PLM in the University Environment

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Overview

- Identification of a Major Paradigm Shift in Industry
- Positioning Purdue to be the Academic Leader in PLM
- Utilization of Internal and External Resources to Make Purdue the Preeminent Academic Institution Involved in PLM
- Success Stories
- Purdue’s PLM Vision for the Future
Strategic Planning/Business & Industry Partnerships

- Department of Computer Graphics Technology (CGT)
  - CAD and PDM Technologies
  - Availability of Low Cost High End Desktop Workstations
  - Anticipated Industrial Utilization of Web Technologies

- Identification of Visionary Industrial Partners
  - Joel Lemke, CEO ENOVIA (EE, 1978)
  - Bruce Harreld, IBM (BSIE, 1972)
  - IBM - HEAT Program
  - Dassault Systemes
Digital Enterprise Center

1997 - 1999 Purdue Academic Reinvestment Grants to CGT

- Purdue’s Investment: $400,000.
- Partners Investment: $5,592,280.
  - **Hardware**
  - **Software**
  - **Cash**
- Knoy 373 Room Renovation
- Center Director
- IBM Application Engineer
- Interdisciplinary Nature of PLM
PLM Centers for Excellence

Resources
- September 2003: Provost commits $250K/year for a three year period
- PLM Centers Partners have contributed over $200K in support

Workstations populated labs from IBM SUR grant $19K:
- PLM Center of Learning and Engagement (Knoy 373)
  - Including AAE and AT satellite lab
- PLM in Mechanical Engineering
- PLM Showcase Facility in the Envision Center

Software
- Dassault Systemes PLM Suite of Tools (HEAT)
- Unigraphics PLM Suite of Tools (PACE)
- PTC Suite of Tools
- Autodesk Suite of Tools
Goals

■ Provide educational PLM experiences for undergraduate and graduate students who will understand the PLM vision, implementation strategies, and applications so they can be PLM leaders that allow industry to successfully integrate PLM as a business strategy.

■ Provide industry practitioners and managers PLM training materials for professional advancement and competitive advantage.

Utilize Cutting Edge PLM Software Tool Suites

■ Dassault Systemes PLM Suite of Tools
■ Unigraphics PLM Suite of Tools
■ PTC Suite of Tools
■ Autodesk Suite of Tools
The Key Elements of an e-Enterprise

Product Lifecycle Management

- Product
- Lifecycle Management
- Customers
- Relationship Management
- Supply Chain Management
- Enterprise Planning

Collaborative Product Commerce
Students Understand the Benefits of PLM Implementation

- Improved products
- Improved customer relations
- Improve utilization of resources
- Improved supply chain management
- Reduced costs
- Reduced time to market
- Increased profits
- Knowledge of the products lifecycle status
Industry Development

2000 COE Conference
- Boeing Commercial
- Boeing Military
- Northrup-Grummen
- DaimlerChrysler
- Honda of America
- Sikorsky
- Butler International
- Student Volunteer Program
  - Boeing PLM Grants

2000 Graduate Study

ENOVIA PDM Demo Project
PLM Integration into Courses

Undergraduate
- CGT 163 – 900 students/year
- PLM minor
- Interdisciplinary Courses
- Project-based learning

PLM Major & Minor
- Advanced Solid Modeling
- Surface Modeling
- CAD Interoperability/Standards
- PDM/Configuration/Collaboration
- Simulation

Graduate
- Applied Projects
- PLM Research
- Industry Training
PLM Integration Beyond Purdue

- Co-op and Internship Programs
- Faculty Sabbatical Leaves
- On-site Projects
- Alumni
  - The Boeing Company
  - Lockheed-Martin
  - Northrop-Grumman
  - Robert Bosch
  - Subaru
  - Honda of America
  - DaimlerChrysler
  - IBM
  - Dassault Systèmes
  - ENOVIA
SME PLM Curriculum Proposal

- $450K for two years
- Identify core competencies for PLM expert.
- Identify existing courses and required new courses in technology that would serve as foundation for PLM focused curriculum.
- Develop PLM curriculum modules and deliver PLM courses in the Spring or Fall 2006.
PDM SME F1 Car Project

SME F1 Competition
- A typical designer spends 20 – 30% of their time searching for or recreating lost files. That’s 1 to 1 ½ days a week.
- “More than $1.4 billion a year is spent correcting engineering incompatibility in the auto industry.”
  Andrea Welgat, *CAD Conundrum*, Automotive Industry

Significance
- A student project-based PLM experience
- Interdisciplinary project
- Touches all aspects of PLM
- A microcosm of an automobile environment
- More competitive future cars through the use of PDM toolsets
General Motors Project

- 2001 Funded Project, $38K
- Developed a PLM Web Portal for GM Automation of Supply Chain Management (SCM)
- Automated repetitive tasks allowing engineers to concentrate on engineering design
- Implemented web, PDM, and SCM technologies
- Currently being used by GM Powertrain
The Boeing Company

- Develop PLM Training Materials
- Project-based learning exercises for use in courses
- Student Internships and co-ops
- Faculty sabbatical leaves
- Cooperation on grant submissions (SME & NSF)
- Presentations at conferences (COE, SME, ASEE)
DaimlerChrysler

**DaimlerChrysler Digital Factory**
- Total simulation of process planning
- 30% reduction of production cycle

**Purdue’s Involvement**
- Computer-aided assembly process planning using DELMIA
- Investigation of hardware and software
- Implementation in a PLM environment

**Future Plans**
- Enlarge from an individual work station to the entire line
- Bridge design and manufacturing information
Example of a Station’s AutoCAD Drawing
Example of an Automatic Station
Example of a Manual Station
Butler International/Sikorsky

**Current Status**

- Butler has hired approximately 50 personnel as full time employees and Purdue engineering and technology interns.
- 15 out of 20 of these interns have taken at least one CGT course and many the CGT PLM focused minor.
- Professor Miller is providing CATIA training for both CATIA V4 and V5 to Butler employees.
- Through a collaborative effort between Purdue, Butler, and IBM 10 UNIX workstations with CATIA V4 and all CBT training materials have been donated to Purdue by IBM for student use.
Strategic Planning Pays Off

...The City of Evansville was prepared to chip in $200,000 for a new training center...in an attempt to land the Sikorsky Helicopter Engineering and Design facility...

...Sikorsky opted to locate the $9.9M engineering & design facility managed by Butler International at the Purdue Research Park in West Lafayette, Indiana.

...A key problem for Evansville officials was the company's desire to have engineers trained in particular computer assisted design and manufacturing skills – training that was already being done at Purdue University.

...However, Sikorsky officials wanted to move quickly, and Purdue University was already training engineers in CATIA.

Evansville Courier & Press, 12/03/04
PLM Future Vision

- Continue to leverage granting agencies to advance Purdue’s PLM preeminence in learning and engagement and include PLM discovery in areas outside of discrete manufacturing.

- Expand the current industry partnership base with the goal of more industry engagement.

- Be diligent in predicting future trends so that Purdue remains the preeminent university engaged in PLM and Purdue students are recognized as change agents in fast changing technological fields.

- Use materials from industry engagement projects as project-based learning tools so the Purdue students are exposed to “real world” industry problems.

- Integration into CAM in Discovery Park.
Questions?