

Configuration Management for Transportation Management Systems

Maintaining and Sustaining System Integrity

Configuration management (CM) describes a series of processes and procedures developed in the information technology community to establish and maintain system integrity. It provides a holistic approach for effectively controlling system change, and is an integral part of the systems engineering process. CM helps to verify that changes to subsystems are considered in terms of the entire system, minimizing adverse effects.



Benefits of Configuration Management

There are many reasons that personnel involved with transportation management systems (TMS) should be interested in Configuration Management. A CM program will ensure that:

- documentation (requirements, design, test, and acceptance documentation) for items is accurate and consistent with the actual physical design of the item.
- an accurate, up-to-date baseline of the system exists, if needed for disaster recovery.
- administration of change decisions are handled with a system-wide perspective in mind.
- requirements are tracked throughout the life cycle through acceptance and operations and maintenance, thereby creating an accurate record of the status of the system.

Benefit Testimonials

"With almost 20 years experience in the design, implementation, modification and expansion of our system, the benefits of quickly being able to recover from problems by returning to an earlier working state are enormous. Our system has been very dynamic, and there is always an area where we are working on an improvement or upgrade, while still actively managing traffic."

"As in any large, complex system, CM can provide a constant understanding of the current state of the system....The key factor in CM is having a central repository of information for reference as personnel changes occur over the life of the system. It is also a great aid in maintaining the system when items are replaced for repair. Technicians should have ready access to configuration data when installing or re-installing standard system components."

- Comments obtained from Spring 2000 survey of transportation agencies

Successful Practices

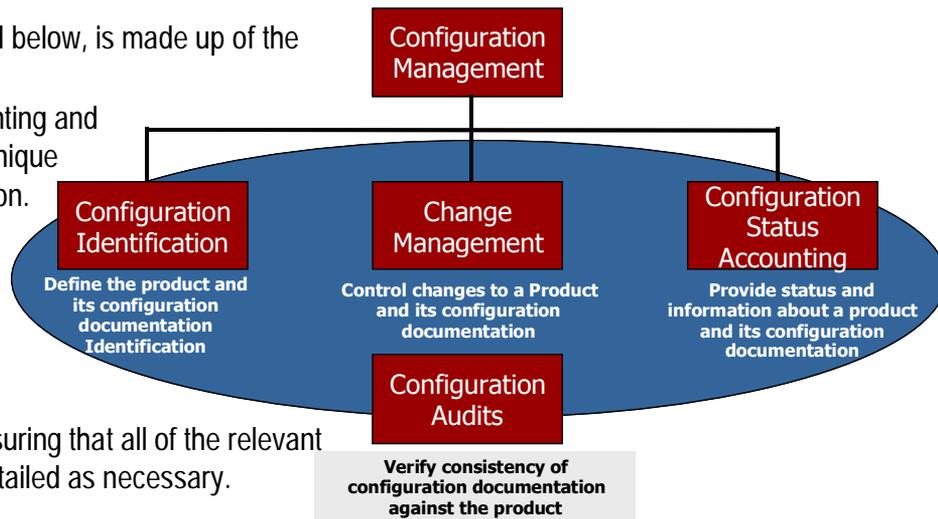
Maryland CHART II Program – This CM plan details the need for determining the overall structure of the system in order to determine the correct level of configuration identification. The plan states, "defining configuration identification (CI) at too low a level results in over-control of system development and overly complex and costly CM. On the other hand, identifying CIs at too high a level reduces management visibility into the project and can make progress difficult to control, manage, and verify."

Georgia NaviGator Program – This CM plan specifies a Configuration Control Board (CCB), which is made up of DOT personnel and consultants responsible for change control decisions. The CCB must review and approve or reject all requested changes to configuration items. The CCB is not tasked with investigations or feasibility analyses.

Configuration Management Process

The general CM process, graphically demonstrated below, is made up of the following elements:

- **Configuration Identification** – process of documenting and labeling the items in the system, by providing a unique identifier to track changes and identify item location.
- **Change Management** – process of assessing impacts of a possible changes to a system, determining the fate of the proposed change, executing the approved changes, and ensuring that the change is properly documented.
- **Configuration Status Accounting** – process of ensuring that all of the relevant information about an item is up to date and as detailed as necessary.
- **Configuration Audits** – process of analyzing items and their respective documentation to ensure that it reflects the current situation.



Guiding Principals

The following nine principles serve as a starting point for any TMS to implement a CM process.

1. Identify the context and environment in which CM is to be implemented and develop an appropriate CM Plan accordingly.
2. Define procedures describing how each configuration management process will be accomplished.
3. Conduct training so that all responsible individuals understand their roles and responsibilities and the procedures for implementing configuration management processes.
4. All items are assigned unique identifiers so that one item can be distinguished from other items.
5. Configuration documentation defines the functional, performance, and physical attributes of a system.
6. A baseline identifies an agreed-to description of the attributes of an item at a point in time and provides a known configuration to which changes are addressed.
7. Each change is uniquely identified.
8. Consider the technical, support, schedule, and cost impacts of a requested change before making a judgment as to whether or not it should be approved for implementation and incorporation in the item and its documentation.
9. Implement a change in accordance with documented direction approved by the appropriate level of authority.

Additional Resources and Training

The handbook entitled *Configuration Management for Transportation Management Systems* is intended to provide guidance for transportation professionals that are responsible for developing and maintaining complex Intelligent Transportation Systems (ITS) and TMS. The handbook expands on the information presented here, by detailing the various aspects and components of CM. For a non-technical audience, the *CM for TMS Primer* identifies key aspects of configuration management, identifies issues for their agencies to consider, identifies the benefits or value of a CM program, and profiles successful practices of existing programs. These documents and additional training material are available on the TMC Pooled-Fund Study website at <http://tmcdfs.ops.fhwa.dot.gov/>.

- CM for TMS Handbook, FHWA-OP-04-013, EDL# 13885
- CM for TMS Brochure, FHWA-OP-04-016, EDL# 13888
- CM for TMS Primer, FHWA-OP-04-014, EDL# 13886
- CM for TMS Training Course, FHWA-NHI-03-119

