# [3. MANAGING TRANSITIONS BETWEEN CONSTRUCTION COMPLETION, PRECOMMISSIONING, COMMISSIONING, AND START-UP (SP333-1)](https://www.construction-institute.org/managing-transitions-between-construction-completion-pre-commissioning-commissioning-and-startup)

**Report Summary:** Several prior studies indicate that commissioning failures are too common in frequency and extremely costly in impact. The business case for action is clear, yet the transitions between construction/pre-commissioning/commissioning/startup/close-out (abbreviated CCSU in this publication, emphasizing the construction component) remain challenging for many reasons. This is primarily due to contractual separations and the multitude of organizational interfaces and handoffs during CCSU.

Achieving project and commissioning success requires a solid understanding of the CCSU activities to be undertaken and the associated responsibility assignments. CII created Research Team 333 (RT-333), Transition Management between Construction Completion, Pre-Commissioning, Commissioning, and Start-Up, and challenged it to provide answers to the essential question: How can the industry establish or clarify the accountabilities and responsibilities among construction completion, pre-commissioning, commissioning, and operations functions?

In response to this essential question, RT-333 developed a 17-step implementation process that integrates the key findings from all three CII research teams that have addressed commissioning: [RS121-1](https://www.construction-institute.org/planning-for-startup-overview-of-research), Planning for Start-Up; [RS312-1](https://www.construction-institute.org/critical-success-factors-for-project-commissioning-and-startup), Best Practices for Commissioning and Start-Up; and [SP333-1](https://www.construction-institute.org/managing-transitions-between-construction-completion-pre-commissioning-commissioning-and-startup) itself.

The [SP333-1](https://www.construction-institute.org/managing-transitions-between-construction-completion-pre-commissioning-commissioning-and-startup) research developed four important deliverables:

1. CCSU Activity Flowchart – a flowchart of 124 CCSU activities, organized by relevant project phase and four thematic categories.

2. CCSU Responsible, Accountable, Consulted, and Informed (RACI) Matrix – builds on the CCSU activity flowchart, defining whether each activity’s manager is Responsible, is

Accountable, should be Consulted, or should be Informed.

3. CCSU Hot Spots – insight into the challenges of CCSU transitions by identifying 20 “hot spots”

4. Heidelberg Spar Case Study – an illustrative case study to demonstrate the substantial value that results from timely and effective mitigation efforts for targeted (i.e., project-specific) CCSU hot spots.

**Key Takeaways:**

## (1) Demonstrate that frequent, costly commissioning/start-up failures make a clear business case for action.

## (Project Phase: Construction through Turnover)

* Quantify commissioning and start-up (CSU) costs by tracking cost overruns and documenting cases of costly delays.
* Pinpoint production losses by calculating the daily revenue impacts caused by start-up delays, emphasizing industry examples.
* Assess the impact of incomplete transitions by examining commissioning ‘hot spots’ that lead to delays and additional costs.
* Present documented industry case studies that illustrate failures and cost overruns in similar projects to validate the necessity of intervention.
* Advocate for preventive planning by outlining critical success factors (CSFs) that mitigate delays and improve project outcomes.

## (2) Ensure smooth transitions across phases by clarifying activities and responsibilities, as organizational handoffs pose significant challenges to project and commissioning success.

## (Project Phase: Construction through Turnover)

* Conduct early alignment meetings with construction, commissioning, and operations teams to agree on roles and transition plans​.
* Define and document system boundaries and priorities for the phase transitions in the project’s initial planning stages​.
* Assign clear responsibilities and accountability for each phase using a RACI (responsible, accountable, consulted, and informed) responsibility matrix to prevent role ambiguity.
* Establish and review transition plans periodically to ensure alignment and to address any changes in personnel or project requirements​.
* Integrate contract provisions that promote timely system turnover and reinforce responsibility for critical tasks.

## (3) Integrate the 17-step Construction CSU (CCSU) process by combining key insights from CII Research Teams 121, 312, and 333 on commissioning.

## (Project Phase: Construction through Turnover)

* Identify CSU requirements early in the project planning stage to ensure readiness across all phases.
* Use the [SP333-1](https://www.construction-institute.org/managing-transitions-between-construction-completion-pre-commissioning-commissioning-and-startup) CCSU flowchart to map critical activities and establish timelines​​.
* Apply [RS312-1](https://www.construction-institute.org/critical-success-factors-for-project-commissioning-and-startup)’s CSU CSFs to guide team alignment and accountability​.
* Establish a RACI responsibility matrix for each activity to clarify roles and ensure efficient handovers​.
* Conduct periodic reviews of the CSU budget and schedule to address any emerging hot spots proactively.

## (4) Organize a flowchart of 124 activities by project phase and four thematic swim-lanes.

## (Project Phase: Construction through Turnover)

* Sequence activities by project phase, covering construction, precommissioning, commissioning, start-up, and close-out, to facilitate smooth phase transitions.
* Divide activities into four swim-lanes, i.e., planning/scheduling, materials/equipment, subsystems/systems, and data/documentation, to enhance task organization.
* Label activities as early, mid, or late within each phase to guide resource planning and execution timing.
* Highlight critical hot spot activities that commonly have challenges, and ensure that teams prioritize these areas.
* Use the flowchart as a central reference in planning meetings to align team roles and responsibilities across phases.

## (5) Map the CCSU RACI responsibility matrix for 124 activities across 60 functions, assigning key responsibilities as a foundation for project-specific management discussions.

## (Project Phase: Construction through Turnover)

* Identify critical CCSU activities and assign responsibility to the relevant project functions based on the RACI responsibility matrix.
* Collaborate with team leaders to clarify the RACI roles, i.e., accountable, responsible, consulted, and informed, for each activity.
* Review and adjust the initial RACI assignments to ensure alignment with project-specific objectives and requirements.
* Use the RACI responsibility matrix as a foundational tool in project kickoff meetings to establish clear responsibilities​.
* Periodically audit the RACI responsibility matrix to address any role ambiguity and to adapt to project changes​.

## (6) Identify hot spots to highlight CCSU transition challenges, including unclear responsibilities, recurring issues, and unmet expectations in key activities.

## (Project Phase: Commissioning and Start-Up through Turnover)

* Review key activities to spot recurring issues that delay phase transitions and increase project costs​.
* Analyze past projects for unmet expectations and poorly defined responsibilities to enhance current planning​.
* Identify ambiguities in role assignments and clarify them to prevent responsibility overlaps or gaps​.
* Flag high-risk activities in the CCSU process that commonly result in delays, cost increases, or safety risks​.
* Develop targeted mitigation strategies for each hot spot based on identified causal factors​​.

## (7) Highlight 20 CCSU hot spots identified by 49 managers, with 75% in the construction phase, underscoring the need for increased project team oversight.

## (Project Phase: Commissioning and Start-Up through Turnover)

* Focus project team oversight on the construction phase to address the 75% of hot spots that managers identified in that phase.
* Prioritize high-risk activities flagged as hot spots to minimize delays and control project costs​.
* Clarify roles and responsibilities to address each hot spot and thus reduce ambiguity and enhance accountability.
* Implement regular audits of hot spots to ensure that issues are promptly addressed during the construction phase​​.
* Use insights from the 49 managers to refine strategies for preventing recurring issues across projects​​.

## (8) Characterize each of the 20 hot spots across 10 fields, and include the impacts, causes, and mitigation strategies supported by trend analysis results.

## (Project Phase: Commissioning and Start-Up through Turnover)

* Document qualitative impacts, such as schedule delays and cost increases, for each hot spot to identify recurring project challenges.
* Identify causal factors, such as role ambiguity and staffing issues, to address the underlying reasons for recurring hot spots​.
* Outline prevention and mitigation strategies that are tailored to each hot spot to improve project continuity and reduce risks.
* Conduct trend analysis across hot spots to uncover patterns in the challenges and to develop standardized mitigation approaches​​.
* Use these characterizations as a basis for informed decision-making and team discussions about risk reduction and process improvement​​​.

## (9) Cross-link the hot spots with the 16 CSU CSFs presented in [RS312-1](https://www.construction-institute.org/critical-success-factors-for-project-commissioning-and-startup), emphasizing the importance of alignment, execution planning, and check sheet factors.

## (Project Phase: Commissioning and Start-Up through Turnover)

* Align project teams with commissioning goals by reviewing CSU execution plans and securing cross-functional sign-offs.
* Integrate detailed CSU execution plans to provide a structured approach for effectively managing hot spots​.
* Define and implement comprehensive check sheets for critical activities to ensure thorough documentation and accountability.
* Conduct regular alignment meetings across the owner, project management, operations, CSU, engineering, and construction teams to reinforce team cohesion.
* Conduct trend analysis of past hot spots to proactively adjust execution strategies and improve project oversight​.