



Project Change Canvas

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Abstract:

Project management plays a critical role in boosting the success of organizations' projects. However, no matter how well a project is managed, changes are inevitable during its execution. It is crucial to evaluate the impact of these changes before implementing them to ensure they do not compromise the project's success. Existing techniques for assessing the effects of changes have several limitations—particularly in their failure to account for how changes might affect various aspects of project management, such as scope, cost, time, resources, communication, risk, procurement, or overall success. To overcome this limitation, this article introduces a new technique – the *Project Change Canvas* – that enables the systematic assessment of changes in information systems and technology projects by identifying and weighing their potential impacts across all relevant project management knowledge areas.

Keywords:

project; information systems; information technologies; integrated change assessment; change; impact; success; canvas.

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1. Introduction

Project management is highly valuable in organizations [1][2] and is crucial to projects' quality and success [3][4][5], which has been traditionally defined in terms of meeting the initial budget, deadlines, and objectives [6][7]. However, leading projects to success can be a huge endeavor because, due to their complexity, there are many dynamic variables to take into account, including technical, behavioral, and contextual ones [8]. Furthermore, no matter how well a project is planned, changes will always occur, requiring one or more aspects to be reassessed [9][10].

In the literature, it is possible to find various definitions to describe the concept of "change" since it can be applied in different contexts, including organizational, project, and technological changes. Organizational changes can occur in the organization's structure and processes; technological changes can be related, for example, to the appearance or diffusion of new technologies or processes [11]. In this article, change is defined as any event that modifies the initially defined scope, execution time, costs, quality, or other project elements [12].

If changes are not controlled, the project may have negative consequences [1]. According to PMI [9][10], change control involves identifying, documenting, and either approving or rejecting changes to project documents, deliverables, or baselines. All changes must be evaluated to assess their impact on the project before making a decision [13]. It is, therefore, essential to have a process for controlling changes that may arise during the project lifecycle [14].

Hussain et al. [15] state that although the efficient management of changes to requirements is a critical aspect of software engineering, approaches in this area tend to be rudimentary. For their part, Vuorinen and Martinsuo [16] also point to the need for integrated change management since current techniques do not comprehensively and seamlessly address the various areas of project management.

This paper proposes a new technique that helps project managers identify and weigh up the impacts of requested changes before implementing them in the project. The developed technique, the *Project Change Canvas*, is a one-page canvas for describing and evaluating changes. The main purpose is to help weigh up the impact of required changes considering the various project management knowledge areas. Design Science Research was used to develop this technique.

This study contributes to project management by addressing a gap in change evaluation techniques. The *Project Change Canvas* systematizes the evaluation of the impact of changes on projects, something that has been done in a limited way until now (without considering all the fundamental aspects of a project). Furthermore, the canvas has the potential to substantially improve the way project managers deal with changes during project execution. By structuring the assessment of impacts, professionals can make more informed decisions, minimizing risks and maximizing the probability of project success.

Section 2 presents the grounding concepts of the research. Section 3 describes the research method. Section 4 presents the proposed technique, the *Project Change Canvas*. Section 5 discusses the evaluation of the new canvas. Finally, Section 6 presents some concluding remarks.

2. Background

2.1 Changes to projects

Despite their temporary nature [17], projects usually experience a variety of changes throughout their life cycle [18][19]. To better understand the changes that occur during projects, it is necessary to be aware of the causes behind these changes, the types of changes that exist, and their associated impacts. According to Butt et al. [18], project changes can arise from a variety of reasons, whether caused by internal or external factors [16][20-23].

Mejl nder-Larsen [22] states that the client typically requests changes driven by external factors, whereas the project team originates changes related to internal factors. Love et al. [24] present a comprehensive view, highlighting those external environmental factors (of the organization), including Government Uncertainties, Economic Uncertainties, Legal Uncertainties, Technological Uncertainties, Institutional Influences, and Natural Causes. On the other hand, some internal

environmental factors (of the organization) lead to project changes, such as project uncertainty, organizational uncertainty, financial uncertainty, human uncertainty, and conflicts of interest.

Bano et al. [25] in their research propose a different organization for the causes of (requirements) changes, classifying them as essential or accidental. The authors explain that essential causes are beyond the control of the work team or organization and result from factors like changes in market demand or the environment. Accidental causes, such as a vague product vision or strategy or a less-than-thorough business assessment, can be controlled and avoided.

In turn, Eckert et al. [26] distinguish between the different types of changes, namely initiated changes in the product and emergent changes throughout the product's life cycle. According to Mejlænder-Larsen [22], emergent changes occur spontaneously and are not planned or intentional. They arise from the product's properties [11] due to existing weaknesses in the product [26]. In contrast, initiated changes are planned and controlled [23], originating outside the product [11]. These changes may occur in response to new needs identified by the customer [26]. Thus, while initiated changes are accepted at any stage of the design process, emergent changes are often seen as negative for the project because they can cause delays [26]. This is justified because initiated changes are supported by more comprehensive knowledge than emergent changes [23].

In the study by Sjögren et al. [23], 55% of the project changes analyzed were emergent changes, while the rest were initiated changes. In the case of emerging changes, the average time from requesting the change to the decision being made was 103 days, while in the case of initiated changes, it was 56 days. Another finding of this study was that initiated changes had a higher rejection rate than emerging changes (32% and 15%, respectively). These figures suggest that emergent changes are the most frequent and urgent to address, as they are unplanned. However, because they are unplanned, it often takes longer to decide whether to accept them to prevent negative impacts on the project.

According to Ibbs et al. [27], not all project changes are negative. In fact, they can be implemented to reduce project costs, time, and difficulties. Additionally, changes can also occur to correct mistakes made during the project [22]. Typically, changes are made to enhance the product by addressing weaknesses and better fulfilling the customer's requirements [26]. On the other hand, these changes can be detrimental, as changes to the plan can affect compliance with the budget, as well as the duration of the project, either directly or indirectly [27], and impact negatively on the project's results [28].

When emergent changes occur in a project, costs typically increase due to the additional time and resources required [26]. According to Majerowicz & Shinn [29], the cost and schedule of a project are generally related; however, this does not imply that every extension of the project schedule results in increased costs. Most of the time, delays in the project are caused by other factors, which lead to increases in the project budget. Majerowicz & Shinn [29] point out that whenever there is an increase in the costs associated with the project, the project duration usually also increases, and vice versa. Similarly, when project risks become problematic, they typically result in schedule delays and cost overruns. As such, evaluating and controlling the impact of changes on projects is essential to avoid poor results.

2.2 Techniques and processes for evaluating changes in projects

The full impact of project changes only becomes evident after they have been implemented [30]. If changes are not adequately controlled, they can lead to additional potentially causing negative impacts on the project [1]. The techniques and processes for evaluating changes identified in the literature are presented next.

According to PMI [9][10], integrated change control encompasses checking change requests, approving requests, managing changes to the project deliverables, the project management plan, and the project documents, and communicating decisions. The main advantage of this process is that it allows documented changes to be considered in an integrated manner while keeping the project's overall risk in focus. Changes are frequently made to the project without considering its overall objectives or plans and without measuring their impact. Therefore, a control process must be established to help the project manager and team monitor changes [14] and prevent and mitigate the risk of project failure.

Hussain et al. [15] propose a change management model that incorporates the types of formal changes and informal changes to requirements, thus representing more realistically the changes that arise in a project. This model assumes that some requested changes are handled with the client through informal conversations without a formal record (contract).

Bhatti et al. [20] suggest a formal method for the process of managing changes to requirements in a software development project, structured into six phases: initiation (requesting the change); reception (formally registering the change on a change request form); evaluation (assessment of the impacts of the change by the Change Control Board); decision-making (approval or rejection of the change); implementation of the change (in the event of approval); and configuration (list of the configuration parameters that were used to configure the change).

In turn, Xing [31] proposes a control process for managing change requests that closely resembles the model by Bhatti et al. [20], adding the baseline concept. This concept is defined as a desired value for a project dimension (e.g., scope, budget, schedule) or an agreed plan, which serves as a reference for comparison during project execution. Xing's model includes four steps: requesting the change, evaluating the change, accepting or rejecting the change, and, if accepted, implementing the change.

Mejl ander-Larsen [22] introduces a Change Control System (CCS) for managing changes, which is based on the five stages of the change management process (identification, submission, evaluation, approval, and implementation of the change) and Building Information Modelling (BIM) to assess the impact and consequences of the change at the evaluation stage. According to the author, the CCS is designed to store, control, report, and track project changes and deviations, facilitating the efficient processing of changes. In other words, when a design change request is made, it is submitted to the Change Control Board, where it is processed, categorized, evaluated, and either approved or rejected.

The study by Gaber et al. [14] outlines three approaches to monitoring and controlling projects based on various scheduling scenarios. It compares these approaches to demonstrate their effects on project cost and time. The first approach described is the Classic Approach, where costs and durations are allocated to each task in the project, serving as reference points for monitoring and control. These reference points are used to determine whether the tasks are carried out according to the schedule initially defined and to assess whether the project cost does not exceed the stipulated budget. The second approach referred to is Earned Value Analysis (EVA), used to objectively measure the project's progress. EVA enables the calculation of the Schedule Performance Index (SPI), which helps assess deviations from the original project schedule baseline, as well as the calculation of cost variances, and the Cost Performance Index (CPI), which measures the amount of work completed relative to the cost incurred. This analysis provides an integrated view of the project by measuring Planned Value (PV), Earned Value (EV), and Actual Cost (AC) [9][10][32]. The third approach discussed, Integrated Project and Change Management (IPCM), focuses on integrating change management and project management activities.

Isaac & Navon [30] propose a model designed to automatically identify the potential consequences of a change in a construction project at the time of the change request without requiring the actual implementation of the change. The model uses available information sources related to the project to assess the impact of changes on the project's cost, schedule, and performance.

The work by Hu & Liu [21] analyzes why changes arise in information technology projects and the impact of these changes, proposing a solution for change management and a process for implementing the proposed solution. This process includes a set of procedures for registering a change request and defining the steps to be considered according to the expected impact of the change.

According to Motawa et al. [33], several project elements must be considered when developing change management systems, as well as possible causes that could lead to project changes. The system proposed by the authors combines a change prediction model based on fuzzy logic with the Dynamic Planning and Control Methodology model, designed to evaluate the negative impacts of changes on construction performance.

Ibbs et al. [27] present a comprehensive project change management system founded on five principles: promoting a balanced change culture, recognizing change, evaluating change, implementing change, and continuously improving with lessons learned. Each of these principles interacts with the others to optimize the system.

The model proposed by Hao et al. [12] was developed by synthesizing various change management process models from the literature. This model consists of five sequential stages: identifying, evaluating and proposing, approving, implementing, and reviewing changes.

In summary, the techniques and processes analyzed do not consider all the areas of a project that can be impacted by the implementation of a change, usually focusing just on the cost, time, or quality of a project. Another limitation identified is that it is rare to find a description of how changes should be implemented.

3. Method

Design Science Research (DSR) was adopted to develop this work, following the six stages proposed by Peffers et al. [34]: identifying the problem, defining the objectives, creating a new artifact, demonstrating and evaluating the artifact, and communicating the results obtained.

In the first stage of the DSR, a literature review was carried out to develop an in-depth understanding of the types of changes that occur in projects and the associated causes and impacts. Existing techniques for assessing the impacts of changes and the current change management processes were also studied. This led to confirmation that a new proposal for change management was needed, as the existing techniques do not deal holistically with the assessment of change impacts. In the second stage of the DSR, after clarifying the state of the art and supporting the problem, the expected objectives for the new technique to be created were defined. Then, in the third stage of the DSR, the desired characteristics of the new technique were defined, and the respective artifact, the *Project Change Canvas*, was created. A detailed study of existing change control techniques in the literature was also carried out at this stage to identify best practices. The *Project Change Canvas*, in a simple and structured way, makes it possible to analyze and weigh up the potential impacts a change can have on the various areas of a project. The fourth stage of the DSR consisted in evaluating the *Project Change Canvas* in practice in two projects. The evaluation was carried out to test the new technique's relevance and identify improvement opportunities. Then, the objectives proposed for the technique were compared with the results obtained from its use, showing to be a valid solution for the problem. Feedback from project teams in a real-life context allowed the *Project Change Canvas* to evolve, giving rise to several versions. This article presents the most recent version of the canvas.

4. Project Change Canvas (or PM Change Canvas)

As aforementioned, project changes are inevitable and are often of significant importance to their progress. The literature review clarifies that it is necessary to adopt control processes for the changes that arise during projects and techniques to assess their impacts holistically. In this way, the possible negative consequences resulting from a change should be mitigated or even eliminated, and the positive impacts of its implementation should be exploited.

Although various techniques have been proposed in the literature, they only focus on the impact on scope, time, or cost, neglecting other equally relevant areas, such as risk, resources, or other success facets. Therefore, a new technique is required to allow project managers to identify and weigh up the impacts of a requested change in an integrated way before it is implemented so that it does not compromise the project's success.

The technique presented here, named *Project Change Canvas* (also called *PM Change Canvas*), is a one-page canvas for identifying the impacts of changes to a project. Its main purpose is to allow the various knowledge areas of project management to be considered in an integrated way using a single assessment technique. By filling in the canvas, whenever a change is required in the project, it is possible to reflect on the potential impacts caused without any area of the project being overlooked.

The canvas was designed considering the main stages of the change control process found in the literature, namely, the change request, the evaluation of the request, the decision-making, and the implementation of the change [12][20-22][31].

4.1 Description of the Project Change Canvas

Figures 2 and 3 show the final version of the *Project Change Canvas* (front and back of the canvas). The canvas can be downloaded at <https://zenodo.org/records/13895163>.

PM CHANGE CANVAS
 University of Minho | Department of Information Systems

PROJECT ID: PROJECT NAME:

NEED | Mandatory Optional PRIORITY | Urgent High Medium Low REQUEST DATE:

CHANGE FOCUS | Stakeholders Goals Scope Quality Schedule Resources Procurement Cost Communication Risk Success Other

CHANGE REQUEST Applicant: Description: Origin: Justification:	STAKEHOLDERS	GOALS	SCOPE Requirements
	OBSERVATIONS	QUALITY	SCOPE Activities
IMPLEMENTATION Recommendations	SCHEDULE Milestones	RESOURCES	SCOPE Deliverables
DECISION Name: <input type="text"/> Date: <input type="text"/> <input type="checkbox"/> Approved <input type="checkbox"/> Rejected <input type="checkbox"/> Deferred	SUCCESS	RISK	PROCUREMENT
EVALUATION Name: <input type="text"/> Date: <input type="text"/>	COMMUNICATION	COST	

Fig 2. Project Change Canvas - Frontpage

After a change request, the first aspect of using the *Project Change Canvas* includes identifying the type of change, describing the change and its origin, and justifying the reasons for its implementation. According to Hao et al. [12], for an integrated change management system to be effective, it must consolidate all the information about the change, including causes, origin, impacts, action measures, change processes, relationships with other aspects of the project, hence the importance of detailing these aspects of the requested change from the very beginning of the process.

Next, there is a set of elements to consider (Stakeholders, Goals, Scope - requirements, Scope - deliverables, Scope - Activities, Quality, Schedule - milestones, Resources, Procurement, Cost, Communication, Risk, and Success), which correspond to the various areas of project management that may be affected by the implementation of the change. Here, an informed assessment of the possible impacts on each area is expected. According to Hao et al. [12], the assessment result should be a change proposal that summarizes the change and its impacts (e.g., a new updated action plan, cost,

schedule, and other aspects of the project). In the *Project Change Canvas*, this impact is expected to be identified in each corresponding box. At the end of the assessment, the result of whether or not the change is feasible should be stated [20].

EVALUATION	
STAKEHOLDERS	
GOALS	
SCOPE Requirements	
SCOPE Deliverables	
SCOPE Activities	
QUALITY	
SCHEDULE Milestones	
RESOURCES	
PROCUREMENT	
COST	
COMMUNICATION	
RISK	
SUCCESS	
EVALUATION	

Note: Please write here, if you don't have more space in the stage 2 of the Canvas

STEP 0 – HEADER	
PROJECT ID	Specify the ID assigned to the project.
PROJECT NAME	Specify the name of the project.
NEED	Specify whether implementing the change is optional or mandatory
PRIORITY	Specify the priority of the change request. <div style="font-size: small; margin-left: 20px;"> <i>Urgent:</i> max period of ___ working days to evaluate the change; <i>High:</i> max period of ___ to ___ working days to evaluate the change; <i>Medium:</i> max period of ___ to ___ working days to evaluate the change; <i>Low:</i> max period of ___ working days to evaluate the change. </div>
REQUEST DATE	Specify the date of the change request.

Observation: these values serve as a reference to better categorize the change's priority level, and may vary depending on the type of project.

STEP 1 – CHANGE REQUEST	
CHANGE FOCUS	Specify the type of change being requested (select only one option).
CHANGE REQUEST	<i>Applicant:</i> Specify the name of the person requesting the change. <i>Description:</i> Brief description of the change. <i>Origin:</i> Explain the reason for requesting the change. <i>Justification:</i> Specify the reasons for implementing the change in the project.

STEP 2 – CHANGE REQUEST EVALUATION	
STAKEHOLDERS	Identify the stakeholders who may be affected by the implementation of the change. New strategies for involving stakeholders in the decisions and implementation of the change can also be discussed.
GOALS	Specify (if applicable) which project goals/objectives will be impacted by the change.
SCOPE	<i>Requirements:</i> Specify the project requirements that will be affected by the change. <i>Deliverables:</i> Specify the project deliverables (e.g., products or services) that will be added, removed, or modified with the change. <i>Activities:</i> Specify changes to project activities, such as adding, subtracting, and/or changing the sequence, the duration of activities, or both.
QUALITY	Specify any changes in the project quality and possible control measures to be altered or implemented to ensure project quality.
SCHEDULE	<i>Milestones:</i> Specify any changes to the project milestones.
RESOURCES	Specify which resources will be required and/or affected when the change is implemented. These resources could be material or human. The assignment of the new activities (resulting from the change) to members of the project team can also be mentioned here.
PROCUREMENT	Specify (if applicable) which new contracting of products or services is needed.
COST	Specify whether there will be an increase, decrease, or no change in the project's cost. If possible, include an estimate of the cost increase or decrease.
COMMUNICATION	Specify the project communications that will be affected (e.g., monthly meetings will now be weekly). It should also be mentioned how the implementation of the change and its possible impacts will be communicated to stakeholders, including methods (e.g., email communication) and frequency.
RISK	Identify the risks that could arise from implementing the change and the impact on the project.
SUCCESS	Specify the benefits and drawbacks that can be expected from implementing the change, including success factors.
EVALUATION	Provide the assessment results of the impacts of the proposed change. It should include the <i>Name</i> of the person responsible for assessing the impacts and the <i>Date</i> when the assessment was carried out.

STEP 3 – DECISION MAKING	
DECISION	Specify whether the change has been approved, rejected or deferred (if the change has already been evaluated, but there are no conditions for its implementation yet). If the change has been deferred or rejected, provide the reason(s) in the blank space. <i>Name:</i> name of the person who made the decision or who has the required authority for that (typically, it should be the project manager). <i>Date:</i> date when the status of the change was altered.

STEP 4 – CHANGE IMPLEMENTATION	
IMPLEMENTATION Recommendations	Given the current state of the project, list the options for implementing the change, taking into account the existing constraints.
OBSERVATIONS	Include here any observations relevant to the implementation of the change.

Fig. 3. Project Change Canvas – Backpage

The status of the change should then be recorded, indicating whether the change has been approved or rejected [20]. However, Ibbs et al. [27] add that, in most cases, more time is needed to decide whether to approve or reject a change, which is why the *Project Change Canvas* has three possible statuses for a change (approved, rejected, or deferred). If the change is approved, the project team must be notified to implement the change. Otherwise, if the request is rejected or remains pending, the reasons for this decision must be given [20].

Finally, the implementation of the requested change must be planned and coordinated considering all aspects of the project that are affected [22]; there is a box in the *Project Change Canvas* for writing down implementation suggestions.

4.2 Filling in the Project Change Canvas

A different canvas must be used for each change request. In other words, if two changes are requested in a project, two canvases must be filled in. Typically, the project manager, together with the other team members (and possibly other project stakeholders), will fill in the canvas. Below is an explanation of the steps involved in filling in the various elements of the canvas. The canvases can also serve to log changes.

Step 0 – Header

When requesting a change to the project, one should start by filling in the Canvas header (figure 4):

- PROJECT ID – Specify the ID assigned to the project.
- PROJECT NAME – Specify the name of the project.
- NEED – Only one option should be chosen, indicating whether implementation of the change is optional or mandatory.
- PRIORITY – Specify the level of priority with which the change request should be handled, namely (the descriptions of the levels presented below are only examples and may vary according to the project):

Urgent: the change must be dealt with immediately (e.g., maximum period of 6 working days to assess the change);

High: the change must be dealt with as soon as possible (e.g., maximum period of 7 to 14 working days to evaluate the change);

Medium: the change does not require immediate attention (e.g., maximum period of 15 to 30 working days to evaluate the change);

Low: the change request has low urgency (e.g., a maximum period of 60 working days to evaluate the change).

- REQUEST DATE – Specify the date of the change request.

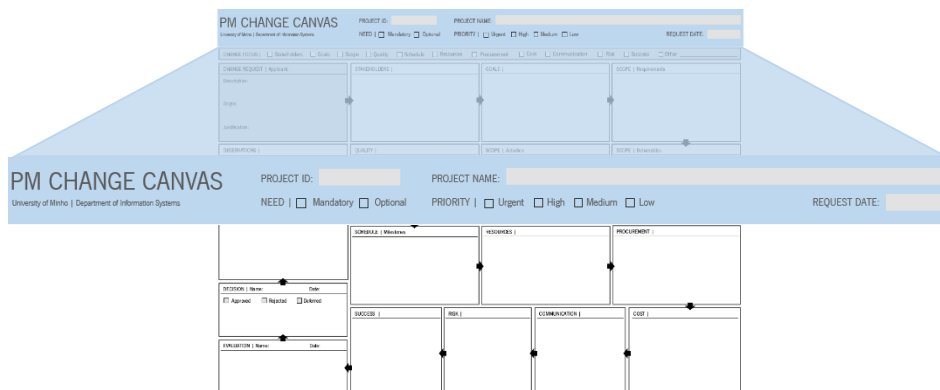


Fig. 4. Step 0 - Header

Step 1 – Characterization of the change

Next, it is necessary to fill in the focus of change and the details of the change requested:

- **CHANGE FOCUS** (figure 5) – Specify the focus of change that is being requested (e.g., Stakeholders, Goals, Scope, Quality, Schedule, Resources, Procurements, Cost, Communications, Risk, Success, or Other areas of the project). The focus of change must be selected from the existing options, and a change may be related to more than one knowledge area.
- **CHANGE REQUEST** (figure 6) – Fill in the details of the requested change:

Applicant: Specify the name of the person requesting the change. The requester can be the client, a member of the team, the organization's management, or other stakeholder in the project.

Description: Briefly describe and explain the change.

Origin: Describe the reason for requesting the change.

Justification: Specify the reasons for implementing the change in the project.

Fig. 5. Step 1 – Change Focus

Fig. 6. Step 1 – Change Request

Step 2 – Evaluation of the change request

In step 2, the change request must be evaluated by analyzing the impact of the change on each of the project management knowledge areas (figure 7). The impact can be assessed using existing techniques in the literature (e.g., [14]). This stage gathers the necessary elements to evaluate whether the proposed change can be accepted and implemented. According to Kauffmann et al. [35], changes and impacts must be appropriately identified, discussed, and agreed upon by all parties interested in implementing the change.

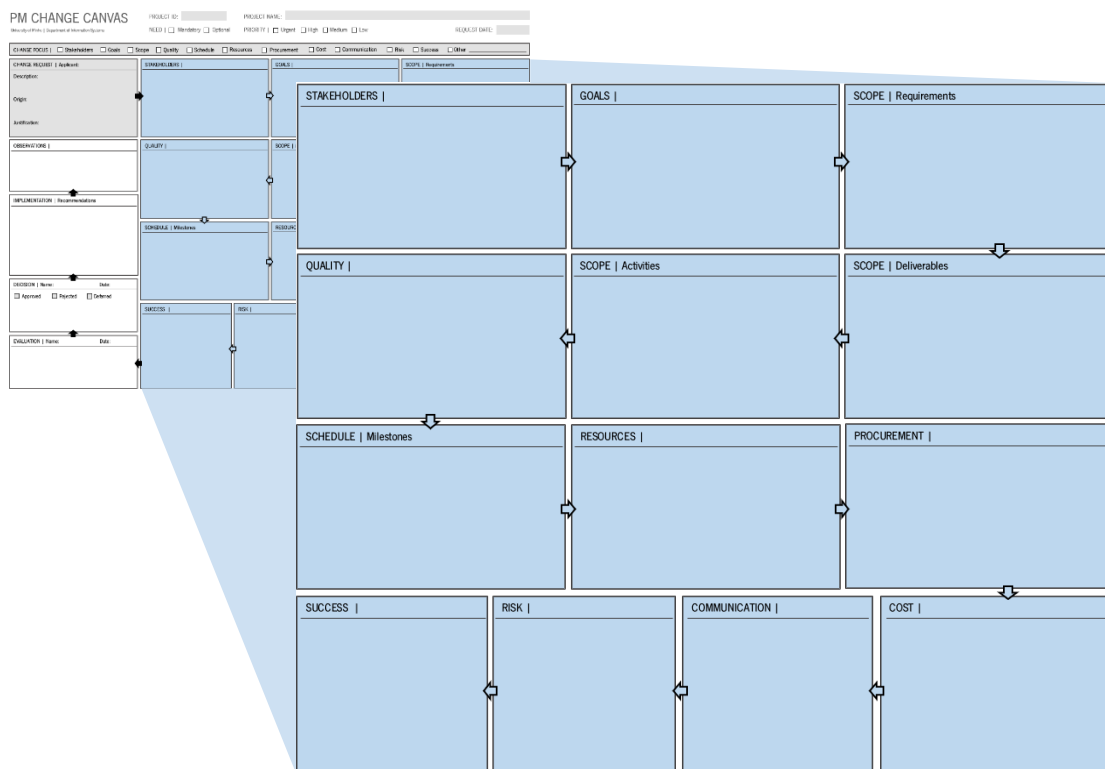


Fig. 7. Step 2 - Identifying and assessing the impacts of the change requested

The fields to fill in on the Canvas are (figure 7):

- **STAKEHOLDERS** – Identify the stakeholders who may be affected by the implementation of the change (including the appearance of new stakeholders). New strategies for involving stakeholders in the decisions and implementation of the change can also be discussed.
- **GOALS** – Specify (if applicable) which project goals/objectives will be impacted by the change (either by adding new objectives, modifying existing ones, or removing objectives).
- **SCOPE | Requirements** – Specify the project requirements that will be affected by the change (e.g., existing project requirements may be modified or removed, but new requirements may also arise as a result of implementing the change).

- **SCOPE | Deliverables** – Specify the project deliverables (e.g., products or services) that will be added, removed, or modified with the change.
- **SCOPE | Activities**– Specify changes to project activities, such as adding, subtracting, and/or changing the sequence, the duration of activities, or both.
- **QUALITY** – Specify any changes in the project quality and possible control measures to be altered or implemented to ensure project quality.
- **SCHEDULE | Milestones** – Specify any changes to the project milestones.
- **RESOURCES** – Specify which resources will be required and/or affected when the change is implemented. These resources can be material or human. The assignment of the new activities (resulting from the change) to members of the project team can also be mentioned here.
- **PROCUREMENT** – Specify (if applicable) which new contracting of products or services is needed (or changes in existing contracts).
- **COST** – Specify whether there will be an increase, decrease, or no change in the project's cost. If possible, include an estimate of the cost increase or decrease.
- **COMMUNICATION** – Specify the project communications that will be affected (e.g., monthly meetings will need to be weekly). It should also be mentioned how the implementation of the change and its possible impacts will be communicated to stakeholders, including methods (e.g., email communication) and frequency.
- **RISK** – Identify the risks that could arise from implementing the change and the impact on the project.
- **SUCCESS** – Specify the benefits and drawbacks that can be expected from implementing the change, including success factors.

Also, at this stage, an assessment of the identified impacts should be made, filling in the following fields (figure 8):

- **EVALUATION** – Provide the assessment results of the impacts of the proposed change.

Name: Specify the name of the person responsible for assessing the impacts of the change or who has the necessary authority to sign the document.

Date: Specify the date when the assessment of the impact of the change was carried out.

The image shows a screenshot of the 'PM CHANGE CANVAS' form. At the top, there are fields for 'PROJECT ID', 'PROJECT NAME', 'NEED' (with options: Mandatory, Optional), 'PRIORITY' (with options: Urgent, High, Medium, Low), and 'REQUEST DATE'. Below this is a grid of sections. The 'EVALUATION' section is highlighted in blue and contains two input fields: 'Name:' and 'Date:'. Other sections in the grid include 'CHANGE REQUEST | Approval', 'SCOPE | Deliverables', 'SCOPE | Activities', 'QUALITY', 'SCOPE | Milestones', 'RESOURCES', and 'PROCUREMENT'. The 'EVALUATION' section is currently empty, indicating it is the step being focused on in the figure.

Fig. 8. Step 2 - Evaluation

Step 3 – Decision-making

After assessing the possible impacts of the change, a formal decision should be made, and it can be approved, rejected, or left pending (deferred). If approved, the work team should be notified to implement the change. However, if the change request is rejected or remains pending (if it is delayed), the person who requested it should be notified of the reasons for this decision. The fields to fill in are (figure 9):

- **DECISION** – Specify whether the change has been approved, rejected, or deferred (e.g., if the change has already been evaluated, but there are no conditions for its implementation yet). If the change has been deferred or rejected, provide the reason(s) in the blank space.

Name: Specify the name of the person who made the decision or who has the required authority for that (typically, it should be the project manager).

Date: Specify the date when the status of the change was altered.

The image shows a screenshot of the 'PM CHANGE CANVAS' form. The form is divided into several sections: 'CHANGE REQUEST | Applicant', 'OBSERVATIONS |', 'IMPLEMENTATION | Recommendations', 'DECISION | Name: Date:', and 'EVALUATION | Name: Date:'. The 'DECISION' section is highlighted in blue and contains three radio buttons: 'Approved', 'Rejected', and 'Deferred'. The 'IMPLEMENTATION' section is also partially highlighted. The form includes various dropdown menus and checkboxes for different categories like 'Scope', 'Quality', 'Schedule', 'Resources', 'Procurement', 'Cost', 'Communication', 'Risk', 'System', and 'Other'.

Fig. 9. Step 3 - Decision-making

Step 4 – Implementing the change

This stage, the last in the change control management process, refers to the implementation of the change, but it is only carried out if the change request has been approved in the previous stage. The fields to fill in on the canvas are (figures 10 and 11):

- **IMPLEMENTATION | Recommendations** (figura 9) – Given the current state of the project, list the options for implementing the change, taking into account the existing constraints.
- **OBSERVATIONS** (figura 10) – Include here any observations relevant to the implementation of the change.

Project Change Canvas

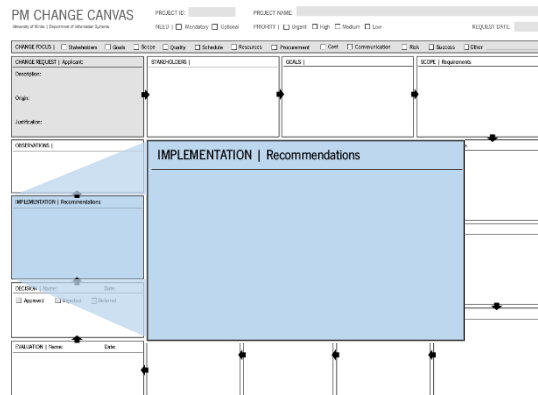


Fig. 10. Step 4 - Implementation suggestions

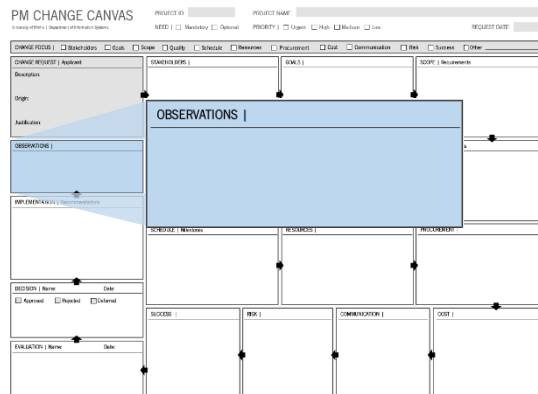


Fig. 11. Step 4 - Observations

4.3 Illustration of the Canvas application

To illustrate the application of Canvas, Figure 12 presents an example that reflects the change request described next.

Let's consider a fictional project for a company with headquarters in Portugal that has the main objective of creating a new website in Portuguese (*PROJECT ID: "web-01"; PROJECT NAME: "New company website"*). However, given the company's need to reach and strengthen its presence in international markets (*JUSTIFICATION*), the project's client (*APPLICANT; STAKEHOLDERS*) in the middle of the project lifecycle requested an English version of the website (*ORIGIN; DESCRIPTION; GOALS*). The main requirement linked to this change request was the translation of the website (*SCOPE/Requirements*), with the content translation and the English version of the website serving as the primary deliverables (*SCOPE/Deliverables*). The client also stated that this request was mandatory (*NEED*) and asked to evaluate and implement this request as soon as possible (*PRIORITY*). Based on the change request's characteristics, it was determined that the focus of the change was related to the scope of the project (*FOCUS*).

Three activities were added to the project to implement this change request. The first activity is the translation of the website contents into English (*SCOPE/Activities*), which requires contracting translation services from an external company (*PROCUREMENT*). The timeframe set for this activity was one week (*SCHEDULE/Milestones*); however, it is essential to note that this limited timeframe may not be sufficient and can cause a delay in the project (*RISK*). On the other hand, the development of the Portuguese website was still ongoing, and the contents were not stable (*OBSERVATIONS*). The

estimated cost of the translation services was €3500 (*COST*), and it was recommended that the company XPTO be contacted for this service, with whom the company has a good business relationship (*IMPLEMENTATION/Recommendations*). The second activity identified is the development of the website pages in English (*SCOPE/Activities*), which requires the collaboration of one of the website developers already allocated to the project (*RESOURCES*). This developer is also responsible for the third activity, which involves carrying out the necessary tests to validate the English version of the website (*SCOPE/Activities*). For these two activities, a timeframe of around three weeks was set (*SCHEDULE/Milestones*), and the costs were estimated at €2000 (*COST*).

The implementation of the change requested involves the verification of the translation of the content and the test of the English version of the website (*QUALITY*). In order to discuss the progress of the change implementation, it was decided to schedule some meetings with the client, the company responsible for the content translation, and other project members (*COMMUNICATION*). The success of the implementation of the change would depend on the client's satisfaction with the English version of the website and compliance with the scope, deadlines, and costs of the project (*SUCCESS*). The project member ("John Doe") responsible for change management evaluated the requested change and proposed that the change can only be implemented if the client agrees with the impacts on the project schedule and budget (*EVALUATION*). After evaluating the change request, the project manager ("Jane Smith") decided to defer the implementation of the change request until it had been approved by the Client (*DECISION*).

PM CHANGE CANVAS
University of Minho | Department of Information Systems

PROJECT ID: web-01 PROJECT NAME: New company website

NEED | Mandatory Optional PRIORITY | Urgent High Medium Low REQUEST DATE: 06/10/2024

CHANGE FOCUS | Stakeholders Goals Scope Quality Schedule Resources Procurement Cost Communication Risk Success Other

CHANGE REQUEST Applicant: CLIENT Description: Create an English version of the company's website. Origin: Client's new requirement. Justification: Business need - Reach new international markets.	STAKEHOLDERS - Client (top management).	GOALS - Create an English version of the website. - Strengthen the company's international presence.	SCOPE Requirements - Translation of the website contents into English.
	OBSERVATIONS - The website development is still ongoing and the contents are not stable.	QUALITY - Verify contents translation. - Test website pages in English.	SCOPE Activities - Translation of all content into English. - Creation of web pages in English. - Test new website pages.
IMPLEMENTATION Recommendations - Contact XPTO, a translation services provider, with whom we have a good business relationship.	SCHEDULE Milestones - Project closing will be delayed by one month (one week for the content translation and three weeks for the website development and testing).	RESOURCES - One website developer.	PROCUREMENT - Translation services.
DECISION Name: J. SMITH Date: 07/10/2024 <input type="checkbox"/> Approved <input type="checkbox"/> Rejected <input checked="" type="checkbox"/> Deferred - The decision is deferred until the client's approves the implementation of the change.	SUCCESS - Project Client satisfaction. - Scope compliance. - Time compliance. - Cost compliance.	RISK - Delay in the translation services.	COMMUNICATION - Further meetings will be arranged with the client, the translation services company, and other project team members to update them on the new features development progress.
EVALUATION Name: J. DOE Date: 07/10/2024 - The proposed change can be implemented, but requires approval from the Client considering its impact on the schedule and budget.	COST - Translation services: €3500. - Developer: €2000. - Total: €5500.		

Fig. 12. Canvas Example

5. Evaluation and discussion

Two real-world projects (evaluations 1 and 2) were used to evaluate the canvas. The final version of the canvas reflects improvements considering the project teams' opinions.

The first evaluation took place in a project aimed at improving the workflow of a journal. The main objectives were to improve the efficiency and effectiveness of the journal's management process, reduce the time involved in administrative tasks, and improve the service provided to the journal's authors and readers. The *Project Change Canvas* was used in the context of a change of scope requested by the client. The change involved the creation of a Portuguese version (duplicated) of the journal's website, which was only in English (according to the requirements initially established).

The second evaluation was carried out in a project aiming to develop a set of software modules needed for an existing application. The expected results for this project consisted of a description of the process, various software modules, and a support manual for the user. The change in which the *Project Change Canvas* was used involved altering the content management system to another platform. This request came from the work team.

Table 1 shows the feedback and evaluation of the *Project Change Canvas* obtained from the members of each work team in the aforementioned projects, summarizing the main advantages and disadvantages perceived by the project teams. After collecting feedback from the working teams, the various suggestions for improvements to the *Project Change Canvas* were analyzed and discussed. It was concluded that some issues needed to be addressed. One of these shortcomings, which was very evident, was the absence of a field that focused on how the change implementation would affect the project's success. In this way, one of the elements of the canvas, originally labeled "Responsibilities" was replaced by "Success". The area of success was seen as very pertinent to the canvas since its purpose is to allow the weighing-up of the change impacts on the various project areas without compromising any success facets. The "Responsibilities" area did not prove useful since it referred to each stakeholder's responsibilities. Therefore, this topic is now covered in the "Resources" area since project resources also include human resources.

Table 1. Feedback on *Project Change Canvas*

Evaluation/ Project	Team member	Advantages	Disadvantages
1	A1	<ul style="list-style-type: none"> ▪ Covers all project areas that may be affected by the change. ▪ Succinct organization of the project areas. 	<ul style="list-style-type: none"> ▪ Does not incorporate the project's success.¹
	A2	<ul style="list-style-type: none"> ▪ Easy to use. ▪ Focuses on crucial project areas. ▪ Helps to discuss possible impacts with stakeholders more easily. ▪ Allows you to summarize everything on just one page. 	<ul style="list-style-type: none"> ▪ Some elements of the Canvas are confusing (lack of descriptions).² ▪ Small fields/boxes.³ ▪ Does not incorporate the "non-scope" and the project's success.⁴
	A3	<ul style="list-style-type: none"> ▪ Covers all project areas that may be affected by the change. ▪ It makes it possible to weigh up the impacts without overlooking relevant areas of the project. ▪ Allows for the synthesis of the most relevant information for making a decision. 	<ul style="list-style-type: none"> ▪ Highly developed technique, which can be exhausting to fill out. ▪ It may not be suitable for all types of projects. ▪ Does not incorporate the project's success.¹
	A4	<ul style="list-style-type: none"> ▪ Allows a clearer visualization of the possible impacts caused by the change. 	<ul style="list-style-type: none"> ▪ This can lead to rapid and rushed analysis, which can result in erroneous assessments of the project's impact. ▪ Does not incorporate the project's success.¹
	A5	<ul style="list-style-type: none"> ▪ Provides an overview of the impact of changes in each area of the project. ▪ Facilitates understanding of impacts by project stakeholders. 	<ul style="list-style-type: none"> ▪ Does not incorporate the project's success.¹
2	B1	<ul style="list-style-type: none"> ▪ Allows for better organization of the impacts of the change, avoiding negative consequences on the project. ▪ Well structured. 	<ul style="list-style-type: none"> ▪ The fact that it is a paper sheet restricts the space of the descriptions.³ ▪ Each change requested involves starting a new sheet.

Evaluation/ Project	Team member	Advantages	Disadvantages
	B2	<ul style="list-style-type: none"> ▪ Just one sheet. ▪ Easy to use. ▪ Allows a better perception of the impact. 	<ul style="list-style-type: none"> ▪ Lack of a detailed description of how to fill in each field.²
	B3	<ul style="list-style-type: none"> ▪ Easy impact analysis. 	<ul style="list-style-type: none"> ▪ Implies ISO 21502 or PMBOK previous knowledge.²
	B4	<ul style="list-style-type: none"> ▪ Just one sheet. ▪ Covers most project areas. ▪ Objective process. ▪ Allows a summary assessment of the impacts in each of the project areas. 	<ul style="list-style-type: none"> ▪ Implies one change per sheet. ▪ Lack of a field for final feedback on the change.⁵
	B5	<ul style="list-style-type: none"> ▪ Intuitive. ▪ Easy weighting of impacts. 	<ul style="list-style-type: none"> ▪ Lack of a detailed description.²

¹ In the final canvas version, a new element related to success was added.

² In the final canvas version, an explanation of how to fill it in was added to the back page of the canvas.

³ In the final canvas version, an extra space was added to the back of the canvas for filling in.

⁴ In the final canvas version, a new element related to success was added, but it was not considered appropriate to include the "non-scope" since it can be mentioned in the scope box.

⁵ In the final canvas version, a new element related to the observations was added.

The lack of descriptions to help with the *Project Change Canvas* use was also cited as an original weakness, requiring an explanation of how to fill in the canvas. It was, therefore, decided to include instructions on the back of the Canvas. The limited space to detail the assessments was also mentioned, and it was decided to address this issue by adding more space on the back of the sheet. Another option to consider in the future is to make the canvas available digitally. The lack of a field for final feedback on the change was also resolved by adding a field for comments, allowing final considerations to be recorded.

Another disadvantage mentioned by the teams was the complexity associated with Canvas, since it requires knowing the ISO 21502 [36] or PMBOK [10] fundamentals. However, a project manager is expected to have this consolidated knowledge – therefore, this was not seen as a barrier. The new descriptions included on the back of the *Project Change Canvas* also help overcome this difficulty. The fact that each change request involves starting a new canvas process was also seen as a disadvantage. However, it was clear from the review that each change should be treated as unique, requiring an individualized request process [21].

On the other hand, the advantages the project team members pointed out are also considerable. For example, the canvas allows for a more exhaustive reflection of the change before it is implemented, without essential areas of the project being forgotten; it provides for an integrated visualization of the possible impacts of the change on the various knowledge areas of the project; it is well structured and intuitive to use, which makes it easier to visualize the areas affected by the change; it only uses one page. Other advantages of the canvas that have not been mentioned but can be considered are that it allows for a centralized record of all the information relating to the requested change, which can serve as a future reference and translate into beneficial learning (lessons learned). The labels chosen for canvas blocks align with ISO 21502 [36], making it easier for users to use and know.

Summing up, the project teams considered the proposed technique an asset to the project, as it enabled them to carry out a detailed analysis and weighting of the impacts of each change on the various areas of the project. In their opinion, the use of the *Project Change Canvas* is intuitive. It makes it possible to easily visualize and reflect on the impacts comprehensively without any area of the project being overlooked. The canvas supports decision-making by helping to accept or reject the implementation of requested changes to the project. It also makes communicating the impact assessment results easier for the project's stakeholders.

6. Conclusion

Project changes are inevitable, and there must be mechanisms for evaluation and control so that the project's success is not compromised. The main contributions of this work are the clarification of the various changes that occur in information technology/information systems projects, as well as their potential impact, and the review of the methods and

techniques currently proposed for their assessment and control. Moreover, this paper proposes a new technique that enables a holistic and integrative evaluation of the possible impacts caused by project changes. As its main practical contribution, the new canvas helps project managers assess and foresee impacts caused by project changes. The canvas also supports teaching by emphasizing the need to consider the impact of various changes on projects without any area of project knowledge management being overlooked.

As a limitation, it should be noted that the evaluations carried out were focused on information technology/information systems projects and were limited to two projects. For future work, we suggest creating a software application to support the *Project Change Canvas* and applying it to projects in other areas.

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A previous version of this study, published in the Portuguese Conference of Information Systems, is available in Portuguese language. However, please note that the canvas presented here is an improved and extended version.

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