PURDUE UNIVERSITY
The Product Lifecycle Management Center of Excellence
Discovery Park
Center for Advanced Manufacturing

Pilot Research Study
Measuring the Impact of Product Lifecycle Management: An Assessment Model and Metrics Framework

Module 20

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Discovery Park Center for Advanced Manufacturing
The Product Lifecycle Management Center of Excellence

Teaching Notes in Notes Page View

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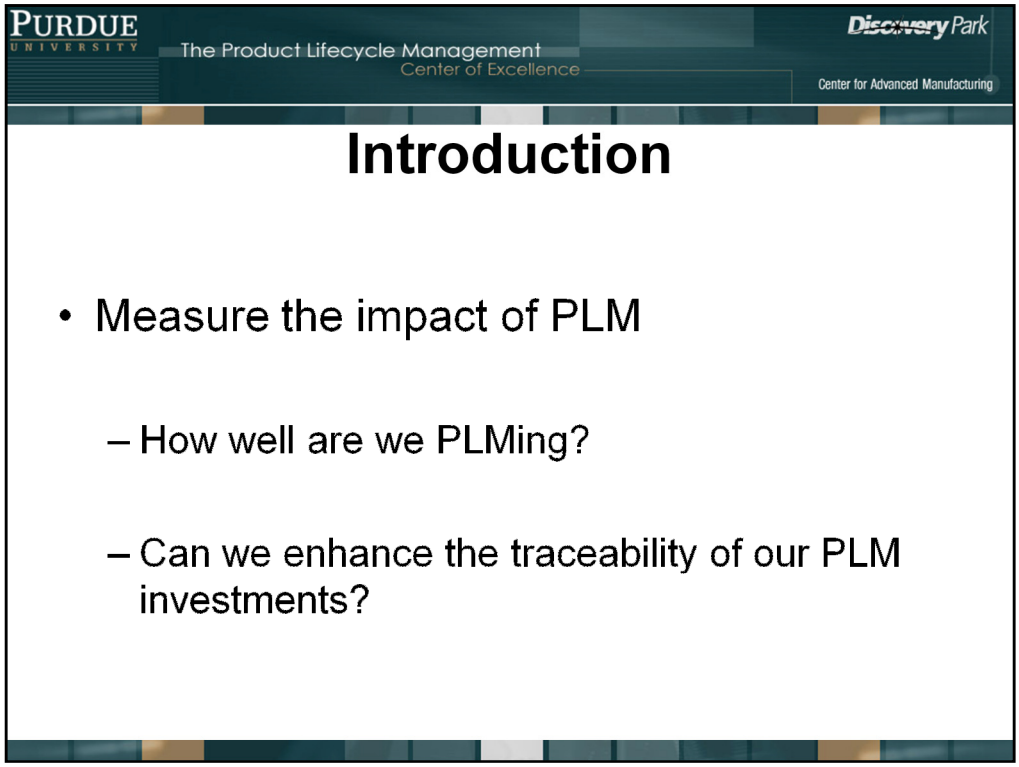


Measure:

Metrics allow an organization to measure performance and anticipate future needs. Accurate, relevant, and developed metrics give executives an idea of how well they are achieving these goals.

PLM Metrics:

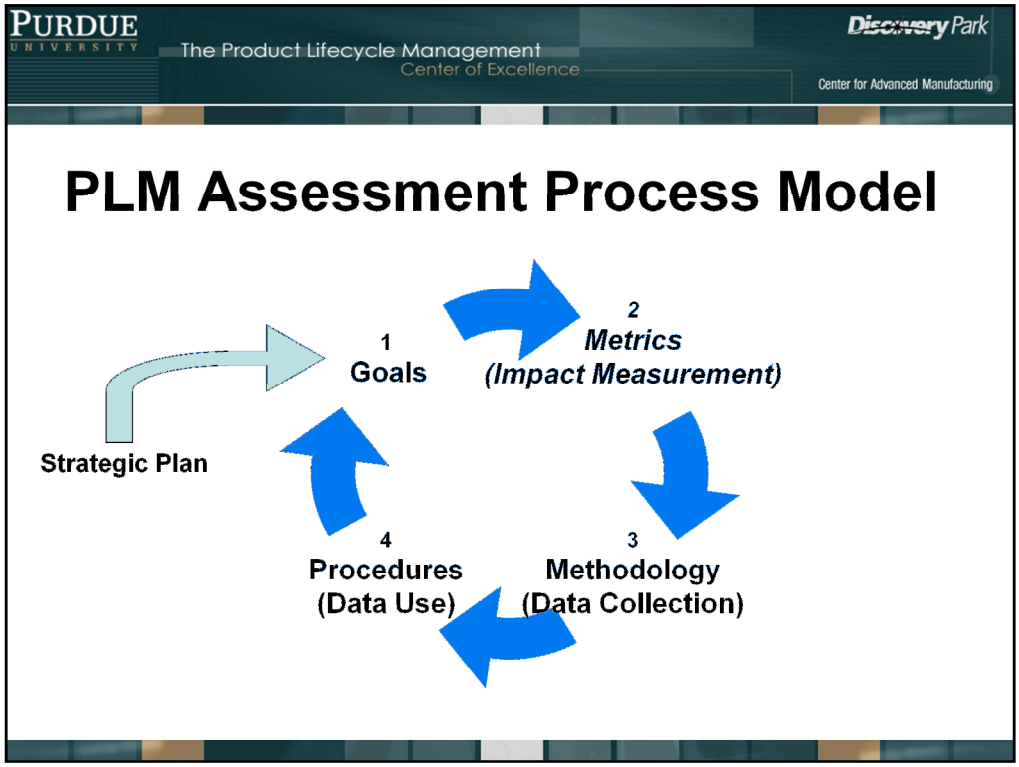
There are many metrics currently being used to measure the level of lean management in and organization, however, without providing detailed analysis of cost-savings and revenue generation an accurate assessment of PLM practices cannot be made. In this presentation we are going to introduce a Product Lifecycle Management metrics model and discuss its role in helping organizations define the best ways to assess the success of their PLM programs.

PLM Metrics Project

– Define an Assessment Process

– Define a Metrics Framework

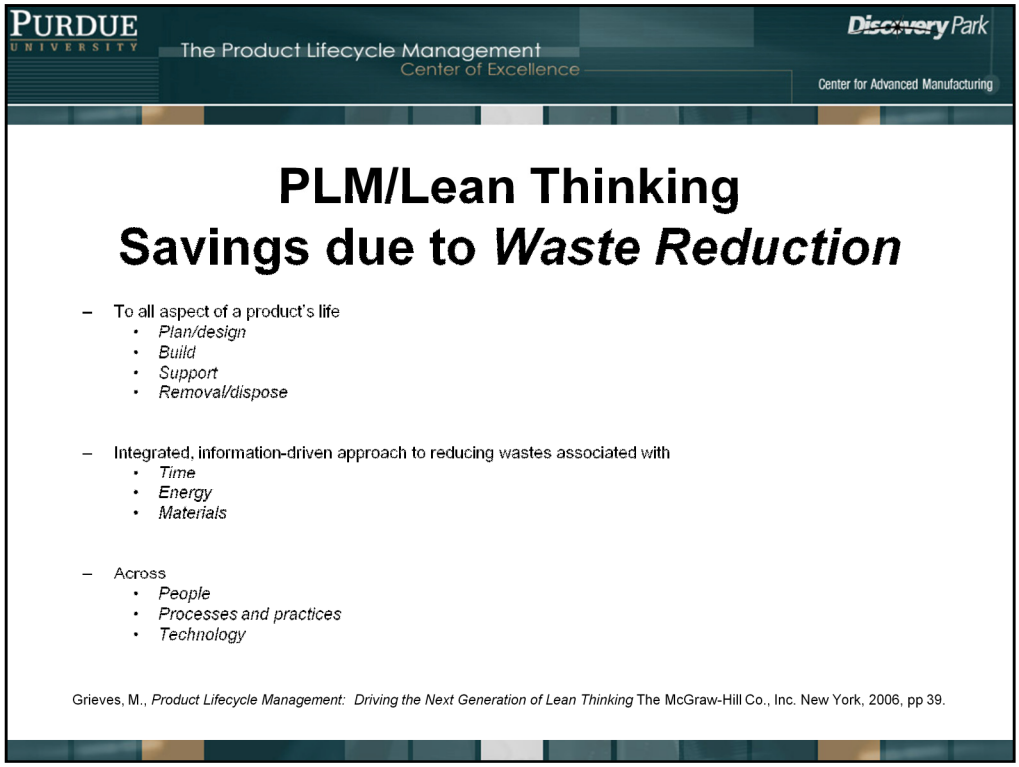
Assessment Model



Before metrics can be generated, an assessment of organizational need must be made. By setting goals that incorporate both the cost-saving or lean practices as well as revenue generation an organization is better suited to develop the necessary PLM metrics to properly evaluate their business processes.

This framework can also be used to visualize the steps required to create an assessment model.

Metrics Framework



PLM Assessment Process Model:

Companies implement PLM as a means to reduce costs associated with wasted time, energy, materials, and reallocates these captured resources to product and process innovation in the creation of new revenue streams. A sound assessment system is critical to understanding the impact of PLM. An assessment model is one of the ways to determine cause and effect relationships within any business practice.

PLM Metrics Framework:

The PLM Metrics Framework provides a starting point for those interested in finding PLM metrics that will best suit their business needs. By showing the connections between lifecycle stages, inputs, and resources, this model assists those looking for way to assess the productivity of their current PLM program.

Tractability:

Several elements of the PLM process have been proposed as critical areas for measurement. These elements include technology, processes / practices, and people. Improvements in these areas effect the amount to time, energy and materials that are used, thus providing quantifiable results of PLM implementation.

Further Research:

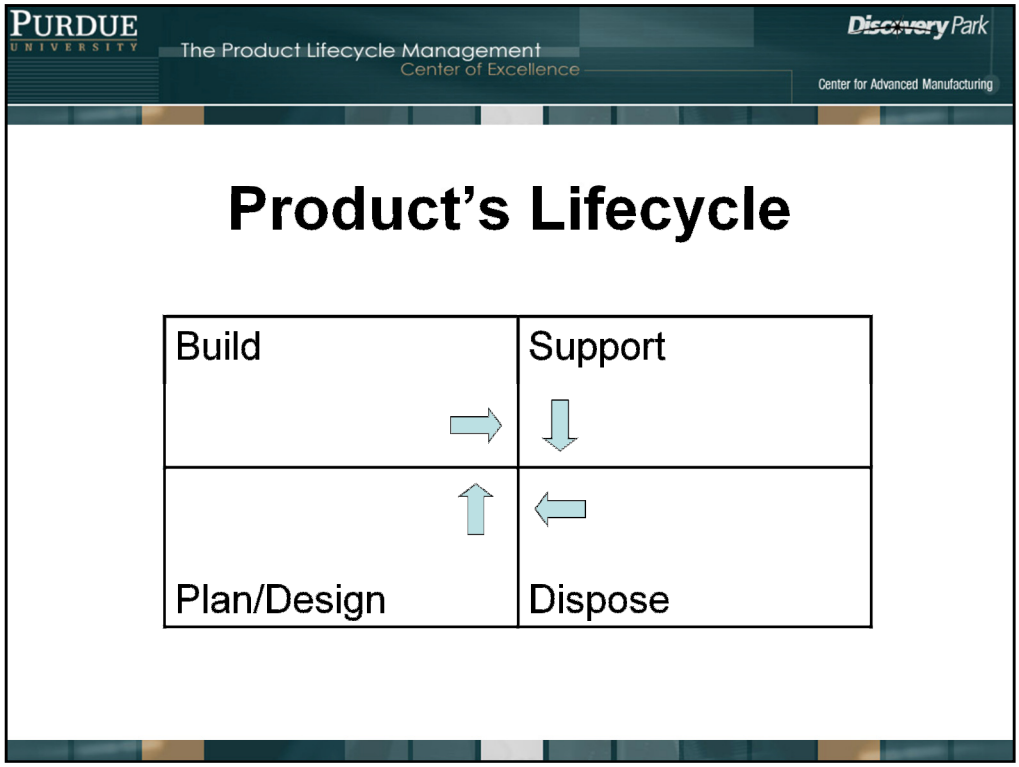
While the framework developed in this studying is supported by a review of current PLM literature, further research needs to assess how businesses are currently meeting their need to quantify PLM results. This presentation focuses primarily on

PLM – Next Generation Lean
Revenue Generation due to *Innovation*

- Provides opportunities to reallocate captured resources toward ***innovation***
  - *Functionality*
  - *Quality*

- Across
  - *Product*
  - *Process*

Grieves, M., *Product Lifecycle Management: Driving the Next Generation of Lean Thinking* The McGraw-Hill Co., Inc. New York, 2006, pp 39.



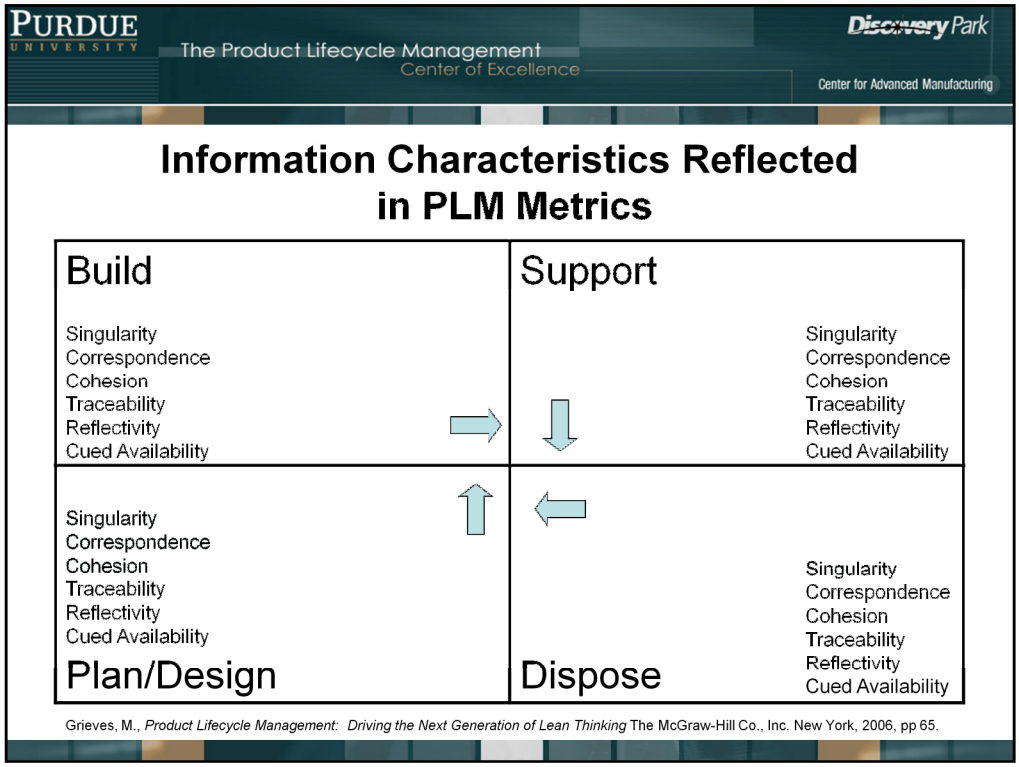
PLM is an excellent tool for tracking the flow of information along the lifecycle of a product, however, many corporations have failed to implement information tracking and gathering procedures during the Support and Disposal phase depicted on this model. Failing to implement these phases of PLM cost the organization valuable time and resources.

By implementing a lifecycle approach to a product or service that maintains a current database of information and that anticipates future needs, tremendous savings can be achieved.

Information Characteristics About a Product/Process

- Singularity – unique and controlling version of the information
- Correspondence – link between actual and virtual representation
- Cohesion – integration of various views/schematics/descriptions
- Traceability – chronological ordering of all documents through time
- Reflectivity – changes in virtual representation reflect actual changes and vice-a-versa
- Cued Availability – having the right information available when needed

Grieves, M., *Product Lifecycle Management: Driving the Next Generation of Lean Thinking* The McGraw-Hill Co., Inc. New York, 2006.



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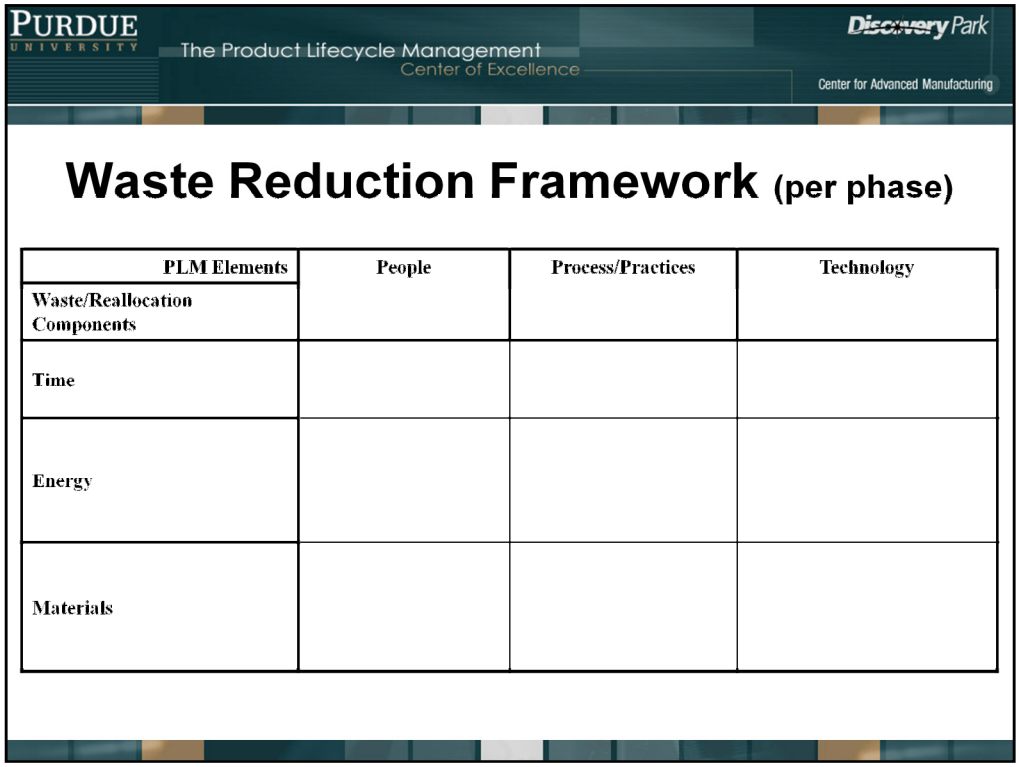


The PLM philosophy recognizes both the need for improved knowledge quality for a particular product phase, and the importance of expanding knowledge access to all phases of a product's life.

Greater control of product knowledge is of increasing importance to businesses as the quantity of information grows. The PLM philosophy recognizes both the need for improved knowledge quality for a particular product phase, and the importance of expanding knowledge access to all phases of a product's life.

Grieves wastes of Time, Energy, Materials.

Categorizing metrics as Technology, Process, or People.

Fundamental:

With the emergence of information technology, such as the internet and high speed fiber optic data transfer, organizations have been able to share ideas, transfer designs, and stimulate collaboration among departments with increasing ease. This ease of information transfer has changed the way business is being conducted. Without a solid technological infrastructure, implementation of PLM would be extremely limited.

Virtual Work:

Limitations such as geographic proximity to other team members have become much smaller barriers now that data can be shared in virtual space [9]. This also allows organizations to make better use of under represented segments of the labor market.

Efficiency:

Time can be saved by making the right information available to team members regardless of where the physical information is located. Energy can be saved by reducing the energy requirements of delivering parts to sub assemblies. Materials can be saved by reducing the amount of scrap caused by physical testing procedures.

Healthy Processes:

A focus on healthy processes and information flow must be established in tandem with the creation of an information transfer and support mechanism if PLM is going to be successfully implemented in an organization. This means that well designed techniques for directing information and reasonable access requirements should be in place to facilitate collaboration throughout the product's lifecycle.

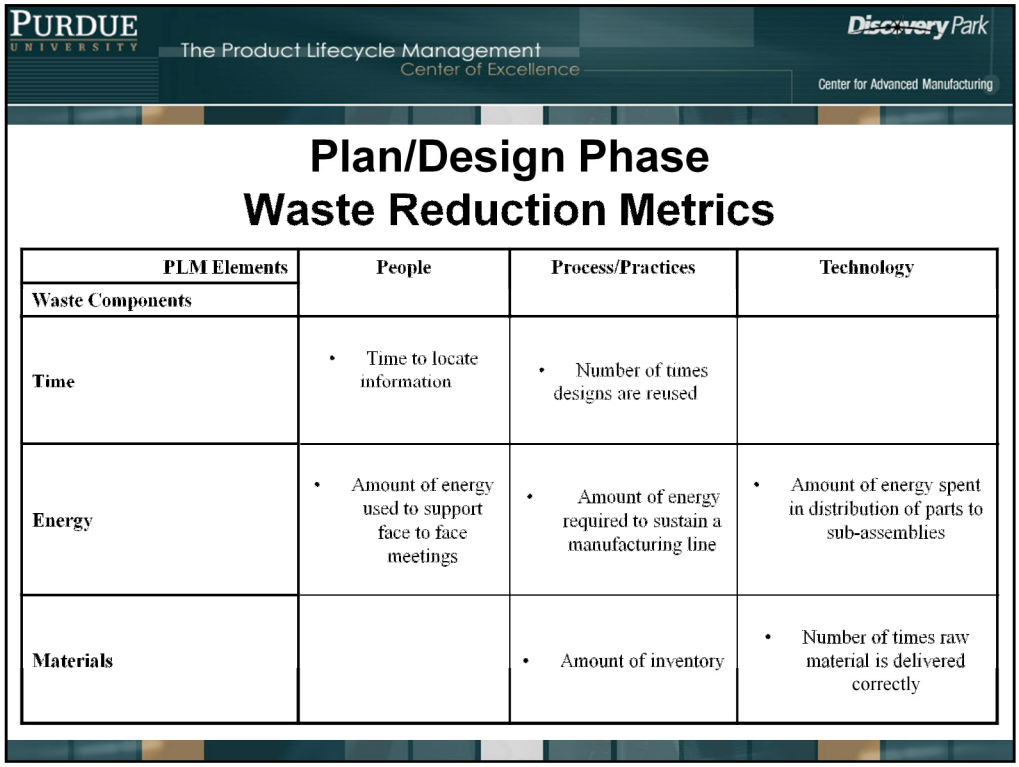
Information Flow:

Now that members can work together in real time on digital models, transactions happen simultaneously with time for preparation and evaluation. A change in design will be immediately communicated to engineering, who in turn can adjust component requirements, which is communicated to purchasing and budgeting. Since these changes are happening concurrently, the representative of each department can focus on their tasks as they relate to the product.

Greater Collaboration:

The savings in time and energy are huge as these employees are no longer forced to duplicate one another's work[3]. This can be measured by the number of times a design is reused or by comparing the amount of energy used to support a manufacturing line before the implementation PLM processes and after. Another good indicator of healthy PLM practices is the amount of inventory before and after the implementation of PLM

Employee Input:



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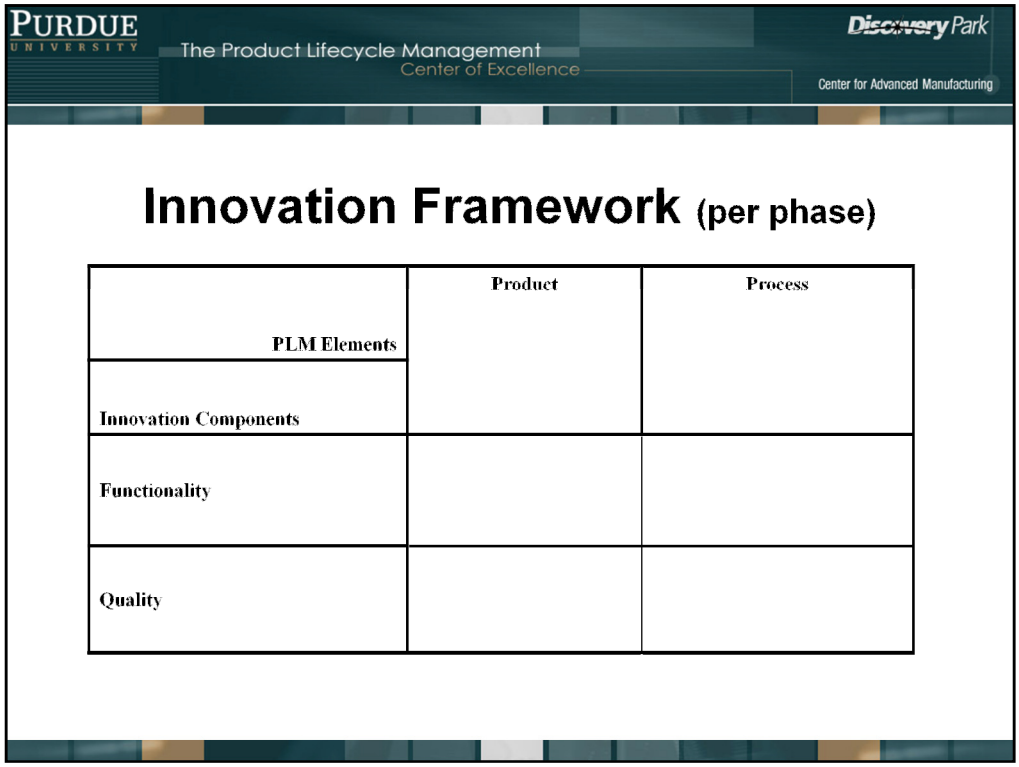

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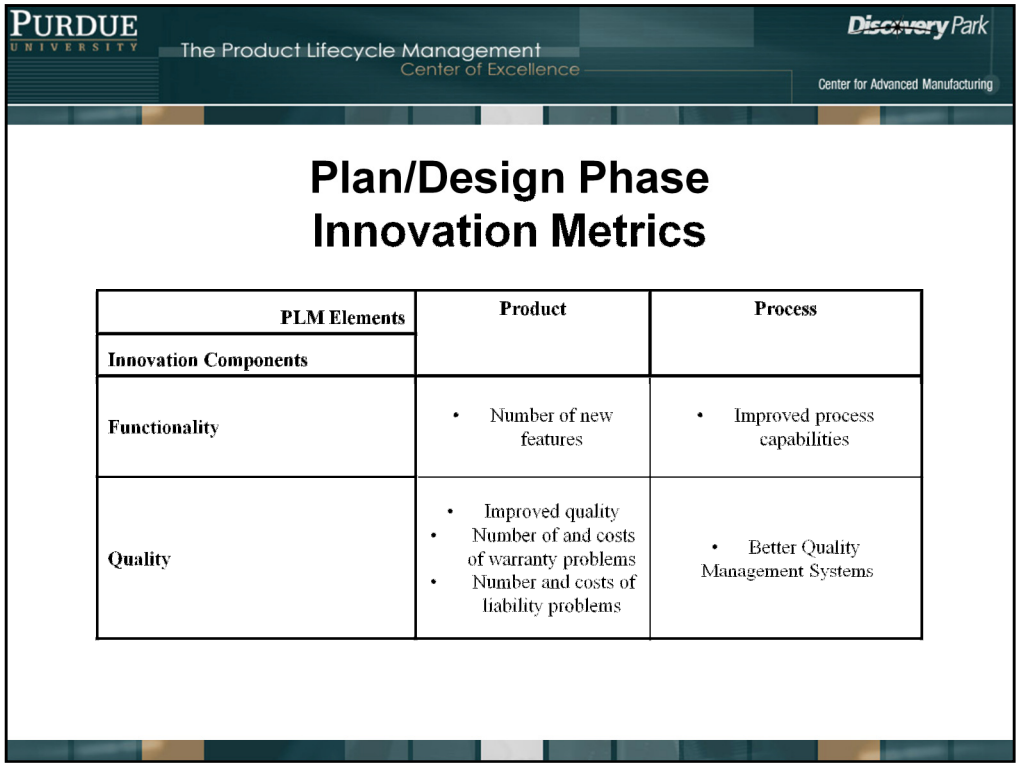

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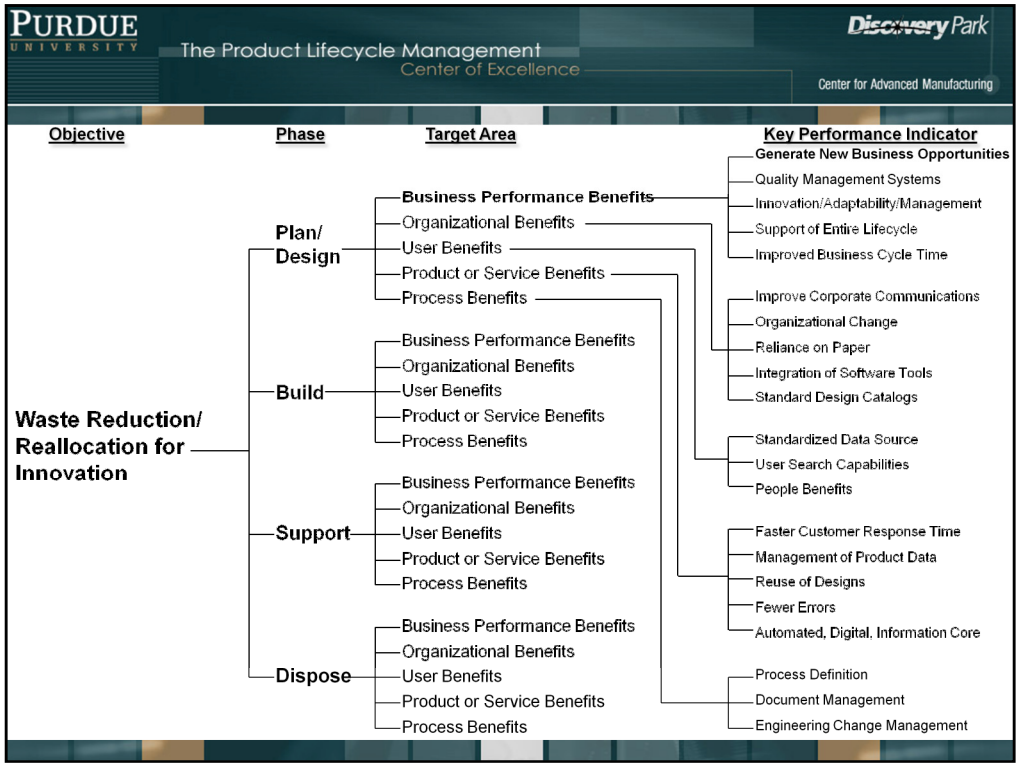
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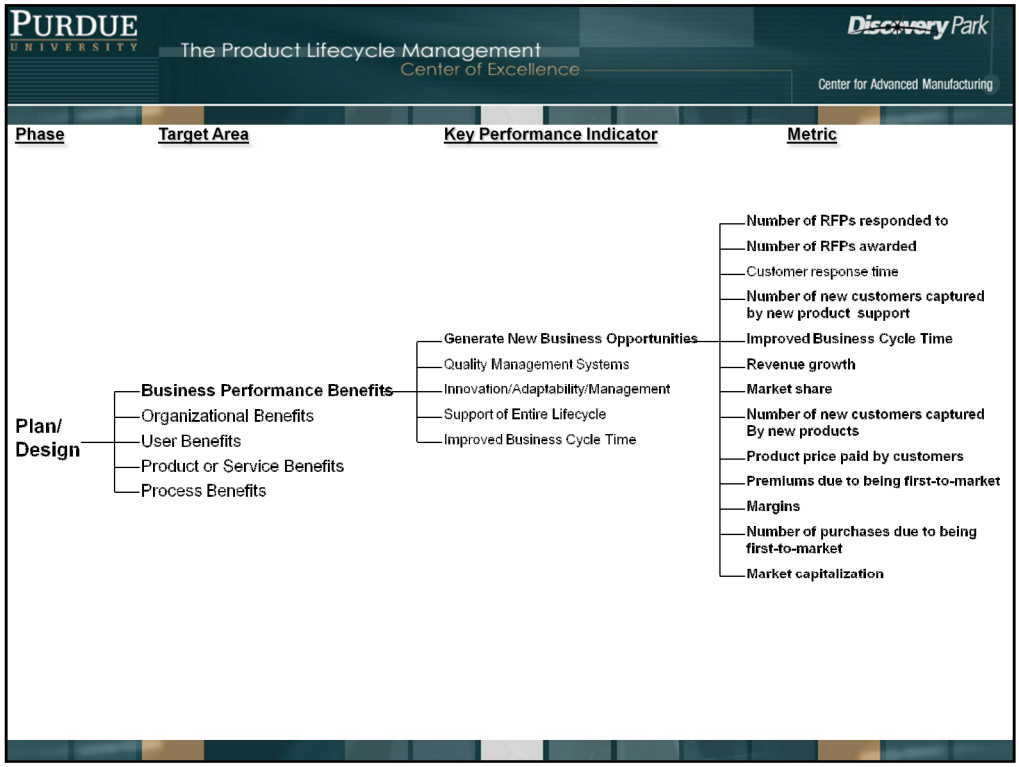
Objective
Phase
Target Area
Key Performance Indicator
Waste Reduction/ Reallocation for Innovation
Plan/ Design
Build
Support
Dispose
Business Performance Benefits
Organizational Benefits
User Benefits
Product or Service Benefits
Process Benefits
Generate New Business Opportunities
Quality Management Systems
Innovation/Adaptability/Management
Support of Entire Lifecycle
Improved Business Cycle Time
Improve Corporate Communications
Organizational Change
Reliance on Paper
Integration of Software Tools
Standard Design Catalogs
Standardized Data Source
User Search Capabilities
People Benefits
Faster Customer Response Time
Management of Product Data
Reuse of Designs
Fewer Errors
Automated, Digital, Information Core
Process Definition
Document Management
Engineering Change Management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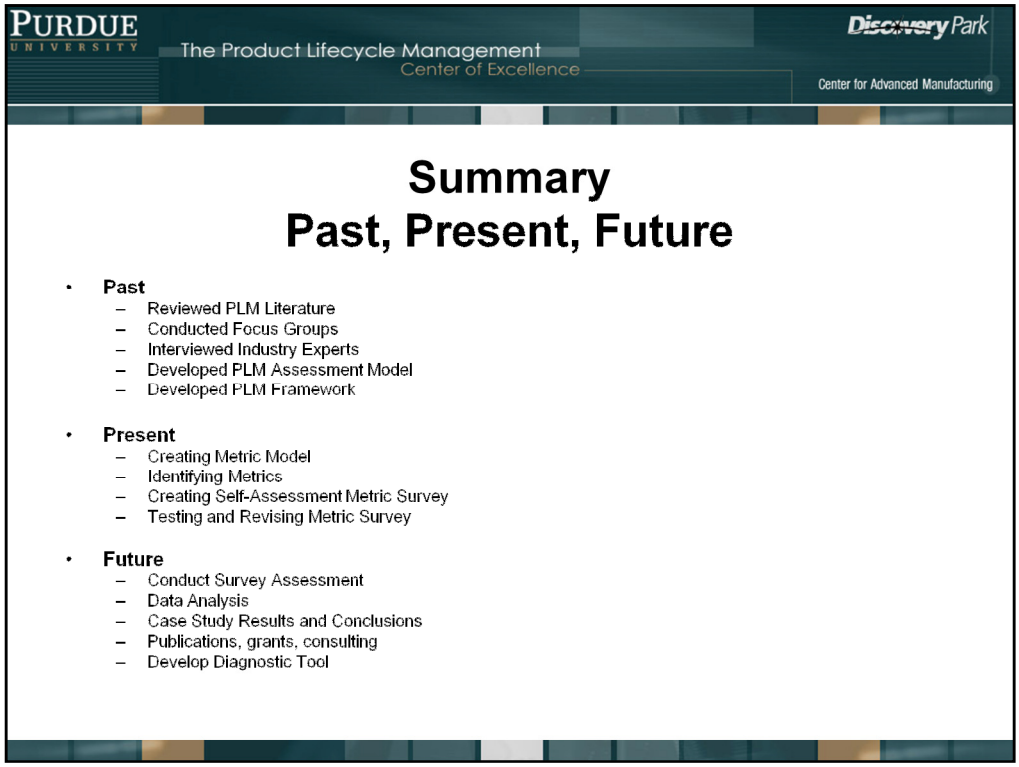
Phase
Target Area
Key Performance Indicator
Metric
Plan/ Design
Business Performance Benefits
Organizational Benefits
User Benefits
Product or Service Benefits
Process Benefits
Generate New Business Opportunities
Quality Management Systems
Innovation/Adaptability/Management
Support of Entire Lifecycle
Improved Business Cycle Time
Number of RFPs responded to
Number of RFPs awarded
Customer response time
Number of new customers captured by new product support
Improved Business Cycle Time
Revenue growth
Market share
Number of new customers captured By new products
Product price paid by customers
Premiums due to being first-to-market
Margins
Number of purchases due to being first-to-market
Market capitalization



Assessment:

As stated earlier, a framework for assessing the effectiveness of PLM processes in an organization is vital. This presentation has introduced a general model for developing PLM metrics.

Tractability:

The need to assess these metrics is important because it relates directly to return on investment of PLM programs. Without metrics that correspond to organizational goals, future investments in PLM cannot be justified.

Further Research:

These metrics tend to form themselves into several categories but the structure and ordering of these metrics is a topic for further research.

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Acknowledgments

The authors wish to acknowledge the support:

- Center for Product Lifecycle Management Excellence, Purdue University, "PLM Metrics Project"
- Center for Advanced Manufacturing, Purdue University, "PLM Metrics Project"
- Department of Organizational Leadership and Supervision, Purdue University
- Society for Manufacturing Engineers - Education Foundation, SME-EF Grant #5004 for "Curriculum Modules in Product Lifecycle Management."