CCB – An Acronym for "Chocolate Chip Brownies"?
A Tutorial on Control Boards

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This article reviews the basic concepts of control boards. It answers the questions, What is a change board? When is a change board needed? How is a change board established and run? What is the role of a change board in the software development lifecycle?

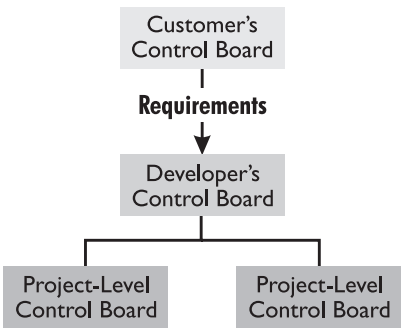
HAVE YOU NOTICED the variety of names given that institution known as the CCB? Configuration Control Board, Change Review Board, Change Implementation Board, and Software Configuration Control Board are popular names. It does not take a great deal of imagination to come up with other possible definitions for CCB. The lack of a universal definition contributes to the confusion that sometime surrounds this critical part of any serious attempt at software configuration management (CM).

Control Board Defined

For the purposes of this article, the term "control board" will refer to a body that provides the means to implement change control at optimum levels of authority. This hierarchical approach is shown in Figure 1.

As shown in Table 1, there are two types of change board: Those that make business decisions and those that make technical decisions. In light of these distinctions, the myriad names mentioned in the first paragraph need to be further examined. Table 2 shows that to know the name of a change board is not enough to know what type of board it is. An "SCCB" may be a business decision change board or a technical decision change board, depending on the organization that chose the name.

Figure 1. *Levels of authority.*



Example Scenario

The two types of boards work together. Consider, for example, how a change request to ensure that system XYZ is year 2000 (Y2K)-compliant would be processed.

The business decision change board authorizes someone to do a preliminary analysis that includes a rough order-of-magnitude cost estimate to implement the change as well as a finding on its technical feasibility. Based on the preliminary analysis, that same change board considers the risks and benefits of implementing, deferring, or ignoring the change request. They consider implementation cost, available resources, and political implications.

If the business decision control board decides to proceed with implementation of the change, a project is initiated to do so. As the project proceeds, Y2K issues and proposed solutions are documented as change requests. These change requests generally do not need the consideration of the business decision control board but rather the technical decision control board, which deals with issues such as how many bytes to use and what type of date representation is appropriate. The sidebar "Sample Control Board Meeting Discussions" on the next page compares conversations in each type of board meeting.

Business Decisions	• Cost. • Schedule. • Function for the whole system.
Technical Decisions	• Specific schedules for partial functions. • Interim delivery dates. • Common data structures. • Design changes.

Table 1. *Decision types [1].*

When to Establish Control Boards

As a project manager of software developers, how do you know if you need to establish control boards? You can answer this question by determining if the manager's near-term project issues in the following example sound familiar. (These issues pertain to a system that has been released and used by customers for six weeks.)

- Get all problems documented in the problem-tracking tool (all problems need to be identified and described).
- Deal with George having quit last week. He was the technical lead for design to deal with technology issues of implementation (Sybase, printing, etc.) Bill and Callie also have quit from the stress of producing almost daily releases in response to customer change requests. There is no documentation of the things George did, so he left a big hole in our staff.

	Institute of Electrical and Electronics Engineers STD 1042-1987	Software Engineering Institute Capability Maturity Model	Institute of Configuration Management [2]	Anonymous software development organization
Boards that make *business* decisions regarding proposed changes.	CCB (Configuration Control Board)	SCCB (Software Configuration Control Board)	CRB (Change Review Board)	SCCB (Software Configuration Control Board)
Boards that make *technical* decisions regarding proposed changes.	SCCB (Software Configuration Control Board)	Software Engineering Group	CIB (Change Implementation Board)	SCRB (Software Change Request Board)

Table 2. *Examples of names for control boards.*

- After seven batch jobs are run successfully at customer sites A and B, configure everything under the version control tool.
- Document and describe all interfaces in the next three months (we have a list of the interfaces).

On a project with functioning control boards, these issues would be less likely to surface because control boards

- Ensure that all problems are documented.
- Authorize releases in a controlled fashion based on schedule and cost considerations.
- Establish controlled baselines.
- Ensure that interfaces are documented and controlled.

Establishing and Running a Control Board

Following are three steps to establish and run a control board.

Write a Charter

The charter should describe the board's objectives, scope, membership, roles and responsibilities of members, reporting and approval process (including standard and emergency changes), meeting frequency, and relationship to other boards. Many organizations have a process to review charters to avoid duplication of effort across control boards. For a sample of a control board charter, E-mail a description of your project to me (address at end of article).

Sample Control Board Meeting Discussions

Business Decision Control Board Meeting

Secretariat: Our first agenda item is EX-01, "MIRS Location Codes Addition."

Chairman: Has anyone not reviewed the data package? (Pause.) This is a major requirements change. We are 18 months into development with established functional and allocated baselines. We are on schedule to field the system in six months. As you know, tank maintenance will begin at least two months before delivery. Sally, what is your position?

Software Project Manager: I agree with the estimate of a three-month schedule slip. This change is clearly out of scope, based on the existing requirements baseline. I support funding this as part of a future release rather than slip the schedule.

User Representative: The problem with incorporating the change in a future release is that the new location data will have to be tracked manually in the interim. Despite that, we would rather have the system delivered on schedule so we can eliminate the workload of manually tracking all the data except the location codes.

Chairman: And Gen. Given has repeatedly stated publically that the system will be available in June. We are going to defer this change for a future release.

Technical Decision Control Board Meeting

Secretariat: The next change request on the agenda is No. 19, named "Restructure Shipments Table to Eliminate Data Redundancy."

Database Representative: I have reviewed the data package and discussed it with the original designer. The Shipments Table as designed produces redundant data. The current design violates basic relational database design principles. This design will cause serious data maintenance problems. The solution outlined in the change request to create separate Shipment and Supplier Tables is correct. We need to make this change.

Graphical User Interface Analyst: The changes to the graphical user interface are manageable. We agree with the estimates in the change request and agree with making the change.

Chairman: When can the change be made, tested, and moved to the development library?

Database Representative: By the fifteenth, if we start on Monday.

Chairman: The change request stands approved. Begin implementation Monday.

Chairman	Secretariat
Follow the charter.	Generate the agenda.
Convene regular meetings.	Distribute the data package.
Prioritize agenda items.	Take and distribute minutes.
Conduct the meeting.	Reserve the meeting room.
If members are not prepared, adjourn the meeting.	
Strive for consensus on change request decisions.[1]	

Table 3. *Responsibilities of the chairman and the secretariat.*

Follow the Charter

The chairman convenes and runs the board. For the business decision control board, the chairman is usually the person who controls the money or other resources; for the technical decision control board, it is the project manager. The chairman and secretariat are the key roles on a control board. Their specific responsibilities are listed in Table 3.

The use of consensus varies between authoritative boards and voting boards. Authoritative boards are governed exclusively by the chairman, who listens to the members and then makes a decision. In a voting board process, changes that fail to receive consensus are deferred possibly many times in an attempt to achieve consensus later. The responsibilities of all members of the board are listed in Table 4.

Reach a Decision

For each change request, the board must approve and assign priority, defer for later consideration and possible inclusion with other changes, refer to a higher authority board, or reject.

Five Principles That Govern Control Boards

I have already discussed the first two principals:

- Business decision control boards make business decisions.
- Technical decision control boards make technical decisions.

The final three principles are as follows:

Use Control Boards Throughout the Lifecycle (Principle 3)

Control boards are required to fully implement these four CM processes throughout the software lifecycle.

- Configuration identification – Identify executables, databases, source files, and procedures to be controlled.
- Configuration change control – Control the identified items so that only authorized changes are made.
- Configuration status accounting – Provide management and practitioners "snapshots" of the state of the identified items and associated change requests.
- Configuration audits – Compare the results with original plans.

Table 4. *Responsibilities of all control board members.*

Before the Meeting
• Review the data package.
• Communicate with other members of the board regarding the change.
At the Meeting
• Represent their organization or group.
• Express and coordinate their organization's or group's viewpoints.

Control the Baseline(s) (Principle 4)

Each board establishes the baseline that corresponds to its authority.

- Functional baseline – Can be established when requirements are agreed on by the customer and the developer, usually at the system design review (SDR). The customer *business decision control board* considers the results of the SDR before authorizing the baseline.
- Allocated baseline – Can be established when requirements have been assigned or allocated to software subsystems, hardware, or manual procedures. The developer *business decision control board* considers the results of the software requirements review before authorizing the baseline.
- Developmental baseline – Can be established during implementation when the *technical decision control board*[2] so authorizes. For example, such baselines can be established at various points during informal testing.
- Product baseline – Can be established when the functional configuration audit and physical configuration audit is complete. The customer and developer business decision control boards consider the results of the audits before authorizing the baseline.

Establish Process for Multiple-Project Decisions (Principle 5)

Refer changes involving multiple projects to a higher board. Consider this example: A technical decision control board considers the following change request.

> The "designator" field in the inventory control system allows for only eight planning shops. One of the user sites of the system has assigned all eight planning shops. They need to add a ninth planning shop. The material shipping system also uses the designator field.

The technical decision control board would be correct to refer the change request to a higher authority board because multiple systems will be impacted by changing the designator field.[3]

Summary

Though they bear many names, there are only two types of control boards: Those that make business decisions and those that make technical decisions. Established control boards have a charter that describes their purpose and procedures. Effective control boards can simplify the role of the software project manager and improve the work environment of the practitioner. To do so, the boards must be used throughout the software lifecycle in conjunction with fundamental CM processes. ◆

About the Author

Reed Sorensen is on the technical staff at TRW and is currently working under contract to the Software Technology Support Center. He has over 20 years experience developing and maintaining software and documentation of embedded and management information systems, providing systems engineering and technical assistance to program offices, and consulting with many Department of Defense organizations regarding their software configuration management and documentation needs. He has published articles in *CROSSTALK* on various software-related subjects.

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References

1. IEEE Guide to Software Configuration Management, IEEE-STD-1042-1987.
2. Institute of Configuration Management at Arizona State University.

Notes

1. This means general agreement, not unanimous agreement.
2. If the developmental baseline in question includes changes that affect multiple projects, a higher authority will be needed.
3. The higher board would probably be a business decision control board that could authorize analysis of this interface issue.

Configuration Management Web Sites

Yahoo configuration management (CM) links
http://www.yahoo.com/Computers_and_Internet/Software/Programming_Tools/Software_Engineering/Configuration_Management

Software Technology Support Center (STSC) home page
http://www.stsc.hill.af.mil

CM Yellow Pages (provided by André van der Hoek)
http://www.cs.colorado.edu/users/andre/configuration_management.html

Brad Appleton's home page and CM links
http://www.enteract.com/~bradapp

Software Engineering Institute CM home page
http://www.sei.cmu.edu/legacy/scm/scmHomePage.html

CM frequently asked questions from the Usenet CM group
http://www.iac.honeywell.com/Pub/Tech/CM/CMFAQ.html

CM Bibliography
http://liinwww.ira.uka.de/bibliography/SE/scm.html

A Software Engineering Resource List for CM
http://wwwsel.iit.nrc.ca/favs/CMfavs.html

Other Web Sites of Interest

CROSSTALK
http://www.stsc.hill.af.mil/CrossTalk/crostalk.html

Association for Configuration and Data Management
http://www.acdm.org

Government Electronic Industries Association
http://www.geia.org

Managing Standards home page
http://www.airtime.co.uk/users/wysywig/wysywig.htm

Data Interchange Standards Association
http://www.disa.org

International Organization for Standardization
http://www.iso.ch/welcome.html

Software Productivity Research
http://www.spr.com

Official Department of Defense Single Stock Point
http://www.dodssp.daps.mil