

View Point



Integrated Product Management

Single view of the Product for higher productivity and profitability

Sourabh Deshmukh and Jagmeet Singh

“The complete flow of information about each product over its lifetime develops into a parallel supply chain: an information supply chain (ISC) that describes its physical counterpart in precise detail. The ISC is the source not only of a company’s leverage within its industry, but of future products, services, and profitability. A company’s survival depends on how it manages the information in this supply chain.”

The challenges facing today's high-tech manufacturer

Emerging and converging technologies continually redefine the high-tech playing field. New-product proliferation and shrinking product life-cycles have intensified competition, while making fast-expanding product portfolios more difficult to manage. Distribution channels have multiplied and profit margins have dwindled.

High-tech has become a buyer's market. Today's consumers have unprecedented access to pricing information. The build-to-order (BTO) business model gives them new levels of control of the purchase process. And, there is rampant growth in the number of competitors in most sectors.

For the vigilant manufacturer, the time has come to work smarter, not harder. As more and more supply chain functions are supported by a growing number of stand-alone applications, competitive advantage goes to organizations which:

- Establish a robust system to manage and support a collaborative approach throughout a product's lifecycle – by the integration of information and processes across designers, manufacturers, suppliers, distributors, sales forces and even customers.
- Making information from disparate, function-specific applications accessible so that anyone involved in a product's lifecycle can productively use it.
- Provide a comprehensive and holistic view of the product throughout its lifecycle so that any relevant person can look for opportunities to increase competitive advantage.

Infosys believes a manufacturer can implement just such an information-sharing and process-optimization system to enhance both productivity and profitability, through Integrated Product Management (IPM)

What makes product lifecycle management so complex – and so vital?

As you can see in Figure 1, the lion's share of a product's lifecycle costs – about 75% – is determined in the initial design phase. Thus, the decisions during conceptualization do more to determine your profit opportunities than at any other point in the lifecycle.

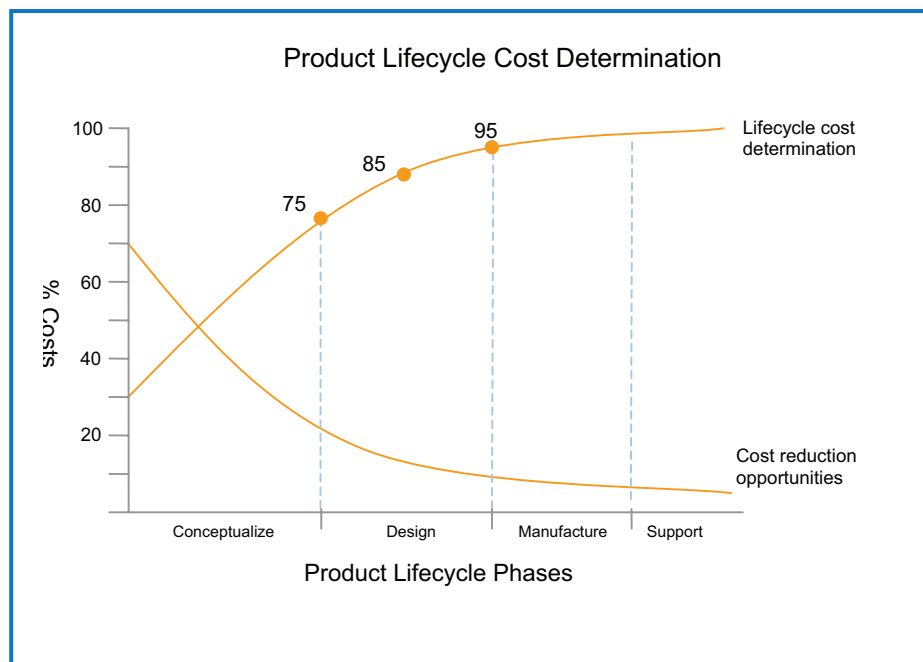


Figure 1: Lifecycle cost determination¹

¹"The Value of PLM and How to Get It" by Kevin O'Marah and Michael Burkett, AMR Research - April, 2003

But do these designers have all the relevant information to formulate their design decisions? Do they have production information to help them assess the cost-effectiveness and reusability of their material choices? Do they have the feedback from tech-support about the design flaw that gave users the most trouble? Do they have input from the customer relationship management (CRM) about the features that the most profitable customers are asking for? Do they have the parts-availability forecasts from suppliers that could influence the time-to-market? Do they have access to all the latest regulatory-compliance mandates from Legal?

These are just a few of the myriad data-points that can influence the productivity of the design process. And that's just the very first steps of the product lifecycle. A typical high-tech product goes through the following major stages in its lifecycle:

- Introduction, or New Product Development (NPD)
- Modification, including upgrades, or Product Sustenance (PS)
- Obsolescence, or Product Phase-out (PPO)

Then there are sub-stages. For instance, NPD involves design, prototyping, modification, supplier ramp-up, and manufacturing ramp-up. And each of these sub-stage functions is supported by its own discrete applications, e.g., the Design group uses computer-aided design (CAD) and product data management (PDM); the manufacturing department uses computer-aided manufacturing (CAM) and manufacturing execution systems (MES); the supplier ramp-up employs materials requirements planning (MRP).

There was a time when the product lifecycle was so elongated, that all these sub-stages occurred, one after another, in very linear fashion. There was enough time for the designers to create their vision of the new product in an information vacuum, and then go through several iterations as their first prototype went through analysis and assessment further along the line.

But that time is past. Now, the product lifecycle is compressed into a fraction of the time it once occupied. A product can move “from cradle to grave” in less time than it once took to simply get the product to market in the first place (Figure 2).

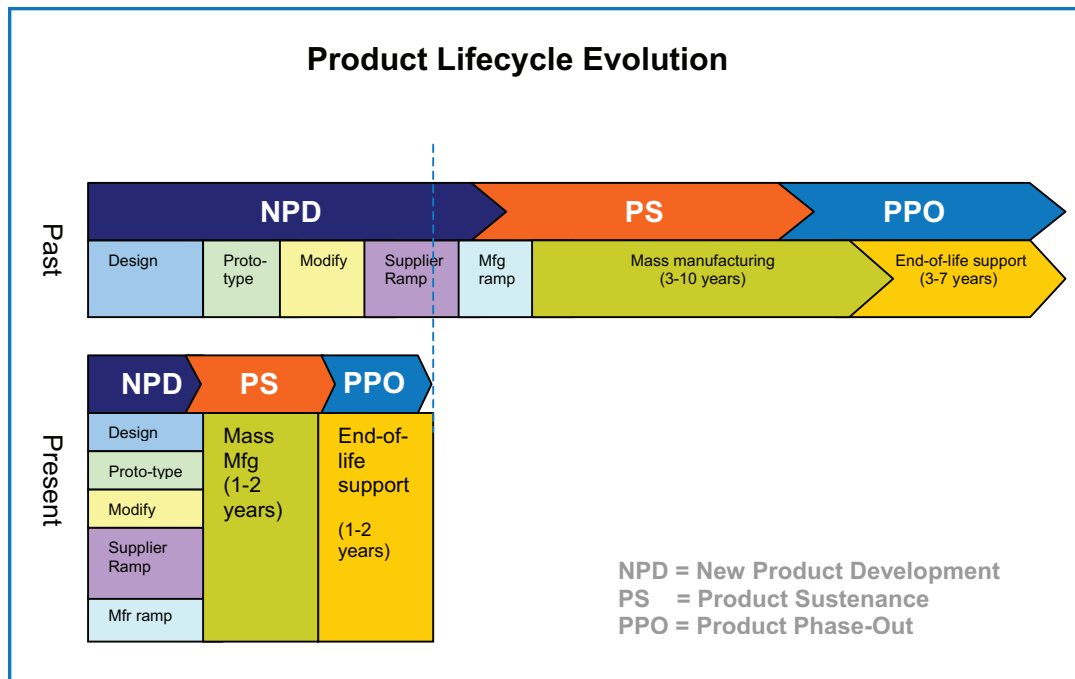


Figure 2: Product lifecycle evolution²

²Adapted from: “Solectron – The world’s premier facilitator” - Dr Ko Nishimura, MIT, 2001

In these foreshortened product lifecycles, functions overlap by necessity. Design, prototyping, modification and supplier ramp-up are all happening simultaneously. This telescoping of functions makes it imperative that processes – and corporate cultures – be adapted to create a collaborative, real-time-communications environment. With the increased time-to-market urgency, companies can not afford the information-impooverished false steps that lead to multiple iterations of the design process.

The need for fully integrated product management is exacerbated by a range of factors that have increased the complexity of the marketplace:

- **Product-line extensions** – Increasingly tighter market segmentation has led to narrower differentiations in product models in order to offer “exactly” the right product for a specific target market. A product line that had only 3 models ten years ago, may have 17 models today.
- **ATO/BTO business models** – These strategies may provide competitive advantage at the point of sale, but they also lead to the explosive growth of product configurations.
- **Supply-chain evolution** – At the same time that the globalization of manufacturing has added cultural, language and distance complications to communications, the compressed product lifecycle has added performance and productivity pressures throughout the supply chain.
- **Product complexity** – Emerging technologies, the bells-and-whistles approach to product differentiation, and low-contact distribution channels like the Web have led to a greater need for after-sales support and more customer feedback on design flaws.
- **Accelerated obsolescence** – Product proliferation at the front-end of the product lifecycle leads to quicker turnover at the back-end, which increases the end-of-life (EOL) burdens of product/parts recycling and hazardous waste disposal.

Adjusting to all these complicating factors has led to a surge of interest in product lifecycle management (PLM) to increase efficiencies, reduce costs and improve customer satisfaction. But do the conventional approaches to PLM deliver everything today's high-tech manufacturers need to optimize their competitive advantage?

The inadequacies of conventional PLM

In the conventional approach to product management, a manufacturing company tends to integrate the upstream applications that are largely involved with the product design function – e.g., PDM, CAD, CAM – with enterprise-wide applications such as enterprise resource planning (ERP). The reasoning behind such narrow initiatives is obvious: there is significant pre-existing investment in these design applications, so the first move is always to leverage that investment by optimizing its performance. This makes sense on another level: 75% of the cost-determination occurs in the design phase. So improved efficiencies in the design function bring an immediate return on investment (ROI).

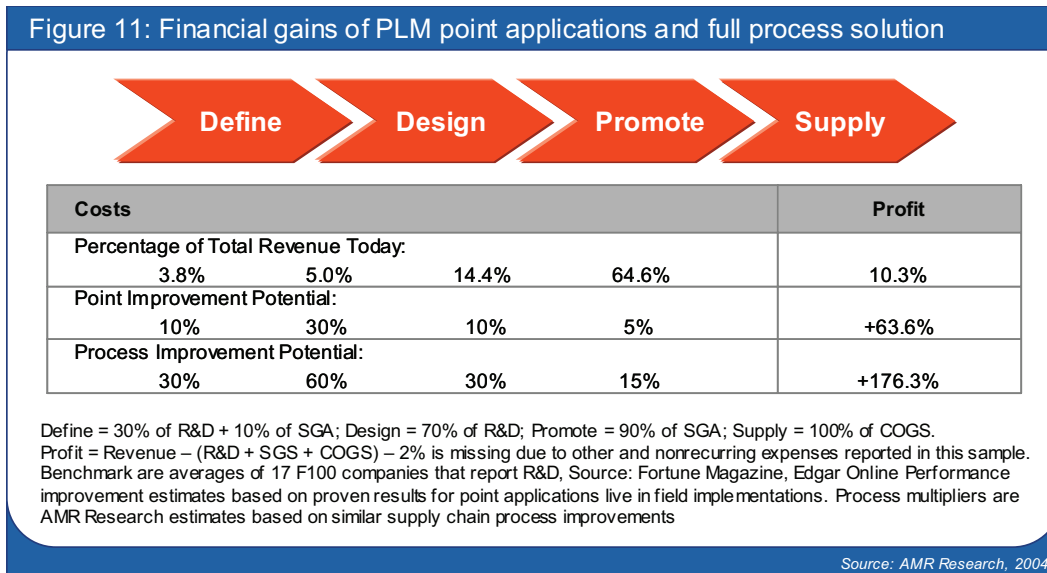
But such an approach has several limitations:

- **Too design-centric** – For one thing, there is still another 25% of cost-determination that happens outside the design function. But more important, addressing issues in the design process as a standalone function ignores all the efficiencies that come from cross-function information-sharing. A more efficient design process does not optimize ROI if the design team doesn't realize that a particular design modification can address all the consumer feedback and get product to market a year earlier than a total redesign. And it totally ignores the potentially critical bottom-line issues of returns management and EOL support and recycling in an accelerated lifecycle.
- **Too application-centric** – Business has become so application-dependent that conventional approaches often think the solution lies in simply making the applications work better. In product lifecycle management, however, the greatest ROI is not in improving the efficiency of the applications, but in improving the efficiency of the product lifecycle as a whole. Another deficiency is that the conventional approach may add new applications. But adding applications without fully integrating them with legacy applications, and the processes they support, merely exacerbates the problem.
- **Too function-centric** – A conventional approach that aims to improve functional operation ignores the less obvious, but no less critical, value to be gained by enhancing processes and data-sharing across functions and partners. Even the most efficient design team is going to cost you money if they are working without full and interactive input with other players in the product lifecycle, e.g., materials procurement, marketing, customer support, manufacturing.

What makes the Infosys approach to IPM different?

Infosys has found that a truly integrated product management solution must fully address far more than functional improvements in the design phase. The best IPM solutions integrate the applications, the processes, and the people – across functions and throughout the product lifecycle.

A fully integrated IPM solution is not merely a good idea – it is a highly profitable approach. Profit potential from an IPM solution that integrates processes as well as applications is far greater than that of improving point applications alone. AMR research reports that “Best practice in functional silos is good, but not enough – 90% better new product development and launch is possible”. Further it states “Cost savings count, but tripling profits depends on raising the bar across processes”.³



Infosys also recognizes that the most effective IPM solutions blend integrated information-sharing with integrated operations. This means implementing a data repository and knowledge engine that enable and support such cross-functional, information-driven activities as:

- **Data extraction and analysis** to allow customer input, across all channels and departments, to help target design flaws and the development of desired features more accurately.
- **Decision support** to make more effective, and ultimately cost-efficient, decisions on whether to develop an entirely new product or simply go with a modification.
- **Business analytics** to provide the metrics to optimize performance and efficiencies.
- **GAP analysis** to facilitate NPD programs by providing more dependable assessments of the relationship between product requirements and limitations.
- **Workflow enhancements** that model business process, rather than design processes, in order to achieve far greater efficiencies through cross-function collaboration.
- **Knowledge reuse** to make all the cradle-to-grave activities along the lifecycle more efficient by avoiding “reinventing the wheel.”

³“Unmanaged R&D Spending is the Leak that Shareholders Want Plugged” – AMR Research, Feb 2004

Consider the new customer loyalty strategies that such an integrated approach could bring to Integrated Service Management (ISM), for instance. If you are an OEM who has sold an extended service contract to a customer, you could automatically monitor the customer's experience with your product over the life of their service contract. If there are wear-and-tear tendencies for that product that haven't occurred, you could send out a notice just before their contract expired, suggesting they take the product to an authorized service center so that expected repairs and replacements could be made before the product was out-of-warranty. Then you could see if those repairs were done and offer one of a range of service-contract renewal promotions, depending on what your business analytics suggest will be most profitable in terms of both generating immediate revenue and building customer loyalty.

Another advantage with your ISM program: imagine there is an equipment failure that starts cropping up with that product. With an integrated IPM solution, you would know what circumstances are most likely to produce that problem and send out a customer bulletin. You would also know the quantity of that product had been sold, what percentage of them were experiencing the problem, and if there were some regions of the world that showed a higher rate of failure than others – all of which information would help you more accurately manage your spare parts inventories more accurately in order to be both most cost-effective and more responsive to your customers.

When you have full integration across functions, applications and processes, information flows seamlessly across the supply and demand chains – from customers to suppliers to product designers. Operations are coordinated for greater efficiency across functions – sales & support, marketing, distribution, engineering & design, sourcing. And, providing a single view of the product to everyone involved with it provides more opportunity for profitability throughout the product's lifecycle.

The Infosys approach: The process perspective

To integrate processes, it is necessary to adopt a process perspective to the product lifecycle. And the first realization that comes from a process perspective is that, in a compressed product lifecycle, processes are no more linear than functions are anymore.

For example, let's say you manufacture a handycam that has problem with a switch. With a typical linear process, customer service would fill out a problem report, which would go to a separate analysis group for triage, who would then send their analysis on to product manufacturing, which would do a root cause analysis: is it a design problem or a materials problem? They would then report their findings the appropriate department, which would address that specific problem. While this approach may ultimately solve the problem, it fails on at least two counts: it is time-consuming and it addresses only the specific problem reported.

If an IPM system were in place, however, the process would go more like this: The problem would be reported on the intranet so that people involved with the product could look at the problem description and start thinking about solutions from their unique perspective. Sourcing might check with their suppliers to find out if they had reports from other manufacturers about the problem and what the most satisfactory solution had been. Data analysts could do a more sophisticated analysis of the customer feedback to see whether the problem was in the mechanics of the switch, the ergonomics of the switch, the interaction of the switch with other mechanisms, or perhaps even in expectations of the consumer. NPD designers might look at the situation as an opportunity rather than problem: if the switch needs to be redesigned, can we also add some emerging functionality to add value?

Findings and recommendations from all interested parties could be shared across departments, e.g. if data analysts discover an issue with the mechanics of the switch, that could be simultaneously reported to design, procurement and manufacturing for their respective recommendations on solutions. Instead of a single solution being generated by a single function at the end of a long series of handoffs, several solutions might be developed from several sources in a shorter period of time. The result could be that the problem will be fixed...and money saved through using a different supplier...and competitive advantage gained by a installing a just-on-the-market, more user-friendly switch...and customer loyalty increased by a showing quick response with an unexpectedly elegant solution.

A process perspective is characterized by three traits:

- **Multi-point feedback** – In the case of the handicap, the service department would report the reason for product returns, but there could also be long-form anecdotal data generated on the manufacturer's Web site or 3rd-party customer forums.
- **Collaborative communication** – Communication that occurs across functions, e.g., design, production, customer service, generates a more comprehensive appreciation of the problem, resulting in solutions derived from a richer perspective of both the challenge and the opportunity in the situation.
- **Multi-use feedback** – A customer complaint no longer means only that there is a problem to be solved. Every customer complaint is as much about an opportunity as a problem. What started as a request for a repair could turn into an idea for a new product. When a customer specifies a function or part that doesn't exist today, it is a prime opportunity for you to gain competitive advantage by being first-to-market with a desirable feature.

By integrating processes into a PLM solution, Infosys believes a manufacturer gives itself the ability to work more efficiently as well as more productively.

The Infosys approach: The application perspective

Since applications are the means through which people do their work, productive collaborative processes cannot be implemented and encouraged until applications are integrated. Once applications are integrated, however, the benefits can accrue for collaborations happening both within an organization and across partnerships.

Collaboration within an organization

Collaborations within a function, such as collaborative design, already occur to some degree with conventional product management solutions. With IPM, however, you pave the way for collaboration to occur among a wider variety of stakeholders, above and beyond intra-function collaboration. For instance, NPD designers can involve the marketing department and its insights into customer psychographics, as a means of more quickly and efficiently coming up with a product design that will appeal more strongly to the target market.

Collaboration across corporate boundaries

As outsourcing has become a more accepted and productivity-enhancing practice, the definition of core competencies to be kept in-house is continually in flux. A comprehensive IPM solution allows a company greater latitude in how it collaborates with its outsourcing partners.

For instance, a computer OEM may have contracted production to an Electronic Manufacturing Services (EMS) provider as a desirable least-cost option for its lean-production business model. With old approaches to product management, the OEM would dictate the specifications developed by its design team and the EMS provider would simply fulfill the production role in a very rigid and constrained relationship.

In an effort to grab a larger "share of lifecycle," however, the EMS provider may start migrating toward a role as original design manufacturer (ODM), offering designs that it has tested for cost-effectiveness and a more streamlined EOL process. The OEM can better enable this migration with an IPM solution that creates a common frame of reference through which the OEM and EMS provider can operate. As a result, the EMS provider is able to expand its business model and footprint in the creative process. Meanwhile, the OEM benefits from even lower-cost product development and a more nimble design process through the use of the EMS provider's design templates. It's a classic win-win situation enabled by IPM.

The Infosys approach: The data perspective

Of course, for applications to be integrated, the data sets need to find common ground. This is easier said than done: there is a long history of applications being designed to generate data sets that effectively limit access by means of exclusive, function-specific jargon. Data sets, like their applications, are generally developed for a specific user group, not the entire supply and lifecycle chains.

In Figure 4, however, you can see how bill-of-material (BOM) can provide a common data set that can easily translate across functions and applications.

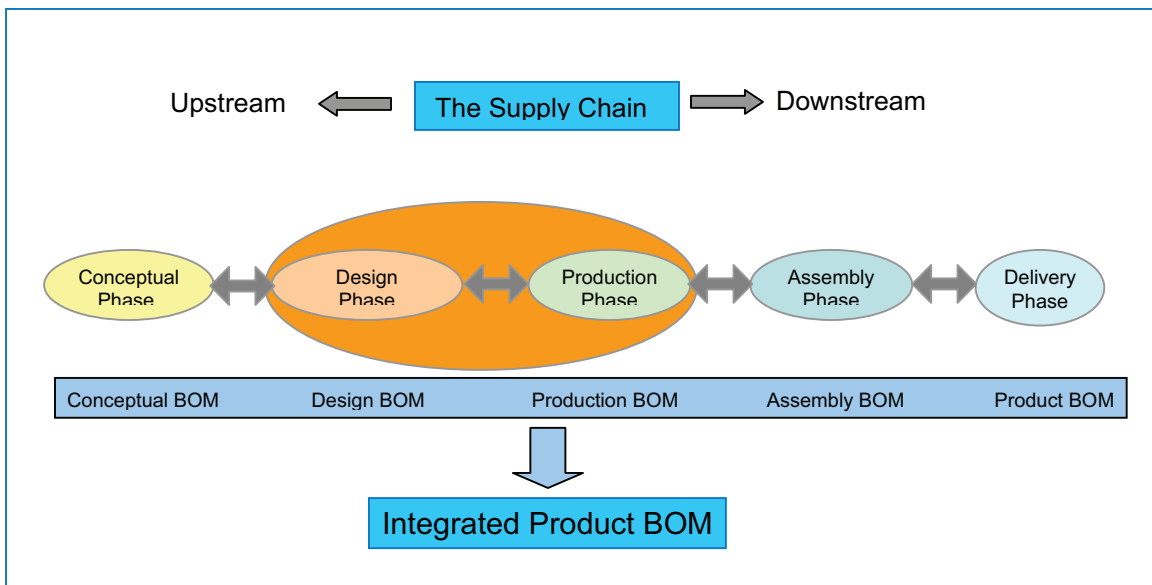


Figure 3: Integrating data sets, using Bill of Materials

Any information that results in a design modification in the product-development loop will ripple through the supply chain, thus updating the Integrated Product BOM. In an IPM environment, the objective is to extend such integration to all the processes and applications that are running concurrently, thus providing an integrated view across the supply chain.

Using BOM, you can create the desired “single view” of the product that minimizes the silo-ing of people and processes. This facilitates the communication of input from stakeholders outside the supply chain who might add value, e.g., EOL management input into the design group regarding preferred materials choices and recycling mandates.

IPM in action

Infosys believes that IPM implementation will offer extraordinary benefits across the product supply chain. While none of these examples fully demonstrate how a comprehensive, cradle-to-grave program would operate, they provide a good indication of the power of such similar implementations.

Port re-use at a high-tech OEM

This large global OEM developed a parts database as a component of their supplier-relationship-management application. Engineers search the database before creating original part designs through an integrated new-part-generation application. As a result, intradivision part reuse has grown from 2% to more than 30%, annual part-number-reductions range from 20% to 38% and year-to-year savings have been as high as US\$240M.

Packaging vendor strategy and artwork collaboration

For this top CPG company, new product development also involves new packaging development. Devising a dual-vendor PLM strategy, the company has claimed savings of hundreds of millions of dollars. They have reduced plastic molded colorant costs by 20%, adhesives by 15% and, by improving collaboration on artwork and packaging among 6000 users (from marketing, design, manufacturing and the supplier base), they have reduced time-to-market by 20% to 30%.

Time-to-market reduction at a major auto manufacturer

Integration efforts at this automotive company since 1995 have reduced development applications from 1500 to just a few hundred, and portals from 150 to just 1. Real-time digital access to vehicle design information and digital mock-ups has reduced the need for creating US\$500K physical prototypes. As a result, the player has reduced their time-to-market by 30 months and been able to cut its global development budget by 35%.

In the final analysis

Because it operates so pervasively within a company, integrated product lifecycle management can be a challenging undertaking. But it also promises to have a dramatic impact on how productively and profitably a company operates, by virtue of that very pervasiveness.

Infosys believes that you can build a highly effective IPM solution on the back of your current systems and begin reaping the benefits of:

- Addressing all product-development and portfolio-management needs by operating with an integrated view across different functions.
- Shifting from a function-centric perspective to a more holistic focus that encompasses business processes and applications.
- Unleashing the creativity and tremendous efficiencies of cross-function collaboration.
- Reduced time-to-market and increased customer-responsiveness.

To significantly improve your odds for success, Infosys believes you need to find the right mix of technology, process change, and consulting savvy. Only by doing so, can you implement solutions with the high level of predictability needed to deliver the full operating-efficiency and financial advantages of integrated PLM.

About the Authors:

[Sourabh Deshmukh \(sourabh_deshmukh@infosys.com\)](mailto:sourabh_deshmukh@infosys.com) is consultant in Manufacturing and Supply Chain group, Domain Competency Group with Infosys Ltd (NASDAQ: INFY). Sourabh has over 5 years experience in fields of procurement, vendor management, manufacturing process audits and holds Masters Degree in Industrial Engineering from Texas A&M University.

[Jagmeet Singh \(jagmeet_singh@infosys.com\)](mailto:jagmeet_singh@infosys.com) has 6 years experience in the areas of CAD, FEA, PLM and ERP-SAP. He has extensively worked in the automotive and aerospace domains for international clients and has been involved in PLM implementations for Fortune 500 clients.

Further Reading:

1. “PLM Coming of Age: ERP Vendors Take Notice”, P.J. Jakovljevic and Jim Brown in Technology Evaluation.com - July 2004
2. “Optimize: The Metamorphosis Of Information”, Larry Downes, June 2002
3. “The Value of PLM and How to Get It”, AMR Research, April 2003
4. “Unmanaged R&D Spending is the Leak that Shareholders Want Plugged”, AMR Research, Feb 2004

Infosys Hi-Tech and Discrete Manufacturing (HTDM) Practice

The Infosys HTDM Practice delivers business solutions to Fortune 500 clients representing all parts of the Hi-tech and manufacturing value chain, spanning from semi-conductor manufacturers to OEMs, value-added resellers and distributors, software products and service companies and other discrete manufacturing companies. Infosys provides services that cover business process conceptualization, process engineering, package selection and implementation, application development, maintenance and support, infrastructure management, product engineering and business process outsourcing. To meet customer needs, Infosys leverages strategic alliances with our partners including IBM, Informatica, MatrixOne, Microsoft, Oracle, Sun Microsystems, TIBCO and Yantra.



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