Aberdeen*Group*

Collaborative Product Commerce: Delivering Product Innovations at Internet Speed

A new revolution is starting, involving the way leading-edge discrete manufacturers develop, build, and manage the products that are their lifeblood. Having first improved internal efficiencies through innovative software like Enterprise Resource Planning (ERP) and data mining, the industry leaders then gained synergistic advantages of size through acquisitions and mergers. Where consolidation did not make sense, Supply Chain Management (SCM) improved the effectiveness of entire supply nets. And to establish and maintain external customer delight, Customer Relationship Management (CRM) software has become a requirement for just keeping up with the competition. So what is next?

Aberdeen research shows that a new category of software, Collaborative Product Commerce (CPC), is now emerging, allowing discrete manufacturers to once again distinguish themselves on their products and innovations. In other words, CPC permits discrete manufacturers to significantly improve the core processes around the management functions associated with the complete product life cycle that are the basis of their existence. Discrete manufacturers that can successfully implement CPC and gain the benefits will be in a position to dominate their industries in ways that their laggard competitors cannot.

Executive Summary

Discrete manufacturers are under pressure from customers (and the market) to move away from the traditional *make-to-stock* production model to a *build-to-demand* model. Many customers are no longer satisfied with mass-produced goods — they are demanding customization and rapid delivery of innovative products. Aberdeen predicts that manufacturing executives will demand CPC tools to enable their organizations to respond to these commercial market pressures. Collaborative Product Commerce (CPC) is a new category of software and services that uses Internet technologies to tie together product design, engineering, sourcing (including manufacturing and purchasing), sales, marketing (and other staff functions), field services, and customers into a global knowledge net. The major benefits of CPC for discrete manufacturers are:

- *Innovating with products customers want and sourcing can deliver:* The collaboration aspect of CPC software and services allows multiple enterprise constituents and customers to participate on a real-time basis during product design — thus, islands of knowledge can be effectively brought together on a global basis. For example, a new product that is to be sold worldwide can be reviewed by regional enterprise executives for legal compliance and localized marketing issues before the design is finalized. Note that in the past this type of review would slow down the product development process, but in the world of Internet-based collaboration, it has the potential to speed it up when managed properly.

- *Customers can directly interact with the system:* They can define their case-by-case product specifications that are unique or have high engineer-to-order content. The customer directives are then translated into all the required documentation, drawings,

sourcing information, etc., to support the manufacturing of the specialized product that a particular customer needs.

- *Tying together the multitude of heterogeneous and geographically dispersed computing systems* used today to create, build, and service a product without requiring the enterprise to scrap those systems and start anew. Using the Internet technologies upon which CPC are based will extend their useful life — and therefore provide the major benefit of leveraging the knowledge developed over many years by the enterprise's (and its suppliers' and their suppliers') key product experts. Working in tandem, the collaborative whole will be more powerful than the individual contributors who must now work on a serial basis.

- *Faster time to market:* As studies have shown, the sooner a new or enhanced product can be brought to market, its product life cycle profitability potential is greater; it delights customers to a higher degree; and it gives competitors major headaches as they are faced with the choices of losing market share, innovating on overtime, or cutting price.

The technologies that are making CPC possible have been developed during the last two years, as the Internet has become a major force of change in the way business is conducted. These technologies include:

- High-speed, reliable, secure communications to every relevant product expert's desktop;

- Browser-based, standardized User Interface (UI) access to product development data and applications;

- Java and other object-oriented technologies for write-once, deploy-to-many device-independent applications;

- URL-style location transparency that allows enterprise application integration at a loosely coupled application and data storage level;

- Secure portals for conducting business, searching for new classes of component and service suppliers on a global basis — and inter-enterprise group collaboration;

- Server and storage high-end scalability at price-performance levels that are equivalent to less costly low-end hardware; and

- Business functions delivered as services on demand ("apps on tap") — the ability to pay for usage based upon value without actually licensing the software (or even the underlying hardware platform) has become a reality.

The technologies that are making CPC possible have been developed over just the last two years.

As a result, users do not have to move product information to those who should be actively participating in the product process life cycle. All parties who should be part of the effort have effective access to the source data over the Internet from wherever in the world they sit — hence data is always current and relevant.

Just as ERP software brought the various operating groups within an enterprise together through the sharing of common information (to compete more effectively), so will CPC dramatically change the way products are developed and brought to commercial markets. Discrete manufacturers and their information technology (IT) suppliers (software, services, and hardware) need to actively participate in this major industry transition now — or risk becoming irrelevant within a few Internet years.

Collaborative Product Commerce Defined

Collaborative Product Commerce defines a class of software and services that uses Internet technologies to permit individuals — no matter what role they have in the commercialization of a product, no matter what computer-based tools they use, no matter where they are located geographically or within the supply net — to col-

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laboratively develop, build, and manage products throughout their entire life cycle. Using a standard browser, an authorized CPC user can review information from an extended-enterprise information system "view" that operates across a dispersed set of heterogeneous product-development resources. These resources typically will reside in multiple information repositories and be derived from independently implemented and maintained systems.

A key attribute of CPC is a loosely coupled integration of data and application functionality — a unifying data model that does not rely on data commonality for individuals to collaborate.

CPC binds together all of the business functionality and resources that work within the product and process life cycle — from cradle to grave. This breadth is made possible through the use of collaborative data management structures within a CPC-based information architecture. The reality is that the industry is not moving to a common data model. But open, object-oriented interfaces from one application's data management system can be used to reference the relevant data to another application. For example, the weight of the metal used in a product can be transferred from one design application to others that might need it for tasks such as costing, component assembly, sourcing, etc. And collaborative databases can provide information about any aspect of the product throughout its entire life cycle. But all information repositories must have Internet "visibility" and be able to be universally accessed regardless of the source location to support the numerous and varied commercial aspects of the product.

CPC products can be used to build an extended enterprise infrastructure — required for the next generation of electronic-based commerce — for the collaboration of product development and management. The CPC infra-structure builds upon current platforms used for product data management, sourcing, visualization, CAD/CAM, CAE, product modeling, document management, structured and unstructured data repositories, and any other tools and services that add value to the product life cycle process. Professional services firms that understand the needs of discrete manufacturers, the new wave of CPC products, and the technologies of both the Web and integration with existing applications, will build initial CPC infrastructures.

Figure 1 illustrates how CPC fits within the context of today's enterprise application infrastructure.

CPC Solves Real Problems

Aberdeen believes the overarching benefit of CPC for the discrete manufacturing industry to be that it allows experienced, knowledgeable, commercial-savvy enterprise executives to focus on the product process life cycle. It will help enterprise executives to once again take a hands-on approach to competing on timely product innovation and product-related customer satisfaction. A fundamental problem CPC solves is that senior executives are demanding tools to allow them to become more involved with the product development and life cycle management side of their business. CPC is the first product process approach to use advances in Internet and data

Figure 1: Connecting CPC to Enterprise Resources
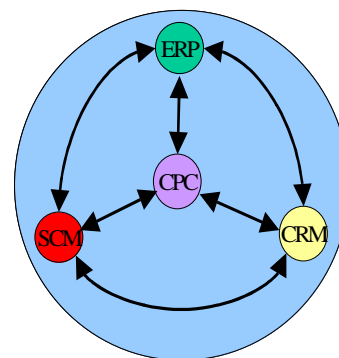
Source: Aberdeen Group, October 1999

management technologies to allow managers to directly review and visualize their enterprise's products no matter what state the product is in — or in what form the data is maintained.

Nearly 80% of a product's costs are embedded by the time that product is tossed over-the-wall to manufacturing.

Aberdeen views CPC as providing Internet-based tools that discrete manufacturers need to collapse the time it takes to turn the intellectual property of new product ideas into deliverable, commercially viable product realities. CPC also addresses the equally important issue that a product's design locks in costs that persist and cannot be removed throughout its full life cycle.

Companies that adopt CPC will be able to get their innovative products to market faster than the competition. Superior first-strike capability generally translates into market share and profitability gains vis-à-vis the competition — being first to market with a new product remains a key advantage. However, unless a continual volley of customer-driven, market-savvy innovations can be released in a timely and efficient fashion — a process that can be facilitated by CPC tools — market dominance will eventually flow to aggressive competitors. And note that in the near future a discrete manufacturer that falls behind its competitors will desperately need CPC tools to catch up and attempt to leap-frog the market leader. In short, the realities of the competitive commercial marketplace will drive enterprises to CPC relatively quickly.

Aberdeen research indicates that nearly 80% of a product's costs are built-in by the time that product is tossed over-the-wall to manufacturing. This means that no matter how efficient a discrete manufacturing enterprise is with ERP and SCM initiatives, such transaction-based applications only assist in lowering the remaining 20% of a product's cost. By Aberdeen's calculations, bringing efficiencies into the engineering and design efforts today has the poten-tial of yielding a more significant cost saving advantage over any of the downstream manufacturing-and-distribution cost savings efforts.

In addition, CPC will assist discrete manufacturers in lowering their in-the-field product life cycle costs. By designing products better and by quickly responding to customer feedback and warranty claims on product problems, discrete manufacturers will be better able to reduce the cost of problems discovered once volume shipments begin. And these costs can be substantial (including the tarnishing of a good reputation), as any manufacturer that has had to initiate a product recall can attest.

It's all about getting innovative product to market faster — exploiting the Internet to collapse time and distance.

In summary, Aberdeen considers CPC to advantageously address the following challenges for the discrete manufacturing environment:

- Executive participation: Every executive within the enterprise who is responsible for the management of a product has visibility to all information about the product, including graphical and visual, throughout its entire life cycle — from concept to retirement;
- CPC aids in eliminating unnecessary embedded costs of impractical-to-manufacture or -use designs;
- Time-to-market — more rapidly design new products and release to sourcing with fewer unanticipated show-stopper delays;
- Managing multiple layers of suppliers. Discrete manufacturers either contract with others who contract with others (you get the idea) to supply parts or they are somewhere within the recombinant supply chain themselves. CPC will allow all of these enterprise participants to collaborate during the entire product life cycle without mandating homogenous systems;

- Proactively enlisting the input and recommendations of experts who are typically locked outside the ongoing product development process because of a lack of ability to participate except during formal, time-sequenced phase reviews;
- Facilitating product information exchange: Product developers have always wanted best-in-class tools to assist them in performing their specific tasks. As a result, heterogeneous systems and data models containing a product history in electronic form cannot be easily exchanged. The industry is not going to a one-size-fits-all data model. CPC will allow individual contributors to work with their chosen tools while exchanging ideas and information with others who do not know the intricacies of their tool.

CPC Technology Supplier Categories

Both existing suppliers and new startups that "get it" will provide CPC products and services. Current application software suppliers will either modify their current products to allow for Internet-based collaboration or develop an entirely new overarching architecture populated with compatible component products. CPC software startups will first create an architectural vision; build a framework; and then attempt to recruit allies to build the content to make the framework a reality. Figure 2 depicts a logical view of the product-centric entry points — from either inside or outside the corporation — to the CPC collaboration infrastructure.

A key question for all of the CPC software providers will be "Which products do I license and which do I sell as a service?" In a collaborative environment, acquiring applications from a software supplier as a service may be more effective than licensing the products directly. This approach, commonly referred to as "apps-on-tap" — a key characteristic of next-generation commerce — would allow multiple organizations in the supply web to access the same applications while avoiding up-front or specific project-only hardware and software licensing acquisition costs.

A partial list of current types of software that will be reengineered to be part of the CPC category includes:
- Product Data Management (PDM);
- Computer Aided Design/Manufacturing (CAD/CAM);
- Computer Aided Engineering (CAE);
- Manufacturing Process Planning;
- Sourcing — Component Supplier Management (CSM);
- Manufacturing Planning;
- Visualization;
- Process Modeling;
- Field Service;
- Warranty Repair and Upgrade; and
- Maintenance Repair & Operation (MRO).

Full-service professional services firms that combine their expertise in both product management planning and the relatively new areas of designing and implementing extranets and enterprise portals will be in an excellent position to transfer these skills to the CPC market. Note that due to both the numerous collaboration links that discrete manufacturers will desire and the cultural shift required for the commercial supply net, there will be more than enough work to keep the professional services suppliers busy assisting their clients.

Aberdeen expects to see suppliers of technical workstations, servers, and the supporting infrastructure middleware and services aggressively promoting the CPC vision — and the ability of their companies to provide solutions

Figure 2: CPC Product Collaboration Entry Points
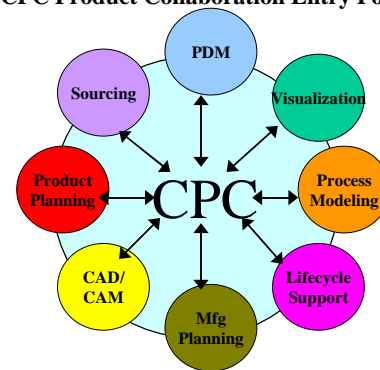
Source: Aberdeen Group, October 1999

for rapid implementation and global support.

Finally, Aberdeen has already tracked the entrance of a new kind of supplier to this market, which we refer to as "Internet product portal and content management providers." This new class of player can provide secure, neutral portal sites for all parties participating in the product development effort, as well as maintain document files and provide content (and links to other content providers) specifically tailored to the needs of the discrete manufacturing industry. Aberdeen believes that this new type of commercial entrant will be a significant catalyst in the desire on the part of design, engineering, and sourcing departments within an enterprise to implement CPC class software as quickly as possible.

Why the CEO Will Mandate CPC

Aberdeen research shows that savvy product design relies heavily on the use of components and that those components are frequently sourced from external suppliers. New product designs often necessitate changes to the supplied components. CPC presents the opportunity for manufacturers to work even more closely with their suppliers and in new commercial relationships to develop mutually agreeable (and producible) products — thereby moving innovative

Figure 3: Partner, Supplier, and Customer Collaboration

Source: Aberdeen Group, October 1999

creations into the channel faster. Aberdeen anticipates that CPC will provide the opportunity for those responsible for product integration to explore various component detail options resulting in assemblies that are easier and less expensive to produce and maintain.

CPC also addresses the need for designers to work within fabrication requirements and limitations. CPC will permit continual designer-requirements and supplier feedback dialogs to take place at Internet speeds.

With so much product-related activity happening outside the product creator's domain, the question is how to provide visibility to gain additional expert perspective.

With the many relevant issues that must be reviewed outside any one product creator's specific domain for profitably conducting business — the question is how to provide visibility and coordination of the efforts of so many players both inside and outside the enterprise. It is no longer viable to continue to architect products in a vacuum. Each of the designated participating players has valuable experience and domain expertise. All available knowledge must be brought to bear during the product development and commercialization stages — even if it requires just a minimal amount of time from an expert in a specific area. For example, fabricators can often provide valuable insight and suggestions as to how design variations might be easier or perhaps cheaper to produce and utilize in final assembly if they are consulted at various stages of product development review. Following are some examples of expertise areas that need to be involved in the product life cycle to ensure best form, fit, function, and serviceability:

- Executives can comprehensively track profitability during the product life cycle, extending beyond the costs of producing
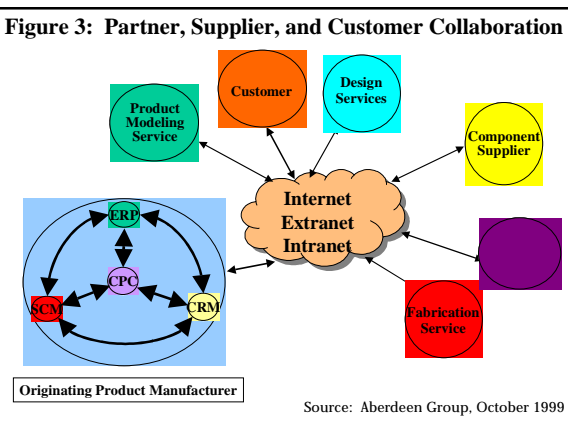
product and into the lifetime costs of supporting and retaining customers;

- Engineering and design groups can concurrently work on product-related issues using different tools and from different geographies;
- Manufacturing planning must be able to determine the manufacturability of new products;
- Strategic customers should have a say in what they desire in new product enhancements;
- Field service and product support can contribute to the process by signaling early warnings of product flaws or harder-to-service designs with real-life product practicalities;
- Sales can provide insight into the requirements of prospects and competitors' customers;
- Procurement organizations can assist with strategic sourcing requirements and vendor selection of intended component suppliers earlier — shortening the time from final design release to prototype production;
- Marketing can more easily and effectively communicate anticipated product modifications and additional understanding of the competition's offerings;
- Finance can provide cost tracking information as well as monitor project budgets and product line profitability results; and
- HR can maintain valuable skills inventory and personnel availability for project participation.

In the end, CPC involves getting all of the appropriate resources available to exert influence and provide expertise during each stage of the product life cycle.

Key Implementation and Operational Challenges

The first but perhaps least obvious challenge for the manufacturer is to strategically commit to the Internet — a commitment to explore the possibilities the universal connectivity the Internet provides. Executives must become comfortable that information can be secured and that the Web is a new channel for doing business. It will also be difficult to adjust to sharing detailed product information with partners, suppliers, and even competitors. The Internet is the catalyst driving fundamental changes in the way companies do business — embrace it and prosper.

Aberdeen research continuously finds that the single most important factor for implementation success of any significant enterprise technology-transition initiative is senior management support. Only the executive staff has the authority to quickly overcome all of the organizational disagreements and business policy trade-offs required to achieve a successful outcome in a timely manner. Any large enterprise project is fraught with potential project-delaying decisions — key executives must streamline that process. Only their direct involvement and rapid decision-making will keep the project focused and on-track to meet the goals of the board. And implementing a CPC-based information infrastructure will require this senior management attention if it is to be successful. Senior management must actively support CPC implementations with their actions — not just communiqués.

No single entity can go it alone — partnering is key.

Additionally, Aberdeen research points out that no single entity can go it alone. Partnering is the key. Here again it requires executive involvement — both from suppliers and users — to build mutually beneficial relationships based upon trust with partners in their commercial environments.

On the operational side, commercial trading partnerships are critical to achieving ongoing market leadership and above-average profitability. CPC is about bringing together all of the knowledge necessary to strengthen these rela-

tionships from a product design, development, and sourcing perspective. Everybody will make missteps in this early adoptive phase — but initial mistakes must (and can) be quickly rectified. And Aberdeen notes that CPC technology addresses some of the flexibility needs for potentially changing partners over time to maximize the commercial benefits.

CPC represents a collaborative environment. The challenge will be for someone to be in charge. That means establishing processes and responsibility entities that allow for the breakdown of organizational barriers while continuously focusing on the product.

Successful discrete manufacturers must make strategic and tactical commitments to the Internet business model.

Security will be a key issue. Because products are the lifeblood of every discrete manufacturer, there will be an emotional as well as intellectual concern about trusting so much business-critical information on the World Wide Web, where hackers, corporate spies, and disgruntled employees may try to misappropriate data. However, Aberdeen believes that security technology is at a high enough level to protect those participating in product collaboration. More importantly, Aberdeen research show that the advantages in speed of development (and time to market) and higher quality product design will be traded-off by corporate management for an increase in the risk of a security breach. Finally, the management processes that can be put in place by experienced professional services firms are more effective in maintaining a secure collaborative environment than any technology can ever be.

Enterprises must be able to institute a cultural change across their extended organizations on a global basis, as more of the product development and management process becomes visible. The enterprise culture must change from placing blame on individuals to supporting them

in making better decisions — and giving greater credit to those who make brilliant innovations. Such cultural changes will be difficult in many enterprises' engineering environments — but a new and better way of developing innovative new products requires a new culture of collaboration.

Aberdeen Summary Observations

CPC employs the Internet to collapse time and distance from the product process lifecycle equation. Now all parties involved with a product's design, manufacture, distribution, and service and support can work in a collaborative fashion. Designers can interactively share creative ideas; engineers can concurrently work on individual modules that are part of a common assembly; procurement can search out appropriate sourcing partners; manufacturing can be readying necessary tooling and production capacity; and, most importantly, the customer can be in on the entire process from the onset. With CPC, discrete manufacturers will be regaining control of their most valuable corporate asset — their product and its complete process life cycle.

Aberdeen research shows that many of the tools for enabling CPC are tested and ready for general implementation. This availability represents a point in the growth of this class of software that denotes the transition from early adopters' experimentation to general implementation by profit-motivated industry leaders — *crossing the chasm*. For software, services, and infrastructure suppliers, this technological viability represents a time of rapid growth and intense competition as rivals strive to become dominant suppliers.

Aberdeen believes that this readiness signals a call to action and opportunity. CPC will help discrete manufacturers ascend to the next level of competitiveness by dramatically reducing the time and associated costs of delay and design rework when introducing a new product. Aberdeen encourages manufacturers to continue to exploit the cost-saving initiatives of the transactional systems (ERP, SCM, CRM) and

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begin leveraging those assets that get new and innovative products to market more quickly.

CPC will bring executives back to the thrill of product development and innovation.

Users and suppliers all agree that the future of collaborative product development and product life cycle management, which CPC enables, is where we are going. But we still need to agree on the common terms to communicate our vision and the details of how we plan to implement it. Aberdeen, in agreement with other leading market research firms and industry suppliers, believes that Collaborative Product Commerce (CPC) best describes the overall functionality that is being provided by a new, emerging category of software products today.

One of the objectives of this *Market Viewpoint* is to help convince industry decision-makers and influencers that we should rally around the term Collaborative Product Commerce to describe the new class of products and services that are now being implemented by leading-edge supply nets. But Aberdeen recognizes that this nomenclature will be extended as additional software is encapsulated in future product development and management models.

Now with CPC senior executives — from the chairman on down — can be actively involved in managing product innovation and product life cycle once more. Aberdeen research shows that as executives move up the ranks of discrete manufacturing companies they miss the ability to be as intimately involved as they once were. And it is usually the case that this hands-on involvement is what most often made them successful in the first place. CPC will bring the thrill of product development and innovation back — finally a corporate asset that can be managed by the CEO.

Aberdeen Group is a computer and communications research and consulting organization closely monitoring enterprise-user needs, technological changes and market developments.

Based on a comprehensive analytical framework, Aberdeen provides fresh insights into the future of computing and networking and the implications for users and the industry.

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