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## Penn State Smeal CMTOC: Forty-Ninth Meeting

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### "Parts Reuse: Its Critical Role In Reducing Product Development Cost And Cycle Time"

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IBM lost \$8 billion in 1993. This was mainly due to increased price competition, which IBM had not experienced very much until the 1980s. IBM soon discovered that its development and manufacturing costs were so high that it was actually losing money on every sale. Its initial response was to reduce staff, but the employee severance packages did not encourage the departure of those whom the company wanted most to leave.

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IBM revised its business model in light of the new competitive dynamics. A major premise of the new model was that high margin opportunities would be found more in software than in hardware. However, in order to fund software opportunities, IBM had to become much more productive in its hardware businesses. Productivity enhancement in hardware could come from the product development process and from centralizing procurement so that the company could have greater leverage with its suppliers.

[Structure](#)

IBM hired consultants to help it develop key metrics to benchmark against best-in-class. This led to thorough re-engineering at all core processes, e.g., order fulfillment, product development, supply-chain. Each core process was led by a Business Process Executive. This was leveraged across product/service areas (which in turn were led by Business Information Executives), and supported by IT and related applications. Product development included integrated product development teams, and a detailed product development process with process definition and operational steps.

Analysis revealed a great need for consolidation of multiple data bases. This impeded plans for collaboration with procurement. Also, each unit had created its own parts selection system that included part numbers only and no parametric data. No one was responsible for maintaining a common database. The same problem applied to bill-of-materials in PDM systems. IBM started with a single PDM system, but it eventually evolved into many separate systems. When engineers in manufacturing manually entered engineering changes, they were not communicated to the PDM. There was no common repository for parts data so that any engineer could get access to it.

The benchmarking studies showed that IBM's ratio of development expense to revenue was twice that of the best-in-class. Its time to market varied between 1.25 and 2 times that of best-in-class. The starting point for improving this situation was to increase its reuse of parts. After eliminating non-active part numbers from its database (90%), IBM discovered that reuse of remaining parts (540,000) was less than 2% in all divisions. Its legacy systems were too outdated and mismatched for the consolidation task that was required.

IBM was not traditionally a market-oriented company. It focused primarily on technology rather than customer needs. This was especially not appropriate in a mature market. Now a high-level Integrated Product Management Team (IPMT) focuses on the customer and on competitor's offerings. The IPMT does a thorough market analysis and, if a new product idea looks promising, it charts a Project Development Team (PDT) to carry-out a six phase product development process. If the PDT completes the concept phase successfully, it receives funds and the approval to move forward. In the past, 25% of projects were killed later than this phase, which was very costly. Many tools have been developed to help the IPMT and PDTs carry out their respective

responsibilities. PDT tools such as Business Management Work Bench are driven by Microsoft Project. Pipeline Management is another tool to help assure that key human resources are not overloaded during the phases. Engineers are able to develop realistic product cost estimates at the end of the concept phase by accessing parametric parts data from its PDM (Aspect), cost data from its ERP, and working with its only remaining MCAD system, CATIA. It can put the most updated BOM on EGInet for suppliers to evaluate.

Work is currently being conducted to further reduce cycle time by integrating MCAD and ECAD (Cadence) databases so that electrical specifications and card size can be co-designed and the BOM has the latest ECs available. Also, as IBM contracts out more card assemblies to suppliers, it is valuable for IBM to have web portal access to the BOM that suppliers prepare for parts. IBM can usually buy components cheaper than suppliers can. The BOM may show which parts IBM can buy directly and give to suppliers. This initiative has saved IBM over \$500 million since 1998.

The Common Building Block process must start with an accurate and well-maintained parts database. The management system consists of Development Councils with key engineers who set technology roadmaps for particular products (PDTs execute against them) and Commodity Councils (Procurement led) that set targets for parts reuse and parts reduction in the concept phase and commit to them in the plan phase, as well as to cost and schedule. There are tools in place to measure if the PDTs meet the targets. The Aspect database is used for parts selection. The Commodity Council identifies preferred parts that PDTs should use, and negotiates with suppliers for prices and quantities for such parts. The Development Executive Council (VP Development World wide) guides all lower level councils. They will subsidize a unit that alters its design to accommodate a parts reuse need for another unit. They also make sure that design is in synch with the technology roadmap.

The Aspect database is one of a set of common tools that has produced benefits in parts preferredness, manufacturing cost, procurement, warranty cost. Design and development council members have monthly conference calls and quarterly face-to-face meetings. All unreleased parts are entered into the database as early as possible, so that engineers worldwide know about them. Aspect and SAP have a common naming convention. Aspect is also integrated with the CAD database, so that a part can be located in the common worldwide repository and made available for CATIA. A team makes sure that the database is maintained, i.e., all electrical and mechanical databases are up-to-date on engineering changes and preferred parts for IBM and supplier parts. Hardware development tools include the ability to assess projected cost from a BOM and percent preferredness.

IBM has reduced its active parts from 540,000 to 280,000. For some metrics, the development process has improved 10X. By 1997, IBM's time-to-market and E/R development costs were equal to its competitors. Wasted development dollars have been reduced from 25% to less than 1%. Warranty costs have improved also. All products have 34% parts reuse and new products have 60-80% reuse. Suppliers have web-based access to designs in order to build their parts. The web is also used to achieve consistency in architecture across all business areas.

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Last modified Sunday, 07-Oct-2001 21:52:40 EDT