickly
Q8	I felt very confident that the domains represent the core mission of the social sector

The data collection employed a set of Likert-scale statements and open-ended questions that addressed the clarity and significance of each model dimension, perceived user-friendliness, and the likelihood of adoption. A score above 70 is considered satisfactory, while a score between 50 and 70 is considered marginal, and any score below 50 is deemed unacceptable.

In parallel with the quantitative input, semi-structured interviews were carried out [41] with stakeholders from each organization. The interview protocol aimed to gather insights regarding the recognized strengths and weaknesses of the proposed dimensions and their priority for each organization. The interview consisted of five phases: (1) warm-up conversations, (2) introducing the interviewer and the purpose, (3) introducing the interviewees about their training and professional experience, (4) questions related to the proposed domains, and (5) closing questions. Each interview lasted between 30 and 45 minutes. The recording was made with the participant's consent and subsequently transcribed for analysis. We used thematic analysis [6] to analyze the data, classify and identify patterns in it, due to the method's ability to help understand any issue more broadly [6] (for example, what are the participants' concerns and why they are concerned), to design a suitable maturity model.

3. Findings from the Systematic Literature Review

The literature was based upon two main lines of research: maturity models for the social sector (Section 3.1) and FLOSS maturity models (Section 3.2). Other studies relevant to inspire our work are also mentioned in Section 3.3.

3.1. Social Sector Maturity Models

An organization's ability to respond effectively to global emergencies affecting its customers relies on its maturity in allocating the necessary resources [22]. Social sector organizations are no different. Therefore, several maturity models were proposed in this context. For example, [19] presented an enhancement to the Process Management Maturity Model for the social sector, encompassing four dimensions: (1) schedule management, (2) people management, (3) process management, and (4) marketing strategies. It addresses shortcomings that hinder the performance of Non-Governmental Organizations (NGOs), particularly in fundraising and the effectiveness of project

implementation. The research conducted by [24] investigates the relationship between social capital [1] and the maturity of knowledge management in NGOs. The authors demonstrated that social capital has a significant influence on the maturity of NGOs' knowledge management.

However, existing maturity models often focus on isolated domains of organizations. There is a lack of FLOSS maturity models that holistically address both the adoption of FLOSS and the maturity of the social sector organization in digital transformation. A possible solution is to evaluate relevant dimensions from past contributions (e.g., project management, resilience [23], or technology maturity [28]), and expand them in close collaboration with practitioners to ensure applicability.

3.2. FLOSS Maturity Models

Despite FLOSS's impact on digital transformation, this area remains emerging [27]. Some researchers concentrate on specific sectors or within a particular country, such as FLOSS adoption in healthcare (e.g., OpenMRS [28], DHIS2 [29], etc.) or adoption in large enterprises [29]. Other studies comprehensively assessed existing FLOSS maturity models [3], [38]. Table 2 summarizes relevant maturity models found in our review that evaluate various aspects of FLOSS development and implementation.

Table 2. The trends of FLOSS maturity models.

Maturity Model	Source	Year	Dimensions / Domain /Elements	Maturity Level / Score	Users
C-OSMM	Capgemini (2006) [9]	2003	Community Software functionality Documentation Support and maintenance Security Legal and licensing compliance	Ad-hoc Developing Mature Enterprise-ready	Industry developers FLOSS communities End-users
N-OSSMM	Golden (2005) [16]	2004	Documentation Integration Evaluation Product requirement product software professional service Technical support Training	1 (ad-hoc) 2 (reactive) 3 (managed) 4 (measured) 5 (optimized)	Developers Open source community End-users
Qualification and Selection Open Source (QSOS)	Team QSOS Core (2024) [37]	2004	Legacy Activity Governance Industrialization	0 (functionality not covered) 1 (functionality partially) covered. 2 (functionality fully covered)	Developers and IT Teams IT Decision-Makers Organizations Consultants and Analysts
Open Business Readiness Rating (OpenBRR)	West et. al (2005) [42]	2005	Functionality Usability Quality Security Maintainability	Score based rating	Software Developers
OMM	Petrinja et. al (2009) [34]	2009	Quality and assurance Management Community and Communication Development process Intellectual property and legal	Basic, Intermediate Advanced	Industry developers FLOSS communities End-users
Apache Project Maturity Model	Foundation (2025) [14]	2015	Licenses and Copyright Community Quality Releases	Incubator Graduation to Top-Level Project (TLP) Ongoing Governance	Developers
OSMM	FINOS (2023) [13]	2022	Strategy Management Usage	1 (unplanned) 2 (aware) 3 (managed) 4 (engaged) 5 (leading)	Developers End-users

The Capability Maturity Model (CMM) has historically played a key role in guiding

organizations toward more structured and predictable software development processes [30], and has inspired several of the models found. Its organized framework, divided into five maturity levels, has enabled numerous organizations to evaluate their existing practices and implement enhancements to improve quality and efficiency [30]. The broad acceptance of the CMM highlights its effectiveness as a fundamental framework for process improvement [25]. Nonetheless, the changing nature of software projects such as cloud services, artificial intelligence (AI) integration, and cybersecurity issues requires that organizations modify their maturity models to better integrate domain-specific challenges and practices [18]. Thus, new maturity models are emerging that extend beyond software development processes, offering greater flexibility and highlighting cultural adaptability, technological skills, and strategic alignment [25].

The first open source maturity model (OMM) was launched in 2003 by Capgemini (C-OSMM) [9]. It was one of the first attempts to standardize the generally ad hoc evaluation approaches for FLOSS projects. The model enables the assessment of generic product-related characteristics (e.g., security, usability, portability) and user-related characteristics (e.g., support availability, governance capabilities). About a year later, Navica proposed its maturity model called N-OSMM [16]. It was more compact and simplified compared to OMM by Capgemini. It assesses project-related features, including support, documentation, training, and professional services. It enables the evaluation of specific aspects of the project. Additionally, its narrower scope is designed for quick, targeted assessments rather than an in-depth view of process maturity. These two models were proposed by companies and are private. However, in 2004, a group of FLOSS developers, users, and enthusiasts [37] proposed the Qualification and Selection Methodology for Open Source Software (QSOS) method, which is compatible with FLOSS. It is released under the GNU Free Documentation License (GFDL), promoting transparency and collaboration. The methodology enables an iterative assessment approach, where, in each iteration, the number of FLOSS tools evaluated for a specific user is progressively reduced.

In 2005, Open Business Readiness Rating (OpenBRR) was proposed by [42]. The method was specifically designed to evaluate FLOSS tools that are mature enough to be used by industry. In 2009, [34] still identifies shortcomings in existing models and introduces another OSMM. It is based on CMMI and designed for industry developers, FLOSS communities, and FLOSS users. More recently, the Apache Project Maturity Model [14], was developed to describe how Apache projects operate in a concise, high-level manner, addressing requirements such as code, licensing, copyright, or release.

A FLOSS maturity model has specific assessment criteria, such as quality, governance, usability [27], community involvement [34], among others, included in Table 2. Nevertheless, many models focus specifically on the development process, such as the OMM, aiming to assess the quality of FLOSS development methodologies [34]. OMM authors employed qualitative methods to understand the expectations of FLOSS developers, conducting interviews and utilizing a goal question metric approach.

The intended users of the maturity models identified in the literature include developers, IS decision-makers, and end-users within an organization. Current FLOSS maturity models focus on technical, developmental, and governance elements essential for software development and operational effectiveness. Many of them (e.g., OMM, OpenBRR, and Apache Project Maturity Model) evaluate software quality, community engagement, and development processes. However, there is a gap in addressing the distinct needs and characteristics of the social sector, especially regarding an ecosystem (healthcare, education, culture, human rights, social services) maturity model and multi-faceted assessments. They do not consider all the interconnections that affect the deployment and sustainability of FLOSS in community-based environments.

3.3. Related Work

This section presents other papers relevant to our work, including reviews, analyses, or related maturity models. For example, [43] characterized existing quality evaluation

models for FLOSS. The authors created a meta-model based on the work of [5] and adopted semi-structured expert interviews to validate the model's comparability, concept alignment, general applicability, and adaptability.

The work of [2] analyzed several quality assessment models for open source software (OSS) found in the literature, emphasizing the importance of improving their practical use. The analysis encompasses 19 studies, categorizing the models into five groups based on their quality traits, evaluation methods, and areas of application. The findings suggest that many models fail to identify a specific application domain. Additionally, the majority overlook community-related aspects. The research suggests that attention should be directed toward creating models that incorporate vital quality attributes, such as maintainability and usability, to enhance OSS's evaluation and selection processes.

The authors in [12] proposed the Public Health Agency Maturity Model (PHAMM). It was selected due to the link with health, a relevant domain of social sector activities. The model has five maturity levels from 0 to 4 (from basic process documentation to advanced systems integration and inter-departmental collaboration). Its purpose is to minimize structural disparities among PHAs and promote digitalization by creating a common vision, setting clear maturity levels, and distributing national funds for digital projects. The creation of PHAMM was informed by a review of existing literature, discussions with practitioners, and workshops, resulting in eight dimensions and various subdimensions to classify practices and support digital transformation. The model prioritizes interoperability, data protection, and the adoption of standardized interfaces to enhance the flow of information among different departments and organizations.

[39] compared different methods for evaluating and selecting OSS, highlighting the increasing dependence on OSS for commercial purposes. The research integrates a variety of models, C-OSMM, the N-OSMM, QSOS, Open BRR, and E-OSS (Easiest Open Source Software Model). Each model is defined by its target audience, evaluation techniques, and scoring frameworks; while C-OSMM, N-OSMM, and E-OSS are seen as practical models, Open BRR is an academic proposal. The paper details the four stages of the Open BRR model (quick assessment filter, target assessment, data collection and processing, and data translation) and emphasizes a structured judgment process for selecting OSS components.

[3] developed a reference model that assesses the maturity of FLOSS communities. The authors employ a mixed-methods strategy, integrating quantitative and qualitative measures to create a maturity model. Their research adheres to the DSR, highlighting the significance of socio-technical practices within FLOSS communities. Data was gathered from well-established FLOSS communities (such as KDE Plasma, Apache HTTP, Poppler, and Inkscape) through various tools and observations of community documentation. The authors noted that the maturity model effectively comprises diverse facets of community maturity and recognize that utilizing the model for rapid evaluations might be cumbersome and that current models for software development fail to adequately reflect the particularities of FLOSS communities.

It was possible to identify a design pattern in the selected publications: literature review and insights collected with experts in the domain. The findings suggest a demand for models tailored to specific sectors and simpler structures that consider factors such as the type of service and different organizational characteristics. We could not find a FLOSS maturity model specifically designed for the social sector. Therefore, as suggested by [7], the complexity of organizations and their operating environments necessitates models that capture the dynamic and interconnected characteristics of ecosystems. The maturity models identified in the literature review, their dimensions (Table 2), and the domains of the social sector (health, education, culture, human rights, and social services), provided the foundations for our artifact.

4. Artifact Design

The literature review and contacts with the participant organizations allowed us to identify key dimensions to deploy a FLOSS maturity model for the social sector,

according to five critical domains of social intervention (see Fig. 3). Thus, we identified the following design requirements [31]: (1) stakeholder and domain alignment, i.e., the artefact must cover the diversity of domains in the social sector (e.g., health, education, culture, human rights, and social services) due to the different need and expectations for the FLOSS in each domain and must consider contextual variables such as behavior, local infrastructure, knowledge [11], [24]; (2) dimension modularity, i.e., the maturity dimensions must allow organizations to assess them independently or in combination or under domain, use case, or combinations of domains) [20]; (3) traceability, i.e., each maturity dimension should be trace back to measurable indicators and use cases (e.g., usability test and user feedback can be suitable to measure) [20] and (4) scalability, i.e., the FLOSS maturity model for the social sector must be scalable to organizations of different size and technology maturity [20].

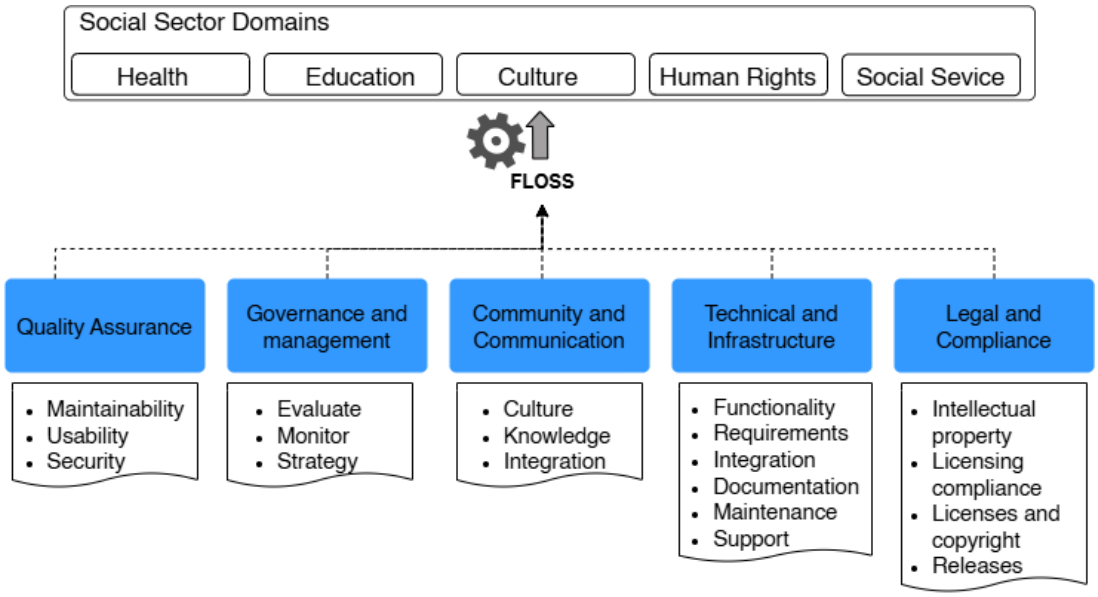

Fig. 3. Framework with identified domains and dimensions of FLOSS for the social sector.

Fig. 3 presents five social sectors' domains (on top) that can be supported by FLOSS solutions. Below, relevant dimensions for the FLOSS maturity model in the social sector are represented. For example, Quality Assurance [25] (on the bottom left) may involve aspects such as maintainability, usability, and security. Others, like Governance and management [20], must encompass evaluation, monitoring, development processes, delivery, and strategy, while Community and Communication [24] might include elements such as culture, knowledge, resilience, and integration. Technical and Infrastructure [20] are also considered, including software functionality, product requirements, software integration, documentation, support and maintenance, technical assistance, and training. Finally, Legal and Compliance [20], [43] involves intellectual property, regulations and compliance, licenses and copyright, and product releases.

The dimensions identified in Fig. 3 aim to create a FLOSS maturity model for the social sector as an ecosystem model. It aims to support the sector's digital transformation, which is facilitated by software that adheres to the free and/or open-source paradigm.

5. Demonstration and evaluation

Four companies participated in this phase, following the approach presented in section 2.2. In total, we had seven respondents aged between 26 and 50, including one individual with a doctorate, three with master's degrees, and three with bachelor's degrees. These individuals represented a variety of professional fields, including IS (developers, process managers, and researchers), social work, nursing, and NGO leadership.

The analysis indicates the relevance of all the dimensions in our artifact. For instance,

quality assurance was highlighted as a primary concern, while governance and management emerged as priorities predominantly within the health and education domains. Community and communication were emphasized as top priorities in cultural and social service areas. In contrast, technical and infrastructure issues remain a concern in the identified domains, though awareness is generally lacking. For example, a respondent from organization B said that "they do not use any software to support their activities, users' records, for example in elderly care, are made on paper, making them susceptible to error, not protecting data, difficult to access, and omission". Also, a respondent from organization C said that "the use of software is limited by the degree of development of society itself". Angolan society lacks a comprehensive level of literacy; yet, there is a will to overcome these difficulties. In the Portuguese context, on the other hand, the literacy level is higher. However, some social sector organizations still face challenges, such as relying on manual process management based on paper documents.

Legal and compliance are considered essential for FLOSS adoption in all organizations. Regarding the questionnaire results, in Q1 and Q3, responses ranged from a score of 3 and above, which was anticipated. In Q2, however, the values fell below 3, with five participants selecting a score of 1, indicating a pragmatic view of quality. The values for Q4 were varied, though most respondents opted for scores below 3. In Q6, one participant rated a 4, suggesting agreement on the inconsistency among dimensions, but later contradicted this by stating that the diverse functions of these dimensions were well integrated (as noted in Q5). In Q5, two participants agreed, while five strongly agreed. For questions Q7 and Q8, the scores were all above 3. In general, the analysis showed that participants are interested in transitioning to the new notation. The average score on the SUS was 82.31%, signifying a satisfactory level of usability.

6. Discussion

This study started by evaluating the current landscape of the area under investigation. It offers an opportunity to identify gaps in existing FLOSS maturity models, facilitating their future enhancement for the social sector. Subsequently, we identify a structure for a FLOSS maturity model suitable for the social sector, concluding with an evaluation that included organizations from Portugal and Angola.

There are limited studies on maturity or evaluation models specific to the social sector. These studies concentrate on the maturity of process management [19], knowledge management and social capital [24], and resilience maturity [23]. The initial FLOSS maturity model OSMM by [9] and the method for selecting qualifying QSOS by [37] were introduced in 2004. Several other models have emerged based on CMM and ISO 25010. The growing adoption of FLOSS brings with it the need to better guide the practitioners, hence many studies related to the FLOSS maturity model (e.g. OSM by [34], N-OSSMM by [16], Apache Project Maturity Model by [14], etc.) are emerging to address the nuances of fields that have not yet been explored.

It was observed that maturity models serve as instruments to evaluate performance and ensure that organizations are fulfilling their missions effectively. This builds trust with stakeholders, including donors and beneficiaries. Moreover, it promotes data-driven decision-making in the social sector. The current focus is on (1) accountability and transparency (with social sector organizations facing increasing pressure in these aspects); (2) process orientation (which assists in identifying inefficiencies and areas in need of improvement); (3) assessment tools (organizing the model according to domains, dimensions and focus areas, maturity levels, and applying appropriate questionnaires to evaluate maturity and make possible adjustments); (4) the development of a tailored framework to align with the unique characteristics of the social sector (resulting in more relevant and effective interventions); (5) digital tools and strategies (to enhance outreach and resource mobilization efforts); and (6) capability building and sustainability (enabling organizations to evaluate their strengths and weaknesses systematically) for achieving long-term success.

We could not identify a unique structure for maturity models in the social sector.

Therefore, our first contribution is an artifact that integrates all the relevant domains and dimensions. CMM is frequently cited for establishing levels of maturity. The analysis also revealed that a combination of literature review and interviews, as we adopted in this work, is a popular and effective data collection method. We confirmed that the maturity concept applies across operations in different areas. It entails categorizing the model into domains/dimensions/elements and categorizing them into maturity levels or scores distributed by practices. However, our findings also revealed that the complexity of these models can pose challenges for individuals lacking a technical background, which may require more than one respondent (e.g., the information technology manager and the domain expert under evaluation).

We categorized community support into three groups: governmental, associative, and proprietary. The findings reveal that only a small number of models receive community backing (e.g., Apache Project Maturity Model [14], N-OSSMM [16], OSMM [13]). Therefore, we can assert a lack of standardization and initiatives for the acceptance of FLOSS maturity models. Developing a FLOSS maturity model as an international benchmark for the social sector would be beneficial.

7. Conclusion and Outlook

This research investigated the status of maturity models for the social sector and FLOSS and designed a FLOSS maturity model structure tailored for the social sector. The work was evaluated using a SUS questionnaire and semi-structured interviews.

Our results reveal a diverse landscape of maturity models within the FLOSS domain, highlighting several significant shortcomings. Consistent with the broader context noted in earlier research, many models identified lack the comprehensive scope needed for applicability in the social sector. Based on our findings, several future research directions emerge. There is an urgent need to establish a widely recognized FLOSS maturity model as an ecosystem model for the social sector. Additionally, our research emphasizes the importance of conducting thorough case studies to gain insights into the practical benefits and applications of maturity models in social initiatives. The next steps of our work will include the identification of use cases and practices relevant to each domain and dimension. According to the participating organizations, some practices may be transversal to all domains (e.g., documentation or licensing). In contrast, others may vary according to each domain, opening the potential for a maturity model that adapts to the domain under evaluation, as happens in the proposal presented by [12] that "omits practices if they do not fit its context".

Several limitations must be stated. The first is the selection of the search terms, academic databases, and the criteria for inclusion/exclusion. To mitigate potential risks, we employed the terminology used by different authors to establish the search chain. We accessed three databases (Scopus, Web of Science, and IEEE Xplore), utilizing Google Scholar for broader coverage and Google for technical resources, given the nature of FLOSS. Additionally, it is acknowledged that the interview method and the SUS questionnaire employed may have limitations, specifically due to the potential subjectivity in how participants interpret the questions and the restricted representativeness of the organizations involved in the interviews. However, it offers a solid starting point for the next stage of maturity model development.

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