

Concurrency



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Summer 2002

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The Society of Concurrent Product Development

Strategy, People, Process, Tools, Technology

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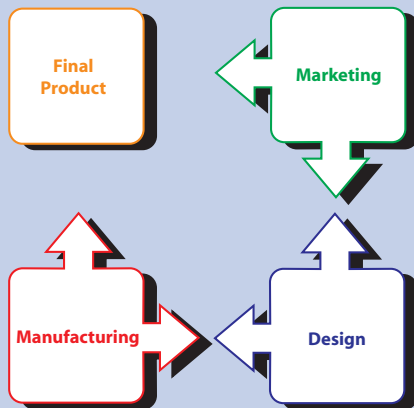
Question: Who are these people and why are they smiling?

- a. A concurrent wine tasting group and it was a great year
- b. A winning team celebrating a great year
- c. A winning team looking forward to an even greater year
- d. Your SCPD Board of Directors enjoying dinner at SCPD's Annual Meeting and Conference in Boston May 29, 2002
- e. All of the above

Answer: All of the above, and you can join in the fun next year!

left to right around the table: Curtis Hargadine, Renee Dorjahn, Ralph Schmitt, Don Stewart, Alan Barnebey, Dick Power, Jon Gilmore, Dick Mason [Head Top], Preston Smith, Brad Goldense, Bob Neel, Chris Hawver

Plan Your Projects for Concurrency



“Concurrent project management is more than simply gathering the right team”

With the change of our society’s name from the Society of Concurrent Engineering to the Society of Concurrent Product Development and the change of name of this publication from SOCE News to Concurrency, readers may ask, is concurrent product development the same as concurrent engineering and integrated product development, which are key concepts in our mission statement? Let’s approach that question by asking, what is concurrency and how is it achieved? **Denker, Steward, and Browning** address the latter question in their paper, *Planning Concurrency and Managing Iteration in Projects* (*Project Management Journal*, Volume 32, Number 3, September 2001, pages 31 – 38).

These authors as well as our readers know that it’s common practice to try to reduce project cycle time and cost by encouraging teams to work concurrently, and we expect disciplines such as design, manufacturing, and marketing to work more closely than in the past. But they caution that “concurrent project management is more than simply gathering the right team, and concurrency means more than teams taking a global view of projects and development.” So what, then, do we need to do?

To help teams reduce cycle time, manage costs, and improve project management as keys to competitive advantage, the authors propose and describe a tool called the dependency structure matrix (DSM). They explain how teams can use the DSM to design project plans that produce greater concurrency and better integration management. The DSM is a square matrix which shows dependencies between all items of information that must be resolved to describe the final project plan and its execution. The DSM is used to “make the process structure explicit and understandable.”

Two questions must be asked and answered: “What information do I need to do my job?” and “What information do I owe others so they can do their job?” Answers to those two questions help us create organizations structured for “better information exchange, better division of responsibility, and greater concurrency.” The DSM helps avoid cycle time waste resulting from missing critical information caused by failure to analyze essential information dependencies.

In their paper the authors illustrate the DSM concept with examples of putting on shoes and designing an electric car. The authors use the intuitive example of inspecting shoes right after we get shoes rather than inspecting shoes after we put them on, as analogous to concurrent engineering: by moving appropriate tasks upstream we minimize feedback loops to reduce variance in total process cycle time. The authors admonish that arbitrary selection of which tasks to perform concurrently does not assure reduced cycle time. In fact, cycle time can increase if we don’t first consider information dependencies of tasks when choosing tasks to work in parallel. “Any project task schedule will always be constrained by the underlying project information dependencies and their logical structure.”

To transform a project plan into a concurrent process, the authors suggest, rather than grouping tasks into the generic phases (preliminary,

“What information do I need to do my job?”

“What information do I owe others so they can do their job?”

intermediate, and final) commonly concluded with verification reviews, that we use the DSM to group tasks more appropriately according to information dependencies. That way, concurrency is increased and cycle time can be reduced significantly, the authors suggest, by breaking large generic project phase-end review cycles into problem-specific micro reviews. Using the DSM, according to the authors, results in more concurrency and less frequent and less restrictive reviews, especially in the product design cycle.

Stephen Denker, PhD, has over 30 years experience in design engineering and product management and has authored over 30 technical and business articles.

Donald V. Steward, PhD, is an emeritus professor from Cal State University, Sacramento, and a principal at Problematics LLC.

Tyson R. Browning, PhD, is an internal consultant for Lockheed Martin Aeronautics Company specializing in product development processes and related specialties.



Definitions

Concurrency:

Concurrence n 1 a having the same opinion; agreement. syn: assent. 2 a happening at the same time. syn: coincidence, juncture. 3 a working together; cooperating. syn: cooperation. (World Book Dictionary)

Concurrent engineering:

A systematic approach to the integrated, concurrent, design of products and their related processes, including manufacture and support. This approach is intended to cause the developers, from the outset, to consider all elements of the product life cycle from concept through disposal, including quality control, cost, scheduling, and user requirements. (Institute for Defense Analysis)

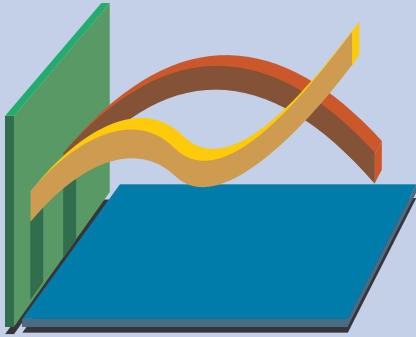
Integrated product development:

A philosophy that systematically employs a teaming of functional disciplines to integrate and concurrently apply all necessary processes to produce an effective and efficient product that satisfies the customer's needs. There is no checklist for implementing IPD because there is no one solution...each application will be unique. (USAF Material Command Guide on IPD)

Monitor Your Fault Feedback Ratio for Project Success

By Johanna Rothman (Former SOCE Board Member)

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“For better scheduling of your system test and project completion, start measuring your Fault Feedback Ratio (FFR)”

Most of us track faults during the system test portion of a project. However, many project managers don't track how many of our fixes are successful and how many fixes are bad — either introducing a new defect or not completely fixing the original defect. If you're looking for better scheduling of your system test and project completion, start measuring your Fault Feedback Ratio (FFR).

$$\text{FFR} = (\text{Fixes that require more work}) / (\text{All the fixes})$$

When I've measured successful projects, the FFR stays under 10% throughout the project, meaning that no more than one in 10 fixes are problematic as the work progresses. (Don't be deceived by a low FFR and a high overall fault count. With a large total count, the defects can be too overwhelming to successfully manage.) A low FFR and a not-too-high overall defect count also implies that the developers have a relatively easy time finding and fixing the problems. The testers don't have too much trouble keeping up with testing the fixes, because the fixes haven't broken other pieces of the software. The project team is progressing.

On the other hand, an FFR of 15% or higher means that people are spending significant time finding and fixing problems. A higher FFR and a low defect count may mean that the problematic fixes are in the same part of the code base. A higher FFR and normal or high defect counts may mean the developers may have trouble detecting where to fix the problems, and the testers may have trouble verifying the fixes are good.

Once the FFR hits 20%, you're making dubious progress on the project because your team is spending too much time refixing problems they thought were already fixed and retesting those fixes.

On one project, the FFR started at 18% in the implementation phase, when the project team started to track their defects. Because the developers had completed the design before they started coding, they had trouble fixing the defects quickly. To make up the time, they took shortcuts for fixing the defects and stopped doing peer reviews on the new code.

By the time the project was supposed to start system test, the FFR was up to 23%. The project had met its previous milestones, but the team was unable to predict the start of system test. Their previous progress was an illusion because uncorrected defects remained in the code. With an FFR of 23%, developers had to take the time to understand each problem and how it affected the rest of the code base, to reduce the fix time for each problem. The project looked stalled, even though the developers were now successfully fixing the problems. The technical lead suggested a “bug bash,” where everyone tries to find and fix problems, but the project manager suggested

“Peer review all fixes from then on, an effective technique for keeping the FFR low”

an alternative: a 2-week period where every fix required peer review. At the end of the 2-week period, the FFR was down to 6%, a dramatic improvement. The team decided to peer review all fixes from then on, an effective technique for keeping the FFR low. You may not catch all of the problem fixes using this approach, but you'll catch many of them.

Measure your FFR to see if you're spending too much project effort on fixing fixes. FFR is not linear with effort, so an FFR of 10% does not mean that you spend 10% of your time fixing fixes. You may well be spending more than 20% of your developer time on those 10% of the fixes. In one organization I consulted to, the FFR was 22%, but the developers spent almost 80% of their time fixing fixes.

Track FFR as soon as you start tracking defects, as early in the project as possible. If you start measuring the FFR only at the end of the project, you've missed an opportunity to see how your defects are affecting your project's progress. Calculate the FFR for the entire project each week, not by developer or by code area, making sure the data can't be associated back to a specific person. Your project staff is allowed to make mistakes when they fix problems; your job is to see whether the bad fixes are causing other problems in the project. Use the FFR data at your project team meetings as an early warning sign to see if your project progress is an illusion or real.



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Concurrency, Collaboration, and Trust



“Trust your partners or get different partners.”

Collaboration on many levels, between individuals and groups within and outside of an organization, is certainly an essential ingredient of concurrency. With new corporate ethical lapses exposed in almost every day’s news big time, these thoughts and examples from an article, *The Trust Imperative - Collaboration: Ethical Challenges*, by Clinton Wilder and John Soat in *informationweek.com*, July 30, 2001, sent to us by Membership VP Bob Neel, seem more timely than ever.

When publisher R. R. Donnelley & Sons Company introduced a collaborative online system to integrate data from supply chains, customer inventories, and other sources, it found that the advantages to Donnelley were not obvious to subcontractors, who saw a system to “beat them down on price.” Donnelley had to convince its subcontractors to trust the world of online collaboration in which sharing previously sacrosanct internal data such as daily sales reports and production schedules can lead to competitive advantage for all. “Trusting that your supply-chain partners will behave responsibly with that information — and agreeing on what constitutes responsible behavior — is absolutely critical to the success of collaborative business.”

“Ethical behavior in collaboration boils down to business partners setting expectations up front about the relationship and data-sharing — and meeting them. ‘It’s simply a matter of doing what you say you’re going to do and believing that your partners will do the same,’” suggests supply chain manager Mark Crowder.

Key points:

- Collaborative business and concurrent product development require new kinds of ethical guidelines and an unprecedented level of trust.
- Eliminate self-serving practices institutionalized in some industries, which defeat effective collaboration.
- Replace win-lose with win-win when considering how business decisions affect partners.
- Distinguish between collaboration and collusion which violates the spirit of collaborative business and retards progress.
- Trust but verify. Agree in advance on rules for verification between partners.
- “Trust your partners or get different partners.” *Gene Tyndall, Ryder Executive VP*



Recommended Reading for Innovators

Board member **Curtis Hargadine** recommends spending some time with the *August, 2002 issue of Harvard Business Review*. The entire issue is focused on innovation and you'll find new, thought-provoking articles and the reprise of a few HBR innovation classics. Here are some of his musings after perusing the issue.

When confronted with a significant truth we need to decide what we're doing to do about it. Now that research shows that individuals can develop and enlarge their creative abilities and that organizations can learn to innovate more effectively, what are we to do?

Clearly, each of us bears the responsibility for developing our personal creative abilities, but what about developing the enterprise where we work, or the organizations that support its efforts? I think we each bear similar responsibilities; part of our jobs is to help the people with whom we work, and helping our organizations learn to consistently innovate in an effective manner helps everyone. Here's a short 'to do' list for your consideration, but consideration won't be enough. Choose one or more, or make your own list and then take action.

Learn something new

Expand a hobby, start one that has interest for you, read a periodical with no direct connection with your formal training. You'll get new ideas.

Go someplace new

We've all heard that 'travel is broadening,' but it doesn't have to be to a foreign country to have an effect. Try a new restaurant, shop in a new area, go to a different library, or try a new grocery or hardware store. The simple processes of getting there and getting what you want will make new connections in your brain.

Learn how to get things done

What works in one environment might not work in another. Learn how to get things done in yours. If something seems wrong, if it feels like there's a pathological aspect to how things are accomplished, see if you can identify what might be done about that.

Use people who know how to get things done

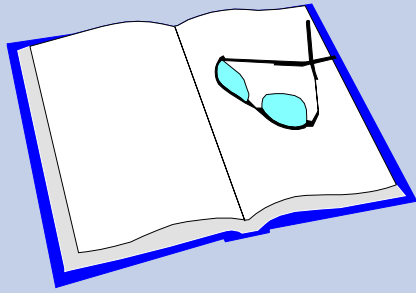
Seek the advice of successful people, inside and outside your organization. Ask how they get things done.

Hire people who know how to get things done

Sometimes it's important to get a specialist, someone who knows how to do one thing very well. Don't forget the value of hiring generalists, people who know or can learn how to do a lot of things.

Get 'outside' help

Discuss problems, approaches, and solutions with people outside your group. Hire someone from another company or department. Talk to customers. Find a consultant who can help you understand or foresee emerging trends. It's easy and dangerous to focus inward. Help your organization learn to focus outward.



“Research shows that individuals can develop and enlarge their creative abilities and that organizations can learn to innovate more effectively”

“In today's workplace, anyone can cause significant change.”

'Manage' from where you are

Leadership from lower segments of the hierarchy can have a profound impact. Don't assume you can't change things because of your position. In today's workplace, anyone can cause significant change. Sure, the CEO can make systemic change faster than an engineer, but no one can change the way you work faster than you can. And good ideas and good business practices take on a life of their own and often spread far beyond the area where they were conceived.

Hatch a plot

If two heads are better than one, how much fun can you have with four? Causing change can be fun, but it isn't always easy. Getting others involved can result in better ideas, implementation plans, and outcomes. Your 'co-conspirators' might just come up with some important ideas of their own and invite you to participate.

Read about innovation

There's much material in libraries and on the web. At a minimum, get the August, 2002 HBR and scan the executive summaries on page 146. Then do something to help your organization become better at innovating.



Share Your Knowledge

To our readers,

SCPD invites all our readers, members and non-members, to submit information for publication in "Concurrency." We welcome feature articles including tutorials, lessons learned, and CPD implementation cases, as well as other news, features, and announcements.

Examples:

- An article especially for Concurrency.
- An article you or someone else has published in another newsletter, journal, or magazine or on the Internet.
- An adaptation of a presentation you or someone else made at a conference or business meeting.
- Announcements of future events and reports of past events.
- News about product development.
- Book reviews.
- News about your area of responsibility as a Board member.
- Results of an opinion poll or research survey.
- A letter to the editor.

Author bios and required permissions are prominently included for all material published.

Let us hear from you. Share your knowledge and experience with your fellow product development professionals of all disciplines. If you have questions or ideas about proposed content, please contact me and I'll get right back to you.

Sincerely,

John P. Cushman
Editor, Concurrency

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Email: jjcush@ix.netcom.com

Fax: 805-381-1156

Rapid Product Development at Chrysler



“There’s an absolute correlation between early design fixes and improved quality.”

Let’s say our digital mockup shows a bigger than desired gap where the fender meets the hood, two parts designed by different engineers. Looks like we need a design change to one or both of those parts — or do we? By involving the supplier of a plastic attachment in the wheel well in the decision process along with the design engineers of the fender and hood, the design team learned that a simple fastening point relocation by the vendor would solve the problem and avoid scrapping and replacing an expensive vendor tool. That’s an example of how Chrysler’s FastCar technology helped solve a problem four or five weeks before it otherwise would have been known, and with a cost saving, according to *Business Week*, September 2, 2002.

By applying Internet technology and e-business methods to product creation, Chrysler is using FastCar to focus on reducing costs and improving quality while also helping to speed up product development. “Chrysler’s next generation of full-size sedans, due in 2004, will be the proving grounds for what may be Detroit’s biggest collaborative design and engineering project to date,” according to Business Week. Interviewed by BW’s Joann Muller, Chrysler’s Karenann K. Terrell, director of e-business strategy, characterized FastCar as taking a virtual CAD/CAM design and teaming it with all the other information already on hand about a part or vehicle. No longer is it necessary to change a part and then ask, “How much do those new components cost? How long will it take? What are the quality implications? How much mass did we add?”

FastCar focuses on integrating fundamental activities such as financial management, change management, prototype procurement, tooling, and parts into new designs.

On change and innovation, Terrell advocates allowing “as much change as early in the process as possible, because there’s an absolute correlation between early design fixes and improved quality. And we know that the more change we allow, the more innovative the design will be.”



Call for Papers

Journal of Concurrent Product Development (JCPD)

We are pleased to extend this invitation to you to submit a paper for publication in the Journal of Concurrent Product Development. This Journal is sponsored by the Society of Concurrent Product Development (SCPD).

Papers are solicited in all core areas of Concurrent Product Development, including; product strategy, portfolio management, pipeline management, resource management, product design/development, product testing, commercialization, and all aspects of cross functional teams and management. Papers should be clear, concise, and complete with assumptions plainly identified and data presented. Industrial, academic, and case study papers are welcome.

Your paper should be approximately 6000 words (12 pages in the proceedings) and professionally presented. Please note that hard copy submission is required. We will not accept electronic submissions. Please send an email to David.Meeker@compaq.com informing us about your paper submission. This email should contain the following information:

Title of the paper
Names of all authors
Name of the corresponding author
Postal address of the corresponding author
Phone number of the corresponding author
Fax number of the corresponding author
Email address of the corresponding author
Three to five keywords
Microsoft Word Version of paper to facilitate the review process.

Additional questions can be addressed to
David.Meeker@compaq.com

Mail papers to:

Society of Concurrent Product Development
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**Papers are solicited
in all core areas of
Concurrent Product
Development.**

SCPD Vision

To be recognized by industry, academia, and by other professional societies as the best value source to attain the knowledge necessary to achieve advanced product development capabilities and practices.

SCPD Mission

To further the development of and to promote the application of Concurrent Engineering (CE) and Integrated Product Development (IPD) in companies and organizations worldwide.

SCPD Values

- **Leadership:** To embrace rapid product realization techniques and to advance our nation's economy, driven by ourselves, our companies and our Sponsors.
- **Member Recognition:** To individuals in our organizations as facilitators of improvement, to our companies and to Sponsors for foresight in fostering environments that lead to the adoption of improved design practices.
- **Learning:** To satisfy our thirst for continuing personal development and renewal and to provide an accessible resource for industry as a whole, bringing new knowledge and skills to the workplace.
- **Networking:** To stay abreast of industry trends, to interact with like-minded professionals and to identify opportunities for business relationships.
- **Friendship:** To make professional acquaintances and to solidify old relationships; taking the SCPD meeting as a professionally rewarding yet enjoyable "time out" from the pace of daily work.

SCPD Objectives

- Disseminate knowledge to promote understanding of Concurrent Engineering (CE) and Integrated Product Development (IPD) concepts and processes.
- Provide a continuous forum for networking and sharing of ideas among professionals in all disciplines involved in product development.
- Improve enterprise effectiveness by expanding the CE/IPD Body of Knowledge by emphasizing the implementation of practical approaches in industry.
- Participate in the origination and/or refinement of the Concurrent Engineering body of knowledge using both internal capabilities and collaborative relationships.
- Foster a continuous learning organization by maintaining an SCPD Body of Knowledge that remains comprehensive while focusing resources and activities on emerging and leading edge techniques.
- Operate to achieve multi-national and multi-lingual communications and text capabilities.



Society of Concurrent Product Development

Formerly the Society of Concurrent Engineering

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EMJ provides articles and features related to the management of engineering and technical professionals and of the organizations that rely on them. Practical and pertinent articles and reviews help readers gain insight to and meet the challenges of coordinating the design, integration, and use of new technology in the workplace.

