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Software configuration management plan

Title: Intelligent parking management system

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Overview of the Software Configuration Management Plan

Introduction

Purpose

The purpose of this Software Configuration Management Plan (SCMP) is to define the planning-level framework that governs how configuration management activities are applied within the Intelligent Parking Management System (IPMS). This document establishes the processes, roles, controls, and oversight mechanisms required to manage the identification, versioning, change control, baselining, and status tracking of project artifacts in a controlled and traceable manner. The SCMP serves as a reference for development teams, project oversight roles, and stakeholders to ensure that all configuration-related activities are performed consistently, transparently, and in alignment with project objectives, quality expectations, and lifecycle milestones.

Scope and applicability

This Software Configuration Management Plan (SCMP) applies to all configuration management activities within the IPMS project. It defines where and how SCM is applied across the project lifecycle, from initial planning through development, baselining, release, and audit activities. The plan covers all teams involved in the project, including development, documentation, and quality assurance roles.

Configuration management applies to defined categories of configuration items such as documents, source code, data files, baselines, and releases, and aligns with the selected project lifecycle model.

SCM activities are aligned with the project lifecycle phases, including planning, development, stabilization, release, and closure.

Organizational Relationships

This Software Configuration Management Plan operates as a project-level planning document within the organizational structure supporting the Intelligent Parking Management System (IPMS). It interfaces with project management, system development, quality assurance, and documentation functions to ensure coordinated execution of configuration management activities.

The SCMP defines configuration-related roles, responsibilities, and authority boundaries specific to the IPMS project while remaining aligned with higher-level organizational policies and standards. Decision-making and oversight related to configuration control are governed by this plan and are integrated with project workflows without duplicating or overriding existing organizational governance structures.

References

The following references have been used for the development of the Software Configuration Management Plan.

- IEEE Std 828-2012, Standard for Configuration Management in Systems and Software Engineering
- Course lecture materials on Software Configuration Management
- Git and GitHub official documentation

Criteria for Configuration Identification

Configuration Items Covered by Configuration Management

Configuration management applies to all project artifacts that require control, traceability, or formal approval. These include planning documents, requirements descriptions, design artifacts, source code files, data files, test documentation, change requests, baseline records, audit reports, and release notes.

Configuration Item Categories

Configuration items are grouped into the following categories:

- Documentation CIs
- Source Code CIs
- Data CIs
- Audit CIs
- Baseline and Release CIs

Limitations and Assumptions

Assumptions

- The project is limited in scope and duration
- SCM activities are implemented using Git and GitHub

- Team members may perform multiple roles
- The system functionality is intentionally simple

Limitations

- Limited external stakeholder interaction
- SCM processes are demonstrated at an academic level

CM Responsibilities and Authorities

Roles and Responsibilities

Role	Assigned Member	Responsibilities
SCM Coordinator	Meron Kassahun	Oversight of SCM activities, SCMP maintenance, baseline approval
Developer	Hilina Fiseha	Implementation of system features, controlled commits
Developer	Kaleb Demisse	Parking allocation logic, CR implementation
QA/Configuration Auditor	Kirubel Eskinder	Conduct PCA and FCA, report findings
Documentation Owner	Meron Getaneh	Maintain CI register and ensure document consistency
Change Control & Reporting	Mesud Ahmed	Manage CR workflow, maintain change log

Authority Lines

The SCM Coordinator has authority to approve baselines, authorize changes to controlled items, and enforce adherence to the SCMP. All team members are accountable for complying with defined SCM procedures.

Oversight and Accountability

Configuration oversight is maintained by the SCM Coordinator. Team accountability is ensured through defined ownership of configuration items, stakeholder involvement in reviews, documentation ownership, and mandatory reporting of SCM status and issues.

Stakeholders, including project team members, project sponsors, system users, and project oversight representatives, participate in reviews of baselines, releases, and audit results to ensure alignment with project objectives, quality expectations, and operational requirements.

Project Organization

Organizational Structure

The IPMS project follows a collaborative team structure. SCM functions interface directly with development, quality assurance, and documentation activities to ensure coordination and consistency.

Configuration Management Interfaces

- Interface with Development: version control and branching
- Interface with QA: configuration audits and verification
- Interface with Documentation: CI tracking and updates

Applicable Policies and Procedures

Configuration management activities for the Intelligent Parking Management System (IPMS) are governed by a defined set of standards, directives, and procedural methods to ensure consistency, control, and traceability across all project artifacts. These policies and procedures provide the operational foundation through which the objectives of the Software Configuration Management Plan are executed.

Applicable Standards

Configuration management planning and execution for this project are aligned with the principles and guidance provided by IEEE Std 828-2012 (Standard for Configuration Management in Systems and Software Engineering). This standard informs the structure of the SCMP, the identification and control of configuration items, baseline management practices, and the establishment of change control and audit mechanisms.

Where applicable, general software engineering best practices related to documentation control, versioning, and lifecycle alignment are applied to support clarity, consistency, and quality assurance.

Directives and Control Policies

All project artifacts identified as configuration items are subject to configuration control once approved or baselined. No changes to controlled items may be introduced without following the defined change management process. Unauthorized modifications, direct commits to protected branches, or undocumented updates to baselined artifacts are prohibited.

Version identification, ownership assignment, and repository structure directives defined in this plan must be followed for all documents, source code, and records. Each controlled item must maintain a clear version history and traceability to related change requests, baselines, and releases.

Configuration Management Methods

Version control is implemented using a Git-based repository, which serves as the authoritative source for all configuration items. Branching and integration activities follow a structured workflow in which development work is performed on feature branches and integrated into the main branch through formal pull request-based reviews. This method ensures peer review, traceability of changes, and controlled integration.

Document control and versioning practices are applied consistently across management, technical, and support documents. Each document includes version identifiers, change history where applicable, and controlled storage within the repository. Updates to documents follow the same approval and traceability rules as source code once they are placed under configuration control.

Together, these standards, directives, and methods provide a controlled and auditable framework for executing configuration management activities throughout the IPMS project lifecycle.

Configuration Identification, File Naming, and Versioning Rules

All configuration items (CIs) for the Intelligent Parking Management System (IPMS) shall follow simple and consistent naming and versioning rules to ensure clarity, traceability, and control.

File Naming Rules

- Document files shall be named using the format
IPMS_<DocumentName>_v<version>
Example:
IPMS_SCMP_v1.0
IPMS_CI_Register_v1.1

- Source code files shall follow standard programming language naming conventions and be organized within clearly named project directories.
- Baseline and release artifacts shall include the baseline or release identifier in the name.
Example:

IPMS_Baseline_BL1

IPMS_Release_v1.0

Versioning Rules

- Version numbers follow the format vMajor.Minor (e.g., v1.0, v1.1).
- A major version change indicates an approved baseline or release.
- A minor version change indicates small updates or corrections that do not affect the baseline.
- Draft documents may use a temporary draft version before approval.

Version Control

All versions of configuration items are stored and tracked using the Git repository. Version history, change details, and approvals are traceable through commit records and associated change requests.

Planned Activities

This section defines the planned configuration management activities for the Intelligent Parking Management System (IPMS), including their scheduling alignment, required resources, and key milestones. The intent is to ensure that configuration management is executed in a coordinated, timely, and measurable manner throughout the project lifecycle.

Planned Configuration Management Activities

Configuration management activities are planned and executed in parallel with the overall project lifecycle. The following activities are formally scheduled and monitored under this plan:

- Preparation, review, and approval of the Software Configuration Management Plan (SCMP)
- Identification, classification, and registration of configuration items (CIs)
- Establishment and maintenance of the configuration item repository structure
- Version control and branching management for all controlled artifacts
- Change request submission, evaluation, approval, and implementation tracking
- Baseline definition, creation, tagging, and documentation
- Release preparation, packaging, and documentation

- Configuration status accounting and reporting
- Execution of configuration audits and corrective follow-up
- Maintenance and revision of SCM documentation

Scheduling of SCM Activities

SCM activities are scheduled to align with defined project stages and documentation deliverables. The planned schedule is summarized as follows:

Project Initiation Period

- Approval of the SCMP
- Initial identification of configuration items
- Creation of the CI Register
- Setup of repository structure and access controls

Early Development Period

- Activation of version control procedures
- Establishment of feature branches
- Initial change request submissions
- Ongoing CI updates and documentation versioning

Mid-Project Review Period

- Formal establishment of Baseline 1 (BL1)
- Review and approval of baseline documentation
- Status accounting review
- Change request evaluation and prioritization

Implementation and Stabilization Period

- Implementation of approved change requests
- Continuous monitoring of repository activity
- Preparation of release artifacts
- Establishment of Baseline 2 (BL2)

Release and Closure Period

- Release v1.0 and v1.1 packaging and publication
- Physical and Functional Configuration Audits
- Final configuration status reporting

- Archiving of configuration records

Specific calendar dates are defined and adjusted by the project team as needed, while maintaining the sequencing and dependency relationships defined in this plan.

SCM Milestones

The following configuration management milestones are formally defined and tracked:

- Approval of the Software Configuration Management Plan
- Completion of the initial CI Register
- Establishment of Baseline 1 (BL1)
- Approval of Baseline 1 documentation
- Implementation of approved change requests
- Establishment of Baseline 2 (BL2)
- Release v1.0 approval and publication
- Release v1.1 approval and publication
- Completion of Physical Configuration Audit (PCA)
- Completion of Functional Configuration Audit (FCA)
- Final SCM documentation sign-off

Each milestone represents a control point requiring review, documentation, and authorization as defined in the SCMP.

Resource Planning

The execution of planned SCM activities is supported by the following resources:

Personnel Resources

- SCM Coordinator responsible for oversight and compliance
- Configuration item owners responsible for maintenance and updates
- Change request reviewers and approvers
- Audit participants and documentation reviewers

Tool Resources

- Git-based version control system for repository management
- Issue tracking or change request templates for change control
- Documentation tools for controlled document preparation and revision
- Release management features within the repository platform

Documentation Resources

- Approved templates for SCMP, CI Register, Change Requests, Baseline Records, Release Notes, and Audit Reports
- Centralized repository storage for controlled access and traceability

Adequate allocation of these resources is required to ensure that configuration management activities are performed consistently and without disruption to development or delivery schedules.

CMP Maintenance

This section defines how the Software Configuration Management Plan (SCMP) for the Intelligent Parking Management System (IPMS) is maintained, reviewed, controlled, and improved over the course of the project lifecycle. The SCMP itself is treated as a controlled configuration item and is subject to the same discipline and oversight as other managed project artifacts.

SCMP Control and Ownership

The SCMP is a formally controlled document under configuration management. Ownership of the SCMP is assigned to the **SCM Coordinator**, who is responsible for ensuring that the plan remains accurate, current, and aligned with project needs. Any proposed changes to the SCMP must follow the defined change management process once the document has been approved or baselined.

Unauthorized modifications to the SCMP are not permitted. All updates must be traceable, documented, and reviewed prior to approval.

Review and Update Frequency

The SCMP is reviewed at defined points throughout the project to ensure continued relevance and effectiveness. Planned review points include:

- Initial approval prior to baseline establishment
- Review during major baseline creation (BL1 and BL2)
- Review significant changes to project scope, tools, or processes.
- Review prior to major releases
- Final review during project closure

Additional reviews may be conducted if deviations, process gaps, or recurring issues are identified through surveillance or audits.

Change Management for the SCMP

Changes to the SCMP are initiated through a formal Change Request (CR). Each CR must clearly state:

- The reason for the proposed change
- The sections affected
- The expected impact on SCM activities or responsibilities

All proposed changes are reviewed by the SCM Coordinator and relevant stakeholders before approval. Once approved, updates are implemented, version numbers are incremented, and revision history is maintained to preserve traceability.

Versioning and Documentation of Updates

Each approved revision of the SCMP is assigned a unique version identifier in accordance with the project's versioning rules. The document header and revision history reflect:

- Version number
- Date of change
- Summary of modifications
- Approval authority

Superseded versions of the SCMP are retained in the repository for reference and audit purposes but are clearly marked as obsolete to prevent unintended use.

Alignment with Project Evolution

As the IPMS project progresses, the SCMP is updated to reflect changes in:

- Configuration item scope
- Tool usage
- Change control procedures
- Baseline and release planning
- Organizational roles or interfaces

Updates focus on maintaining alignment with actual project execution while preserving the integrity of the configuration management framework.

Continuous Improvement

Feedback from team members, audit results, and surveillance activities is used to improve the SCMP iteratively. Lessons learned during execution are evaluated and incorporated where appropriate to strengthen clarity, efficiency, and compliance without introducing unnecessary complexity.

Auditability of the SCMP

The SCMP is subject to configuration audits as part of the overall SCM audit process. Audits verify that:

- The SCMP is properly controlled and versioned
- Defined SCM activities are consistent with documented procedures
- Updates are approved and traceable
- Distribution and access controls are enforced

Audit findings related to the SCMP are documented and addressed through corrective actions when necessary.

Approval

Prepared by: SCM Coordinator

Approved by: Project Team

Version: v1.0

Date: dec 7, 2025