Building Effective Product Development Teams or Integrated Product Teams

Product and process technology is rapidly evolving. Competition is becoming more global. Customers are placing an increasing emphasis on quality and reliability, but at the same time looking for good value. Speed to market is becoming a paradigm of world class manufacturing. To respond to this increasingly dynamic and challenging environment, manufacturers are implementing lean product development (LPD) concepts to reduce design cycle time and improve product value.

Lean product development is based on the integrated design of products and their manufacturing and support processes. It is not a matter of assessing manufacturability, reliability, and supportability of the product after it has been designed and making appropriate changes to the design to enhance these competitive factors. This approach extends the design cycle time, increases product development cost, and may not result in the most optimum way to produce the product. Instead, these factors must be considered from the very start of product development and designed into the product.

However, as organizations have grown in size and sophistication, personnel have become geographically spread out and the organization has evolved into narrower functional specializations to master the complexity of today's product development process. Product development teams are a way to re-organize personnel involved in product development to facilitate informal communication, sharing of requirements, constraints and ideas early in the product development cycle. The result will be the parallel design of product and process and the early consideration of the constraints and factors that impact the successful development of competitive products.

ORGANIZATION AND TEAMS

Early involvement and parallel design are key objectives of integrated product development. The achievement of these objectives is dependent upon how people work together and organize product and process development activities. As a result, organizational approaches are critical to the success of lean product development.

As a company grows larger and products become more complex, hierarchical organizations structures build to manage the increasingly large organization size, the technical complexity of the product, and the specialization that evolves to master this complexity. Another factor that occurs in organizational growth is the geographic dispersion of people and functional departments. These factors inhibit many of the informal relationships that previously provided effective communication and coordination between functional disciplines. A hierarchical organization structure with enterprise activities directed by functional managers becomes incapable of coordinating the many steps to provide effective early involvement and parallel design. Cross-functional product development teams (PDT) / integrated product teams (IPT) are a way to breakdown this organizational complexity and put together the necessary skills and resources to support more effective product and process development.

Product development teams or integrated product teams are formed with personnel from different functional departments to support the design, development and transition to production of a new product. These teams provide a mechanism to facilitate earlier involvement of the key functions that are involved in the design, production and support of a product. This early involvement is intended to result in the design and production of a product on schedule and within budget that is lower in cost, higher in quality, and more reliable and supportable.

By getting people from functions other than just design engineering involved early, this approach will result in a more complete understanding of all the requirements (external customer requirements as well as internal departmental requirements such as producibility); a broader, more balanced discussion of issues and alternatives; and a consensus approach (see Consensus Decision-Making (http://www.npd-solutions.com/consensus.html)) to designing both the product and its processes. The team concept is intended to promote open discussion and innovative thinking resulting in superior products, more efficient processes and, ultimately, a more satisfied customer. The focus of the team will be to satisfy the external customer's product and support requirements as well as the internal customer (functional department) requirements related to factors such as producibility, cost, supportability, testability, etc.

Although PDTs/IPTs will require more resources early in the development process, the result will not only be superior designs, but reduced resources over the life cycle of development to production through reduced design/build/test iterations and less effort to correct initial design deficiencies through the reviews and engineering changes. The early involvement of the affected functional areas will lead to buy-in with the design of products and their processes and result in a smoother transition to production.

A PDT/IPT is a team of people responsible for the design of a competitive product and the related processes to manufacture and support that product. The team consists of people from all disciplines that can positively impact the development of the product and improve competitive factors, not just personnel from the various design engineering disciplines.

Each PDT/IPT would be staffed as appropriate for the requirements of the project and the composition of the membership may change over time. In addition to formal team members, others in the organization may be called upon to support the team's efforts. As the organization emphasizes early supplier involvement, key suppliers may also participate in team activities either as formal team members or to consult with the team as required.

The ideal team size will be eight to ten core team members (excluding personnel that support the team efforts for relatively short periods or participate/consult for a smaller percentage of their time). As team size increases, there is more inertia in melding the team into an effective working group. In addition, more effort is required to coordinate activities and schedule meetings with a larger group of people. The number of interfaces or points of coordination increases rapidly as the team size increases (=n[n-1]/2). Yet it is important to balance this objective of a compact team with the need to obtain representation from all the functional areas that can contribute to the design of a product and its processes and improve the product's competitive factors.

ORGANIZATION STRUCTURE

It is important to define and understand the relationship of the team and team members to the function organization and the product/program organization. When a product development effort is undertaken, company management will assign responsibility for this effort to a program manager or management team. This individual or group is responsible for planning the project (budget and schedule), acquiring or coordinating necessary project resources, providing critical technical and business direction to the development effort, and monitoring the performance of the development effort.

With a small project, the project/program manager may be a functional manager, typically the engineering or R&D manager, director, or vice president. With a larger development effort, the effort required to plan and manage the project will require the full time involvement of a project/program manager.

At the initiation of the development project, the program manager or management team would develop a plan that indicated personnel required from each functional department to support the development effort. This manpower plan would be the basis for requesting personnel to be assigned to the project. Personnel assignment could be full-time for the duration of the project, full-time for a portion of the project, part-time for the duration of the project, or part time for a short period of time.

If the development effort is significant and a large number of people are assigned to the project, the product may be partitioned into modules or subsystems with a separate team established for each module or subsystem. This accomplishes two objectives. First, it allows work to proceed in parallel on the product development effort, and, second, it allows a reasonable size team to be set up for each module or subsystem. With multiple teams, there is a need to provide technical coordination of the

individual team efforts. With a small number of teams, this coordination can be provided by the program manager or management team and meetings among the team leaders. With a larger number of teams, the coordination may be provided by a separate system integration team reporting to the program manager or management team.

The responsibility and authority of the program manager and the functional managers relative to managing the development project and team activities need to be explicitly defined, otherwise there will be confusion and misunderstanding that will affect the results of the team. This delineation is also important as a basis for establishing appropriate performance objectives and preparing performance appraisals for personnel involved in PDTs/IPTs.

TEAM OPERATION

Collocation

When a team is formed, it is extremely valuable to collocate the team into a project area. This physical proximity of the team members will provide a number of benefits. It will allow interpersonal relationships to develop more quickly leading to more effective and timely communication of information. This proximity will provide a greater opportunity for feedback and discussion of the design requirements and design issues. Collocation facilitates better coordination and results in less demanding infrastructure requirements (e.g., document distribution, meeting room requirements, local area networks, workstation and software requirements, etc.). Finally, it allows more rapid response to issues and enables processes and tasks to be streamlined.

Team Leader

A team leader needs to be appointed for each team. The team leader is not the manager of the team, but can better be described as the chairman, facilitator, or coach. This distinction is important for the team to effectively operate in a balanced, self-directed way. The role and responsibilities of a team leader are described in Team Leader Responsibilities (http://www.npd-solutions.com/leader.html).

Planning

In addition to organizing itself, one of the first steps for the PDT/IPT is to obtain a thorough understanding of the task at hand. They need to understand the project objectives, the specifications/customer requirements, design targets, cost, and schedule. This information should be provided to the team(s) by the program manager or management team, and the team(s) must thoroughly review these requirements and raise any questions or issues before they proceed. While the project goals will always be aggressive, the team must “buy-in” to these goals.

Team Building

As teams are formed, there is a need to recognize the interpersonal dynamics that exist in an effort to make the team process effective. People assigned to the PDT/IPT will represent a variety of personalities and styles. The different perspectives that the people bring to the team can enhance its vitality and creativity. However, team members need to have or develop a basic orientation towards working in a team environment and toward group problem solving.

Underlying the PDT’s/IPTs tasks are interpersonal dynamics which can severely affect the team’s performance. Most people have spent the majority of their career performing tasks as individuals with specific assignments outside of a team or group structure. Many will never have participated in a team or group other than serving on a committee – which is a very different concept. It is important to recognize this fact and understand the barriers that need to be overcome and the stages of growth in moving toward effective team operation. PDTs/IPTs will typically go through four stages of development in moving toward becoming productive groups: forming, storming, norming, and finally performing. This interpersonal development process can take several months.

Empowerment and Self Direction

Functional department managers should empower the people assigned to the PDT to represent the department’s interests as the individual serves on the team. This implies that qualified people will be assigned to the team. By empowerment, as the individual serving on the PDT is part of a consensus decision on a design approach or issue, that individual is committing his or her functional organization to support that design approach. Functional department managers should avoid second-guessing or having to review every action taken by their PDT/IPT members. However, functional department managers can and should provide guidance and direction to the PDT/IPT members assigned from their department as those team members seek this guidance.

Teams should be self-directed. This will maximize the contribution of the team members. It provides a mechanism for balanced, consensus decision-making without undue outside influence which might bias the result and without second-guessing which disables the concept of empowerment. Empowerment and self-direction lead to greater motivation, ownership and development of each individual’s capabilities.

The team concept is not without challenges. Many organizations are only beginning to develop the experience to operate teams effectively. Functional managers used to operating in a hierarchical organization can feel threatened by self-directed teams that appear to work outside of their control.

Other Requirements

Effective teams require a significant investment in training. This includes team building training (http://www.npd-solutions.com/teambldgws.html) or a team launch workshop (http://www.npd-solutions.com/teambldgws.html), cross-functional training, training in various integrated product development techniques such as DFM (http://www.npd-solutions.com/featuredworkshops/dfmws) or QFD (http://www.npd-solutions.com/featuredworkshops/qfdws), and minimal technical training to allow the non-technical members to effectively participate in product and process design.

Performance measurement/appraisal systems and reward and incentive systems, such as compensation adjustments, need to be re-oriented away from rewarding individual achievement of departmental objectives and toward measuring and rewarding team performance in achieving enterprise objectives. If this is not addressed, it can undermine the effective operation of a team.

A positive culture oriented toward continuous improvement and team-based approaches must created. Management must provide leadership and define the required culture. Management needs to guide this move toward effective product development teams by explicitly defining roles, and responsibilities of team members, functional managers, and program managers.

SUMMARY

Lean product development concepts are not radically new and different. In many ways, these practices reflect the smaller, less formal organization of the past where people knew each other, communicated effectively between the various functional departments, and coordinated their activities with relatively little effort. However since technology has advanced and become more complex, a return to the yesteryear is not feasible. Lean product development concepts represent a modern day approach to addressing the complexity and technology associated with today’s new product development.

The greatest challenges exist not in implementing new techniques, business practices or technology, but in overcoming the organizational barriers and the resistance to changing the way things are done. As new products and speed to market become crucial in achieving competitive advantage, the use of lean product development concepts as a basis for new product development will become essential.

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