PME - Project Management (IT-PMEI1-S22)

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Best practices for development of projects

- IBM statement (2006): Most software projects fail. In fact, the Standish group reports that over 80% of projects are unsuccessful either because they are over budget, late, missing function, or a combination.

- Moreover, 30% of software projects are so poorly executed that they are canceled before completion

- Avoid this :
  Make use of the **Best Practice** models and standards.

We will make use of CMMI Process Models, ISO- and IEEE standards

- **CMMI**:
- Capability Maturity **Model** Integration (CMMI) is a process level improvement training and appraisal program. Administered by the CMMI Institute, a subsidiary of ISACA, it was developed at Carnegie Mellon University (CMU), USA.

- **ISO**: International Organization for Standardization
- The International Organization for Standardization develop and publish International **Standards**, EU.

- **IEEE** STANDARDS ASSOCIATION
- Leading consensus building organization that nurtures, develops & advances global technologies. They drive the functionality, capabilities and interoperability of a wide range of products and services that transform the way people live, work and communicate.

We will make use of CMMI Process Models, ISO- and IEEE standards

- CMMI Process model and ISO Certification standards have different origins.
- CMMI Process Models have been developed in the past by an organization called Software Engineering Institute (SEI) which is US Department of Defense funded organization and a part of the illustrious Carnegie Mellon University based at Pittsburgh, USA.
- ISO Certification Standards are published by International Organization for Standardization and is based at Geneva. The various countries of the world are represented at ISO by their respective National Standards Body.
- IEEE-SA (Standard Assosiation). IEEE is a leading developer of industry standards in a broad range of technologies that drive the functionality, capabilities, and interoperability of products and services, transforming how people live, work, and communicate. **IEEE 829 (Test Plan Outline) and IEEE 830 (Software Requirement Specification - SRS) standards will be used as templates for 2. of the 3. PME Assignments.**

The relationship of CMMI Process Models with ISO Certification Standards

- Coming to the **relationship** between CMMI Process Models and ISO Certification Standards – both being structured collection of best practices – have reasonable overlap in terms of subject matter content.
  - The most common ISO 9001:2008 Quality Management System Certification Standard finds resonance with the CMMI Process Models like CMMI-DEV (CMMI for Development), CMMI-SVC (CMMI for Services) and CMMI-ACQ (CMMI for Acquisition). ISO 27001:2013, the ISO Certification Standard for Information Security Management Systems has commonality with the Document published by the Software Engineering Institute called *Security by Design* with CMMI for Development. On similar lines, the ITIL framework based ISO 20000-1 Certification Standard for IT Service Management has the overlap with CMMI-SVC (CMMI for Services).
- The crux of the matter is when an organization is going in for implementation and certification of multiple standards it should consider adopting an integrated approach for implementation and certification.

Formalised way of working

- It is myth that CMMI® or ISO add documentation. Documentation is anyhow needed in any project, but these models implementation deals with systematic work products, so that changes can be controlled, technical consistency can be maintained and traceability could be established.

- Documents like Project plans and Requirement Specifications are essential as per these models and plans assist in significant way to meet project goals and help to established synergetic teams.

CMMI - Capability Maturity Model Integration

- **Capability Maturity Model Integration** (CMMI) is a process improvement approach that provides organizations with the essential elements of effective processes that ultimately improve their performance.

- CMMI can be used to guide process improvement across a project, a division, or an entire organization

- CMMI according to the Software Engineering Institute (SEI, 2008), helps "integrate traditionally separate organizational functions, set process improvement goals and priorities, provide guidance for quality processes, and provide a point of reference for appraising current processes."

What is CMMI ?

- CMMI® model integrates Software, Systems, Integrated Process and Product development, Supplier Sources into a coherence model.

- The model's version 1.1 is released in early 2001 by SEI and is being currently adopted by industry globally.

- The advantage of CMMI® over SW CMMI® for software industry is the present CMMI® model is also having improvements made over existing SW CMMI® version 1.1 (includes SW CMMI® draft 2.0).

What are the benefits of going for CMMI ?

- Implementing a disciplined process in a organization improves the organization's control over execution of projects, meet the stiff project deadlines and quality levels.

- CMMI® models assists organizations to develop and institutionalized efficient and effectives processes in organizations.

- A well interpreted, developed and properly followed process shall increase the ability to meet project goals and improve profitability.

- **The benefits associated with CMMI® models are: Improvement in productivity, quality and increase in cycle time thus improving the customer satisfaction, meeting business objectives, improvement in business and growth.**

- A well established CMMI® program acts as a catalytic business model for an organization.

CMMI – Levels

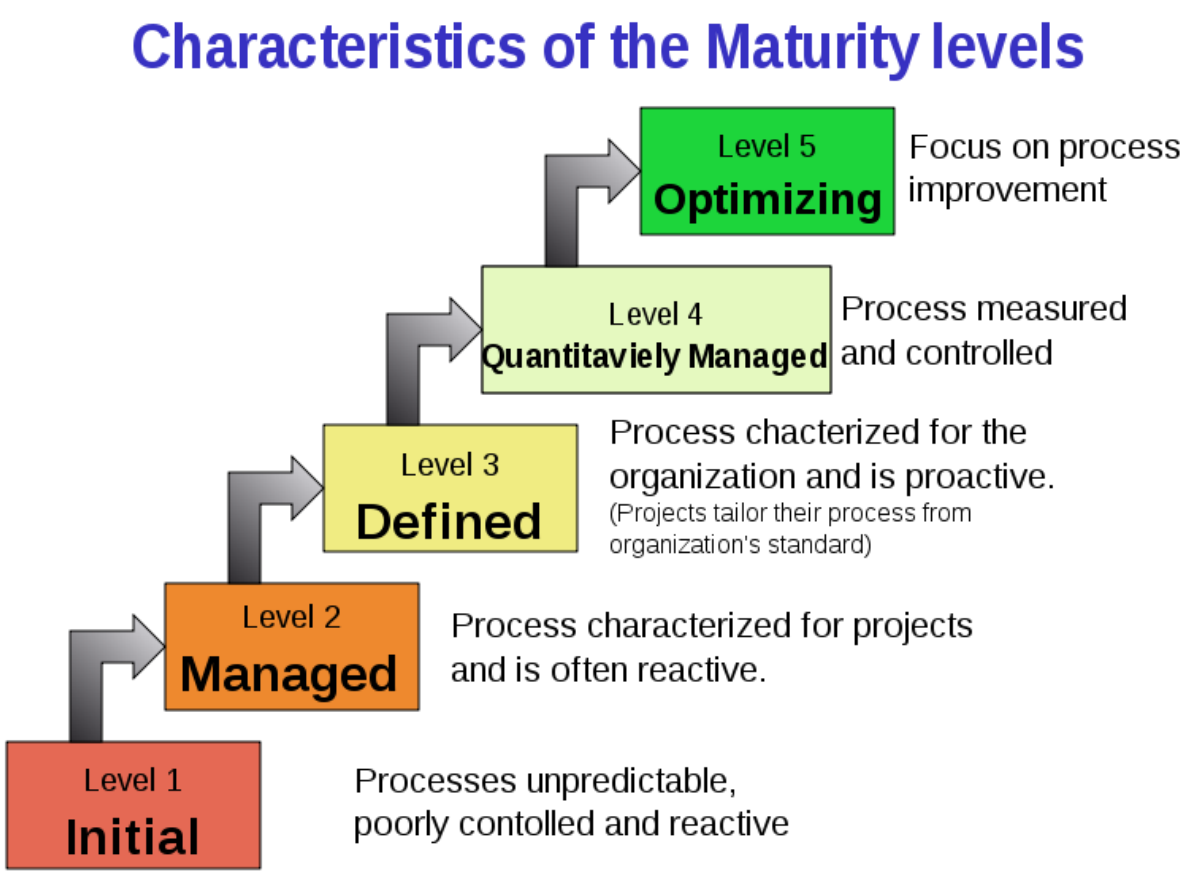
CMMI levels:

- CMMI is a model that shows roads (road maps) to improve processes. Primarily wish to achieve improvements not to gain approval (Assessment).

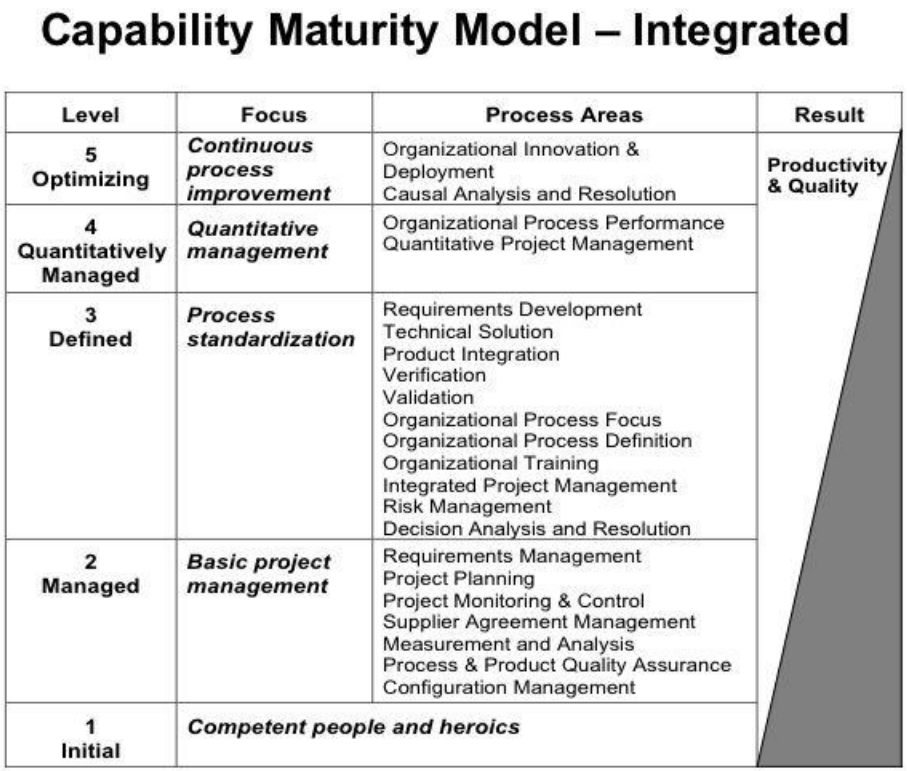
- In CMMI models with a staged representation, there are five maturity levels designated by the numbers 1 through 5

  - Initial
  - Managed
  - Defined
  - Quantitatively Managed
  - Optimizing

CMMI – Level 1-2-3-4-5



Capability Maturity Model - Integrated



Capability Maturity Model – **Level 1 - Initial**

- Processes are usually ad hoc and chaotic. The organization usually does not provide a stable environment. Success in these organizations depends on the competence and heroics of the people in the organization and not on the use of proven processes.

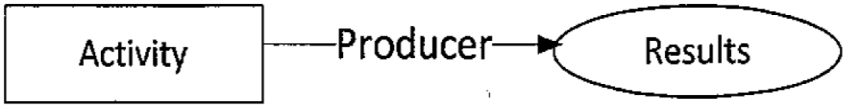
- Organizations often produce products and services that work; however, they frequently exceed the budget and schedule of their projects.

- Organizations are characterized by a tendency to over commit, abandon processes in the time of crisis, and not be able to repeat their past successes.

Capability Maturity Model – L1

- **Level 1 - Initial**

Level 1
Ad Hoc



Capability Maturity Model – **Level 2 - Managed**

- At maturity level 2, an organization has achieved all the **specific** and **generic goals** of the maturity level 2 process areas. In other words, the projects of the organization have ensured that requirements are managed and that processes are planned, performed, measured, and controlled.

- The process discipline reflected by maturity level 2 helps to ensure that existing practices are retained during times of stress. When these practices are in place, projects are performed and managed according to their documented plans.

- At maturity level 2, requirements, processes, work products, and services are managed. The status of the work products and the delivery of services are visible to management at defined points.

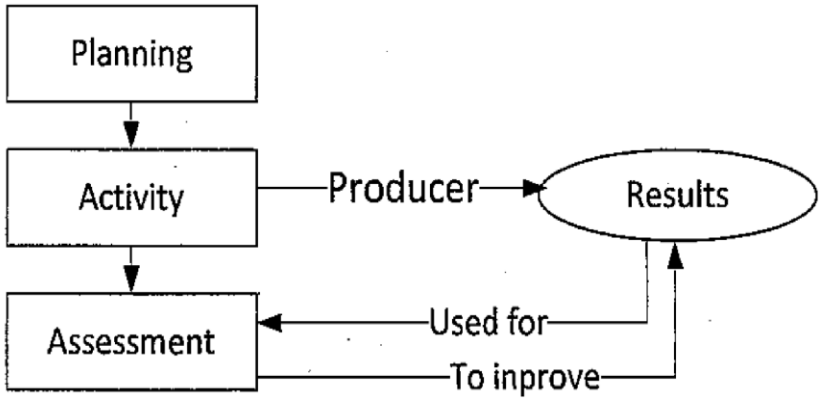
- Commitments are established among relevant stakeholders and are revised as needed. Work products are reviewed with stakeholders and are controlled.

- The work products and services satisfy their specified requirements, standards, and objectives.

Capability Maturity Model – L2

- **Level 2 - Managed**

Level 2
Repeatable



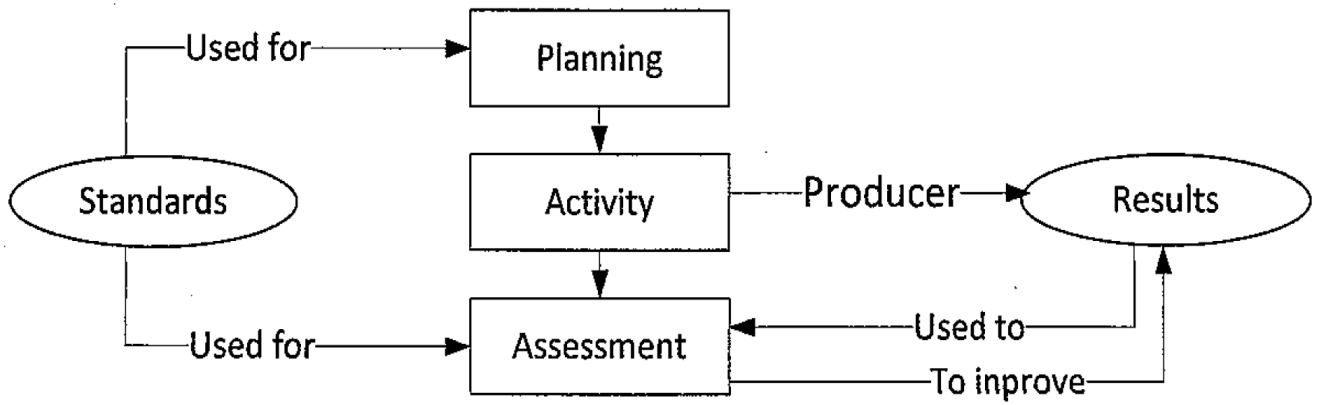
Capability Maturity Model – **Level 3 - Defined**

- An organization has achieved all the **specific** and **generic goals** of the process areas assigned to maturity levels 2 and 3.
- At maturity level 3, processes are well characterized and understood, and are described in standards, procedures, tools, and methods.
- A critical distinction between maturity level 2 and maturity level 3 is the scope of standards, process descriptions, and procedures. At maturity level 2, the standards, process descriptions, and procedures may be quite different in each specific instance of the process .At maturity level 3, the standards, process descriptions, and procedures for a project are tailored from the organization's set of standard processes to suit a particular project or organizational unit. The organization's set of standard processes includes the processes addressed at maturity level 2 and maturity level 3. As a result, the processes that are performed across the organization are consistent except for the differences allowed by the tailoring guidelines.
- Another critical distinction is that at maturity level 3, processes are typically described in more detail and more rigorously than at maturity level 2. At maturity level 3, processes are managed more proactively using an understanding of the interrelationships of the process activities and detailed measures of the process, its work products, and its services.

Capability Maturity Model – L3

- **Level 3 - Defined**

Level 3
Defined

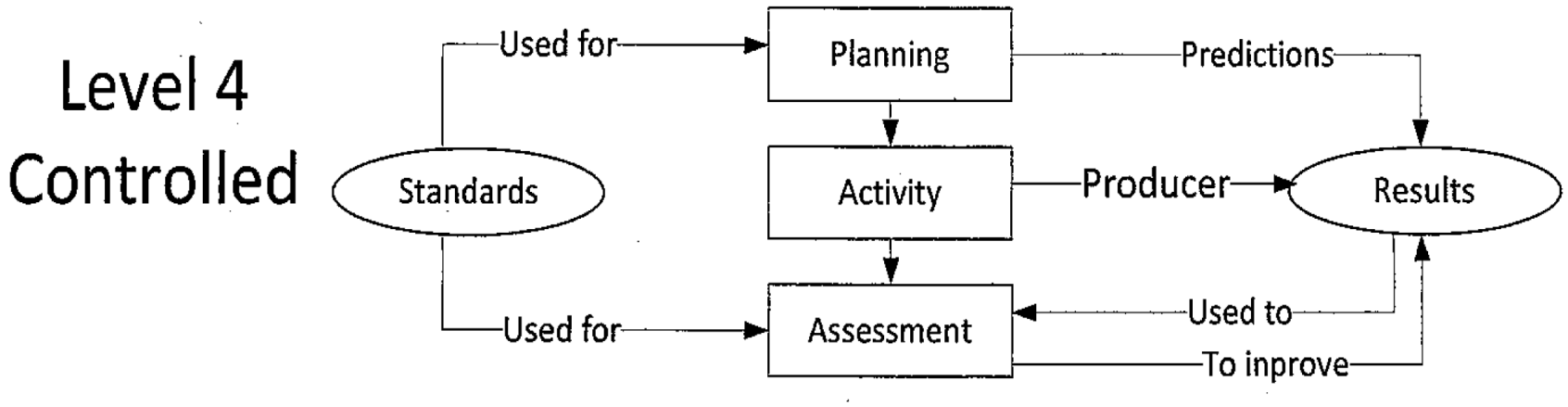


Capability Maturity Model – **Level 4 - Quantitatively Managed**

- Has achieved all the **specific goals** of the process areas assigned to maturity levels 2, 3, and 4 and the **generic goals** assigned to maturity levels 2 and 3.
- At maturity level 4 Sub processes are selected that significantly contribute to overall process performance. These selected sub processes are controlled using statistical and other quantitative techniques.
- Quantitative objectives for quality and process performance are established and used as criteria in managing processes. Quantitative objectives are based on the needs of the customer, end users, organization, and process implementers. Quality and process performance are understood in statistical terms and are managed throughout the life of the processes.
- For these processes, detailed measures of process performance are collected and statistically analysed. Special causes of process variation are identified and, where appropriate, the sources of special causes are corrected to prevent future occurrences.
- Quality and process performance measures are incorporated into the organizations measurement repository to support fact-based decision making in the future.
- A critical distinction between maturity level 3 and maturity level 4 is the predictability of process performance. At maturity level 4, the performance of processes is controlled using statistical and other quantitative techniques, and is quantitatively predictable. At maturity level 3, processes are only qualitatively predictable.

Capability Maturity Model – L4

- **Level 4 - Quantitatively Managed**



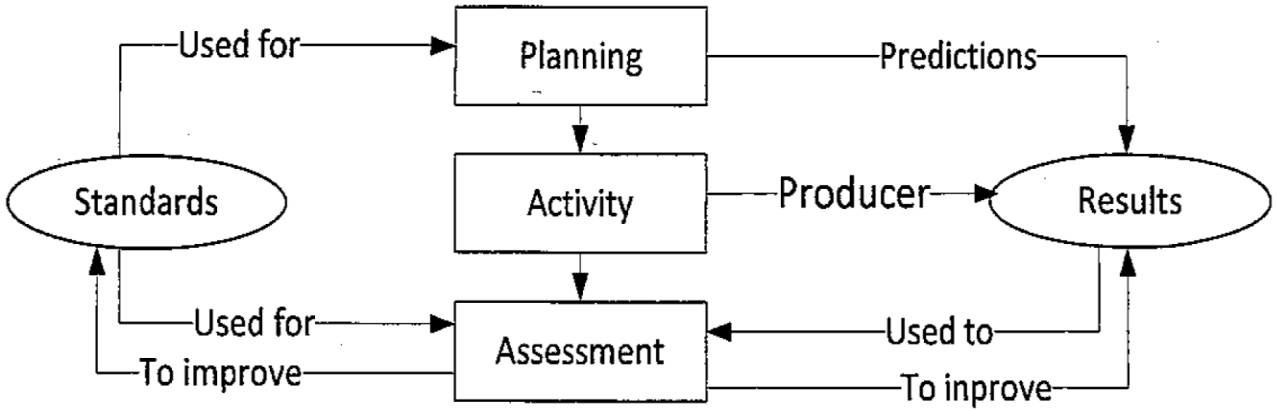
Capability Maturity Model – **Level 5 - Optimizing**

- At maturity level 5, an organization has achieved all the **specific goals** of the process areas assigned to maturity levels 2, 3, 4, and 5 and the **generic goals** assigned to maturity levels 2 and 3.
- Processes are continually improved based on a quantitative understanding of the common causes of variation inherent in processes.
- Maturity level 5 focuses on continually improving process performance through both incremental and innovative technological improvements.
- Quantitative process-improvement objectives for the organization are established, continually revised to reflect changing business objectives, and used as criteria in managing process improvement.
- The effects of deployed process improvements are measured and evaluated against the quantitative process-improvement objectives. Both the defined processes and the organization's set of standard processes are targets of measurable improvement activities.
- Optimizing processes that are agile and innovative depends on the participation of an empowered workforce aligned with the business values and objectives of the organization. The organization's ability to rapidly respond to changes and opportunities is enhanced by finding ways to accelerate and share learning. Improvement of the processes is inherently part of everybody's role, resulting in a cycle of continual improvement.
- A critical distinction between maturity level 4 and maturity level 5 is the type of process variation addressed. At maturity level 4, processes are concerned with addressing special causes of process variation and providing statistical predictability of the results. Though processes may produce predictable results, the results may be insufficient to achieve the established objectives. At maturity level 5, processes are concerned with addressing common causes of process variation and changing the process (that is, shifting the mean of the process performance) to improve process performance (while maintaining statistical predictability) to achieve the established quantitative process-improvement objectives.

Capability Maturity Model – L5

- **Level 5 - Optimizing**

Level 5
Optimized

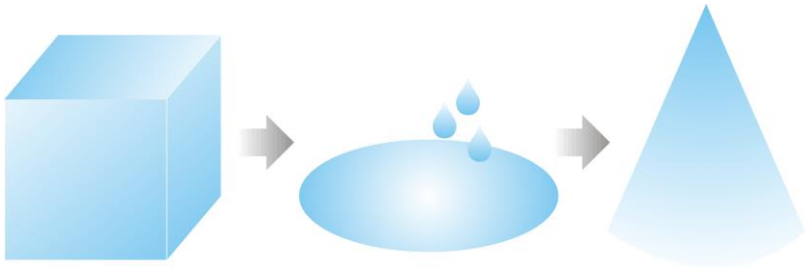


Capability Maturity Model – Reflections on CMMI

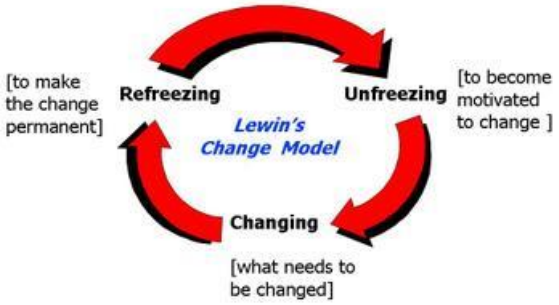
- CMMI project is exploiting the resources better as we have already.
- CMMI creates a road map for your testing project ex: what you need to test, the functionalities, with which platforms you want to test…etc. All of these have to be managed with CMMI, then the process will be pure for the testers to check and not to end with poor system.
- It's made to help testers to test their systems in a better way, and specific with defining which level of testing they are. And then they can separate the tasks and test it individually so it will be easier to find the bugs and test it.

Lewin model

- The Lewin model is used when moving from one CMMI level to the next (e.g. Level 2 → level 3).
- Lewin Model : Unfreeze – move – freeze
- • Unfreeze
- – Establish a sense of urgency
- – Build support
- – Develop a change version
- – Communicate the change vision



- • Move
- – Empower and enable action
- – Generate short-term wins
- – Consolidate and re-vitalize change
- • Freeze
  – Anchor a new approach in culture



Lewin model (Unfreeze)

Unfreeze

1. Determine what needs to change
   - Survey the organization to understand the current state
   - Understand why change has to take place.

2. Ensure there is strong support from upper management
   - Use Stakeholder Analysis and Stakeholder Management to identify and win the support of key people within the organization
   - Frame the issue as one of organization-wide importance.

3. Create the need for change
   - Create a compelling message as to why change has to occur
   - Use your vision and strategy as supporting evidence
   - Communicate the vision in terms of the change required
   - Emphasize the “why”.

4. Manage and understand the doubts and concerns
   - Remain open to employee concerns and address in terms of the need to change.

Lewin model (Change)

Change

1. Communicate often
   - Do so throughout the planning and implementation of the changes
   - Describe the benefits
   - Explain exactly the how the changes will affect everyone
   - Prepare everyone for what is coming.

2. Dispel rumors
   - Answer questions openly and honestly
   - Deal with problems immediately
   - Relate the need for change back to operational necessities.

3. Empower action
   - Provide plenty of options for employee involvement
   - Have line managers provide day–to–day direction.

4. Involve people in the process
   - Generate short-term successes to reinforce the change
   - Negotiate with external stakeholders as necessary (such as employee organizations).

Lewin model (Refreeze)

Refreeze

1. Anchor the changes into the culture
   - Identity what supports the change
   - Identify barriers to sustaining change.

2. Develop ways to sustain the change
   - Ensure leadership support
   - Create a reward system
   - Establish feedback systems
   - Adapt the organizational structure as necessary.

3. Provide support and training
   - Keep everyone informed and supported.

4. Celebrate success!

Lewin model (Key Points)

Key Points

Lewin's change model is a simple and easy-to-understand framework for managing change.

By recognizing these three distinct stages of change, you can plan to implement the change required.

You start by creating the motivation to change (unfreeze).

You move through the change process by promoting effective communications and empowering people to embrace new ways of working (change).

And the process ends when you return the organization to a sense of stability (refreeze), which is so necessary for creating the confidence from which to embark on the next, inevitable change.