National Manual of Assets and Facilities Management

Volume 5, Chapter 21

Change Control Process Procedure

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IMPORTANT NOTICE

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1.0 PURPOSE

The purpose of this document is to explain and define the term "Change Control" (CC) in relation to the strict management of configurations i.e. Baseline of Design (BoD) and Sequence of Operations (SO). It will also demonstrate a high-level generic process, how it relates to other management tools, why it is utilized, and its relationship to key elements of Asset and Facility Management (A&FM).

This document will provide Senior Managers and other stakeholders with the standard process for controlling change specifically in relation to A&FM.

The CC process is an indispensable management tool and discipline that maintains order through a strict control process. When adhered to, CC prevents what can become a chaotic multi-variant mix of hardware, software and documentation; acts as a standardized process, and protects them against destructive uncontrolled change.

The purpose of the CC process is to manage Change Requests (CRs) in a standardized manner such that approved changes will be controlled, ensuring stability is maintained within lifecycle planning and budget projections.

The primary objectives of CC management are to:

- Manage and control CRs from initiation to closure.
- Provide CRs prioritization based on direction from Senior A&FM.
- Ensure that the impact of justified change is communicated to appropriate stakeholders.
- Provide a framework process that can be utilized to meet the requirements of controlling change, regardless of scope and scale, when adopting systems engineering principles.

Some of the advantages of adopting the CC process are as follows:

- Managing and maintaining the control of baseline and complex processes.
- The documentation, recording, and monitoring of change.
- Assurance of returning a process or system to a known datum.
- Provide the variety of process or system Stakeholders with a suitable viewpoint to facilitate authority over unjustified change.
- Provision and authority for a safer CC process.

2.0 SCOPE

This document is designed to meet the needs of Senior Management and Asset and Facility Managers while ensuring that the importance of the CC process is communicated to all stakeholders that have a vested interest in CC, in a manner that will reflect future industry best practices.

The document provides guidance for the process to be developed by the Entity when undertaking projects and enhancements within their facility. It does not provide a decision matrix or considerations for financial processes for Change Control. These methods will be part of an Entity's internal strategy and governance and are, therefore, not covered here.

This document will provide some guidance as to how CR could positively influence Quality, Target and Budget.

2.1 Change Control (CC) vs. Change Management (CM)

It is important at this stage to understand the subtle differences between CC and CM and the general elements of due diligence surrounding successful mitigation of risks associated with potentially altering BoD or SO.

CM	CC
Responsible for managing and controlling CRs to affect changes to the infrastructure or any aspect of Configuration Management thereby minimizing the risk of disruption of services.	Includes activities like analyzing, recording, submitting, and approving changes to improve the overall performance of the asset, system, or product.

Table 1: Change Methodology Comparison

2.2 Managing the Change

Upon closure of the CC process and the control parameters imposed by it, it cannot be assumed that the change will remain stable. Rather, the situation shall be governed by the CM philosophy which states that the assets or system's condition and performance shall be monitored for a period of time commensurate with the complexity and priority of the asset/system and the changes imposed. The length and frequency of this process is a direct function of the decided risk profile and can vary from one cycle of a rotating part to several rotations over many months.

Due to the vast majority in variance of processes and systems that may be subjected to CC, this document does not provide specific CC plans for any defined process or system. The examples contained in this document are intended to guide and facilitate management and relevant stakeholders in developing their CC to suit the processes and systems for which they are held responsible or accountable for.

The CC process is the mechanism used to assess, approve, initiate, and record process or system changes. Changes are needed when it is deemed absolutely necessary to make a controlled change to the baseline, process, or SO in the interest of value in the terms of true and effective A&FM. The management of changes that affect budgets and/or schedules shall cascade through the financial management chain according to the relevant Entity's financial control measures.

This document does not include CC processes that apply to specific asset or system types. However, it does highlight topics that are subject to higher-than-average criticality.

3.0 DEFINITIONS

Term	Definition
Asset	An item, component, or Entity that has potential, or actual value to an organization. The value will vary between different organizations and their stakeholders, and can be tangible or intangible, financial or non-financial. A resource controlled by an Entity as a result of past events and from which future economic benefits are expected to flow to the Entity. Infrastructure assets are a sub-class of property, which are non-current assets with a life greater than 12 months and enable services to be provided
Baseline of Design (BoD)	A set configuration of items from which deviation cannot occur without the reliability of that configuration being altered
Change	Relates to circumstances that could potentially jeopardize (directly or indirectly) the suitability of the Asset or System's Lifecycle Plan and therefore place an unpredicted level of risk upon predetermined levels of performance, outputs, costs, and safety
Control	To maintain order of configurations in a manner that has an acceptable level of risk
Due Diligence	Compilation, comprehensive appraisal, and validation of information of an organization required for assessing accuracy, commercial integrity, financial stability, and functional competence integrity at the appropriate stage of the agreement sourcing process
Entity (or Entities)	A Kingdom of Saudi Arabia (KSA) Government organization which is responsible for the delivery of government funded Operations and Maintenance (O&M) Projects
Facilities Management	Organizational function which integrates people, place, and process within the built environment with the purpose of improving the quality of life of the people and the productivity of the core business

Term	Definition
Industry Best Practice	In relation to any undertaking and any circumstances, the exercise of the degree of skill, diligence, prudence, and foresight which would reasonably and ordinarily be expected from a skilled and experienced operator engaged in the same type of undertaking under the same or similar circumstances
National Manual of Assets and Facilities Management (NMA&FM)	Defines the minimum requirements to be followed in the planning, execution, and delivery of Operations and Maintenance (O&M) by KSA Entities
Quality Management	The act of overseeing all activities and tasks needed to maintain a desired level of excellence
Return on Investment (ROI)	Measure and comparison of improved value against costs and efforts to implement the changes required to realize that change
Acronyms	
A&FM	Asset & Facility Management
BMS	Building Management System
BoD	Baseline of Design
CC	Change Control
CM	Change Management
CR	Change Request
ISO	International Organization for Standardization
IT	Information Technology
KSA	Kingdom of Saudi Arabia
NMA&FM	National Manual of Assets and Facilities Management
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
ROI	Return on Investment
SO	Sequence of Operations

Table 2: Definitions

4.0 REFERENCES

- ISO 10007: 2003 Quality Management Systems – Guidelines for Configuration Management
- ISO 26511: 2018. Software and Systems Engineering
- ISO 55002: 2018 Asset Management, Management Systems, ISO Application Guidelines
- ISO 9000 Series: Quality Management Systems

5.0 RESPONSIBILITIES

Role	Description
Entity	Responsible for the quality of CC
Asset Management Team	The team responsible for maintaining records of the asset's condition and systems being maintained
Operations Team	The team responsible for taking on operational ownership of the repaired, replaced, altered, or extended assets or systems
Expro	• Establish standards and performance measures for public building and infrastructure assets throughout KSA • Provide support and advise
In-house resource or contractor	Responsible for the quality assurance of CC

Table 3: Responsibilities

6.0 PROCESS

The CC process shall always be initiated by a real need for change versus risks imposed. Therefore, this aspect must be significantly proven, irrespective of perceived benefits to performance, value, or safety.

Each Change Request (CR) shall be tracked against a unique identification from the time of presentation through to the end of the CR process, and during the CM phase that follows the change after it is implemented.
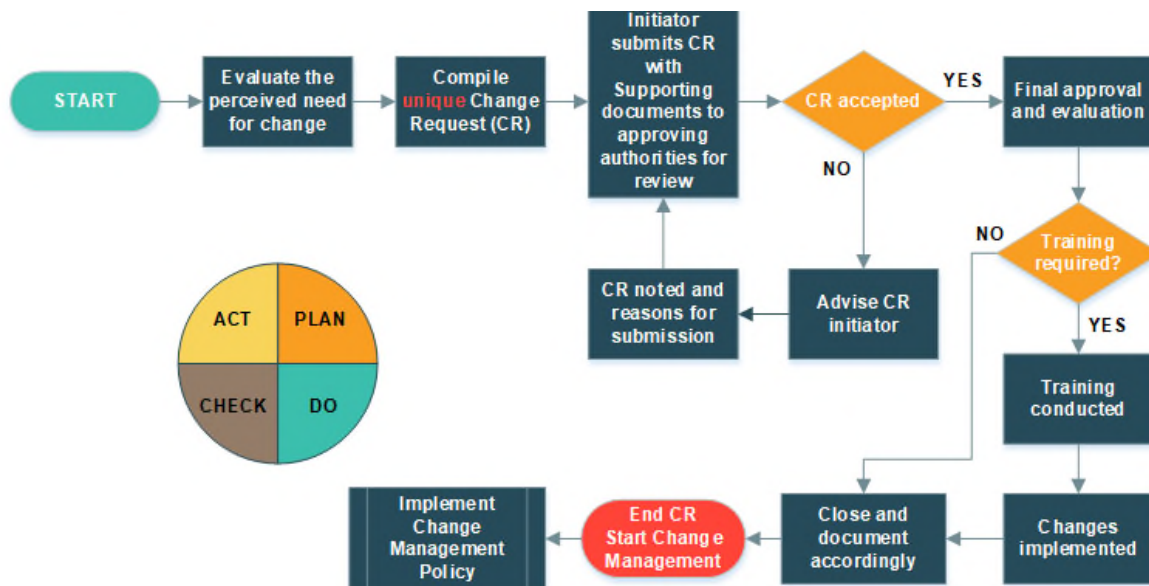

Figure 1: Generic CC Process

6.1 Start

The CC process can be a form of performance improvement or enhancement project and, therefore, follows the principles of the Deming Wheel i.e. "Plan, Do, Check, and Act".

Awareness of the need for change comes from a competency of what "good" or "bad" looks like. A Mechanical Engineer will understand and recognize why a mechanical system's integrity is sub-standard. Similarly, an Electrical, Information Technology (IT), Medical, Vehicle, or Civil Engineer will possess the same level of awareness and competence of systems that reside within their own related discipline. Therefore, a need for change can be initiated by those who are competent in their chosen discipline by recognizing what may improve/enhance or detract from the original intent.

Projects will also have an impact on an existing system's BoD or SO, especially IT Systems. The relationship between the Project Manager, Facility Manager, and other accountable managers are important and should be conducted in an open and honest manner. It is essential to Asset & Facility Management System (AMS) control that any impact to a system, item or component that has value in terms of A&FM, must be made visible to accountable managers to ensure the CR process is initiated and evaluated by SME stakeholders.

6.2 Evaluate the Perceived Need for Change

Prior to the compilation of a CR form, it is best practice to carry out an initial evaluation of the need for change. This must be an objective and impartial evaluation that is unbiased toward any particular discipline, project, operation, or other interested party. The emphasis of this evaluation must be based on the balance of risk (impact), performance, and cost.

The more complex the system that is potentially subject to change, the more thorough the questions must be. In a similar manner, the potential benefits that may be realized have to be well scrutinized prior to completing the CR

form. The CC process can be an expensive and risky activity to carry out. Hence, a Return on Investment (ROI) mechanism should be established to assess the costs incurred by the CC initiative against any potential benefits to be gained from its implementation.

6.3 Compile the Change Request (CR) Form

Once the need for a CR has been evaluated and justified, the CR Form can be populated. An example of this form is illustrated in the Attachments section.

It is essential that the CR Form is set out in a way that calls upon the initiator/implementer to provide all the necessary information to enable the request to be investigated and evaluated thoroughly by the Authority and SME.

The information included in the sample CR form in the Attachments section is considered to be the minimum information required to satisfy this requirement. It must include originators' signatures and contact details for follow up purposes.

Regardless of the CR's success, the CR Form is to be recorded for CM purposes and for future reference, should the same or similar CR be initiated elsewhere.

6.4 Submittal of Unique CR Form

Once the CR Form is fully populated and the Initiator has a credible case for change, it is then submitted to the most relevant authority i.e. the person who is accountable for the asset, facility, system, or operation. In most cases this accountability will be delegated to the most suitable level of Engineering/Operational expertise for complete evaluation.

It is highly recommended that a Systems Engineering approach is adopted for this element of the CC process, as it helps to develop a map for the purposes of risk assessing and evaluating the CR. Mapping out the implications associated with implementing the change to critical assets and/or systems is imperative. This step must involve all interested parties and relevant SMEs.

6.5 Evaluation of CR by Relevant Authority

In the interest of assigning work to the most competent personnel, the Senior Manager is responsible for delegating accountability for the evaluation of CR. It is highly recommended that each Entity maintains a high-level list of names of those who are delegated with evaluating CR against specific Asset and System types.

At this stage, the following points would need to be considered:

- Has the CR been initiated by a credible source i.e. are they competent in the subject matter?
- Has this CR been submitted before? If so, how many times? The repeated submission of a CR may indicate that there is a recurring underlying problem that requires a different solution to that being recommended by the Initiator of the CR.
- Have all requests for change been assessed in a structured way for analyzing possible impacts with other components? As previously mentioned, Systems Engineering is the best approach (schedules, cost, resources).
- Have only authorized and competent individuals been tasked to make changes if CR is successful?
- Does it require review by a CC board?
- How much time will be required to research and implement the change?
- What is the impact upon the project delivery and interim milestones?
- Is there any threshold under which the Initiator can approve the CR?
- Is training required to enable change to be implemented and/or to maintain the new configuration?
- Would the change be more valuable or safer to implement if it were deferred to a later date? If so, what control measures and CM will need to be in place?

6.6 Training

To ensure any changes made as part of the CR approval process, it is essential that all elements of service and operations provisions are catered for and that suitable and sufficient training is provided. Gap Analysis will have taken place at the evaluation stage to highlight the need for any change. Change risk and complexity level should be identified before developing a training package. This will assist with developing the training scope matrix and therefore, the management of this topic which is just as important as the change itself.

6.7 Implement Change

Any change shall be implemented by competent personnel and in accordance with Original Equipment Manufacturer (OEM) instructions, operational limits, and any other technical instruction pertaining to the maintenance of the integrity of the asset, facility, or system upon which the change is being imposed.

- The CC process will take into consideration the timing of the change i.e. there will be potential for a conflict of interest if the change is carried out at an inappropriate time during an operationally busy time. Careful consideration must be given to this as part of the planning phase.
- A process for rolling back to the previous version should be identified; especially for complex IT systems where the ramifications of a poorly evaluated CR can have very serious implications.
- Testing and User Sign-off: All software change should be thoroughly tested and verified to be in accordance with the systems and standards applicable to that software. Clearly defined UAT techniques are to be developed for approval / sign off.
- The CM process must take into consideration the scale and scope of the criticality of change e.g. a change to a Hospital Building Management System (BMS) will always be a critical activity and therefore, warrants a robust CC and CM process to assure its success in all respects.
- The change should consider any warranty consideration impacts where there may be multiple suppliers involved.

6.8 Close and Document

The CR activities relevant to the asset or system being affected must be accurately documented. Having no proper documentation in place can have serious implications with regard to safety, reliability, and costs.

- A central CR log shall be maintained that records the date, Initiator details, and the changes implemented.
- Documentation and Procedures: Whenever system changes are implemented, the procedures and associated documents shall be updated accordingly and disseminated to the relevant stakeholders.
- O&M Manuals and As-Built Drawings are to be reviewed against the overall system by stakeholders and end users.
- Version Control: Make sure that only the latest version is updated.
- Emergency Changes: In instances where the CR has been initiated as a result of an emergency, a verbal authorization should be obtained and the change should be implemented and documented as soon as possible. Ensure safety and then amend documentation later.
- Depending on the level of risk and the criticality of the system, it is imperative that a contingency plan is in place, should the change create an unsafe situation.
- Update all relevant project procedures and management plans.
- Inform the team of the changes ensuring that all personnel understand the implications of these changes – Do not assume they are aware of these implications.
- Record the completion of the CR in the CR Log.
- Close the CR.
- Ensure all lessons learned are documented and cascaded to all relevant stakeholders for future reference.

7.0 ATTACHMENTS

1. CR Form Sample
2. CR Log Sample

Attachment 1 – CR Form Sample

CR Form				
To be completed in full by CR initiator				
Initiator:	Abdulaziz Ali		Submitted on:	12/9/2020
Contact Details:	Hospital One			
CR Details				
1. Area of Change (tick as appropriate)	Policy	Process		Procedure
	Staff	Contract		Assets
	Other? Specify:			
2. Risk Management Action Required?		Yes		No
3. Details of Proposed Change:				
*Describe Proposed change				
*Explain why change should be approved.				
*What are the consequences if proposed change is not implemented?				

SAMPLE

Attachment 2 – CR Log Sample

HOSPITAL ONE - CR LOG							
DOCUMENT INFORMATION:							
Facility/Location:		Hospital One					
Document Owner:		Abdulaziz Essa			Document version No:		V#123765
Title:		Facility Manager			Document version date:		9/2/2020
Reviewed by:		Ahmed Khalid			Document Review date:		13/2/2020
CR INFORMATION:							
Request no.	Description	Requirement reference	Initiator	Initiation date	Priority (H, M, L)	Status. Open. Closed. Deferred	Target Date
1	BMS IT Software Patch	CR IT 12348765	Ali Salem	12/3/2019	H	Closed	14/06/2019
2	Strengthen Security Gate	CR 39265493	Bassam Fekry	18/09/2019	H	Deferred	1/6/2020
3	Replace Flooring	CR 30454955	A. Another	9/2/2020	M	Closed	12/2/2020
4	Change Boiler	CR 40454955	B. Smith	17/03/2020	L	Open	19/04/2020
5							
6							
7							
8							
9							
10							