



CMTrends

News and Perspectives for CM Professionals

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July 2016
ISSUE 24

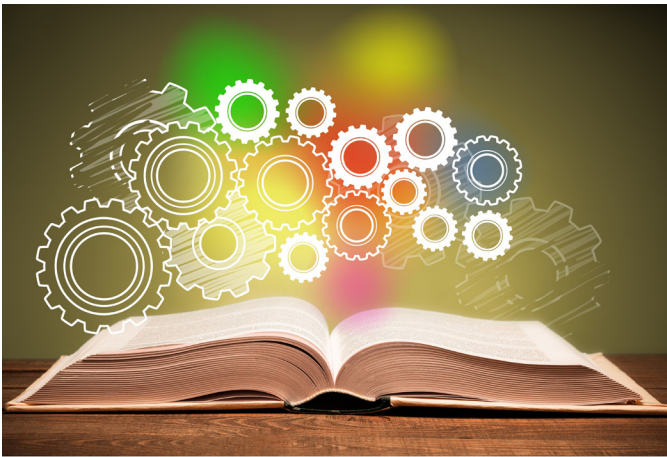
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Key to Establishing and Managing Configuration Items & Baselines

Throughout System Engineering Lifecycle

by **Nicholas Freije, Laura Hooker, & Lisa July**

SPAWAR System Center Pacific & J2E Technology, LLC



Too often Project Managers (PMs) believe if they write a high level Configuration Management Plan and charter a Configuration Control Board (CCB) to manage changes, they are meeting the requirements for Configuration Management. However, when questioned about their Configuration Items (CIs) or current baseline, the PMs are unable to provide accurate information without significant work on the part of the CM Manager. This is because they did not take the time to properly select their CIs.

If EIA-649-1 tells us that CIs are the basis from which all other CM activities occur, and a baseline is established by agreeing to the definition of the attributes of a product at a point in time, why are projects skipping this critical step or incorrectly establishing CIs when implementing their CM process?

What is a Configuration Item?

First, let's clarify the definition of a CI. Per GEIA-Handbook-649A (GEIA-HB-649A), a CI is "hardware or software, or an aggregation of both, that satisfies an end use function and is designated for separate configuration management."

It is important to note that while the configuration documents describing a CI are controlled as part of the data management process, they are not considered CIs.

The Process

The selection of configuration items is a repetitive process that continues throughout the product's lifecycle – from System Requirements & Design, through Project Closeout.

Entrance Criteria

A Project enters the Configuration Item Selection process when entering a new phase of the project lifecycle (i.e. establishing Functional, Allocated, Initial Product, and Product baselines); or when a new requirement has been approved that will require hardware and/or software additions to the established baseline.

Process Participants

While the CM Manager facilitates the CI selection process,

it is imperative that the Project Leads for each functional area provide recommended items for selection. These leads also participate in the discussions to determine CIs, their associated artifacts, and develop the product's CI Structure/Hierarchy.

When a complete CI proposal package is available, the CCB is responsible for approving the CI to include in the upcoming baseline as well as the associated CI describing documentation.

Step 1 – Establish a Configuration Identification Selection Criteria

The key to effective configuration identification is having your CCB develop common selection criteria to consistently evaluate each part of your product. Below is a list of example questions on the Selection Criteria:

- Is it safety critical?
- Is it Mission Critical?
- Is independent testing required?
- Is interface control required?
- Does the component provide an end use function?
- Is it a critical Cyber Security or Information Assurance item?

A list of assessment questions can be found in GEIA-HB-649A to help get started.

By providing this tool, your project will be able to find the correct level of management required for your product structure.

Step 2 – Initiate Configuration Item Selection

When a new phase starts in the project's lifecycle, the CM Manager sends out a notification to the project team's functional area leads requesting their list of recommended systems, subsystems, assemblies, hardware and software components to be proposed as CIs. This notification can be initiated through the project's Configuration Management System (CMS) or via email, whichever works best for the project team.



Step 3 – Identify Specific Project Related Items That Require Configuration Control

The Leads work with their teams to determine the recommended CIs for their functional area. Depending on the size and complexity of the project, this may require a Project CI workshop. This information is returned to the CM Manager for consolidation. The end result is a complete, cross functional listing of items that need to be evaluated for possible CIs.

Step 4 - Selecting the Recommended Configuration Items

In order to select the correct level of control for your project, the Project Manager, CM Manager, and functional area leads will evaluate each recommended item using the CI Selection Criteria that was developed in Step 1. Once a "Yes" answer occurs, that item is now a CI and the team can move to the next recommended item. This exercise will give your team knowledge of what is important within your product at the specific point in the lifecycle.

Step 5 – Develop the Configuration Documentation Needed to Describe CIs

The Project Leads determine the Product Configuration Information (PCI) that needs to be developed in order to describe the performance, functional/physical attributes,



and support of each recommended CI. This includes:

- Product Definition Information
- Product Operational Information
- Associated Information

A detailed list of PCI can be found in GEIA-HB-649A.

The team then assigns a single person to be the Current Document Control Authority (CDCA) to each piece of information that will be created for the baseline. After this is completed you will have a single person assigned to initiate of piece of PCI required for your baseline.

Step 6 – Develop the CI Structure / Hierarchy

The Lead Engineer and Project Manager will use the functional and physical composition to arrange the recommended CIs and PCI in a hierarchical manner that will show the relationships among the various parts and the interfacing elements that make up the target product.

Step 7 – CI Listing Review / Approval

The CM Manager presents the list of recommended Configuration Items, associated PCI, and hierarchal structure to the CCB for assessment. The CCB reviews each item individually to establish the CIs applicable to the next upcoming baseline. If approved, the CCB assigns a CI Owner. Items not approved by CCB will not be CIs at this time; however, their reconsideration may come with the next baseline.

Step 8 – Enter CI Data into CMS

The CM Manager enters the CI data into the approved CMS, where each CI is assigned a unique identifier IAW the approved CI Numbering System in the project CMP. By entering this information into the system early in the process you will be able to track the development progress of your baseline CIs and PCI data.

Step 9 - Collect the CI Information for the Baseline

One of the most grueling tasks for a project is to collect the CIs and PCI data for a baseline. By following the steps 1-8 above when it is time to release the baseline, the CM Manager can simply run a Preliminary Baseline Report to ensure that the approved CIs and PCI are released in the CMS and available for the verification team. For items not yet released, the CM Manager works with the CI owners to ensure all CIs and PCI are on track for completion before the upcoming verification event.

Step 10 – Baseline Verification

The Verification Team conducts a technical review of all CIs and PCI to ensure product requirements have been met. The verification team also determines if all CIs and PCI are in a released status and verify all actions from the previous reviews or audits are complete.

The verification team documents all necessary actions in the Baseline Verification Report and forwards it, with the Preliminary Baseline Report, to the CM Manager.



The CM Manager works with the appropriate project members to close any actions identified during the verification process, and then produces a Final Baseline Report to include a list of all open actions against the baseline.

Step 11 – CCB Baseline Decision

The CM Manager presents the recommended baseline package which will consist of the approved CI Listing, Product Hierarchy, list of all required PCI, the Final Baseline Report, the Baseline Verification Report, and a report of any open action items to the CCB for assessment. At the conclusion of the CCB meeting, the baseline is approved, deferred, or sent back for rework.

If Approved - the CM Manager publishes the baseline and marks all CI and PCI information listed in the Baseline Report accordingly. Formal change control is required for all CIs from this point forward.

For Rework - the CCB assigns the action items necessary to finalize the baseline. The CM Manager tracks the action items until they are closed and reconvenes the CCB to establish the baseline.

If Deferred – the CM Manager does NOT publish the baseline, all baseline CIs will be marked appropriately and deferred until the time established by the CCB.

What Does This Give Us?

By following this process, the project's CM program will be built on a solid foundation which is essential for all other configuration management activities. The project will have determined;

- CIs at the appropriate level
- the types of PCI required
- the appropriate level of control for each CI and PCI

But most importantly, the PM will be able to provide an approved baseline with CIs that have been selected in a consistent manner and identify the impact of recommended changes to the performance envelope.

Mr. Freije began working for Space and Naval Warfare System Command in 2000 serving as the Chief Engineer for the Automated Digital Network System. By 2008 he was promoted to the Consolidate Afloat Network and Enterprise Services Technical Director in charge the definition and technical execution of the ~\$4B program. In 2010 Mr. Freije transitioned to become the SPAWAR Pacific Networks, Communications and Information LSE. Mr. Freije's personal awards include the Meritorious Unit Accommodation and various Naval Special Act Awards. In 2009 Mr. Freije was awarded the 2009 Top Navy Scientists and Engineers of the Year Award. Mr. Freije's latest award is the DON 2014 Acquisition Workforce Individual Achievement Award for his leadership on the NGEN contract.

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LISA JULY

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“Why is the Windshield of Your Car Larger than Your Rear View Mirror?”

by Mike Treadwell, Northrup Grumman

“Establishing and Managing Configuration Items and Baselines throughout the System Engineering Lifecycle”

by Nick Freije, SPAWAR System Center Pacific

“Balancing Configuration Management: Example of Responsive CM in a Lab Environment”

by Mitch Kaarlela, Lockheed Martin

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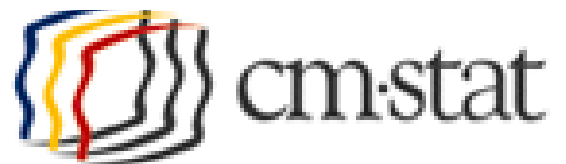
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The Wichita Lineman

Life on the Grid and the True Power of CM

by **Rick St. Germain**
CMPIC Canada

You've watched them work, right? Evidently, I live under a rock because I haven't really. Oh sure, I've seen them in passing but never paid them much attention — another of those invisibles we blissfully ignore as we stumble along in the daily grind. But this one caught my eye.

I was stopped at a busy intersection waiting for the light to change when I noticed the Hydro truck — you know, the kind with a hydraulic boom arm and an insulated basket on the end that lifts the operator up to service the electrical equipment overhead. This crew was stringing wire onto power poles lining the street. Fascinated, I watched the lineman use an attachment on his boom arm basket to hook a newly strung wire and raise it onto an insulated connector. He was using that basket not as a mere positioning platform but as a working tool.

That realization set off a cascade of thoughts about power grids, unchecked suburban growth and the dedication of people like that guy in the basket to keep our lights on.

As I watched him work, the lyrics of Glenn Campbell's 1968 hit, *The Wichita Lineman*, filtered into my head:

*I am a lineman for the county
And I drive the main road
Searchin' in the sun for another overload...*



Uh oh. I recognized that voice — my inner Muse back to harass me with yet another lesson in CM.

“What do you want?”, I asked dryly. “Better make it quick, the light’s about to change.”

“Is that how you greet an old friend?”

“I’m trying to get to work and I don’t want to get pulled over for distracted driving.”

Ignoring me, he continued, “See that lineman over there? Do you realize what he’s doing?”

Sensing a trap, I played dumb. “Um, stringing wire?”

“No. He’s doubling the power line capacity to service those new housing developments down the road. The power cable is the means to do that.”

Glancing impatiently at the “stale red” signal, I continued, “And your point is?”

“That cable delivers the power.”

Power Cable

I rolled my eyes and sighed heavily. “Obviously. Any other profound revelations I need to know before I order my morning coffee?”

Brushing aside my sarcasm, he continued, “Half-inch ACSR power cable: Aluminum Conductor Steel Reinforced. Strong, light weight, rated for 2400 volts.”

“Why are you telling me this at a traffic light?”

“Because that cable powers everything in the area, even that light. Just like CM.”

I perked up. “You’ve got my attention.”

“If you look at that cable’s structure, you’ll see six



aluminum strands surrounding a steel core — very similar to your CM environment.”

“Oh?”

“Yes. That central steel core provides strength. In your world it’s People — they generate the knowledge, do the work, interact with the environment, the tools and each other.”

“Okay, I get that. What about the other strands?”

“The outer strands support the core. Process guides people in repeatable behaviour to achieve a desired outcome — the products and services they sell. Process, in turn, is supported by an infrastructure of Technology and Applications designed to handle the complexity and volume of information, complementing human strengths in pattern recognition and decision making.”

“Wonderful. So what about information?”

“Glad you asked. Information generated by people and apps is stored in a variety of Work Products like documents, reports, models, even product elements. Corporate Business Context and Regulatory Context serve to constrain and guide work towards the intended purpose. Like the power line, the outer strands reinforce and

support that core — the capability of people who do the work and contribute to the outcome.”

“Interesting model, but you haven’t answered my question. You’ve told me who generates information, what they use to get it and where they store it, but I don’t see anywhere in this model any representation about of the information itself. What good is all this structure if it doesn’t deal with information, huh, tell me that?”

He yorped with delight. “Very good, son. There’s hope for you yet.”

“A power cable is structured to carry power — high voltage and current — channelling it to consumers. Same thing with CM but there, information is the power. It flows through that structure like current. Information capacity is dependent on the soundness of that structure. Any weakness in the supporting elements will restrict information flow and impact the capability of people to do their work. And that generates resistance and heat.”

Whoa. Didn’t see that one coming. A whole new perspective opened up in my mind, and more questions. As I frantically tried to formulate the next question, that damned music started up again and he continued his song:

*I can hear you singin’ in the wire
I can hear you through the whine
And the Wichita Lineman is still on the line....*

Then the light turned green.



Rick St. Germain is a CM researcher, consultant, trainer, and coach with over 30 years experience in implementing military and commercial CM processes for both hardware and software. He is President and Managing Director of Nouvella Consulting Services based in Ottawa, Canada, and is Chief of Canadian Operations for CMPIC Canada. He can be reached at rstgermain@rogers.com

RICK ST. GERMAIN

The Very Nature of Things

Conservation and CM



by **Kim Robertson**
Value Transformation LLC

SNESCM

A small contingent from Genesis Test Equipment consisting of Mike Tarquist – CEO, Sangita Morales – Director CM, Samantha Vandonagan – Director Contracts and Peter Dobbs – Director Supply Chain arrived in Copenhagen for the Twelfth Scandinavian SCM day. He was greeted by several of the SNESCM members during the coffee and registration session outside the lecture hall as they studied the discussion topics.

Of particular interest to Sangita was the keynote address by Kristian Ellebæk Kjær, A Day in the Life of a Project Manager. CM at Genesis included HW CM, SW CM, IT and SW tool development. The loss of Fred Keating due to ITAR violations meant that she was pulling double duty as Genesis had yet to hire a replacement.

During lunch she was delighted to find herself confronted by a set of bushy eyebrows jutting over a set of glasses and a broad smile.

“Hello Sangita,” Akio Akiyama said. “I noticed you near the front at the keynote address and at the following two sessions. Good choices.”

Sangita beamed. Akio had been her mentor before moving on to Mitsikara. “I thought so as well. Why aren’t you presenting?”

“I’m a student at events like these,” he replied. “There

is always so much more to learn.”

“Yes,” she sighed. “Like the concern over the possibility of q-bits breaking through standard protection algorithms designed to protect sensitive data. One more reason to find a replacement for Fred Keating ASAP”

Akio took off his glasses and looked down as he polished them. “I know someone who can help you there. We should all get together after the sessions are complete and have dinner at “Frederiks Have.” It’s not too far from the center of Copenhagen at Smallegade 41, Frederiksberg and I have reservations at 6:30. How many are with you?”

“Mike, Sam, Peter and myself”

Akio was already having a conversation with the restaurant, “Hello? Yes I have reservations for 2 for tonight and was wondering if we can expand that to 6? Yes I’ll hold.”

“They are verifying.” He told Sangita.

“Ole can accommodate our larger group? Thank you very much ... we look forward to dining with you again!”

“Well I’m off to one of the Open Sessions,” Akio smiled. “Tell the others ... the dress code is something known as smart casual.”

The group from Genesis left the Fasanvej metro and made their way to the restaurant. They found Akio sitting next to a slim dark haired olive skinned woman in her late 20's.

Akio stood as they approached, "Allow me to introduce Katharine Xavier a native of Navarra. She is an IT expert and was recently involved with an archeological dig and site preservation project in Utah."

As the evening progressed Katharine told them that after gaining her PhD she had trouble finding work in Spain and decided to take a year off participating in an Archeological dig of a Native American site in the Uintah-Ouray area. That work was now complete and it had been much more involved than it appeared at the beginning.

The Very Nature of Things

"Information Technology to archeology to site conservation at first glance may appear to be unrelated," she said in a soft voice. "It is not. Many of you attended Sofus Albertsen's, Traceability in a Heterogenous Software Development Lifecycle. The premise that as the lifecycle gets more and more complex, the traceability between the different artifacts is increasingly hard to obtain efficiently, making creation and alternation of a pipeline difficult. This premise is not unique to the Software Development Lifecycle alone. It the very nature of things and how you look at them."

Peter Dobbs chimed in, "That is exactly what Sam and I were discussing at lunch. The inter-relationship of a contract extends beyond the words on the pages, what we call the four corners of the contract. It includes the referenced documentation and citations down to the lowest level."

"Perhaps that world view is too limited," Katharine laughed.

"In what way," queried Sam?

"Let's look at each aspect of the project I was working on and perhaps it will be made clearer. You've heard of



the terms Knowns, Known Unknowns and Unknown Unknowns? The archeological dig was a good case of the first two and the return of the site to its pre-western expansion condition is a good case of the third.

Archology has improved a great deal since the days when people would cut a trench directly through a site and study only those items thought fit to display in a museum. These days we start with obtaining as detailed geophysical profile of the site as we can. By using magnetics, ground penetrating radar and other methods."

"Like on Time Team", asked Sam?

Exactly... all of this information is correlated with current and historical maps of the location, deeds, surveys, and historical traditions. Only then can you start to plan the excavation.

In the case of our dig artifacts had turned up on the surface from time to time in the area and we believed them to be from the Ute tribe. The Geophysics was a jumble. Much of the site content had been turned over deep into the resident archeology itself due to over deep plowing. We put in two trenches in the most promising locations and each was excavated by hand with extensive photo documentation. Finds were examined by those on the team for anything that could be dated prior to the first documented non-indigenous site influence; the Dominguez-Escalante Expedition of 1776."

"I'm with you so far," Mike said. "It is similar to what Alessandro Notte described in the session on SCM



vs. WorkItem. A near real-time KPI of the site itself involving the entire known and correlating it with the unknown's revealed by the dig itself."

Katharine nodded. "So let's look at the Unknown Unknowns associated with the returned of the site to its pre-western expansion condition. Prior to beginning the archeology the site had to be cleared of anything we knew to have been introduced since 1775. Burdock, hounds tongue, and teasel, all with a seed viability of 2-3 years, were laboriously cleared by hand as no chemical defoliation was allowed on the project. All visible evidence of refuse left by Europeans were removed for a separate study project. This was followed by endless weeding and watching as the dig proceeded. Unfortunately the seed viability of cheat grass and ragweed is 40 years and once the over-cover was removed these sprouted and grew with astounding vitality. We finally obtained permission to do a controlled burn in the area and replanted it with cuttings propagated to match Ute legends of the area."

"I'm not sure that I follow how all of this relates to my description of the contract being too narrow," Peter said.

"I think I do," Sangita chimed in. "As with poetry, archeology and legend once the obvious is stripped away other subtleties are found that were hidden from view. Your sub-surface archeology exposed an underlying layer of seed waiting to take advantage of a vacant biological niche. The fact that it was not looked for part of the dig did not negate the fact that it was there and it surfaced during restoration. What a grand lesson in CM as it relates to soil science and botanical tenacity. In a way the viability of seed types

is relatable to the viability of certain IT technologies and to even software licensing itself. Some are short lived and others go on for decades. Both are in the mix and must be managed."

"Yes," replied Katharine. "If you fail to recognize the non-obvious factors like workforce experience, infrastructure viability, cohesiveness of the project team, training to recognize how referenced documentation and citations relate to the individual performing the task you have not adequately captured the contractual implications. It is the same in IT, SW development and the world around us. Once you understand CM you find application of the management tool everywhere."

"What do your future plans look like," Mike asked?

"I was hoping you would tell me," Katharine smiled.

Akio chuckled, "Forgive me, I told Katharine this was an interview for the IT Manager position at Genesis."

"All right then," laughed Mike. "I should have known something was up ... just for the record what was your PhD thesis title?"

"Simulated IT infrastructure defenses in a multi node q-bit environment," she replied. "I'll be in Copenhagen a few more days if you wish to explore a possible fit between my talents and your company's needs. Right now I'd simply like to enjoy the good company I find myself with and this wonderful meal."



Kim Robertson is a NDIA Certified CM practitioner, consultant and trainer with over 30 years of experience in contracts, subcontracts, finance, systems engineering and configuration management. He has an advanced degree in operational management with a government contracts specialty and is the co-author of Configuration Management: Theory Practice and Application. He can be reached at Kim.Robertson@ValueTransform.com

VALUE TRANSFORMATION LLC

KIM ROBERTSON

Through the Looking Glass and into Wonderland

by **Leo Clark**
CMPIC LLC

Alice meets three playing cards who are furiously painting the white roses red.

They fear the wrath of the Queen of Hearts whose punishment is swift, sure, and irreversible.

Some mixup in inventory or procurement or production caused the wrong configuration. The logical and, too often, insidious answer is to inspect all of the roses and spend oodles of time, energy, and money to compensate for a process that delivers failure.

When organizations experience results that they neither expect nor like, management's reaction is swift and sure.

"Let's implement a new process step that inspects all output and have an expensive meeting discussing ways that we can alter the results to conform to our expectations."

Sometimes organizations do look up stream and change the process. Certainly planting red roses would be a better choice that painting the white roses red.

But the sad truth is that some inject an inspection rework loop into a process that is not worth



following in the first place.

Off with Their Heads!

Whether it is 20 reviewers for a 250 page specification or 100% code coverage for software test, the effort to "find and fix" is always too late, too hard and too expensive. But the inspection effort sometimes seems to pay off when errors or non-conformances are found. "See," you can hear management exclaim, "This is why we put another set of eyes on it. To catch the problems that our process delivers!"

And so, expensive, time consuming effort, usually conducted under duress, gets institutionalized to where people cannot imagine an alternative.

This topsy-turvy world, where priorities shift like playing card wickets on a Wonderland croquet game, where players are expected to use inadequate tools like so many flamingoes as mallets, where objectives wander off like hedgehog croquet balls, seems like a bad dream from which we may never awaken.

All the while, those in charge command "Off with Their Heads!" for any or all participants.

Through the Looking Glass

What is needed is a change of perspective. We need to see with different eyes at the reflection that is ultimately backwards. On the wrong side of the looking glass, we do things wrong and look for the most efficient way to correct it. To paraphrase Deming, when the house is on fire and you put out the fire, you have not improved the house. There should not be green-belt credit given for discovering a cheaper way to rework stuff that should have been wrong in the first place.

On the right side of the looking glass, we ask, "Why do we have a process that requires downstream correction?"

Unfortunately, some organizations' change management efforts are focused on the inspection-rework cycle. As a result, change itself is thought to be too slow, too expensive, and too difficult.



Management sometimes concludes that the fix is obvious. The answer is just as swift, sure, and irreversible as the Queen of Hearts conclusion, "No More Change!"

Leo is a former Marine from New York. He has implemented quality systems in over 250 factories on 5 continents. In the past 18 years, he has taught CM to over 1,000 organizations on 6 continents. Leo is a member of the American Society of Quality and the US Technical Advisory Group for Quality Management. He is a Technical Reviewer for Software Quality Professional magazine and one of the US Configuration Management experts to the ISO 10007 Technical Committee.



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