

7E: A PROPOSED CHANGE MANAGEMENT MODEL INTEGRATED WITH SOFTWARE DEVELOPMENT LIFECYCLE

HUSSAM HOURANI, MOHAMMAD ABDALLAH AND ABDELFAH TAMIMI

Faculty of Science and IT
AL-Zaytoonah University of Jordan
P.O. Box 130, Amman 11733, Jordan
Hussam.hourani@gmail.com

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ABSTRACT. *There are many vital issues that the software implementation faces during all projects phases journey and throughout the Software Development Lifecycle (SDLC). Many software change implementations fail due to lack of engagement of the stakeholders, employees and management resistance, poor leadership, organization environment, cultural issues and others. The importance of this study is to propose a new Change Management (CM) model and framework that are integrated with the SDLC. The new CM framework supports the different aspects of the change and introduces a new process that helps integrate organization, technology, and stakeholders, which will result in increasing employees' acceptance of the change (Software) and to have a smooth deployment and successful change implementation.*

Keywords: Change management framework, 7e's model, SDLC change management model

1. **Introduction.** The Greek philosopher Heraclitus has a famous saying that: “Change is the only constant” [1]. The basic definition of change is a transformation or transition from one state to another [2]. Change is a planned and managed process. Many objectives, benefits, values and gains may be obtained by managing change, among them is that it prepares the organization for the “valley of despair” and how the organization can react to that change [3]. By dealing with SDLC as a change in organizations, the benefits of the change are known before starting the project and prior to starting any phase of the SDLC which will drive and gain the whole success to the project. Nowadays professional companies and organizations start seeing change management plays a major and essential role during introducing and implementing new software or technology. Change management will ease any organizational transitions related to technology and adopt new software. The main contribution to this research is to propose a new change management model and framework that are integrated with SDLC. The new proposed model and framework will gain the following significance and advantages: minimize resistance, leadership alignment, increase stakeholders' engagement, cultural alignment, proper communication, improve performance, reduce costs and have a smooth software deployment and user acceptance for the new system. The organization of this paper is as the following: provide the problem statement, then provide a literature review, then detail the proposed model and the framework and then conclude the results.

2. **Problem Statement and Preliminaries.** There are many challenges that affect adopting new technologies in organizations. The key challenges are related to the following:

- Aligning organizational practice with organizational vision, mission, strategy and values
- Delivering benefits oriented projects to the organizations that serve business needs
- Creating consistency and efficiencies in organization's methodology
- Building the organizational needed internal capabilities
- Mitigating critical risks and ensuring projects success
- Culture, leadership & management coaching & alignments
- Accelerating projects acceptance, and increasing its likelihood of success
- Controlling projects time, cost and budget
- Finally treating employee's right.

The above issues are caused by changes occurring in organizations without considering one of the most critical areas in business which is change management. Change management is a competency that embraces change and gives organizations tools to handle it effectively and efficiently and plays a key role in implementing software projects by focusing on change benefits, leadership alignment, stakeholder engagement and cultural alignment.

3. Literature Review. Table 1 highlights the summary of the most famous models for change management. The summary highlights the key benefits of each model and provides some description for each model.

4. The 7e's Proposed Model. In this research, we introduced a new change management mode that is effective and efficient for all project's phases in SDLC. The new proposed called 7e's model shown in Figure 1 is based on best practices and can add a great value to align software technology with organization's business needs. The model drives a visionary view on the key requirements and expected solutions for the business and it strategizes all SDLC phases to engage the right teams during the project implantation. This model drives the quality of the proposed framework and the related processes. The model utilizes a structured change management approach prior to the project implementation that assures the success of change management journey through the whole software implementation project life cycle.

The 7e's proposed model consists of the following stages.

- **Envision:** This is the stage that triggers the change and builds the change's vision and inspires a solution. This stage must link and integrate the change's vision and benefit with the organization's strategy, vision and values.
- **Embrace:** Adopt and foster the change and drive it to success.
- **Engage:** Involve all the related stakeholders, management and leadership to maximize the alignment, explore and gain the related benefits.
- **Enable:** Qualify the organization and make it ready for the change.
- **Execute:** Implement and achieve the desired vision.
- **Endure:** Sustain the change and continue improvement.
- **Excellence:** Provide insights and best practices for all stages as input and produce optimized tacks, activities and deliverables as outcome from each stage.

In the next section, the new framework has been introduced and explained in respect of the SDLC.

5. The 7e's Change Management Framework. Based on the proposed 7e's model stages highlighted in Figure 1, the 7e's change management framework and the related processes for SDLC are introduced and highlighted in Figure 2. In this framework, each phase of the SDLC is highlighted with all its related change management processes that drives the project success from best practices point of view. The proposed framework details the start and end for each process within each phase of the SDLC based on the

TABLE 1. Change management models summary

<i>Model Name</i>	<i>Description</i>	<i>Benefits</i>
ADKAR Model	ADKAR has been created by Prosci founder Jeff Hiatt. The model proposes five phases of change processes: awareness, desire, knowledge, ability and reinforcement. The ADKAR model focuses on people change adaptation and is sequenced by how an individual experiences the change [4].	Considered as individual change management model [5]. The main objective of ADKAR is to enhance the individual to gain a positive growth in the organization [6].
Kotter's 8-Step Model	John Kotter introduced the Kotter's 8-Step Change Model to enhance the organization's ability to change and to increase and raise its chances of business success. The model's eight steps are: establish sense of urgency, create guiding coalition, develop a change vision, communicate vision, empower broad-based action, generate short-term wins, never let up, and finally incorporate changes into the culture.	Considered as organizational change management model [5]. The model proposes an easy step by step process to enhance the organizational change success. This model is considered as a great tool for leaders who have difficulties and obstacles in getting employees on board and who face resistance. The model has an effective communication plan and prepares employees to cope with the organizational changes [7].
Kubler-Ross Model	In 1969 Kubler-Ross described five stages of grief in her book "On Death and Dying" [8]. The proposed model shows the following key stages of change management: Denial, Anger, Bargaining, Depression and Acceptance.	Considered as individual change management model [5]. The model's stages represent the usual diversity of feelings that individuals experience in their lives or workplace.
McKinsey 7S Framework	McKinsey 7S framework has been developed in the early 1980s by Tom Peters and Robert Waterman, who were working at the McKinsey [9]. This model created seven internal aspects of an organization that need to be aligned to succeed: Strategy, Structure, Systems, Shared Values, Skills, Style and Staff.	Considered as organizational change management model [5]. It offers an effective method to understand an organization and it provides guidance for organizational change. The model is considered relatively as complex model and there is a higher degree of failure if not handled carefully.
Lewin's 3-Stage Model	The model involves three steps: Unfreezing, Changing and Refreezing. Lewin's model focuses on employees' resistance and decrees it, rather than having to desire the change [6].	Considered as organizational change management model [5]. It is simple and easily understood and has a fewer steps that have to be followed which make the model efficient. It provides the organizational leaders to think past quantitative analysis throughout the change [7].
Burke-Litwin Model	The model consists of 12 organizational elements that determine a change within an organization. The incorporation of the Burke-Litwin model of organizational performance and change produces perspectives of individuals at different levels [10].	Considered as organizational change management model. The model focuses on creating a cause and effect relationship [12]. The model is based on evaluating the organizational and the environmental aspects, which may be adapted to ensure a change implementation success.
Beckhard and Harris's Model	The original "Formula for Change" was described by David Gleicher in the 1960s, but was molded into the modern change equation during the 1980s by Richard Beckhard and Reuben. The model aims to serve as a simplified mechanism of analyzing the potential success or failure of a change initiative within organization [13].	Considered as organizational change management model. The model introduced a change equation for clarifying the organizational change. Change will only occur if: $D \times V \times F > R$ (where D: Dissatisfaction, V: Vision, F: First concrete steps that can be taken towards the vision, R: Resistance). The equation is simple to be communicated fast to an audience, but this simplicity can also be the model's weakness because it does not take in consideration all other factors [13].
Iceberg Model	The Iceberg of Wilfried Kruger CM model is considered as strong visualization of the change in organizations where CM focus is concentrated on peripheral issues of cost, quality and time at the expense of the critical and weightier issues of managing acceptance, attitudes and behaviors which are key to successful change implementation and reducing resistance to change [11].	Considered as organizational change management model. The model deals with both the apparent and unseen barriers to change in the organization. In order for the change to succeed in the organization, change representatives must consider the tip of the iceberg, which relates to issues of cost, quality, and time, also must consider perceptions, beliefs, power and politics that are below the surface.



FIGURE 1. The new 7e’s change management model

Planning	Requirements	Design	Implement	Testing	Deploy	Support
Initiative’s change trigger	Requirements Deliverables	Design Deliverables	Software Package	Testing Deliverables	Deployed Software & Documentations	Support Contract
Create initiative’s vision	Conduct CM workshop	Conduct CM workshop	Conduct CM workshop	Conduct CM workshop	Conduct CM workshop	Benefits & Impact Assessments
Identify initiative’s Benefits	Study Similar Business cases	Demonstrate Prototype	Review Software Modules outcomes	Engage in UAT	Implement the New Operating Model	Evaluate New software Releases
Create Change Business Case	Stakeholders Assessment	Stakeholders Assessment & Alignment	Stakeholders Alignment		Feedback analysis & corrective actions	
Leadership Alignment	Structural Assessment	Structural Assessment & Alignment	Structural Alignment		Knowledge Management	
Forming a coalition & empowerment	Cultural Assessment	Cultural Assessment & Alignment	Cultural Alignment			
Communicating the vision	Capability & Training Assessment		Capability & Training Alignment			
Gain management commitment	Change & Readiness Assessments				Celebrating and recognize success	Continues Evaluation
Create short term quick wins	Stakeholders Management & Communications					Sustain the Change
Establishing a sense of urgency		Integrate Change Control Process (Change Requests)				
Resistance Management						
Review, Execute and Update Change Management Strategy & Plan						
Manage & Control Change Management (CMO – Change Manager)						

FIGURE 2. The 7e’s change management framework

waterfall model that consists of Requirements, Design, Implement, Testing, Deploy and Support. The planning phase is introduced to handle the change management processes before the project starts.

5.1. Planning phase. The first phase of the change management journey that is integrated with the SDLC is planning phase outlined in Figure 2. This phase is considered as a key driver that sets up the change management stage and produces the change management key deliverables including the change management plan that has all planning activities. The main idea behind this phase is to plan for the change and to do change management activities the right way. Office of Strategy Management (OSM) must be engaged along with the Change Management Office (CMO) to align the new change with the organization’s strategy. The key CM processes in the Planning phase are as the following: initiative change trigger, create initiative vision, identify the initiative benefits, create initiative business case, leadership alignment, gain management commitment,

forming a coalition & empowerment, create short term quick wins, communicating the vision, establishing a sense of urgency, resistance management, update CM plan and related documents, and CM control by CMO.

5.2. Requirement phase. The second phase of the CM journey is Requirement & Analysis phase outlined in Figure 2. This phase is the key driver for SDLC journey that determines the requirements for the targeted software. During this phase, it is crucial to engage the project manager and the Business Analysis and project team with what has been done in the change management track, this is to align the project manager and Program Management Office (PMO) about the CM activities in the project and integrate PMO with the CM track and avoid any conflict between the two tracks. The key check point at this phase is to align the outcome of the requirements with the change vision, objects and benefits. Without this alignment, the project will fail based on the initial identified change strategy. The key CM processes in the Requirements phase are as the following: requirements gathering deliverables and activities, conduct CM workshop, study similar business cases, stakeholders assessment, structural assessment, cultural assessment, capability & training assessment, readiness assessments, establishing scene of urgency, stakeholders management and communications, resistance management, update change management plan and related documents, and CM control by CMO.

5.3. Design phase. The third phase of the CM journey is the Design phase outlined in Figure 2. Software Design is the process of defining software architecture, GUI, classes, attributes, methods, functions, objects, database, and the overall structure and integration schemas that will satisfy the users' requirements. In this phase, the design of the software will be detailed and finalized based on the best practices and based on the CM key drivers. This phase is important in the change management as stakeholders start engaging in the key concepts of the product, as for example how the screens will look like, the usability of the system throughout system prototypes and the other technical and nontechnical design aspect of the system. The outcome of the design phase must be aligned with the change vision, objectives and benefits. The key processes in the planning phase are as the following: design phase activities and deliverables, build and demonstrate prototype, stakeholders assessment and alignment, structural assessment and alignment, cultural assessment and alignment, capability and training assessment and alignment, readiness assessments, integrate change control process (change requests), stakeholders management and communications, resistance management, update CM plan and related documents, and CM control by CMO.

5.4. Implement phase. The fourth phase of the change management journey is the Implement (development) phase outlined in Figure 2. During this phase, everything that has been required and designed will be developed, customized, coded or configured as per the signed off requirement and design deliverables. Based on the approved requirements and system design documents, the actual development work is started. It is recommended at this stage to engage the key end-users with the early finished modules so that they provide feedback on the outcome and start engaging with the system and be part of the team. It is recommended to deal with this phase as agile approach to get feedbacks as early as possible and before the official user acceptance testing activities. The key processes in the planning phase are as the following: implement phase activities (building the solution), conduct CM workshop, review software modules outcome, stakeholders alignment, structural alignment, cultural alignment, capability and training alignment, readiness assessment, integrate change control process (change requests), stakeholders management & communications, resistance management, update CM plan and related documents, and CM control by CMO.

5.5. Testing phase. The fifth phase of the CM is the Testing phase outlined in Figure 2. When there are stakeholders who will be required to accept and commence new change that affects the current organizations structure or processes, then gaining users buy-in early is critical for success of the change implementation. User Acceptance Testing (U-AT) is a critical process that stakeholders need to handle to assure what they requested has been designed properly. UAT will give the end users a chance to try out the new system and it is an opportunity to improve change management by capturing the approval of the end users who will use the software. The key processes in the planning phase are as the following: testing phase activities and deliverables, conduct CM workshop, engage in UAT, stakeholders alignment, structural alignment, cultural alignment, capability and training alignment, integrate change control process, stakeholders management and communications, resistance management, update CM plan and related documents, and CM control by CMO, UAT and conduct CM workshop.

5.6. Deploy phase. The sixth phase of the change management journey is the Deployment phase outlined in Figure 2. The key processes in the planning phase are as the following: deploy phase activities & deliverables, conduct CM workshop, implement the new operating model, stakeholders alignment, structural alignment, cultural alignment, capability and training alignment, celebrating and recognize success, integrate change control process, stakeholders management and communications, resistance management, update change management plan and related documents, CM control by CMO, and conduct CM workshop.

5.7. Support phase. The seventh phase of the change management journey is the Support phase outlined in Figure 2. The Support phase of the SDLC deals with the on-going support and maintenance of the deployed software solution. The role of change management at this stage is to sustain the change. Change's Sustainability refers to holding the gains of change's improvement and outcomes. OSM and CMO must work together for measuring the planned benefits (benefits realization). The key processes in the planning phase are as the following: support phase activities and deliverables, benefits and impact assessments, feedback analysis and corrective actions, cultural alignment, knowledge management, capability and training alignment, integrate change control process, resistance management, continuous evaluation, sustain the change, update CM plan and related documents, and CM control by CMO.

6. Conclusions. The new proposed 7e's model and framework provide clear taxonomy and a mechanism to link and integrate the CM's activities within SDLC. The 7e's model provides the base for SDLC and CM structure and combines model, framework, context, and all related processes. In comparison to the other CM models, 7e's is tailored to SDLC, it integrates all CM processes across all project phases and it distinguishes the implementation processes in each phase of the project life cycle. In addition, the model integrates OSM, PMO and CMO to work in synergy and it orchestrates all work processes for the change to succeed. The 7e's model supports organizational leaders, members, project team, in establishing the change's vision, objectives, and benefits and manage the change across SDLC. Integrating the change management framework with the SDLC will gain the following advantages: minimize resistance, leadership alignment, increase stakeholders' engagement, proper communication, improve performance, reduce costs and having a smooth software deployment and user acceptance for the new system. Future work can detail all highlighted business processes in the framework and provide also templates to be used in this proposed model.

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