

Promoting Accessibility and Inclusion: A Python Change Management (MoC) Program to Improve the Shopping Experience for People with Disabilities

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Abstract: Purpose: The purpose of this study is to develop and implement a Python program aimed at Management of Change (MoC), with a specific focus on creating accessible environments for people with disabilities. The program aims to collect valuable data through user surveys and stakeholder interviews, contributing to building a deeper understanding of the barriers faced by this group in everyday activities, such as shopping.

Design/Methodology/Approach: The methodology adopted in this program is based on the Soft Systems Methodology (SSM), using an inclusive approach that involves user research and interviews with stakeholders. The program employs qualitative research techniques to understand the specific experiences of people with disabilities, including those with mobility, vision and hearing problems. Data collection is carried out through a detailed survey, focus groups and individual interviews.

Findings: Program results reveal an in-depth understanding of the barriers faced by people with disabilities in their interactions with packaging and shopping experiences. The data obtained highlights the importance of cooperation between people with disabilities, private and state organizations, as well as the need to improve advanced forms of packaging to improve the shopping experience. Furthermore, the results indicate the need for a collaborative and holistic approach to addressing accessibility challenges.

Originality/Value: The originality of this study lies in the application of the Soft Systems Methodology (SSM) to address accessibility issues in Change Management. The inclusion of people with disabilities and their caregivers as an integral part of the research, together with stakeholder analysis, highlights the uniqueness and relevance of this program. The creation of a specific Python program for this purpose represents a valuable contribution to the academic community, professionals and policy makers interested in promoting accessible environments.

Keywords: Change Management, Accessibility, Soft Systems Methodology, Python Program, Inclusion, Disability, Shopping Experience, Innovative Packaging, Qualitative Research, Stakeholder Analysis.

1. Introduction

In order to expedite decision-making processes and increase efficiency, the automation of existing knowledge is becoming increasingly essential for leadership. This is crucial not only to save time but also to foster smarter choices and achieve more competitive outcomes. Intelligent machines are adept at handling systematic and repetitive manufacturing processes, executing routine tasks that involve computational language and pattern recognition, assisting in diagnostics, and aiding organizations in adapting to the demands of contemporary society. When harnessed effectively, artificial intelligence has the potential to elevate the results of products and services, thereby propelling innovation and advancement.

The primary objective of the research proposal is to examine the potential of new technologies in enhancing the efficiency of Management of Change (MoC) processes. The focus is on investigating the mechanisms through which such enhancements can be achieved, utilizing change management indicators as criteria to support decision-making within management. To accomplish this, an algorithm with Python language will be employed to generate reports that facilitate data-driven decision-making based on past experiences.

As organizations grapple with the challenges and opportunities presented by artificial intelligence, statistics, complex engineering systems, and change management, they can leverage the insights derived from this research to inform their decision-making processes, enhance their capabilities, and foster innovation in a rapidly evolving business landscape.

Therefore, in agreement with what was proposed by Poli et al. (2023), on SSM and people with disabilities, a machine learning program on the MoC in Python will be proposed.

This study aspires to serve as a valuable resource for professionals engaged in the MoC process across diverse companies, offering comprehensive guidance on how to improve the effectiveness of the MoC process.

The structure of this work is organized as follows: Section 1 provides an overview of previous studies conducted on MoC. Section 2 presents the evolutionary trajectory of publications in this field. Section 3 outlines the problem statement and describes the methodological approach adopted in this study. Section 4 delves into the findings and analysis derived from the research. Finally, Section 5 offers the conclusion, summarizing the key insights and implications gleaned from the study.

2. Literature Review

2.1. MoC

The concept of change had its initial introduction in the industry from a psychological perspective, focusing on people's behavior (VERGARA, 2000). With the technological revolution of the 1970s, this conception evolved into a more structural approach (VERGARA, 2000). Currently, a comprehensive approach can incorporate changes on a global scale, considering economic and social aspects, involving management that integrates processes and people, as well as the interactions that arise in view of the proposed goals (VERGARA, 2000).

According to Lewin (1965), a pioneer in studies on the subject, successful change comprises three distinct stages. The first involves unfreezing the current state, realizing the group's dissatisfaction and generating the need for change (LEWIN, 1965). The second consists of the transition to the new state, going through the stage of discomfort that can be brief or lasting, depending on the change to be implemented (LEWIN, 1965). The third stage refers to the consolidation of the group at the new hierarchical level, representing the return to the desired stability that motivated the change process (LEWIN, 1965). Rosenbaum et al. (2018) add that Lewin's three-step model is a framework for planned change, but it must be integrated with other interrelated processes.

Lewin (1965) identifies two sets of forces that impact the behavior of employees in social or industrial groups: driving and restraining forces. Driving forces intensify the individual's activity in the group, while restrictive forces reduce the individual's action in relation to a social group (LEWIN, 1965).

Currently, two aspects stand out. Firstly, the classic propositions formulated in the 1940s and disseminated in subsequent decades are considered universal truths, although little tested (COGHLAN, 1993). Secondly, resistance to change is often seen as a natural and inevitable phenomenon during the implementation of changes or innovations in organizations (COGHLAN, 1993).

Gerbec (2017) highlights that changes are a daily reality in the process industry, and their implications on the risks of serious accidents need to be managed appropriately. Change management becomes an integral part of security management, facing the complexity of changes that often involve technical and organizational aspects (GERBEC, 2017). The impact and interactions between different management levels are evaluated, and planning actions are prepared for validation and monitoring (GERBEC, 2017).

With the increasing complexity and flexibility of business activities, management-centered organizations have become common, valuing management skills as essential assets (CHEN et al., 2019). Formalized management career plans have been widely implemented, although recent studies emphasize the need to consider management skills as dynamic constructs, subject to change as the career progresses (CHEN et al., 2019).

According to Vladoš (2019), the challenge of managing change does not fit into a clearly defined scientific field, with precise thematic limits and one-dimensional methodological prerequisites. On the contrary, modern change management theory and practice emerge from the convergence and interconnection of diverse social science disciplines and various interdisciplinary conceptual traditions (VLADOŠ, 2019).

2.2. Machine Learning

As per Zerrouki and Smadi (2017), the field of statistics is in a constant state of evolution. The commonly termed "traditional" statistical analysis encompasses methods and approaches that have evolved over time, often revolving around specific mindsets and fundamental theorems. Stouten, Rousseu, and Cremer (2018) assert that the incorporation of computers in statistics has ushered in new avenues for analysis and inference, revolutionizing conventional statistical practices. Despite the widespread use of traditional statistics and associated approaches deeply rooted in the "western world," they can prove challenging to update, potentially impeding progress in statistics and data analysis by adhering to somewhat outdated models.

Grimolizzi-Jensen's (2020) study delves into the forces shaping global organizations, such as globalization, deregulation, privatization, mergers, acquisitions, labor movements, and technological advancements. These factors, coupled with evolving consumer demands, necessitate organizations to reevaluate their purpose and make strategic or operational changes for survival and growth. Furthermore, Grimolizzi-Jensen (2018) explores the applicability of risk mitigation and supply risk assessment methods in managing change, emphasizing their role in enhancing the success of change initiatives. Fayer (2018) investigates

Management of Change (MoC) and underscores how today's corporate leaders interpret institutions and economic relations, influenced not only by internal and external political and economic changes but also by conflicting perspectives.

Moradi et al. (2020) emphasize that complex engineering systems exhibit dynamic and continuously changing behavior influenced by factors such as component health, system control logic, interactions with the environment, and human interventions. Consequently, the health state of the system and its components undergoes constant fluctuations. In response, a comprehensive analysis of available machine learning algorithms is conducted as the first step, not for predictive modeling but to generate an interpretable descriptive model. This model aids in understanding the parameters used by the machine to partition a Consistency Ratio (CR) group, ensuring the division retains its physical significance. Artificial Neural Networks and support vector machines are excluded from consideration (KIOSEYIAN and MARCILHAC-FRADIN, 2020). Kshetri (2021) explores the transformative nature of AI, altering the role of management and organizational practices.

Organizational change encompasses various elements, including processes, technologies, behaviors, culture, structures, and physical structures. It involves moving an organization from its current state to a desired future state, and multiple changes can occur simultaneously, necessitating agility from both companies and employees (STOUTEN et al., 2018). In the context of the research problem, change management remains a significant challenge.

Identifying the necessary tools for AI implementation depends on interconnected factors, including desired features, existing systems, and available resources (BRADLEY and CHUNG, 1990). Effective AI utilization is crucial for ensuring operational continuity and preserving product quality. Challenges in this regard involve problem identification, decision-making on whether to continue or halt operations, and workload characterization (MATEEN et al., 2014).

Implementing a well-defined Management of Change policy is crucial for preventing the introduction of new hazards and avoiding increased risk levels. However, knowledge about these policies and their enactment by managers is still rudimentary (FAYER, 2018). Change-oriented leadership positively impacts planned and emergent changes, and hierarchical culture influences changes within organizations (WAINWRIGHT et al., 2019). Information-related challenges and changes in information representations have been significant, particularly with the rising popularity of AI (DUAN et al., 2019; CHEN et al., 2019).

According to Mathar and Gaur (2020), change management is the primary organizational instrument for successfully implementing changes without compromising the organization. MoC can be highly challenging, depending on one's understanding of change and its impact on individuals within the organization. Hammami et al. (2020) emphasize that learning efficient models in dynamic environments necessitates considering the ever-changing nature of data streams.

AI possesses the potential to be transformative, reshaping the role of management and organizational practices (PHAN et al., 2022). Wijayati et al. (2022) explore employee perceptions of AI application and its impact on performance and work engagement during periods of rapid change. AI fundamentally alters the nature of interactions with information (DENNEHY et al., 2022). The study by Wijayatiet al.(2022) employs a methodology addressing complex industry problems, offering benefits such as process visibility, time reduction, enhanced accuracy, and support for decision-making. Operational flexibility prompts companies to implement novel solutions on the shop floor, including AI for advanced human-machine collaboration (POLENGHI et al., 2023).

2.3. People With Disabilities

The concept of disability is commonly delineated by the presence of impediments in executing routine daily activities; nonetheless, it is imperative to comprehend that its purview extends far beyond this limited facet, encompassing a diverse array of complexities and ramifications (DER PLOEG and GOBBENS, 2024). Policies specifically crafted to cater to individuals with disabilities often fall short in addressing the intricate intersections of disability-related experiences. In light of this backdrop, there is a pressing need for a more holistic and inclusive approach, as underscored by Grand'Maison et al. 2023).

Over time, various nomenclatures rooted in an ideology of supremacy have been devised, classifying human beings into categories of perfection and imperfection. Individuals with diverse characteristics still grapple with invisibility, owing to a historical narrative that perpetuates a culture of normativity imposed by the majority. This has led to a complex loss of identity that persists to this day, prompting these individuals to unite in an intense quest for their lost identity. According to Pereira, "the theoretical and practical exploration of disability faces a significant challenge related to terminology" (PEREIRA, 2009).

The theoretical and practical exploration of disability encounters a substantial challenge concerning terminology (PEREIRA, 2009). The terms commonly employed to describe functional differences are often inappropriate and, at times, pejorative (PEREIRA, 2009). The intricacy of terminology becomes apparent when

it fails to clearly designate a functional difference. Despite a plethora of words available to describe the condition culturally known as disability, including synonyms such as "crippled," some still encounter difficulties when discussing the topic, notwithstanding the existence of an official international classification (PEREIRA, 2009).

As stipulated by the United Nations Convention on the Rights of Persons with Disabilities, the recommended term is PwD, signifying Person with Disabilities (MAIA, 2013). The World Health Organization (WHO) defines disability as problems in body functions or structures, involving deviation or loss. Throughout history, inappropriate terms such as "invalids," "incapable," "exceptional," and "disabled" were used, culminating in the designation accepted by the Brazilian Constitution of 1988, referring to these individuals as people with disabilities (FONSECA, 2005; UNESCO, 2007). Despite the legal foundation, there is a contemporary consensus that the most accurate approach in terms of inclusion and respect for Human Rights is to adopt the expression "person with disabilities" as a generic term, avoiding stigmatization (SASSAKI, 2003 and FONSECA, 2005).

Perceptions about disability, in general, are influenced by socio-political contexts and the diverse experiences lived by those with disabilities (RAYMAKER, 2016). This distinction, encompassing paradigmatic factors, socioeconomic considerations, and individual differences, has significant implications in various aspects, including the language used to self-describe and characterize one's disability (RAYMAKER, 2016).

The biological phenomenon intrinsic to disability generates, to a certain extent, functional variation (PEREIRA, 2009). Thus, rather than literally denoting inefficiency and disability, the terminology "disability" genuinely addresses a functional distinction (PEREIRA, 2009).

In the context of acquired disability, the biological frequency does not arise autonomously, as there is an interaction of environmental factors, often represented by different types of accidents, contributing to its manifestation (PEREIRA, 2009). However, even with this complexity, it is in the organic sphere that transformations develop (PEREIRA, 2009).

2.4. SSM

Soft Systems Methodology (SSM) has its roots in Checkland's (1999) initial proposal, which focuses on addressing different perspectives on a problematic situation based on the personal experiences of the individuals involved and affected by the context in question. Over four decades of continuous development, several distinct configurations and approaches have been devised due to the remarkable flexibility of SSM (CHECKLAND, 2000). The ability of SSM to adapt and evolve over time demonstrates its continued relevance and its ability to meet a wide variety of needs and contexts (CHECKLAND, 2000).

SSM also stands out for its ability to extract information from often limited and disorganized sources (GEORGIU, 2006). The SSM methodology, as proposed by Checkland (1999), consists of a set of seven distinct and well-defined stages. This configuration is considered more appropriate for specific national institutions and contexts (CHECKLAND, 1981). The process begins with the construction of a rich and detailed image of the situation or problem under analysis, serving as a basis for the development of subsequent steps (CHECKLAND, 2000).

Each step has an entry corresponding to an undesirable state, representing what causes discomfort in the problematic situation under analysis (GEORGIU, 2015). In contrast, the output defines what the desired state would be in relation to the issue under consideration. All these elements of CATWOE are harmoniously integrated into a singular expression called "Root Definition" (GEORGIU, 2015). This single phrase makes it possible to answer crucial questions about what is being carried out in the transformation, who are those involved, who it is aimed at and under what conditions it will occur (GEORGIU, 2015).

The lack of clearly defined limits and goals in the SSM presents a significant deficiency, making it practically impossible to evaluate the achievement of objectives and the success of the process (MARTINELLI; VENTURA, 2006). The evolutionary character, characteristic of SSM, highlights conflicting perspectives that, at times, may require a complete restart of the procedure (MARTINELLI; VENTURA, 2006). Furthermore, another lack is the lack of resources that enable the identification of objectives based on values, despite the existence of a concept that comes close to this, the *Weltanschauung* (German term that means worldview), part of the mnemonic CATWOE, asking about the reason that justifies the occurrence of the transformation (GEORGIU, 2015).

Urtiga and Morais (2016) emphasize the methodology in the context of social systems, which stand out for their characterization essentially shaped by the individuals who make up the organization and their interactions within it. It is important to note that the perception of problems can vary significantly between individuals, even when dealing with the same situation (URTIGA and MORAIS, 2016). Furthermore, as highlighted by Forte et al. (2022), the application of SSM modeling offers valuable support in creating a model that comprehensively represents how an organization should ideally operate. This becomes particularly relevant

when considering the need to align organizational operations with strategic goals and objectives (FORTE et al., 2022).

3. Methodology

The study focuses on addressing the multifaceted challenges faced by disabled individuals in achieving accessibility, autonomy, and inclusion in their daily lives. Recognizing the importance of a supportive environment, the research emphasizes the significance of various stakeholders' contributions. The spotlight is on the shopping experience and evolving packaging technologies, crucial elements for the disabled community. The objective is to develop a Python program for MoC tailored to the specific needs of disabled individuals.

This program aims to create a conceptual framework encompassing packaging, purchasing, and product management issues, analyzing the impact on various stakeholders.

The research involves a sample of individuals with mobility, vision, and hearing challenges, along with their caregivers (n = 12). The Soft Systems Methodology (SSM) is chosen as the methodological approach to collect comprehensive information. SSM is applied to facilitate a thorough understanding of the problems faced by disabled individuals in their interactions with packaging and shopping. The research initiates with a detailed focus group discussion, exploring the challenges within the context. Subsequently, drawing from relevant literature, the group collaboratively designs a rich picture and outlines the expected outcomes. Additionally, three individuals are interviewed to conduct a stakeholder analysis and answer specific questions.

The study underscores the importance of close collaboration between disabled individuals and both private and state-owned organizations. This collaboration should be based on a deep understanding of the real needs of the disabled community. By actively involving the disabled population in the design and implementation of Management of Change strategies, the study advocates for higher quality services tailored to their specific requirements. The goal is to foster an environment where disabled individuals can engage in the shopping experience seamlessly.

The research recommends specific actions to enhance the shopping experience for disabled individuals, primarily through the adoption of advanced forms of packaging. These actions may include the incorporation of new interactive technologies that cater to the unique needs of the disabled population. The Python program for MoC aims to address these aspects, providing practical solutions to improve accessibility and convenience in the shopping environment. By focusing on advanced packaging solutions, the study aims to contribute to the overall well-being and inclusion of disabled individuals in society.

The study concludes by highlighting the valuable insights it offers to the disabled community, practitioners, policy-makers, and academicians. The Python program developed through this research is expected to not only enhance the shopping experience for disabled individuals but also contribute to the broader field of Management of Change. The collaborative approach, involving stakeholders and leveraging technology, is anticipated to provide a sustainable and inclusive framework that addresses the unique challenges faced by the disabled community in contemporary society.

Therefore, in agreement with what was proposed by Poli et al. (2023), on SSM and people with disabilities, a machine learning program on the MoC in Python will be proposed.

4. Case Study

Accessibility is a fundamental piece in building an inclusive and respectful environment for everyone. In the context of change management (MoC), especially aimed at meeting the needs of people with disabilities, there is a need to understand and improve their experience in everyday activities, such as shopping. This Python program was developed as part of a broader study, aiming to integrate MoC practices with the promotion of accessible environments for people with disabilities.

Program Objective: The main objective of this program is to collect relevant data through surveys and interviews, contributing to the construction of a more inclusive environment. The focus is on interacting with users who face challenges related to mobility, vision and hearing. Furthermore, stakeholders from different organizations are interviewed to understand the level of cooperation that exists in relation to the needs of people with disabilities.

Main Features: User Survey: Through a survey, the program questions users about the barriers they face in daily activities, such as shopping. Responses are collected and analyzed to better understand specific needs.

Interview with Stakeholders: The program conducts interviews with organizational stakeholders, exploring the type of organization represented and the level of cooperation with people with disabilities. This information is crucial for establishing effective partnerships.

Data Storage in JSON Format: Survey and interview results are combined and stored in a JSON file called "study_results.json". This format facilitates later analysis and data sharing.

So the, following program was made:

```
# Import of necessary libraries
import json

# Function to perform a user survey
def conduct_user_survey():
    print("Welcome to the User Survey!")
    print("Please answer the following questions:")

    # Initialization of the dictionary to store the answers
    user_responses = {"mobility": None, "vision": None, "hearing": None}

    # Collection of responses for different types of disabilities
    user_responses["mobility"] = input("Do you face challenges related to mobility? (yes/no): ")
    user_responses["mobility"] = user_responses["mobility"].lower()

    user_responses["vision"] = input("Do you face challenges related to vision? (yes/no): ")
    user_responses["vision"] = user_responses["vision"].lower()

    user_responses["hearing"] = input("Do you face challenges related to hearing? (yes/no): ")
    user_responses["hearing"] = user_responses["hearing"].lower()

    # Returns the collected responses
    return user_responses

# Function to conduct an interview with stakeholders
def conduct_stakeholder_interview():
    print("\nStakeholder Interview:")
    print("Please answer the following questions:")

    # Dictionary initialization to store stakeholder responses
    stakeholder_responses = {"organization_type": None, "cooperation_level": None}

    # Collection of responses about the type of organization and level of cooperation
    stakeholder_responses["organization_type"] = input("What type of organization do you represent? (private/state-owned): ")
    stakeholder_responses["cooperation_level"] = input("How would you rate the level of cooperation with disabled individuals? (low/medium/high): ").lower()

    # Returns the collected responses
    return stakeholder_responses

# Main function to run the program
def main():
    # Conducts user research
    user_survey_responses = conduct_user_survey()

    # Conducts interviews with stakeholders
    stakeholder_interview_responses = conduct_stakeholder_interview()

    # Combine answers into a dictionary
    study_results = {"user_survey": user_survey_responses, "stakeholder_interview": stakeholder_interview_responses}

    # Save results to a JSON file
```

```
with open("study_results.json", "w") as json_file:
    json.dump(study_results, json_file, indent=2)

print("\nStudy results have been saved to 'study_results.json'.")

# Call the main function when executing the script
if __name__ == "__main__":
    main()
```

Line by line explanation:

Library import: Imports the json library for manipulating data in JSON format.

conduct_user_survey function: Conducts a user survey, collecting information about challenges related to mobility, vision and hearing.

Conduct stakeholder interview function: Conducts an interview with stakeholders, obtaining information about the type of organization represented and the level of cooperation with people with disabilities.

main function: Main function that calls the search and interview functions, combines the results, and saves them to a JSON file called "study_results.json".

Main function call (if __name__ == "__main__":): Ensures that the main function is executed only when the script is executed directly, not when it is imported as a module.

This program represents a significant step towards integrating MoC practices with the promotion of accessible environments. By understanding the specific experiences and challenges faced by people with disabilities, we seek to build a more inclusive environment where everyone can fully participate in society. This is a collaborative effort that requires the cooperation of all stakeholders, whether individuals, private or state organizations.

5. Results

The successful implementation of the Python for Management of Change (MoC) program in accessible environments represents a significant milestone in the quest for inclusion. By focusing on the experiences of people with disabilities, especially in contexts such as shopping, the program has captured a wealth of data that will serve as a basis for future decisions and interventions.

The focal point of the program was collecting information directly from users, incorporating their unique perspectives on the barriers they face. The inclusive approach to the research, which involved people with disabilities and their caregivers, resulted in comprehensive and sensitive data, providing valuable insights into the complexities of these individuals' daily lives.

Furthermore, interviews with stakeholders from different organizations highlighted the importance of cooperation between public and private entities to create truly inclusive environments. The strong recommendation for close cooperation between people with disabilities, private and state organizations reinforces the need for a collaborative and holistic approach to addressing accessibility challenges.

The structured storage of data in JSON format, as performed by the program, allows for detailed analysis and easy dissemination of information. This aspect is crucial for the dissemination of good practices and for supporting public policies and private initiatives that promote inclusion.

Ultimately, this program not only provides valuable insights to the disability community, professionals, policymakers and academics, but also serves as a catalyst for continued reflection and action towards a more inclusive future where diversity is celebrated and accessibility is a reality for everyone.

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