CMTrends

News and Perspectives for CM Professionals

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Measure for Measure

by Leo Clark
CMPIC LLC

Relating the configuration structure of measuring devices to the structure of the items that you create can improve product quality, provide opportunities for continuous improvement, and trace money spent on refining our measurement processes.

Metrology is a Configuration

A Configuration is defined by the documents that describe it. The Configuration structure, which models the parent-child relationships in a design, also help us to determine the number of documents necessary to achieve success.

There are 2 types of documents: design documents and process documents.

Design Documents, such as Bills of Material and 3D models, define the results we would like to realize. Process documents, such as Assembly Instructions and Machine Setup Instructions, provide the step-by-step recipes to produce a quality item.

One process document to consider is a Test Procedure. Using different measuring devices, we can assure that the work we performed achieves the results we desire.

This Metrology comes in many forms. We can use simple calipers and micrometers or advanced optical comparators and even coordinate measurement machines. Some organizations select random samples of items to subject to destructive testing to verify results and improve quality.

These test beds are themselves configurations that need

to be managed. Just like we construct Configuration Structures to define products, we need to define structures of our measuring device.

We can then authorize bringing the Measurement Structure into conformance before we use it to determine the results of our manufacture. Without confidence that the metrology is what it should be, we are basing our quality determination by using a rubber yardstick. That is never good.

Even simple hand measuring devices may need to be connected to a transducer that sends data to a computer with a Statistical Process Control file installed. A compliant test bed would have the right tool, the right connectors, the right file, and the right measurement selected. All of this process needs to be determined, defined, and disseminated so that measure occurs correctly everywhere, every time.

To make sure that this happens, we need to relate the configuration structure of the item to the configuration

structure of the measurement device. That way, we can perform more comprehensive impact analysis when design or process information changes.

Repeatability and Reliability

Some metrology needs on-going calibration to maintain its accuracy. Even if the measuring device does not "drift", routine scheduled calibration provides confidence to customers and auditors that our processes are world class. Calibration, like any work in the enterprise, should be scheduled through the ERP procurement and production scheduling functionality. Evidence of work performed and the costs of that work can then be captured in real time. We can use this evidence for liability reasons, or audit purposes, or, better still, to continuously improve the manufacturing and measurement processes.

Gage Repeatability and Reliability studies help us further understand our process capability. Gage R&R is a method of determining the accuracy of our measurement process. In every process, variation is introduced by some causes. Sometimes variation is caused by the measurement device, or sometimes by the measurer themselves.

In Gage R&R, three people use a measuring device to check 10 different instances of the same item. Of course, the results should all come out the same. But after inputing the data, a Gage R&R study could uncover undesirable variation caused by the inspector or by the device. The result of the study could help you to determine how to improve the measurement process or whether to switch to a more reliable measuring device.

Along with calibration schedules, Gage R&R processes should be identified, defined, and scheduled in the ERP.

Software Needs Measuring Too

And before everyone writes this article off as "manufacturing only", remember that software has measuring devices and processes as well. Automated testing tools, test data sets, screen scraping functionality, and test procedures all need to conform to design to be reliable. Rarely do organizations create Configuration Structures of the software test environment. And even less often do they authorize constructing a 100% conforming test platform before running tests. When the test fails, development says "It works on my machine." Of course it does. We are using a rubber yardstick to measure quality.

Even more rare in the Software Quality Assurance world is the routine scheduled Gage R&R studies to see if the test or the tester is introducing unwanted variation.

Conclusion

We need to broaden our focus of Configuration Structures to more than just the product we put in the customer's hands. Everything in our enterprise is a configuration that could benefit from the same common, optimized capable process of managing things well.

Leo Clark has over 25 years of CM and related QA experience and ten years with the Institute of Configuration Management. He has taught configuration management to thousands of students and consulted on CM, SCM and QA implementations for over 1000 companies. Leo has consulted with PDM/PLM software tool providers to improve workflows & functionality, and taught and consulted extensively on SPC, CIM, DNC, MES, ERP, preventive maintenance. He is the author of numerous articles, papers and presentations on SCM, SPC and management methodologies. Leo is a graduate of Marquette University, CMPIC Certified, CMIIC, CM Lead Assessor Certification, U.S. Marine Corps, member ACDM, and ASQ. Leo once played banjo for the Commandant of the Marine Corps. He also helped Andy Warhol digitize Debbie Harry.

LEO CLARK

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CIMdata, Peter Bilello - "The Emergence of the PLM Platform and its Support for Closed-Loop CM"

CMPIC, Steve Easterbrook - "Configuration Management Requirements"

CMstat, Lisa Fenwick - "Marrying Process with Technology"

Cummins Inc, Mike Bostelman - "An Application of CM for Managing a Highly Customizable Product"

Cummins Inc, Tina O'Dell - "Divine Boldness"

Federal Aviation Administration, David Cumti - "Buying in: Finding the Right Organizational Stakeholders to Promulgate CM"

CMPIC, A. Larry Gurule & NAVAIR, Dan Christensen - WORKSHOP: "Operation of Acquisition System CM and the "-1""

Leidos, Randy McCullough - "Software ReUse and Configuration Management"

Lockheed Martin, Mitch Kaarlela - "Interface Management Solutions and Challenges for Complex Systems"

PSA / CMPRO, Rob Stone - "Form-Driven CM/PLM Process Automation Planning Perspectives"

Sikorsky Helicopter, Ken Wallace - "Superhero vs. CM"

SPAWAR, Crystal Reed - "How to Map Standards, Policy, and Process Together"

SPAWAR, Dee Layton - "Executing CM on Systems of Systems (SoS)"

US Navy, Danielle Yockman - "CM in the Virtual World"

usb GmbH, Harald Schwabe - "CM Identification and Status Accounting Based on a Development Plan and Breakdown Structure"

1102 Contract Advisors, Mercedes Peters - WORKSHOP: "Communication and Client Satisfaction"

*More presentations and details about speakers & workshops can be found at **www.CMPIC.com/2015_CMTrends_Speakers***
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Photographer's Sight

The Secret to Effective CM

by **Rick St. Germain**
CMPIC Canada

Amazing things happen around Scotch. It has that aura about it. Last March I had a rare fine Scotch. Mortlach, $15 a glass, with a flavour as rich and complex as Peter, the man who covered the tab.

Robin Hood

In my day job, I'm Configuration Manager for embedded systems at a major aerospace supplier. That old saw about getting the right information to the right people at the right time pretty much describes what I do.

It's the challenge that keeps me going. I use the Robin Hood approach — keeping track of changes, prying information from selfish hands and passing it along to where it's most needed, just in time. High maintenance, but it works.

In the background I'm always hunting for that elusive step, that final perfecting tweak to the process that'll make it foolproof. Getting closer, but haven't found that magic bullet yet.

When I go home, I put all that behind me. I trade my process for a camera and go out to study the world as it really is, in the moment. There's something profoundly therapeutic in discovering the beauty of ordinary things through a lens, up close and personal.

My Dad taught me everything I know about photography, both technical and artistic. As I grew up, he shared with me the lessons he had learned from the great masters of his time. Of these, one man, Peter McInnes, had marked him profoundly, giving him what he called "photographer's sight". I never forgot his name.

Elly

A few years back, I chanced upon a box of musty books at a Flea Market. Amongst the tattered paperbacks, an aged hardcover stood out. Its heavy brown paper wrapping, carefully taped at the corners, marked it as a product of an earlier, more respectful time. One word graced the cover: Photography, hand written in flowing script with a fountain pen. Inside, an enchanting mix of portraits and stills on a wide variety of topics.

The author's name caught my eye: P. McInnes. I bought it on the spot for fifty cents.

As I studied those images over the next few months, I began to notice things that developed my ability to
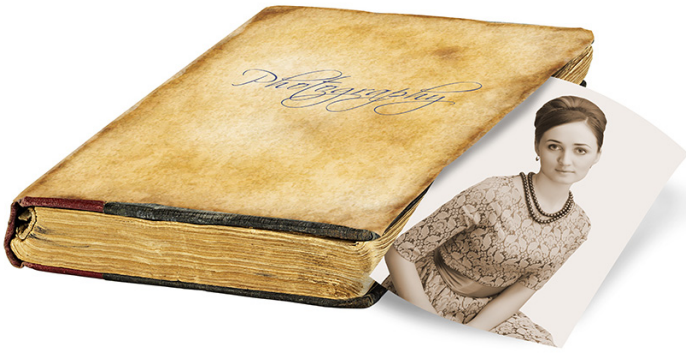
truly see — photographer's sight. My photos improved dramatically.

One day, I accidentally knocked that precious volume off the table. It landed on edge, splitting the paper cover. Rather than desecrate it with more tape, I decided to replace the covering with a new one, retaining the original script as a label.

As I scraped the powdery tape from the corners to free the torn paper, a photograph fell out from its hiding place inside — a sepia portrait of a young woman in a 40's-style dress. Its size and careful preservation in acid free cellophane marked it as a portrait proof. On the back, three lines in the same flowing script:

<div align="center">

Elly
Oct 5, 1948
P. McInnes

</div>

I was immediately smitten by the radiance of the young woman's face. The photographer had captured it perfectly, just like Da Vinci had in the Mona Lisa. There was something about her that defied analysis yet spoke so powerfully. I resolved at that moment to find an opportunity to meet Peter McInnes, to ask him about this print and maybe get him to sign it for me.

So when my father called to say that Peter was giving a public lecture and book signing in the next town, I immediately cleared my schedule. Three weeks later, I found myself breaking bread with a legend.

The Signing

On the day, Peter mesmerized the audience with his wit and insights into the world of photography, drawing heavily from his newly released book. Like many others, I lined up to buy a signed copy. When my turn came, I asked him if he would also sign a photograph that he had made. He graciously agreed.

I took the photo out of my binder and handed it to him. I saw waves of emotions wash over his face as he cradled the small image in his hands.

"May I ask where you found this?", he said softly.

"It was hidden under the cover of an old book I bought at a flea market," I responded, "It's one of my favourites."

He smiled. "Mine too."

He invited me to meet him for a drink afterwards "to discuss this little treasure". I was over the moon.

Connection

That's where the Scotch came in. Over dinner he wanted to hear all about my work managing Configurations and the challenges of sharing information. He laughed at the Robin Hood reference and seemed quite fascinated by my quest for process perfection.

When we had eaten, he ordered the Scotch. He closed his eyes as he inhaled the delicate scent from the glass. Smiling appreciatively, he took the first sip. He laughed as my eyes widened from the fire, then mellowed into an explosion of flavours.

Our discussion drifted towards our mutual interest in the photograph. I shared with him my fascination with the look on the young woman's face and I asked

him what he had seen in the moment he pressed the shutter. His answer floored me.

"Although I was there, I didn't make this image. That special moment was captured by my father, Phillip. And that extraordinary young woman is my mother, Elly."

"What you're feeling here is deep connection, though just a pale reflection of the profound relationship among the three of us at that moment. You see, I was born eight months after this image was made."

"Knowledge is like that, too — the product of relationships among people, facts, events. It's a living, breathing thing, constantly evolving, a flow. Once in a while we dip our ladle in and sample it, like a fine Scotch. We analyze, we document and render. We do our best to project a complex 3D experience onto a two dimensional space. But words are a poor substitute — we always lose information when we render. What remains is insufficient and incomplete but, if done well, is enough to restore the original intent in the reader's mind."

"Those Changes you manage at work aren't "things", but the space between things: differences relating one configuration to another, like frames in a movie. The magic bullet you seek isn't found in process, but in the relationships among the people involved. In other words, the essential ingredient that makes process work is found only in people … like YOU."

To Us

So began a magical evening. Maybe it was the Scotch, perhaps the company of a new old friend. But what I really remember is that silver bullet. Since then, I've applied the principles of Photographer's sight — the ability to see what's really there — to focus my CM practice. I've become more directly involved in helping people understand their role in the flow of information — their information — for mutual benefit, not just because the rules say so. Still a challenge with some, but at least we're now on the same team.

I offered to return the photograph, but Peter wouldn't hear of it. He said he had the original and was delighted to see that the lost proof had found a good home. He signed the back with a simple dedication: "To us".

We sipped fine Scotch. We compared notes on photography and process. He shared his box of mini Oreos with me. Too soon the Scotch was gone.

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

BOOK HIGHLIGHT:

"Configuration Management: Theory, Practice, and Application" by Jon M. Quigley & Kim L. Robertson

This new book on Configuration Management is long overdue. Many texts attempt to tell the reader how to perform the task of Configuration Management. This one provides the back story and takes the reader back to basics explaining how the discipline of CM developed, why we do certain things we do and offers real world examples of CM implementation. Due to its industry wide and non-market segment approach it has received very positive reviews from highly respected CM leaders in an international setting.

438 Pages - 145 B/W Illustrations

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—Steve Nissen, Software Quality Assurance, Ball Aerospace & Technologies Corporation

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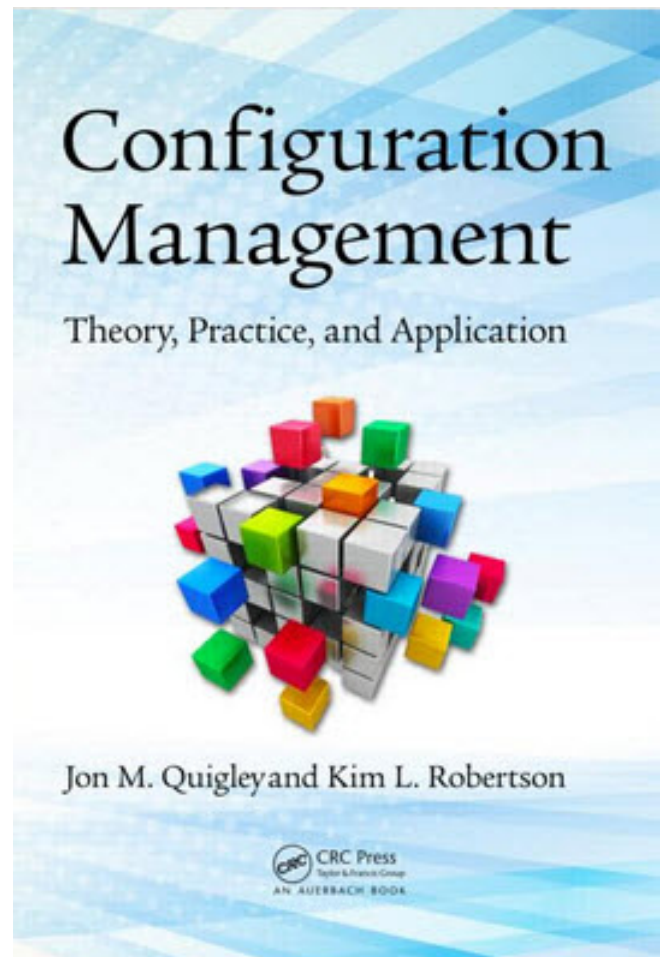
Well That Was Unexpected
IT and Asset Management CM

by Jon M. Quigley, Kim Robertson, & Joe Townsend
Value Transformation LLC

Falling Skies and Pepé

BSD was being considered as the corporate wide supplier of traction control modules for Mitsikara. Their design, quality, and cost point were the best Mitsikara had seen and as the global supplier Mitsikara would have a competitive advantage that would place their vehicles in front of the pack. Mitsikara was insisting that the BGS secure interface to the Mitsikara web be hardened to protect against the constant and persistent threat of data theft from external sources. Cindy Delacour, CEO of BGS, and Freda Usman, the manager of IT at BGS, were confident their systems would pass the final hurdle. Cindy chose to run simulated attacks on their own to give them the opportunity to harden their system with the help of Zubin Rhumba, Mitsikara's Counterintelligence Officer. They had code named the external attack *Falling Skies*, the objective: to get through their external defenses. The code name *Pepé* had been chosen for the simulated attack from within. The Test Readiness Review was held on the Monday before the test.

Cindy opened the Videoconference, "It is good to see all of you again. I think everyone knows what this test is about but for those of you who don't

I'll let Freda Usman, our manager of IT, give a brief introduction."

Freda looked up from her notes, "BSD is on the verge of going Global under the wings of our business partner, Mitsikara. Before we can do this we have to demonstrate our IT system's ability to ward off internal and external threats. Zuberi Sumbako let us borrow Zubin Rhumba to help us set up the test scenario. We are doing this so we can correct anything we find before we agree to a real set of tests run by Mitsikara"

Big Data - Little Data

At the end of Freda's overview, Cindy answered questions from the participants.

Akio Akiyama, director C&DM at Genesis Test Equipment waited until there was a lull before speaking, "Thank you for inviting me. Genesis has run similar simulations once a quarter over our history. I see nothing wrong with what you plan to do. I'd like to summarize what I have heard to assure that my thinking is correct before I make comments or recommendations.

"*Falling Skies*," Akio continues, "will use sophisticated technologies developed by Mitsikara to inundate BGS systems. This will help exploit external vulnerabilities common to all firewalls, such as their limited ability to check data integrity, like packets not sent through the firewall or a lack of robustness for application security; along with observe if there is a less than complete capability to stop malicious code through back doors and verify that the firewalls use valid user names and passwords.

"*Pepé*, named for a cartoon skunk, will test the ability of the system to fight threats once they are inside. This little skunk of Zubin's will systematically target from within BGS data and, if discovered by BGS countermeasures, stop what it is working on by dispersing a "stink bomb" to confuse the attempt by scrambling the 1's and 0's in the path of the counter attack. Afterwards, it will morph into a new code set and continue on its rampage.

"Do I have it right so far?" Akio ended.

Zubin nodded, "*Falling Skies* will throw everything at the BGS firewalls and learn from where Mitsikara has been attacked in the past to see how hardened BGS is. *Pepé,* in addition to its ability to morph, has the additional task of encrypting all of the data it is looking for using a multiple encryption schema. Data, once encrypted, is encrypted again several additional times using different encryption allgorythms before being pushed from the inside to a stand-alone Mitsikara data storage facility used specifically for tests of this kind. The idea is to leave the system that has been attacked incapacitated without the capability to unencrypt data while transferring as much data as possible outside of the company before it is stopped by the BGS countermeasures."

Akio took off his glasses and rubbed his eyes before continuing, "Forgive me, it has been a long day. How long does it take Pepé to do all of this?"

Zubin replied, "That depends on the robustness of the BGS countermeasures. On most systems we can clean out a petabyte of data quite quickly. Pepé is efficient."

Akio nodded, "Very sophisticated, I assume that all of the data will be backed up per your disaster recovery protocol. I would like to monitor the process on site if I could."

Freda burst out, "I know that IT reports to you at Genesis but I don't see how C&DM could add anything to the testing or analysis of the test data after the testing is complete! Just what would C&DM monitor?"

Akio shrugged and replied, "You must remember that the word Data Management is part of the C&DM charter. I would like to monitor *Pepé*'s progress using big data evaluation techniques proprietary to Genesis. This might show how rapidly the virus mutates and spreads, along with how the overall health degrades over time. I would also like to monitor the rapidity of file permutations and data push to the Mitsikara data storage facility. This combination of large data and small data monitoring will tell you much. So we don't

disrupt any of the planned testing, I'd like to use one of your ITS interfaces as the monitoring will require a very high transfer rate."

Cindy agreed despite Freda's dark looks, "Zuberi will you still be joining us on Saturday?"

Zuberi chimed in, "Yes, I have decided to attend and will be sitting with Akio."

After the meeting, Zuberi chuckled to himself, "Zubin has his skunk but I have something greater. Genesis Test Equipment has let me borrow their *Raijū*."

Unexpected Results

The day before the test, Zuberi's computer was checked by IT security and connected to the ITS system. The system was allowed to collect data throughout the night. The next day the test team arrived along with Zuberi. Pleasantries exchanged, Zuberi and Akio retired to their satellite station.

Zuberi stood behind Akio, "What do you see."

Akio smiled, "As we thought, it is already infected. Someone got in before the external firewall upgrades BGS implemented last month and is waiting to get free."

"Foreign or domestic?" Zuberi queried.

"Hard to tell, two traces," Akio replied as he opened a file and clicked run. "Difficult to detect at this stage but it has an Asian feel; there are two different sleepers from one source or possibly unrelated sources."

The telephone rang, "Everyone on line?"

"Zubin Rhumba, *Falling Skies* is primed!"

"Akio Akiyama, Monitoring is live."

"*Pepé* is primed. Go live in 60 seconds", Freda announced. "30 seconds. 10 seconds, 9, 8, 7, 6, 5, 4, 3, 2, 1!"

The test was over more quickly than expected. The fire wall IT countermeasures fought *Falling Skies* for two hours before a cascade of failures erupted and the stoic Freda had muttered, "Well that was unexpected." She wouldn't elaborate.

Defense against *Pepé* appeared to have gone better. Zubin's stink bomb was not a strong enough deterrent and initial reports Freda ran looked like *Pepé* had been stopped in its tracks. After the tests were complete, Zubin initialized a data reset that reversed the encryptions.

It was only after a complete system diagnostics was run that the aberrations were found. All of the data in the entire BGS system had been replaced with files that purported to be the same size but, when opened, contained no information. The data that had been sent to the Mitsikara data storage facility was compromised as well.

"So tell me," Cindy said, "just what went wrong?"

"Just about everything," Freda replied with a hint of hysteria tinging her normally placid voice.

"Perhaps not," came Akio's voice over the phone.

Zuberi's laughter could be heard rumbling down the hallways.

Null Set

Concurrently with the test debriefing, BGS teams dutifully pulled out the disaster recovery plan. Sabastian Mills arrived at the closest storage facility to retrieve the back-up tapes. Facility personnel retrieved the container from the warehouse and watched as it was opened.

The facility control officer yelled out when he saw the tapes, "Hey, that's a violation of your contract!"

Sabastian looked dumbfounded, "I don't understand. We've been bringing storage boxes of backup tapes here for years."

"I'm telling you that it is a violation of your contract," the guard yelled. "All we allow to be stored here is paper."

"When did that happen?" Sabastian asked

The guard shook his head, "We haven't allowed storage of anything here but paper for five years. I'm afraid you made a useless trip. We subject every box to a low power MRI before we shelve it. Your tapes are scrambled!"

The guard went to his work station, typed something and printed out a form. He handed it to Sabastian and said, "This is a show cause order. You have one week to purge all of your stored materials of anything but paper or we are going to terminate your storage

contract and stack it all outside. Once we do that you have eight hours to remove it or face a $1,000.00 penalty as specified in your contract."

All Systems Nominal

Zuberi's deep voice filled the conference room, "Let's start with the good news. I'm pleased to inform you that BGS has recovered from their IT meltdown. And, due to the new safeguards, we passed the Mitsikara systems evaluation with flying colors. You are going global as our corporate wide supplier of traction control devises."

Zuberi continued, "We all owe a debt of gratitude to Genesis and particularly to Akio for this rapid recovery. Akio is in meetings at the Mitsikara corporate offices in Japan, so I'll let Mike Tarquist, CEO of Genesis, explain."

Mike set down his trademark cup of cold coffee on the podium. "Cindy, Akio, and Zuberi met with me months before the BGS internal test was scheduled to start. Akio found weaknesses in the system that caused him concern. As a result, an additional set of differential tapes were copied and placed in our vault.

"Akio found nearly undetectable viruses had gotten into the BGS system just before the test started. Once inside a system, the viruses were hard to eradicate. When the viruses find where a breach in the firewall is located, they transmit data to foreign locations. It is a form of industrial espionage. *Pepé* inserted itself

into data files so that when the file was opened it would continue spreading. Akio's counter measure, *Raijū*, sanitized the infected files by deleting all the information and leaving the check sum to all appearances unchanged. In the middle of the test, Freda noticed something odd..."

"Yes," Freda laughed. "The people on the other end of those viruses were after our technology but got a lightning bolt instead. When the firewall came down, the first thing across the interface was the *Pepé*. Their entire server structure has been encrypted. It will take them months to recover."

Freda continued, "Then we found out that even if we had made good back-ups we were in violation of our contract with Storage Guard. All they allowed stored in their facility is paper. If it hadn't been for Akio, we would have lost everything. I have a whole new respect for C&DM. When we started this I thought they just released changes. Now I know that C&DM has to be interpreted in the broadest sense of the words and integrated throughout our processes."

Mike resumed, "Now for the second piece of news. Akio has accepted the position of Vice President of Configuration & Data Management for Mitsikara International. Sangita Morales will be taking over as Director of C&DM at Genesis."

Later that day Mike met with Sangita. He looked out at the lowering sky and said, "I'm sure glad you were here to step into Akio's shoes. He has never recommended anyone for a position here so highly!"

She replied. "You know I'll never to be able to do what he did."

Mike turned to her and smiled, "Never?"

Jon M Quigley PMP is a product development expert with more than 20 years of experience and a founder of Value Transformation LLC. Value Transformation LLC provides training and consulting on a range of product development topics and co-author of Configuration Management: Theory Practice and Application. Jon has multiple advanced degrees, certifications, and US patents. He can be reached at Jon.Quigley@ValueTransform.com

VALUE TRANSFORMATION LLC **JON M. QUIGLEY**

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**

Joe Townsend is a recognized expert in Software CM, Release Management and Change Management with over 16 years of experience. He a regular contributor to multiple CM Groups on LinkedIn and has been published many times on Techwell.com. Joe is ITIL Version 3 Foundation – Certified. Joe was also provided a critical review of Configuration Management: Theory Practice and Application. He can be reached via LinkedIn.

JOE TOWNSEND

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Contact Info

CMPIC LLC
P.O. Box 2131
Forest, VA 24551
ph: (434) 525-8648
fax: (434) 382-0677
email: info@cmpic.com
web: www.CMPIC.com

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