

Knowledge Capture & Management

CIMdata PLM Leadership Webinar—April 2016

PLM Leadership

Knowledge Capture & Management

CIMdata PLM Leadership Webinar Series
14 April 2016
#cimdatawebinar

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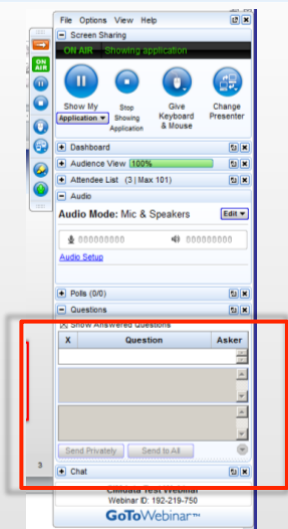
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Questions?

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- Please enter questions in the GoToWebinar Question panel
- We will answer as many questions as time allows...
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Our Mission...
Strategic management consulting for competitive advantage in global markets


CIMdata is the leading independent global strategic management consulting and research authority focused exclusively on the PLM market.

We are dedicated to maximizing our clients' ability to design and deliver innovative products and services through the application of PLM.

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Presenters' Profile
Your presenters' professional background

- **John MacKrell, Vice President**
 - More than 40 years of experience in the application of computer-based solutions to engineering & manufacturing; has held senior positions in product management, marketing, research & development, and consulting with companies that produce PLM solutions & services
 - B.S. in Naval Architecture & graduate-level studies in computer science



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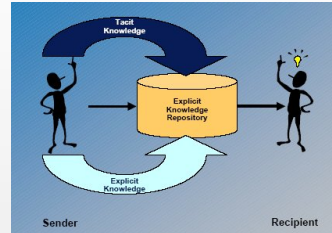
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Key Takeaways

What we will cover today...

- What the constituent parts of knowledge are
- How to make the implicit explicit
 - Implicit (or tacit) is learned by experience
 - Explicit is defined & documented
- How PLM-enabling solutions can support knowledge capture and management
- Benefits of capturing and reusing knowledge
- How to encourage groups to share and make knowledge readily available



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Our Definition of PLM...

PLM – integrating people, processes, information, and business systems

- Strategic business approach
 - **NOT** just technologies
 - Consistent set of business solutions
- Collaborative creation, use, management & dissemination of product/plant related *intellectual assets*
 - All product/plant definition information – the virtual product
 - MCAD, AEC, EDA, ALM, analysis, formulas, specifications, portfolio, docs, ...
 - All product/plant process definitions – the virtual processes
 - Processes that plan, design, produce, operate, support, decommission, recycle, ...
- Supports the extended enterprise
- Spans full product/plant lifecycle, from concept through life



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Knowledge Pain Points

Our customers exhibit many different scenarios

- Most organizations find it difficult to define and capture the knowledge of their members
- Knowledge is difficult to classify and transform from implicit to explicit
- When the information that makes up knowledge can't be easily found, people will redevelop it, wasting time, energy, & resources
 - Reuse and learning are minimized
- As people leave organizations, for whatever reason, valuable knowledge is lost
 - Those leaving have little incentive to transfer knowledge
 - Often, those left behind don't have any incentive to capture it



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Why We Care About Knowledge Re-Use

Knowledge drives innovation—innovation matters...

- “Innovative organizations are twice as profitable as other firms.”
(K. Pavitt. Key Characteristics of the Large Innovating Firm. British Journal of Management. 2 (1). 1991.)
- “The top 20% innovative firms deliver up to four times the shareholder return of the bottom 20%.”
(AD Little. Innovation Survey. 1999. Boston.)
- “Companies generating 80% of their revenue from new products typically double their market capitalization over a five-year period.”
(PwC. PricewaterhouseCoopers Innovation and Growth Survey. 1999. New York.)

Innovation is key to business success!



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So Where Does Innovation Take Place?

What is the basic process?

They are the key to enabling Innovation

Collective ideas of the organization's employees

Intellectual Assets

Transformation ...

Deliverable Assets

The organization's products and/or services

They provide the foundation for Innovation

Innovation does not only take place during the transformation process but also in the definition of the organization's intellectual assets!

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So Who Innovates?

Fundamentally, the organization is a reflection of its people & their knowledge!

Collective ideas of the organization's employees

Intellectual Assets

Physical Assets

Deliverable Assets

Transformation ...

The organization's people, finances, and facilities

The organization's products and/or services

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Enable Innovation—How?

What is needed to enable innovation?

- Create and capture the knowledge of the organization in a proactive manner
- Enable more people to participate throughout the extended enterprise
 - Reduce barriers to interaction
 - Work collaboratively
- Leverage knowledge
 - Provide easy, fast access to knowledge, expertise & information across individuals and organizations

Being innovative requires taking advantage of your intellectual assets—your KNOWLEDGE base!



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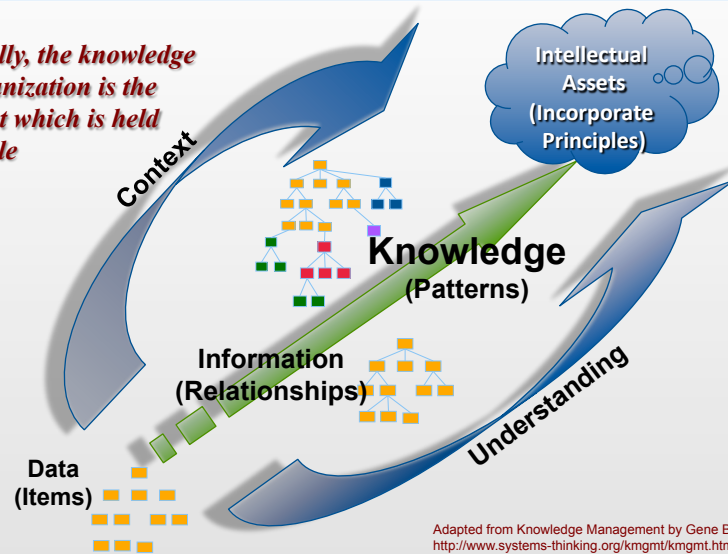


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So Where's the Starting Point?

Creating and managing your intellectual assets to enable innovation

Traditionally, the knowledge of the organization is the sum of that which is held by its people



Adapted from Knowledge Management by Gene Bellinger
<http://www.systems-thinking.org/kmgmt/kmgmt.htm>



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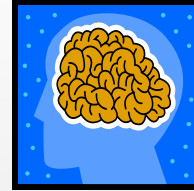
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Knowledge and Intellectual Property

Knowledge is a foundation of IP

- “Knowledge is information combined with experience, context, interpretation, and reflection.”

(Albert, S. and K. Bradley. *Managing Knowledge—Experts, agencies, and organisations*. 1997. Cambridge University Press.)



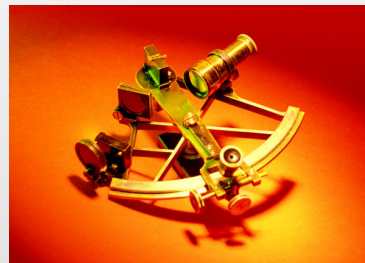
- Intellectual Property is the embodiment of knowledge in a “product” by an individual or organization
- Overly restrictive IP protection often precludes our ability to leverage knowledge
- Fences can help protect IP but also hinder innovation



Leveraging Knowledge for Innovation

Knowledge Management requires effort

- Knowledge management and leveraging IP provide competitive advantage and improved productivity
 - Captures the experience that leverages IP
 - Helps people navigate through the clutter of too much information to find the “good” stuff
- Leveraging knowledge requires these steps:
 - Capture it
 - Categorize it
 - Aggregate it
 - Manage & control it
 - Distribute it
 - Access it



Libraries as Knowledge Repositories

Libraries provide an example for sharing IP

- Letters—Words—Sentences—Books
- Central feature of campuses
- Research organizations have libraries of “good” information
—product development organizations should as well



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Issues:

Knowledge and IP management need to be embedded in the culture

- Few people are willing to take the time required to put their information and knowledge into a useful form
- Knowledge is continually evolving, so “finding” it is a continuous process
 - “The hard stuff has to be easy to find!”
(Paul Courant, Professor, University of Michigan)
- Extracting knowledge from your key people
 - You have to build it over time
 - Expertise changes over time
 - Some people do not want to give their knowledge
- Who are the experts?
 - Helping people find and access them is also part of knowledge management



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Knowledge Creation

Knowledge creation is composed of four processes

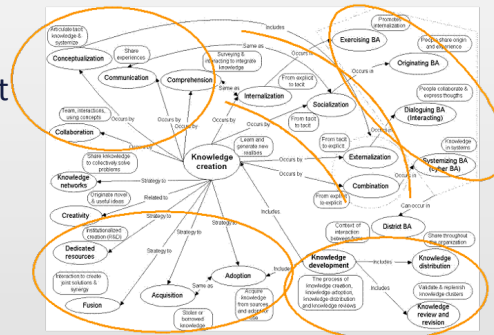
- Comprehension: learning from & interacting with an environment to identify problems, needs & opportunities
- Communication: sharing experiences
- Conceptualization: transforming tacit knowledge into explicit concepts
- Collaboration: teams applying & expanding the knowledge

How to Capture Knowledge

This is the hard part (1 of 2)

- Interview SMEs—use the Socratic method: lead with questions not answers
- Write it down—use an ontology or taxonomy to classify and document important elements in a regular way
 - But remember, SharePoint is not knowledge management
- Index documents to support free-text, semantic & contextual search

Gauvin M., M-Ch. Roy, Y. Ferland, R. Lecocq. *Understanding The State Of Knowledge Management With Ontologies: The Case Of The Canadian Military*. Journal of Knowledge Management Practice. December 2005.



How to Capture Knowledge

This is the hard part (2 of 2)

- Transcribe & index lab notebooks
 - These are notoriously difficult to find & search
 - They usually contain critical IP
 - They often document failures as well as successes
- Distill to the most important ideas & concepts
- Beware of the “digital landfill”
- Validate with the SMEs
- Save it in a knowledge repository
- Tell people that it is available
 - Allow people to subscribe



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Best Practices

Make knowledge management unobtrusive

- Build a culture of documenting & sharing
- Reward use & reuse of knowledge
- Deploy a cultural change management strategy
- Embed knowledge management into business processes and organizations
 - Assure that processes are based on your collective best experiences
 - Embed knowledge capture into the business processes
 - Don't let IP capture overwhelm users
 - Don't let IP protection get in the way of collaboration and innovation – it's a balancing act
- Use PLM to facilitate knowledge capture—including during WIP
- Investigate *electronic* lab notebooks—capture as much as possible at its source



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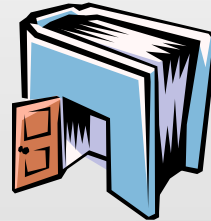
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Best Practices

There are several factors for good knowledge management

- Knowledge capture and management
 - Use PDM to store & track what you do
 - Capture as much as possible from design tools (e.g., design rules, parametric relationships, decision notes)
 - Classify information to give it structure & create knowledge—develop a classification system—an ontology
 - Create a directory of talent—who to call, who knows what
 - You have to build it over time—**AND** keep it up-to-date
 - Extract as much as you can from the systems the experts are using every day
- Provide a central knowledge repository
 - People need to know where to look
 - And who to ask
- Explore new technologies
 - Semantic search
 - On-line knowledge sources (e.g., Knovel)



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Failure Points

Beware of these pitfalls

- Underestimating the effort
 - This takes time & work—especially capturing what is learned from interviews
- Try to capture too much
 - Focus on what users of the knowledge need
 - Go after what is not already well documented
- Capturing knowledge that isn't used
 - Base what you capture on the hard, less understood problems
- Lack of incentives to share information and knowledge
 - There is a cultural barrier to overcome—sell the concept



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Concluding Remarks

Expanding knowledge presents many opportunities to improve business

- Leveraging knowledge doesn't just happen
 - You have to work hard to make it available
 - You have to change the culture of "ownership"
- Information is useless unless it can be easily found in context
- Leveraging knowledge provides real business value
 - Shortens time to value
 - Improves reuse (saves money & time)
 - Value grows as more people have access
 - Knowledge and IP sharing span the lifecycle & have a full-lifecycle impact
- For a success story see:
 - A.J. Will. The Institutionalization of Knowledge Management in an Engineering Organization. https://gpc.stanford.edu/sites/default/files/wp040_0.pdf



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Our Services...

Creating, disseminating, and applying our intellectual capital



Research

- Market research & analysis
- Technology research & analysis
- Reports & publications
- Market news
- Member services...



Education

- Executive seminars
- PLM Certificate Programs
- Technology seminars
- Int'l conferences & workshops
- Best practices training...



Consulting

- Strategy & vision
- Needs assessment
- Solution evaluation
- Best practices
- Quality assurance
- Program management
- Market planning...

Delivering strategic advice and counsel through a comprehensive, integrated set of research, education, and consulting services



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Our PLM Transformation Clients...

A sampling of CIMdata's international industrial clients (1 of 2)

A&D	Auto	Fab & Assembly	High-Tech

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Our PLM Transformation Clients...

A sampling of CIMdata's international industrial clients (2 of 2)

CPG/F&B/Process	Medical/Pharma	Emerging Ind.	Other

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CIMdata PLM Leadership
PLM Industry's most comprehensive non-biased education & training offering

CIMdata's certificate program is primarily comprised of a set of well defined, assessment-based PLM education and training classes.

These certificate programs are available to industrial companies who are considering and/or implementing PLM, and to PLM technology and service solution providers.

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PLM Certificate Program Outline
5-day, 9-session outline for PLM Leadership offering

- **Day 1:** Session 1: Introduction to PLM
- **Day 2:** Session 2: PLM Benefits & Potential Value
Session 3: PLM Strategy & Solution Definition
- **Day 3:** Session 4: PLM Solution Evaluation & Selection
Session 5: PLM Implementation, Monitoring & Continuous Improvement
- **Day 4:** Session 6: PLM Process Development & Testing
Session 7: Integrating PLM within the Enterprise
- **Day 5:** Session 8: Expanding PLM Across the Value Chain
Session 9: Configuration Management's Role in PLM

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What Others Are Saying

Sample of feedback received from past certificate program participants

“A must attend program for anyone that is planning to participate in PLM selection or implementation activities at their organization.”

—Mr. Shinod Kumar, Edwards Lifesciences, USA

“An excellent overview of all PLM and it's fit to companies. Good insights that can avoid many troubles in implementation.”

— Mr. Paulo C L Villaca, Embraer, Brazil

“I wish we had done this before we started our PLM effort...”

— Mr. Jeff Burk, Whirlpool, USA

“Hazy about PLM? Come to CIMdata and clarify.”

—Mrs. B. Uma Prasad, Bharat Heavy Electricals Ltd., India



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2016 PLM Certificate Class Schedule*

Join us, and learn more about PLM

- March 7-11 – Ann Arbor, MI USA *(completed)*
- June 6-10 – Amsterdam, The Netherlands
- October 3-7 – Boston, MA USA
- December 5-9 – Cypress, CA USA



15% Discount for any scheduled class:

Sign up and pay by May 10th 2016

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* Dates are subject to change



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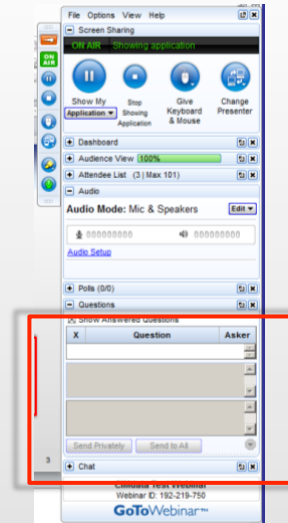
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