

Bibliography on Integrated Product and Process Development CMMI-SE/SW/IPPD

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This bibliography was developed for people interested in learning more about Integrated Product and Process Development (IPPD) as an element of the Capability Maturity Model[®] Integration (CMMISM) Product Suite. It includes references that

- address the history and technical aspects of IPPD as it developed from concurrent engineering
- provide a general introduction to IPPD and Integrated Product Teams (IPTs)
- address IPPD-related concepts and issues from the CMMI model

It was designed to help individuals who are interested in understanding, implementing, assessing, and troubleshooting IPPD in organizations.

This bibliography is neither authoritative nor exhaustive. It should not be construed as an endorsement for any of the books or papers referenced.

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General, Introductory Literature

If you want more general information about the basics of IPPD or concurrent engineering, this is a good place to start.

[Capozzoli 98] Capozzoli, T. "How to Succeed with Self-Directed Work Teams." *Supervision* 59, 12 (December 1998): 14-15.

Summarizes guidelines for implementing self-directed work teams, many of which map to the IPPD PAs in the CMMI.

[Hollins 90] Hollins, B. & Pugh, S. *Successful Product Design: What to Do and When*. London, England: Butterworths, 1990.

The authors focus on the front-end stages of product design, starting with market/user need, and ending with conceptual design. They seek to describe the what (static vs. dynamic product), how (needed disciplines), and when (introduction of disciplines) of successful product design. Those looking to understand and/or implement CMMI/IPPD may find this of value as a general overview, as well as for the discussions of the importance of identifying problems early, the disciplines needed for product design, and design using quality circles.

[Shunk 92] Shunk, D.L. *Integrated Process Design and Development*. Homewood, Ill.: Business One Irwin, 1992.

This book was written as part of the American Production and Inventory Control Society (APICS) certification program in Integrative Resource Management. The stated intent is to provide "a rigorous...look at the fundamental building blocks for integrated process (including terminology), the planning needed, the control of the processes and the execution of an integrated process... followed by business measurements... information requirements and... trends and [future] directions." The focus on integrated design and production in more traditional manufacturing environments is enhanced with segments focused on information system needs, the integration of suppliers, future trends in processes, and the cultural and people side of integration. Case studies illustrate the descriptions.

[Taninecz 96] Taninecz, G. "Team Players: Cross-Functional Engineering Teams Bring Product Designs to Market Fast, Frugally, and Right the First Time." *Industry Week* Vol. 245, Issue 14; (July 1996): 28-32.

General article discussing industry's move toward cross-functional teams of engineers—what they are doing and what results they are seeing.

[Weisbord 87] Weisbord, M.R. *Productive Workplaces: Organizing and Managing for Dignity, Meaning, and Community*. San Francisco: Jossey-Bass, 1987.

General background and a little history of organizational development.

Technical Background and History

IPPD has its roots in concurrent engineering, and is actualized through the basic engineering practices throughout the CMMI model. These materials will provide more insight and background into the basic principles of concurrent engineering and the integration of IPPD in the CMMI model.

[Pugh 91] Pugh, S. *Total Design: Integrated Methods for Successful Product Engineering*, Wokingham, England: Addison-Wesley, 1991.

Without using the terms *concurrent engineering* or *IPPD*, the author details *total design*, which includes the activities from identification of need through sales of a successful product. The author describes these as an integrated series of activities in which participants (both engineers and non-engineers) understand how their partial contributions fit into the whole and work together to build the whole product. Principles of total design include the use of multi-disciplinary teams. For all stages of the process, the author provides many examples of a wide variety of products, as well as a number of design exercises.

[Pugh 96] Pugh, S.; Clausing, D. ed., Andrade, R. ed. *Creating Innovative Products Using Total Design: The Living Legacy of Stuart Pugh*. Reading, Mass.: Addison-Wesley, 1996.

A collection of 39 conference papers that examines the human side of product design and addresses team dynamics, management techniques, and the processes that foster creative and steady progress. The papers were written by design professionals.

[Shumaker 98] Shumaker, G. & Thomas, R. Ch. 10, "Integrated Processes in Defense Manufacturing," 281-308. *Integrated Product and Process Development, Methods, Tools and Technologies*, New York: John Wiley & Sons, Inc., 1998.

The authors review some of the differences affecting the use of IPPD for defense vs. commercial endeavors, and describe some of the current research that is making IPPD management structures more effective.

[Wheelwright 92] Wheelwright, S.C. & Clark, K.B. *Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency, and Quality*. New York: The Free Press, 1992.

Wheelwright and Clark examine product development and present several development strategies for firms to use in creating an architecture for the integration of marketing, manufacturing, and design functions. They focus particularly on the critical design-build-test cycles of prototype creation. In addition, they discuss project management and leadership, different teaming arrangements, and the role of senior management against these different strategies.

Articles Related to IPPD Process Areas and Specific Goals

Teaming, General

(Relates to Integrated Project Management (IPM) for IPPD, SG 4, Organize Integrated Teams: "The integrated teams needed to execute the project are identified, defined, structured, and tasked." and to the Integrated Teaming Process Area)

A selection of the extensive literature on teams and teaming is listed below.

- [Bennis 98] Bennis, W. & Biederman, P. *Organizing Genius: The Secrets of Creative Collaboration*. Reading, Mass.: Addison-Wesley, 1997.
Declaring that the age of "collaborative advantage" is at hand, Bennis and Biederman examine six case studies that include Xerox's PARC labs, the 1992 Clinton campaign, and Disney animation studios and distill the characteristics of successful collaboration.
- Blanchard 96 Blanchard, K.; Carew, D.; & Parisi-Carew, E. "How to Get Your Group to Perform Like a Team." *Training & Development Magazine* 50, 9 (September 1996): 34-36.
Describes the seven characteristics of high-performing teams.
- [Brassard 94] Brassard, M. *The Memory JoggerPlus +TM*. Methuen, Mass.: GOAL/QPC, 1989.
An excellent handbook describing tools and techniques for teamwork.
- [Curtis 02] Curtis, B., Hefley, W., & Miller, S. *The People Capability Maturity Model: Guidelines for Improving the Workforce*. Reading, Mass.: Addison-Wesley, 2002.
An overview of the People Capability Maturity Model[®], with several sections focused on process-based workgroup development at maturity level 3. These are consistent with the IPPD PAs in the CMMI model. For a brief mapping of CMMI-IPPD PAs and the People CMM[®], see the People Capability Maturity Model[®] (P-CMM[®]) Frequently Asked Questions (FAQ) on the WWW: <<http://www.sei.cmu.edu/cmm-p/version2/faq.html>>.
- [Humphrey 00] Humphrey, W. *The Team Software ProcessSM (TSPSM)*. (CMU/SEI-2000-TR-023, ADA387279). Pittsburgh, Pa.: Software Engineering Institute, Carnegie Mellon University, 2000.
<<http://www.sei.cmu.edu/publications/documents/00.reports/00tr023.html>>.
While it was designed to complement the development of software using Capability Maturity Models[®] and Personal Software ProcessSM (PSPSM), the TSP describes processes that may be adaptable for other product development teams and cites resources for non-software team members. This article will provide a general introduction to the concepts in the TSP.

SM Team Software Process, TSP, Personal Software Process, and PSP are service marks of Carnegie Mellon University.

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- [Humphrey 00] Humphrey, W. *Introduction to the Team Software Process*. Reading, Mass.: Addison-Wesley, 2000.
A longer, more detailed description of the Team Software Process.
- [Katzenbach 92] Katzenbach, J. & Smith, D. *The Wisdom of Teams: Creating the High-Performance Organization*. Boston: Harvard Business School Press, 1992.
The author argues that world-class levels of quality and customer service are not possible without the use of teams. This book includes dozens of stories, and distills from these examples the characteristics that make teams effective.
- [Katzenbach 93] Katzenbach, J.R. & Smith, D.K. "The Discipline of Teams." *Harvard Business Review* 71, 2 (March-April 1993): 111-120.
Focuses on what differentiates a work group from a team and what is needed to make a team effective.
- [Meyer 94] Meyer, Christopher. "How the Right Measures Help Teams Excel." *Harvard Business Review* 72, 3 (May-June 1994): 94-97.
The authors distinguish between results measures used by senior management to make business decisions and process/team measures for teams to evaluate and improve their functioning. They discuss the impacts of using the wrong measures and suggest ways to identify and implement appropriate measurement systems.
- [McAndrews 00] McAndrews, D.R. *The Team Software ProcessSM (TSPSM): An Overview and Preliminary Results of Using Disciplined Practices*. (CMU/SEI-2000-TR-015, ADA387260). Pittsburgh, Pa.: Software Engineering Institute, Carnegie Mellon University, 2000.
<<http://www.sei.cmu.edu/publications/documents/00.reports/00tr015.html>>.
McAndrews describes the use of TSPSM with software-only teams and with mixed teams composed of hardware, software, systems, and test professionals, providing more specific detail on some initial results from using TSP.
- [Mohrman 97] Mohrman, S.; Crocker, C. ed.; & Mohrman, A. *Designing and Leading Team-Based Organizations, A Workbook for Organizational Self-Design*. San Francisco: Jossey-Bass, Inc., 1997.
A workbook filled with guidelines and templates for the successful operation of teams. These include designing team structures, designing management and leadership roles, building a framework for decision making, creating a framework for communication, and establishing a team charter.
- [Mohrman 95] Mohrman, S.A.; Cohen, S.G.; & Mohrman, A.M., Jr. *Designing Team-Based Organizations, New Forms for Knowledge Work*. San Francisco: Jossey-Bass, 1995.

This book presents a five-step sequence for designing an organization to do team-based knowledge work, framed by discussions of the commitment and groundwork needed for this change and implementation issues and concerns. The key issues in each chapter are clearly summarized at the chapter's end. Many of the IPPD practices in the CMMI—skills, support and infrastructure, performance management—are addressed.

[Scholtes 88] Scholtes, P. et al. *The Team Handbook*. Madison, Wisc.: Joiner Associates, Inc., 1988.

For IPPD, the most relevant sections of this book concern the tools and techniques for teamwork and working together as a team (e.g., roles, responsibilities, operating procedures, stages, dealing with conflict).

[Sweeney 99] Sweeney, P.J. & Lee, D. "Support and Commitment Factors of Project Teams." *Engineering Management Journal* 11, 3 (September 1999): 13-18.

Reporting the results of a survey administered to 608 project managers from around the world, the authors document what project managers perceive to be important compared to what they have actually observed regarding corporate support, successful team operations, and intra-team conditions. Recommendations are developed from the results.

Product Development / Integrated Product Teams

The books and articles in this section focus on the use of teams for product development. These teams are often called Integrated Product Teams (IPTs).

- [Bregard, 96] Bregard, R. "Implementing Integrated Product Development: A Project Manager's Perspective." *Acquisition Review Quarterly* 3, 2 (Fall 1996): 163-174.

A first-hand account of the first stages of an IPT implementation for product development, from the Program Manager's perspective. He reviews how this is different from a traditional approach, selecting a team structure, determining readiness, providing training, and launching the team. He ends by describing some concerns about establishing an organizational culture that will use successfully use IPTs in the future.

- [Carney 98] Carney, D. "Case Study: Significant Schedule Delays in a Complex NDI-Based System". SEI Monograph Series, Software Engineering Institute, Carnegie Mellon University, June, 1998.
<http://www.sei.cmu.edu/cbs/SEI_refs.html>.

IPTs were identified as the primary organizational structure for this project. This paper points out problems associated with incomplete, inconsistent implementation of these teams.

- [Cusick 97] Cusick, "A Collection of Integrated Product Development Lessons Learned," 657-662. *Proceedings of the 7th Annual International Symposium-International Council on Systems Engineering*. Los Angeles, Cal., August 3-7, 1997. Seattle, Washington: International Council on Systems Engineering, 1997.

This paper describes the research and findings upon which the original IPD-CMM¹ was based. It contains a valuable list of conditions that are essential to successful integrated product development.

- [Hocevar 98] Hocevar. S.P. & Owen W. "Team-Based Redesign as a Large-Scale Change Applying Theory to the Implementation of Integrated Product Teams" *Acquisition Review Quarterly* 5, 2 (Spring 1998): 147-166.
<<http://www.dsmc.dsm.mil/pubs/arq/arq98.htm#Spring>>.

IPTs and IPPD require fundamental organizational change, which include: organizational factors (culture, structure, decision making), group factors (interpersonal and inter-group dynamics and team building) and individual factors (empowerment, motivation, conflict management). Each of these areas is examined and insights related to IPPD are highlighted.

- [Leonard-Barton 94] Leonard-Barton, D.; Bowen, H.; Clark, K.; Holloway, C.; & Wheelwright, S. "How to Integrate Work and Deepen Expertise." *Harvard Business Review* 72, 5 (September-October 1994): 121-131.

¹ Software Productivity Consortium, IPD-CMM, <http://www.software.org/quagmire/descriptions/ipd-cmm.asp>, 2001.

One of three articles based on case studies of product development at Kodak, DEC, and Hewlett-Packard, this article examines the importance and value of cross-functional teams and the use of tools to facilitate integration .

- [Malishenko 99] Malishenko, Maj. Gen. Timothy. *Teamwork Can Turn Anything Around, Including a 585,000-Pound Aircraft*. <<http://www.dla.mil/Dimensions/mar-apr/baldrige.htm>>.

The article reviews the successful use of IPTs to turn a near-disaster into a Malcolm Baldrige Award winning program. Discusses lessons learned.

- [Ranney 95] Ranney, J. & Deck, M. "Making Teams Work: Lessons From the Leaders in New Product Development." *Planning Review* 23, 4 (July-August 1995): 6 - 13.

Beginning with the comment that "cross-functional teams are emerging as the best route to faster product introductions," the authors later develop insights from research, describing the four factors critical to the successful implementation of teams in new product development.

- [Sethi 00-1] Sethi, R. "New Product Quality and Product Development Teams." *Journal of Marketing* 64, 2 (April 2000): 1-14.

Examines the relationship of team characteristics and organization/contextual factors to final product quality. The author concludes that quality is positively related to the integration of cross-functional information within the team, to the extent of customer input and influence on the product development process, and to the quality orientation in the firm.

- [Sethi 00-2] Sethi, R. "Superordinate Identity in Cross-Functional Product Development Teams: Its Antecedents and Effect on New Product Performance." *Academy of Marketing Science Journal* 28, 3 (Summer 2000): 330.

The author examines superordinate identity—the extent to which team members identify with the team, rather than with their functional areas, and perceive a stake in the success of the team—and concludes that it does have a positive influence on new product performance. He also identifies a number of other factors that have less or no influence on new product performance. These include team longevity, task interdependence, team structure, and physical proximity.

Organizational Culture

While culture is not explicitly addressed in the CMMI model, the successful introduction of teams often requires an organization to undertake a significant cultural shift. This is recognized in OEI: "Important characteristics of effective environments for integration include [trained people, resources, and processes] that culturally enable an IPPD environment." (p. 693, CMMI SE/SW/IPPD V. 1.1 Continuous)

The following provide information of value for organizations faced with cultural change.

[Pfeffer 99] Pfeffer, J. and Veiga, J.F. "Putting People First for Organizational Success." *The Academy of Management Executives* 13, 3 (May 1999): 37-48.

This article reviews the large body of research that reveals the relationship between an organization's financial success and its commitment to management practices that treat people as assets. One of these seven practices is teaming. It also reviews reasons why organizations run into problems trying to implement the seven practices.

[Schein 92] Schein, E. *Organizational Culture and Leadership*, San Francisco: Jossey-Bass Inc, 1992 .

Classic book on organizational culture and leadership.

[Sherriton 97] Sherriton, J. & Stern, J. *Corporate Culture Team Culture: Removing the Hidden Barriers to Team Success*. New York: American Management Association, 1996.

Citing common problems that arise when business leaders outwardly embrace the team concept while continuing to behave according old command-and-control philosophy, the authors provide practical advice on methods to ensure teamwork is more likely to be implemented successfully. Their discussions of myths of teaming and change, and "lessons not learned" are insightful, and organizations may find some value in the detailed methods for evaluating culture, setting executive direction (including "shared vision"), and making changes to the organizational infrastructure (relevant to OEI and IT) and to training.

[Tushman 97] Tushman, M. & O'Reilly, C. *Winning through Innovation*. Boston: Harvard Business School Press, 1997.

Focusing on the more general issue of product innovation (rather than on teaming specifically), the authors nonetheless provide valuable guidance for changing culture to meet business needs. They argue that managing culture is the most neglected and highest leveraging tool for promoting innovation and change.

Empowerment

(Relates to OEI SP 2.1-1, Establish Leadership Mechanisms.)

Once an integrated work environment is established and training is provided, mechanisms to handle empowerment, decision making, and issue resolution also need to be provided. The following may provide some insights here.

[Blanchard 99] Blanchard, K.; Carlos, J.; & Randolph, A. *The 3 Keys to Empowerment. Release the Power Within People for Astonishing Results*. San Francisco: Berrett-Koehler Publishers, 1999.

Describing this book as a “user’s guide for the journey to empowerment,” the authors develop an action plan for creating an empowered workforce within an organization. They examine three keys to empowerment: information sharing, creating autonomy with boundaries, and letting teams replace the hierarchy. They then develop methods of using these keys during three stages of change. The steps in each stage are outlined and discussed, the authors providing the reader with valuable advice, effective activities, and tools for action. While not focusing on development teams per se, their guidance will be valuable for anyone trying to create empowered teams.

[Bohn 93] Bohn, E. & Adams, B. “I’d Rather be Dead than Empowered.” *Executive Excellence* 10, 3 (March 1993): 16-18 .

The authors describe six cultural characteristics and six leadership challenges of organizations that successfully empower their employees. One of these challenges is the articulation of a clear vision.

[Byham 88] Byham, W.C. & Cox, J. *Zapp! The Lightning of Empowerment*. New York: Ballantine Books, 1988.

The authors use the format of a fable to teach lessons related to empowerment.

[Wellins 91] Wellins, R.; Byham, W.; & Wilson, J. *Empowered Teams*. San Francisco: Jossey-Bass Publishers, 1991.

This book explores how teams work, how empowered teams are different from other teams, and how an organization might change to successfully support empowered teams. The authors describe ways to prepare for, start-up, and build empowered teams. Within these overall discussions, they address creating a vision, leadership roles, selecting team players, training, and present a case study of a “day in the life” of an empowered team.

Leadership

(Relates to OEI SP 2.1-1, Establish Leadership Mechanisms.)

Appropriate team leadership is the other side of empowerment and is also critical to team success.

[Bennis 89] Bennis, W. *On Becoming a Leader*. Reading, Mass.: Addison-Wesley, 1989.
A very good book by one of the recognized leaders on the study of leadership.

[Bennis 94] Bennis, W. & Goldsmith, Initial. *Learning to Lead: A Workbook in Becoming a Leader*. Reading, Mass.: Addison-Wesley, 1997.

For those who want to learn to be a leader and those who are interested in developing training on becoming a leader.

[DePree 89] DePree, M. *Leadership is an Art*. New York: Bantam Doubleday Dell Publishing Group, Inc., 1989.

A little book that is a light read, but presents leadership in a thoughtful way.

[Jassawalla 00] Jassawalla, A.R. & Sashittal, H.C. "Strategies of Effective New Product Team Leaders." *California Management Review* 42, 2 (Winter 2000): 34-51.

Examines behaviors and mindsets that are critical to team leadership, and makes the argument for the importance of investing the time and resources for team and leadership learning.

[Fisher 98] Fisher, R.; Sharp, A.; & Richardson, J. *Getting It Done: How to Lead When You're Not in Charge*. New York: HarperCollins Publishers, 1998.

Starting with the observation that collaboration is difficult, the authors describe the elements and skills needed for improvement. They call this *lateral leadership*, which is defined through five elements: clarifying the purpose of what you're trying to accomplish, understanding how to harness the power of organized thought, learning how to integrate thinking with doing, getting yourself and your team engaged, and learning how to give feedback on what's been accomplished. The book describes and illustrates skills, techniques, and tactics to effect lateral leadership.

Team Rewards

(Relates to OEI SP 2.2-1, Establish Incentives for Integration.)

In calling for organizations to "establish and maintain incentives for adopting and demonstrating integrative and collaborative behaviors," issues relating to rewards and recognition are introduced.

[McAdams00] McAdams, J. "The Essential Role of Rewarding Teams and Teamwork." *Compensation & Benefits Management* 16, 4 (Autumn 2000): 15-27.

A short but relatively comprehensive overview of different reward and incentive plans for individuals, groups, and teams, with suggestions and brief analyses of associated benefits and pitfalls.

[Parker 00] Parker, G.; McAdams, J.; & Zielinski, D. *Rewarding Teams, Lessons from the Trenches*. San Francisco: Jossey-Bass, Inc., 2000.

This book is a rich source of examples, with 27 case studies in which the successes, struggles, and lessons learned by organizations implementing one or more of the top three reward systems for teams are explored. The top three reward systems, according to these authors, are recognition plans, project team incentives, and organizational unit incentives.

Shared Vision

Shared visions are a part of goals in the CMMI model at three levels: at the organization level, within a project, and for a team.

- OEI SG 1, Provide IPPD Infrastructure, calls for the organization to establish and maintain a shared vision.
- IPM for IPPD SG 3, Use the Project's Shared Vision, calls for projects to define a project level shared vision context, then to establish and maintain a shared vision.

- IT SG 2, Govern Team Operation, calls for the establishment of a shared vision at the team level.

[Block 87] Block, P. *The Empowered Manager. Positive Political Skills at Work*. San Francisco: Jossey-Bass Inc., 1987.

Addresses the issues of empowerment and vision building.

[Frisch 98] Frisch, B. "A Pragmatic Approach to Vision." *The Journal of Business Strategy* 19, 4 (July-August 1998): 12-15.

Discussion of organizational vision building "in a way that optimizes its implementation."

[Senge 90] Senge, P. *The Fifth Discipline: The Art of the Learning Organization*. New York: Currency/Doubleday, 1994.

This larger book contains a valuable section and discussion of "building shared vision," which can be useful even outside of a learning organization.

[Spect 00] Spect, D. *Lessons from the Window Seat. Achieving Shared Vision in the Workplace*. Huntington Beach, Cal.: Telos Publications, 2000.

A method for developing shared vision in the workplace is demonstrated through a workplace fable. A quick and easy read that provides interesting insights into the linkage between individual and organizational visions.

Skills

(Relates to OEI SP 1.3-1, Identify IPPD-Unique Skill Requirements.)

The following materials discuss skills and training that may be critical for an IPPD environment.

[Chambers 01] Chambers, H. *Effective Communication Skills for Scientific and Technical Professionals*. New York: Perseus Publishing, 2001.

Discusses communication skills that may be critical for successful teaming in a way scientific and technical folks can understand. Includes checklists for self evaluation.

[Fisher 00] Fisher, K. *Leading Self-Directed Work Teams: A Guide to Developing New Team Leadership Skills*. New York: McGraw-Hill, 2000.

A comprehensive discussion of many facets of leadership in self-directed work teams (SDWTs). Includes descriptions of team leader roles, competencies, and activities needed at different stages of team development and useful team leader evaluation tools. Also features examples from case studies of SDWTs at Kodak, Apple, Corning, Walmart, and other leading firms.

Team-Oriented Work Environment

(Relates to OEI SP 1.2-1, Establish an Integrated Work Environment.)

The following articles are reviews of tools and techniques useful in an integrated work environment.

- [Coleman 95] Coleman, D. and Kanna, R. (eds) *Groupware: Technologies and Applications*. Upper Saddle River, N.J.: Prentice Hall, 1995.
Although any book on technology is out of date by the time it is published, and this is six years old, it remains valuable because of the breadth of coverage and the descriptions and examples of decisions about and implementation of groupware products (including mail and messaging, workflow, calendaring and scheduling, electronic meeting systems). The case studies may be particularly useful.
- [Mitchell 00] Mitchell, L. & Dineley, D. "Test Center Comparison: Web-Based Project Management—Project Meets Portal." *InfoWorld* 22, 5 (Jan 2000): 62-68.
Inovie Software Inc.'s TeamCenter 3.0, Primavera Systems Inc.'s TeamPlay 1.6.4, and WebProject Inc.'s WebProject 3.1 are reviewed.
- [Sofranec 00] Sofranec, D. "Breaking Down the Communication Barriers." *Computer-Aided Engineering* 19, 11 (November 2000): 34-36.
A review of Collaborative Product Commerce Systems, with examples of usage.

Other Areas of CMMI, as related to IPPD

IPTs in Acquisitions

Issues related to acquisition are addressed in the CMMI model in Supplier Agreement Management (SAM), and in the future will be addressed in more detail through the release of a CMMI model focused on supplier sourcing, CMMI-SE/SW/IPPD/SS. The following raise some issues and explore the use of IPTs and IPPD in acquisitions.

- [Hawthorne 98] Hawthorne, S.; Sable, J.; Abellera, J.; & Brown, C. "Acquisition Reform and the Integrated Product Team Approach: Fundamental to the Success of Acquisition Reform." *Program Manager Magazine* 27, 1 (January-February 1998): 82-85.

Reviews surveys on the use of IPTs for acquisition, focusing on effectiveness and empowerment. The authors conclude that, in 1998, progress was being made in the institutionalization of IPTs.

- [Graham 99] Graham, R. & Hoffman, Captain E., USAF. "Reengineering the Acquisition Process a Quantitative Example Of Acquisition Reform Working For the Air Force's Launch Programs System Program Office." *Acquisition Review Quarterly* 6, 1 (Winter 1999): 87-119.

<<http://www.dsmc.dsm.mil/pubs/arq/arq99.htm#Winter>>.

The Air Force Launch Programs System Program Office used acquisition reform tools and techniques and a contractor/government IPT to define a new, streamlined approach for changing existing contracts. The authors review lessons learned in the achievement of a 63% reduction in cycle time.

- [Murphy 96] Murphy, D. & Heberling, M. "A Framework for Purchasing and Integrated Product Teams." *International Journal of Purchasing and Materials Management* 32, 3 (Summer 1996): 11-19.

Presents nine case studies of commercial and governmental organizations that have implemented cross-functional teams for purchasing. The study includes eight basic tenets of integrated product development and five key characteristics of integrated teams, and looks at different approaches to implementation, with the accompanying obstacles and lessons learned. Ending with recommendations, the authors conclude that implementing IPTs for purchasing brings great opportunities along with considerable risk.

- [Struth 00] Struth, R., Jr. "Systems Engineering and the Joint Strike Fighter: The Flagship Program for Acquisition Reform." *Acquisition Review Quarterly* 7, 3 (Summer 2000): 221 –231.

<<http://www.dsmc.dsm.mil/pubs/arq/arq2000.htm#Summer>>.

Describes the operationalization of acquisition reform measures that involved the cancellation of military standards and specifications and their replacement with high-level, performance-based specifications in contracts.

Stakeholder Involvement

(Relates to GP 2.7, Identify and involve relevant stakeholders.)

The following books and articles address some issues related to the inclusion of stakeholders in the product development process and in IPTs.

- [Dyer 00] Dyer. *Collaborative Advantage. Winning Through Extended Enterprise Supplier Networks*. Oxford ; N.Y.: Oxford University Press, 2000.
Dyer describes, analyzes and compares the supplier networks developed by Toyota and Chrysler. These inter-organizational processes, practices, and relationships may provide valuable ideas and insights for organizations trying to implement IPPD in collaboration with their suppliers.
- [Handfield 99] Handfield, R.B; Ragatz, G.L.; Petersen K.J.; & Monczka, R.M. "Involving Suppliers in New Product Development." *California Management Review* 42, 1 (Fall 1999): 59-82.
This article provides potentially valuable insights into risks, objectives, selection criteria, and the role of technology change in the integration of suppliers into the new product development process. The research is based on case studies of 17 manufacturing organizations and a survey of supplier integration in 134 companies worldwide.
- [Teague 97]. Teague, P; Bak, D., Puttre, M., Fitzgerald, K., et al. "Suppliers: The Competitive Edge in Design", *Design News* 52, 9 (May 5, 1997): 5-23.
An overview of the reasons and methods different companies have for involving suppliers in product design. The focus is on the growing relationships between engineering and external suppliers, and/or engineering and purchasing staff.

Risk Management

(Relates to the Risk Management PA)

Risk Management is a process area specifically devoted to addressing the risks of CMMI-related product development. The following describe a team-based approach to risk management that is compatible with the CMMI model and with the implementation of teams using IPPD.

- [Gluch 95] Gluch, D.P.; Dorofee, A.J.; Hubbard, E.A.; & Travalent, J.J. *A Collaboration in Implementing Team Risk Management* (CMU/SEI-95-TR-016, ADA309157). Pittsburgh, Pa.: Software Engineering Institute, Carnegie Mellon University, 1995. <<http://www.sei.cmu.edu/publications/documents/95.reports/95.tr.016.html>>.
This article focuses on a collaborative effort among the DoD, a commercial contractor, and the SEI to implement team-based risk management. It describes the team risk management model, an implementation roadmap, the collaboration effort, and lessons learned.

[Higuera 94] Higuera R.P.; Dorofee, A.J.; Walker, J.A.; & Williams, R.C. *Team Risk Management. A New Model for Customer/Supplier Relationships* (CMU/SEI-94-SR-005 ADA283987). Pittsburgh, Pa.: Software Engineering Institute, Carnegie Mellon University, 1994.
<<http://www.sei.cmu.edu/publications/documents/94.reports/94.sr.005.html>>.

Describes a team risk management approach through which customers and suppliers can cooperatively manage risks throughout the life cycle of a software-intensive development program. Much of this may be applicable to managing risks in an IPPD environment.

[Loveland Link 99] Loveland Link, J.; Barbour, R.; Krum, A. & Neitzel, A.C. *Rollout and Installation of Risk Management at the IMINT Directorate, National Reconnaissance Office* (CMU/SEI-99-TR-009, ADA375848). Pittsburgh, Pa.: Software Engineering Institute, Carnegie Mellon University, 1999.
<<http://www.sei.cmu.edu/publications/documents/99.reports/99tr009/99tr009abstract.html>>.

Details successful use and planned rollout of team risk management at the National Reconnaissance Office.

IPPD-Related Web Sites

There is a large quantity of information available on the Web about IPPD. Some of the organizations whose Web sites you might check include:

- International Council on Systems Engineering (INCOSE),
- the Society for Concurrent Product Development (SCPD),
- the Best Manufacturing Practices Center of Excellence,
- NASA,
- National Center For Advanced Technologies (NCAT),
- the Center for the Study of Work Teams, and
- the Team Engineering Collaboratory .

Below you will find links to a few case studies, and to some of the official DoD documents related to IPPD. Many other DoD and related websites also have success stories, case studies and training materials related to IPPD and IPTs.

DoD Documents on IPPD

IPT and IPPD Acquisition Information Memorandum, Special Edition, IPT and IPPD, August 1996, Navsea Acquisition Support Office (Sea 91y)	http://www.acq-ref.navy.mil/
DoD Integrated Product and Process Development Handbook	http://www.acq.osd.mil/io/se/ippd/ippd_pubs.html
DoD Guide to Integrated Product and Process Development	http://www.acq.osd.mil/io/se/ippd/ippd_pubs.html
DoD Rules of the Road: A Guide for Leading Successful Integrated Product Teams	http://www.acq.osd.mil/io/se/ippd/ippd_pubs.html
DoD 5000.1, Defense Acquisition	http://www.acq.osd.mil/io/se/ippd/index.htm
DoD 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs	http://www.acq.osd.mil/io/se/ippd/index.htm

Case Studies of IPT/IPPD Implementation

Davis, Phillips, and Vazquez. The Phoenix Rises. Acquisition Review Quarterly, Fall 1997.	http://www.dsmc.dsm.mil/pubs/arq/arq97.htm#Fall
Ford Motor Company's Investment Efficiency Initiative: A Case Study	http://www.acq.osd.mil/io/se/ippd/ippd_pubs.html
Integrated Product/Process Development in the New Attack Submarine Program	http://www.acq.osd.mil/io/se/ippd/ippd_pubs.html

Acronyms

CMMI	Capability Maturity Model Integration
DoD	Department of Defense (U.S. Government)
GP	Generic practice
IPD	Integrated Product Development
IPM	Integrated Project Management (PA)
IPPD	Integrated Product and Process Development
IPT	Integrated Product Team
IT	Integrated Teaming (PA)
OEI	Organizational Environment for Integration (PA)
PA	Process area
PSP	Personal Software Process
SEI	Software Engineering Institute
SG	Specific goal
SP	Specific practice
TSP	Team Software Process