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Quickening the Pace of New Product Development

It's a risky business to bring a revolutionary new product to market. When a world-class Japanese auto firm decided to undertake the challenge, it had to reckon with some serious challenges. It expected to create significant new profit streams. The company felt it was time to meet the market's interest in environmentally-positive products. It also wanted to enlarge its range of overall improvement, especially in product development.

A decision was made its Japanese research division set about developing a hybrid gas/electric vehicle. The challenges were not small. Management requested a 50% reduction in time-to-market, and there were new technical problems to be solved.

Assessing the project's risk, the chief engineer was worried about the new, unfamiliar technologies to be mastered. It would be necessary to develop all-new battery, electrical and power control and motor subsystems. In addition, he worried about creating sufficiently robust testing to produce a reliable vehicle.

These challenges could cause the department to fall into fire-fighting¹ mode as seen in Figure 1.

The company had sophisticated IT tools, such as CAD, product data management (PDM), product life-cycle management (PLM), and ways to capture design knowledge immediately. In addition, the company's design process was considered almost perfect. The company was already admired for its leadership by everyone in the automotive industry. So the chief engineer's concerns may have seemed surprising. However, under relentless pressure to meet the schedule, his fears were very real.

What emerged was a remarkable innovation in linking corporate objectives to R&D challenges and the design process itself. Grasping a new word to represent such an innovation is a characteristic of American business culture. "Oobeya," or project control room, may be the next such term to sweep through publications and conference. The project control room itself is a big step forward in project work, but it's only a small piece of the thinking that has emerged from a new approach to product design.

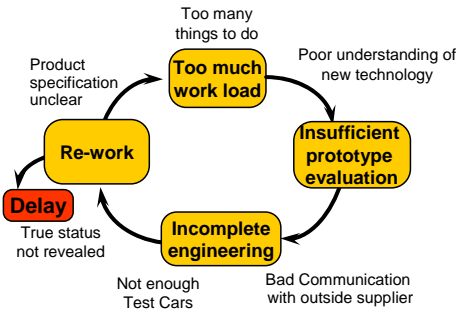


Figure1. Fire fighting in product development

Quickening Visualization

Visual control boards in the factory, value stream maps for process improvement and Ishikawa fishbone diagrams for problem solving are methods of visualizing what once was captured only in the written word, often in long detailed reports.

Bringing visualization to product development (or other knowledge work, for that matter) is new. The visual tools used in the Oobeya, along with the structure and discipline required to use them effectively have enabled a few companies to dramatically shorten project cycle time and quality.

The word “quickenning” is a deliberate choice. “Quick” might seem like a better word to use. Yet quickening has a deeper meaning than simply making something happen faster. Quickening, as to make alive or to cause growth and development, adds an important dimension to this innovative process.²

The visualized project lives, grows and develops because of the people and human relationships that allow it to move forward. The people bring widely varying experience from all parts of the company. When they learn to work together concurrently in a new way, they solve problems more quickly and find better solutions. The visual tools brought together in the Oobeya nurture teams and help individuals interact with respect and commitment.

Linked Objectives throughout the Company

Corporate objectives are established by senior management. The objectives include targets, the starting point for the R&D main board in Figure 2.

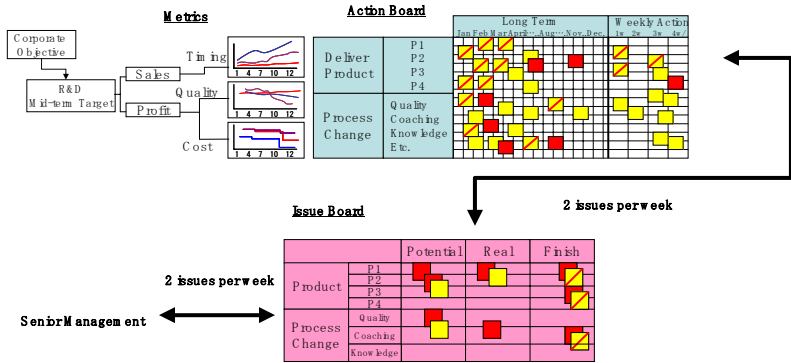
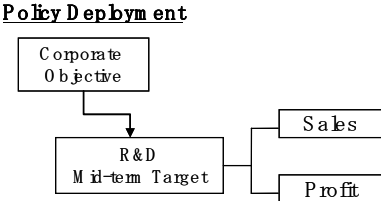
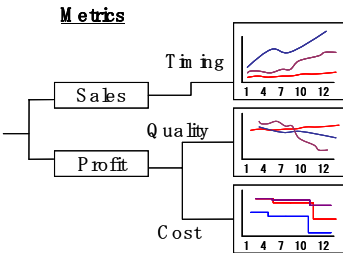


Figure 2, R&D Main Board

1) This board starts with its mid-term target, broken out into sales and profit targets.



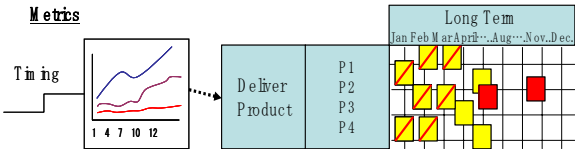
2) Metrics important to achieving the targets are displayed. Making the metrics visual means that progress can be easily tracked.



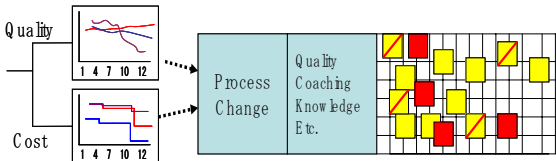
- a) Timing is determined to be the most important metric for achieving target sales.
- b) Quality and cost will be managed to achieve the profit target. Quality metrics may include not only durability and reliability but also attractiveness and performance. Visually monitoring cost metrics helps to display the cost impact of specification changes. The impact on the schedule is also shown.

3) The action board shows how actual values match up with target. Integrated problems show up right away, and corrective action will be visible.

- a. The upper level shows delivery milestones and action items for each project (P1, P2, etc.) being deployed.



- b. The lower level integrates process improvement activity. Process improvements are thus fully connected to the existing project, and the work of support functions (quality, IT, training, HR) is displayed and monitored on the schedule.



4) Schedule: Monthly, yearly, weekly

Action Board

		Long Term												Weekly Action				
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Nov	Dec	1w	2w	3w	4w			
Deliver Product	P1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	P2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	P3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	P4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Process Change	Quality	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Coaching	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Know Edge	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

5) The issue board is a special tool to speed up decision-making. On the issue board, the “Potential” column allows the team to identify future problems and proactively focus the project.

Issue Board

		Potential	Real	Finish
Product	P1	■	■	■
	P2	■	■	■
	P3	■	■	■
	P4	■	■	■
Process Change	Quality	■	■	■
	Coaching	■	■	■
	Know Edge	■	■	■

Deploying the R&D Projects: The Oobeya

Oobeya,³ which simply means “big room” in Japanese, is where coordination and decision-making takes place. The Oobeya is team-oriented, taking into account the needs and strengths of the people on the project. It helps teams visualize the entire project situation. The display boards in the room form a highly structured, but simple system.

It starts with the project objectives, as defined by the current R&D strategy and plan. This creates alignment with R&D objectives, which in turn, were carefully aligned with corporate objectives using the main board, discussed above. Project objectives, expected outputs, metrics, action plans, and reporting mechanisms become aligned perfectly with the company’s intent and market assessment, serving as an effective policy deployment process.

No functional area is left out of the product development process. Marketing, sales, design, engineering, manufacturing engineering, production and logistics people work in the project room together. The structured action in the Oobeya makes their meetings short and productive. Meetings don’t end in postponed issues, confusion about decisions, and frustration.

The Oobeya and its visual controls allowed the chief engineer’s team on the hybrid vehicle project to dramatically cut product development time, and the quickly resolve problems, late design changes practically unnecessary.

The Oobeya's Structure

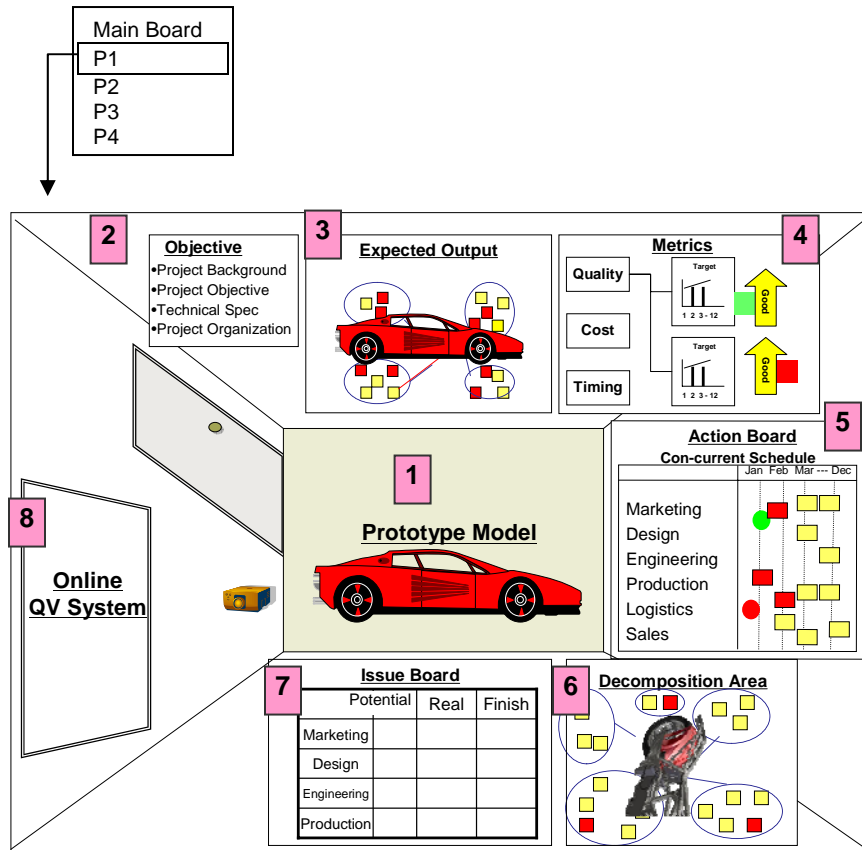


Figure 3. The Oobeya or Project Control Room

The Oobeya helps the design and development team visualize the entire project situation. Figure 3 shows an example of a project room.

1. At the center is a model, mock-up, drawing, or some other visual representation of the output the team is responsible for.
2. Project objectives appear in the top left of the first wall. They typically are determined at the corporate or department level before the product development team is formed.
3. To the right of the objectives is the expected output of the project. The red squares indicate urgent issues.
4. The metrics board, next on the wall, shows current project performance. Again, red squares show hot issues that need quick attention, while the green ones show where current targets are being met.
5. On the next wall, the concurrent schedule board, or action board, shows the activity of project members or teams (marketing, design, engineering, production, logistics and sales, sometimes suppliers). It fosters concurrency. Where milestones may be in trouble, red squares are posted.
6. The decomposition board on the third wall shows sub-projects from the expected output board (3), and the hot issues needing attention. Different decomposition boards will be used throughout the stages of the project—some dominated by style issues, some by cost, quality or performance.

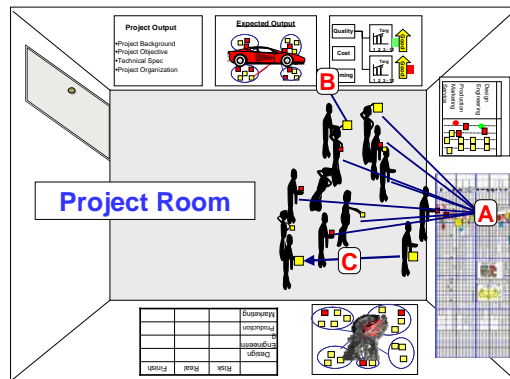
7. The issue board, next, displays critical problems. Potential risks are identified in one column, and those that have become real in the next. The board also shows the type of issue that needs to be referred to a higher-level manager. In any given meeting, no more than two high-priority issues may go to the company's higher-level main board or referred to sub-system project boards.
8. Although visual tools in the oobeya are the most important part of the process to master, companies with a lot of experience with them may add carefully chosen online project control tools to support global collaboration,

This room should be simple to manage. The layout and flow of the boards are very important for efficient and effective project meetings. Teams use Plan-Do-Check-Act (PDCA) cycles to organize activity, stay on schedule, and make adjustments as needed.

Focused Meetings

Weekly meetings are conducted in the Oobeya, which include the chief engineer and all project leaders, plus important staff function representatives, and—on a monthly basis—senior management.

Visualizing the project helps meeting participants point out current hot issues. In the project room meeting, communication becomes more focused. If “A” is on the agenda for the meeting, all members are concentrating only on “A” to create a solution and decide on the next steps.



While in the room, someone may notice something missing at point “B.” Without interrupting the meeting, he attaches a sticky note on the visualization board. Someone sees the need for an additional action item and assigns a task to another member of the team (“C”).

The project control room is where contentious priorities are resolved and harmonized. In a multinational auto company’s project, American, German, Swedish and Italian teams each advocated their own design needs. Italian team members wanted higher performance, Swedes stressed improved reliability and the American team members insisted on lower cost. The visualization process enabled optimal, balanced trade-offs.

At the meeting wrap-up, issues that can only be resolved by higher-level management must be prioritized. As with the R&D main board, no more than two issues that could not be solved at the meeting may be brought to R&D management. Although there are often a tremendous number of issues, only the two with the highest priority can be chosen.

As work habits change, meetings become short, regular, vital and productive. They have a rapid, exciting cadence. Before each meeting, project members update all charts and action items. Agendas are very

detailed and pertinent, with strict control over time. Individual accountability includes a weekly report of the current situation, and as issues are raised, the meeting generates clear decisions and agreements. Cutting waste from meeting time is a relief to everyone.

Changes that Make Everyone Happy

Most people feel they receive too many e-mails. Some are not read right away. Then the sender e-mails to ask, "Did you get my email?" An unwanted e-mail may be forwarded to someone else, temporarily suspending the obligation to answer. Because the root cause of e-mail proliferation is a lack of clear objectives and responsibilities, the clarity achieved in the structured Oobeya meetings reduces the problem greatly.

The sub-system schedule board requires everyone to be realistic about heavy workloads. If 150% of a person's time will be required, managers have a hard time saying, "Work harder!" Tasks must be prioritized or resources added. If there is a capacity problem, it becomes an issue to be presented to senior management. People leave project meetings confident they can complete their work, not overwhelmed by impossible deadlines. Managers are confident that work will be completed when promised. Team leaders are confident that concurrency will be maintained, so they won't lose time because another team was unable to do its work well.

Quickening Visualization Depends on People

Don't make the mistake of viewing the Oobeya and boards as methods or tools that can bring great product development results by themselves. It's the human side that makes the visual product development system work. The human-side approach allowed one automobile firm to cut lead-time by 40% in a single design cycle. It has become a competitive advantage.

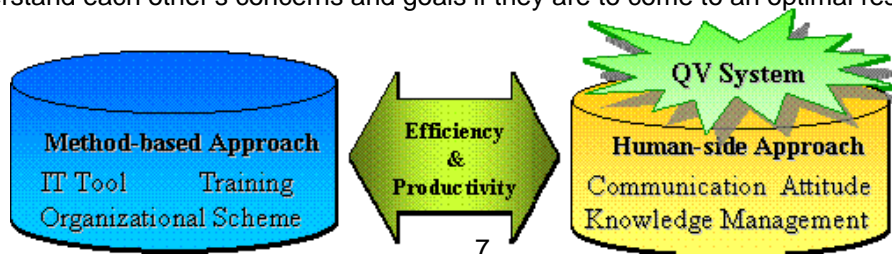
In attempts to shorten project lead-time, traditional method-based approaches look to such things as new IT systems, employee training or organizational changes. Changed methods may achieve lead-time reductions of 10-20%. In the products being designed, the focus may be on technology breakthroughs at the expense of process excellence.

What managers in such firms don't realize is that project objectives may be unclear or not broken down into specific tasks. Objectives and plans may not be shared widely enough. Employees may work without effective coordination.

In a traditionally managed firm, people working a project running past its due date have learned to expect managers to order them to work longer hours to make up lost time. People are blamed, even for matters outside their control. In the absence of trust, fear can make people reluctant to bring up problems. Management is based on fear and, as Dr. Deming⁴ warned, the results are disappointing.

The human side⁵ includes close attention to communication, the basis for knowledge management. It fosters an atmosphere of cooperation and intellectual stimulation.

An open atmosphere both in the oobeya and throughout the company is essential. All parties will need to honestly share their current situations. With team members coming from all parts of the organization, they need to understand each other's concerns and goals if they are to come to an optimal result.



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With the human-side approach, any problem is readily identified. The team, perhaps with the help of a higher-level manager, agrees on a solution, and moves forward to implement it. Fear is replaced by the satisfaction of solving a difficult problem.

The Competitive Imperative

While product development and management capabilities are already strong in many corporations, relentless competitive pressures demand that they constantly improve. The needs for rapid development and international team collaboration are not likely to go away, in the highly competitive automotive industry for example.

Summary

Method-side approaches to product development are often temporary remedies, with an upper bound on productivity gains. A human-side approach allows companies to achieve remarkable results in a short time by reforming the way people interact with each other and creating an enjoyable and thought-provoking work environment.

About the Author

Takashi Tanaka, founder of QV System Inc., has implemented visual-based product development process improvements at multinational manufacturers in Japan and in Europe, as a consultant with Japan Management Association Consultants (JMAC) Europe, and JMA Consultants, Inc. in Japan. He has served vehicle, construction, IT, electronics, chemical and fashion industry leaders. In addition, he implemented factory and dealer sales/marketing/service Visualization projects: Quickening Factory, and Quickening Sales/Marketing.

Most recently he has worked with a number of companies in the U.S. Tanaka is a frequent keynote speaker at Product Development and Project Management conferences world-wide.

Tanaka received his BS in mechanical engineering at Osaka Industrial University, and his MBA in international marketing at Oklahoma City University.

About QV System, Inc.

QV System, Inc. brings expertise in "Quickening Visualization" to U.S. firms, after the process has been used successfully in Japan and Europe. Along with the ability to implement the tools, the company uses a human-side approach that transforms work habits and organizational culture. QV System, Inc. addresses teamwork, leadership, motivation, and creating an environment for spontaneous, warm collaboration, in a system shown to produce dramatic results.

QV System is in partnership with Toyota Engineering Corporation, an independent company of Nagoya, Japan, to offer additional process improvement capabilities based on the practice of Toyota Management System. Expertise includes: Toyota Development System, Total Toyota Production System, Toyota Sales/Marketing System and technology consulting in engine, engine control, body and other vehicle-specific practices.

For more information, contact Craig Flynn, President, at +1 585 330 3262, email craig@qv-system.com

Our web links appear below:

www.qv-system.com

<http://www.toyota-engineering.co.jp/index-eng.htm>

Notes

¹ Nelson P. Repenning, Understanding fire fighting in new product development, *The Journal of Product Innovation Management* 18 (2001) pp. 285-300.

² “Quickening,” according to one source, comes from the Scandinavian “kvikr,” which means “living” or “the heart of” something.

³ Jeff Liker, in “The Toyota Way,” calls the oobeya “one of the biggest visual control innovations in Toyota’s globally benchmarked product development system.”

⁴ Deming, W. Edwards. *Out of the Crisis*. Cambridge, Mass., MIT Press, 2000.

⁵ In their book, *Product Development Performance*, Kim Clark and Takahiro Fujimoto say that hardware and software must be combined with “human-ware.” Human-ware includes the organization’s structure and processes as well as its philosophy. It encompasses the skill needed for rapid problem solving, for internal integration across job functions, and for external integration with customers. Harvard Business School Press, 1991.

Further Reading

Warner, Fara. *In a Word, Toyota Drives for Innovation*, Fast Company, Issue 61 August 2002, p. 36.

Thank you to Ms.Karen Wilhelm of the Society of Manufacturing Engineers (www.sme.org) for editing this paper.