The Value Obtained by Timely and Accurate Feeding of the ERP "Beast"

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Dow Corning Profile

- 2002 Sales: 2.6 Billion

- Employees: 7000 globally

- Manufacture of Silicon based chemicals

- Significant softwares
  - OSI Soft PI tools including RLink
  - SAP 4.6B – single instance globally (the "beast")
  - Sample Manager LIMS
  - Web based Radio Frequency (RF) interface to PI and SAP
  - Various Control Systems (one of everything)

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OSI Soft in Use at Dow Corning

- First PI system in 1992 – VMS based PI 1.X
- Interfaces – Sixteen, including Dow Corning written
- UDS/Edict (PI3.3)– 14 sites with 18 servers, 450,000 tags
- Client Licenses – 450, 200 shared, 250 named users
- PI Batch – 200 batch units
- Process Template SPC – 35 implementations
- Process Book & Excel Add-in – 700 clients
- RLink PM & PP/PI– 38(22 PM + 16 PP/PI) at 4 sites

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Agenda

- What is our "beast"

- Why does Dow Corning feed the beast

- How do we feed the beast

- What are our costs to feed the beast

- What are our returns on food dollars spent

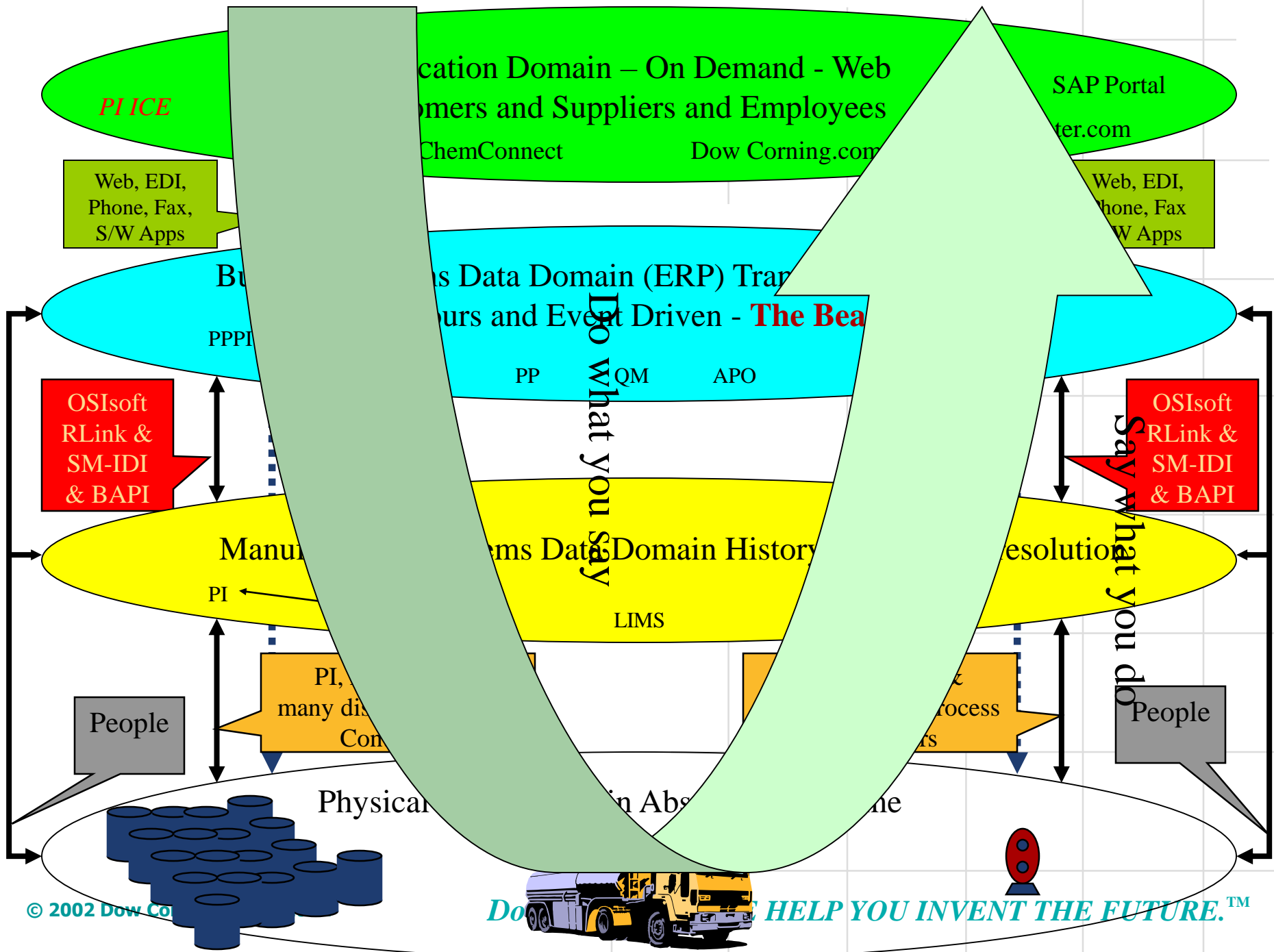- What are our returns on feeding technology dollars

The Beast

SAP Architecture

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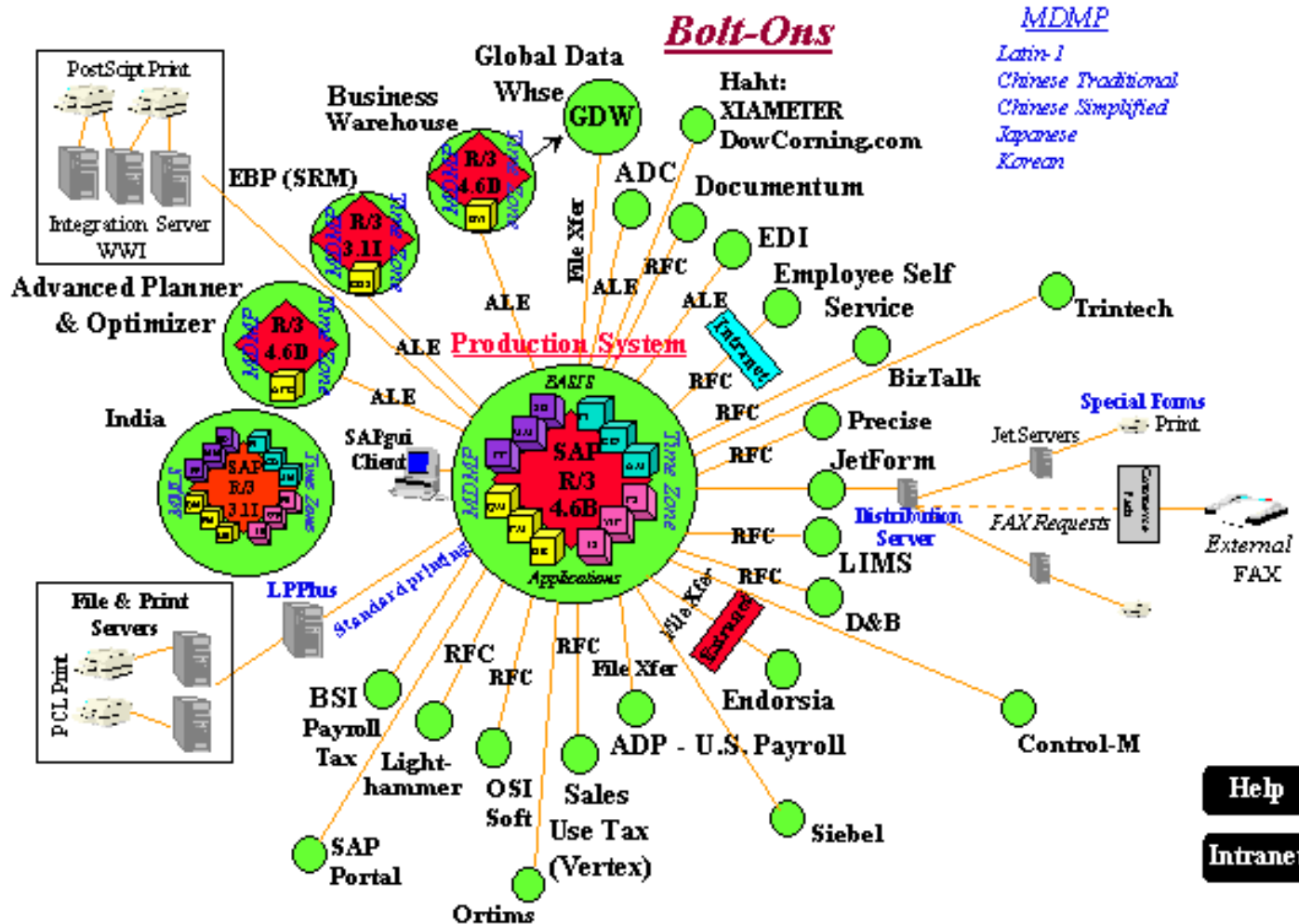
Why Feed the Beast?

- What the beast does with his nourishment
  - E-Order Entry
  - E-Order Tracking
  - E-Invoicing
  - E-Everything
- Caretaker's return from the beast
  - Expense tracking
  - Profit
  - Quality
  - Service
  - E-Business infrastructure

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How We Feed Our Beast

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cation Domain – On Demand - Web
omers and Suppliers and Employees

PI ICE

SAP Portal

ter.com

ChemConnect   Dow Corning.com

Web, EDI, Phone, Fax, S/W Apps

Web, EDI, hone, Fax /W Apps

Bu...s Data Domain (ERP) Tran...
...urs and Event Driven - **The Bea...**

PPPI   PP   QM   APO

Do what you say

Say what you do

OSIsoft RLink & SM-IDI & BAPI

OSIsoft RLink & SM-IDI & BAPI

Manu...ms Data Domain History...   ...esolution

PI   LIMS

PI, many dis... Con...

...g rocess ...rs

People

People

Physical...in Abs...ne

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Implementation Costs –
It is not cheap

- A 10 year journey
  - PI – 3 MM
  - LIMS – 2 MM
  - RF – 1 MM
  - ERP – 100 MM
- A 5 year future
  - PI – 0.5 MM
  - LIMS – 1 MM
  - RF – 0.5 MM
  - ERP – 20 MM

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ROI – But it is Worth the Investment

- Satisfied Customers – increased sales - **Xiameter**tm

- Lower maintenance costs (@ DC 800,000 USD per annum for a given supply chain - 4 plants)

- 5,000,000 USD per annum from improved quality and lower reject rates – this is from the OSIsoft PI infrastructure for E-commerce

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Supply Chain Integration Goals and Objectives

- ROI

- Customers have accurate data about their order within 4 hours of physical reality

  - Order Status – Where, when, how much, cost

  - Shipping Status – Who, when, etc.

  - Quality Status – COA, SPC

- Seamlessly integrate our Make processes with Sell, Deliver and e-Commerce

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Where We Started

- Three distinct internal data domains – not counting external
- Limited integration between domains
- Potential for upset customers
- Customer expectations were and <u>are changing</u> with E-business
- Potential for customer to get incorrect order information. As you have seen in other forums.
  - Incorrect process status
  - Incorrect Inventory
  - Others

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Whse number	From 01 April, 2001 to 31 May, 2001	Total Moves No.mvmts	Cancel Move types No.mvmts	Percent Corrective by count	Percent non-value added
Total		593714	111878	19%	38%
1	W204 Warehouse Barry	9,133	2,822	31%	62%
4	DCAL YAMAKITA WAREHOUSE	26,030	3,849	15%	30%
5	W303 Warehouse Barry	723	371	51%	103%
13	W303 Warehouse Barry	24,020	12,925	54%	108%
31	Mexico City	6,699	451	7%	13%
33	DCC Hemlock warehouse	9,679	1,686	17%	35%
41	DCE Seneffe warehouse	45,555	21,338	47%	94%
42	DCE Houdeng warehouse	87,034	2,139	2%	5%
47	DCC Auburn warehouse	25,067	8,272	33%	66%
49	DCC MAW warehouse	37,813	845	2%	4%
50	DCC E-town warehouse	25,814	20,303	79%	157%
52	DCC Midland Plant Whs.	61,792	10,608	17%	34%
53	DCC CDC warehouse	36,111	673	2%	4%
62	Singapore warehouse	4,401	728	17%	33%
69	Hong Kong warehouse	2,952	109	4%	7%
71	Manseung warehouse	38,197	1,379	4%	7%
78	Songjiang WHouse China	15,138	123	1%	2%
83	DC Taiwan - Chungli	6,501	383	6%	12%
87	Lat Krabang Thailand	7,026	1,019	15%	29%
97	Shanghai Contract Whse	1,889	9	0%	1%
100	Wiesbaden Warehouse	17,947	5,849	33%	65%
101	Kolb warehouse	6	1	17%	33%
121	Chiba Site	40,361	6,690	17%	33%
122	Fukui Site	47,710	2,382	5%	10%
51A	Greensboro Bldg 1/3/4/5	12,713	5,777	45%	91%
SH5	Shuttle Warehouse Barry	3,402	1,147	34%	67%

This is incorrect and corrective transactions

>100% means more non-value added than value added.

In other words some things were corrections of corrections

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Why is data integration important?

- Plant events impact business
  - Real-time inventory means less $$ in inventory
  - Asset Efficiency - operate to capacity, operate to plan
  - Cycle Time - reduce order to delivery time
- E-everything – Speed and accuracy is key

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Example – Scenario 1
Un-integrated Situation

- Via Web customer orders product in high demand with low inventories
- Delivery date = 9 days from order entry date
- Distillation column operating normally, but not at capacity, the column has run for an extended time, beyond Overhead compressor manufacturers recommended maintenance window.
- Overhead vapor compressor fails, shuts down the process
- 30 day delivery on compressor replacement
- Customer order not delivered for 45 days
- Many other orders for product not delivered

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Example – Scenario 2
Un-integrated Situation

- Via Web customer orders product. No human interaction.

- Delivery date = 9 days from order entry date Communicated to customer.

- ERP Inventory shows no issues with making a 9 day delivery

- Physical inventory is incorrectly stated in ERP. In reality, there is inadequate inventory to meet order delivery date

- No signal to make, no signal of issues, no signal of pending delinquent.

- Manufacturing operations have to "scramble" to meet order. Adding expense and causing up and down stream supply issues
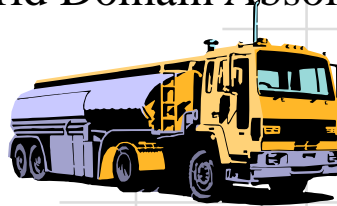
- Order may or may not deliver on time

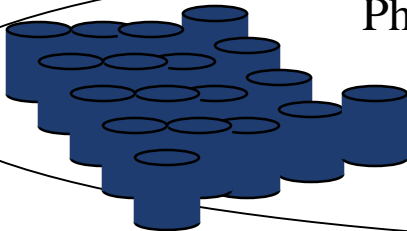*Dow Corning . . . WE HELP YOU INVENT THE FUTURE.*™

Business Systems IT Domain (ERP) Transactional & History
The Beast

Manufacturing Systems IT Domain History @ 1 second resolution

People

People

Physical World Domain Absolute Real Time

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Gartner Group, 1998
"Manufacturing businesses that make investments in ERP-directed manufacturing applications that fail to provide for accurate *real-time information from the process* will achieve at least 50% lower ROI on those investments..."

AMR:
"Nothing exposes *business systems deficiencies* faster than e-business"

"…But the recent years' remarkable surge in the availability of real-time information has enabled business management to remove large swaths of inventory safety stocks and worker redundancies, and has armed firms with detailed data to fine-tune product specifications to most individual customer needs."

Federal Reserve Chairman
Alan Greenspan
Testimony to Joint Economic Committee
U.S. Congress
June 14, 1999

ARC Advisory Group, Feb 2002
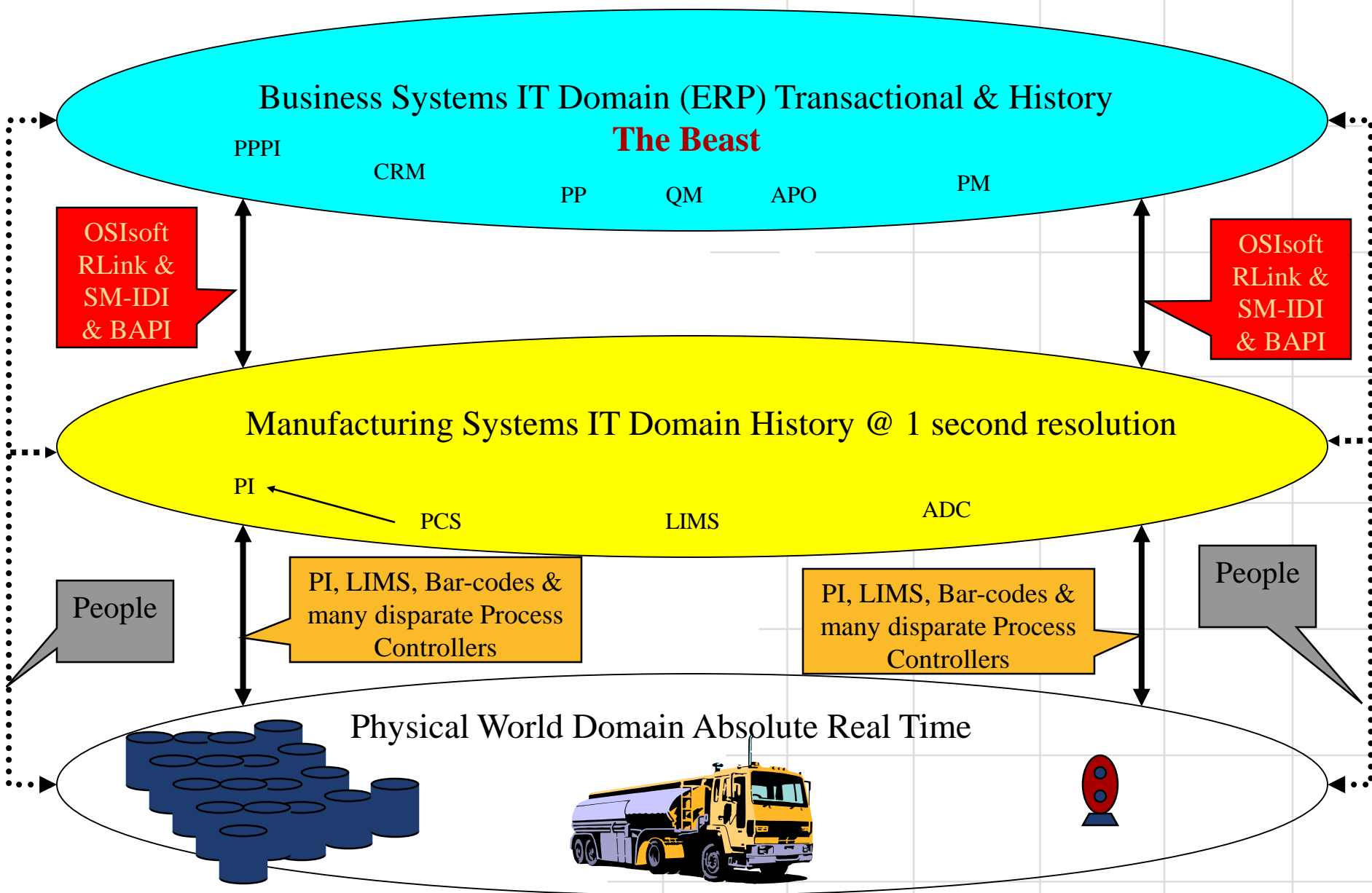"Once you move from having real-time control at the plant level to having real-time control at the enterprise level, things really begin to change for the better. You begin to synchronize business processes that span your own company, across multiple plants and beyond to customers and suppliers. That's where the big payback can be found."

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At Dow Corning we believe our Customers success is our success. Without accurate, timely data our E-commerce efforts will not be as be as successful for our Customers nor as profitable for us.

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Potential Data Integration Solutions

- Integrate our processes data (Sell, Make, Deliver)
  - We can do it with existing technologies
  - We can do it with known workflow; but we still have to get discipline
  - It takes people and capital
- Benefits – reduced expenses & better E-commerce preparation
  - Improved inventory accuracy (can eliminate 50% of corrective entries)
  - Improved speed of transaction data (can provide 4 hour resolution in SAP)
  - Reduce data entry activities – 1 HC per 10,000 transactions

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PPPI

CRM

PP   QM   APO   PM

OSIsoft RLink & SM-IDI & BAPI

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Manufacturing Systems IT Domain History @ 1 second resolution

PI

PCS   LIMS   ADC

PI, LIMS, Bar-codes & many disparate Process Controllers

PI, LIMS, Bar-codes & many disparate Process Controllers

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Data Integration Solutions (cont.)

- Do it better – Get discipline
  - Put into place assurances that data entry is timely, accurate and precise
  - Part of Performance Improvement Process - goals
  - No cost, but very difficult

- Option Benefits
  - Low cost option
  - Necessary with all options to some extent

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Example – Scenario 3
With integration – Do what you say and say what you do

- Customer enters order via web
- Delivery date = 9 days from order date
- Distillation running normally – compressor run-time data flows into PI system
- Compressor manufacturers recommendation for service or replacement is: 2000 hours continuous running
- Compressor running hours PI alarm sounds at 1500 hours – ERP Preventative Maintenance notification created via OSIsoft Rlink software
- Order compressor replacement parts and prepare for preventative procedures
- Increase rates on column to build inventory
- 72 hours later parts arrive
- Shutdown column in an orderly fashion to replace parts and maintain compressor
- No customer delinquents

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Example – Scenario 4
with Integration – Do what you say and say what you do

- Via Web customer orders product. No human interaction.
- Delivery date = 9 days from order entry date Communicated to customer.
- ERP Inventory shows no issues with making a 9 day delivery
- Physical inventory is *correctly* stated in ERP.
- No signal to make, no signal of issues.
- Manufacturing operations operate in a normal mode, no upstream or downstream supply chain issues.
- Order delivers on time

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Example – Conclusions

- Integration prevents customer delinquents

- Integration lowers maintenance costs

- Integration lowers operating costs

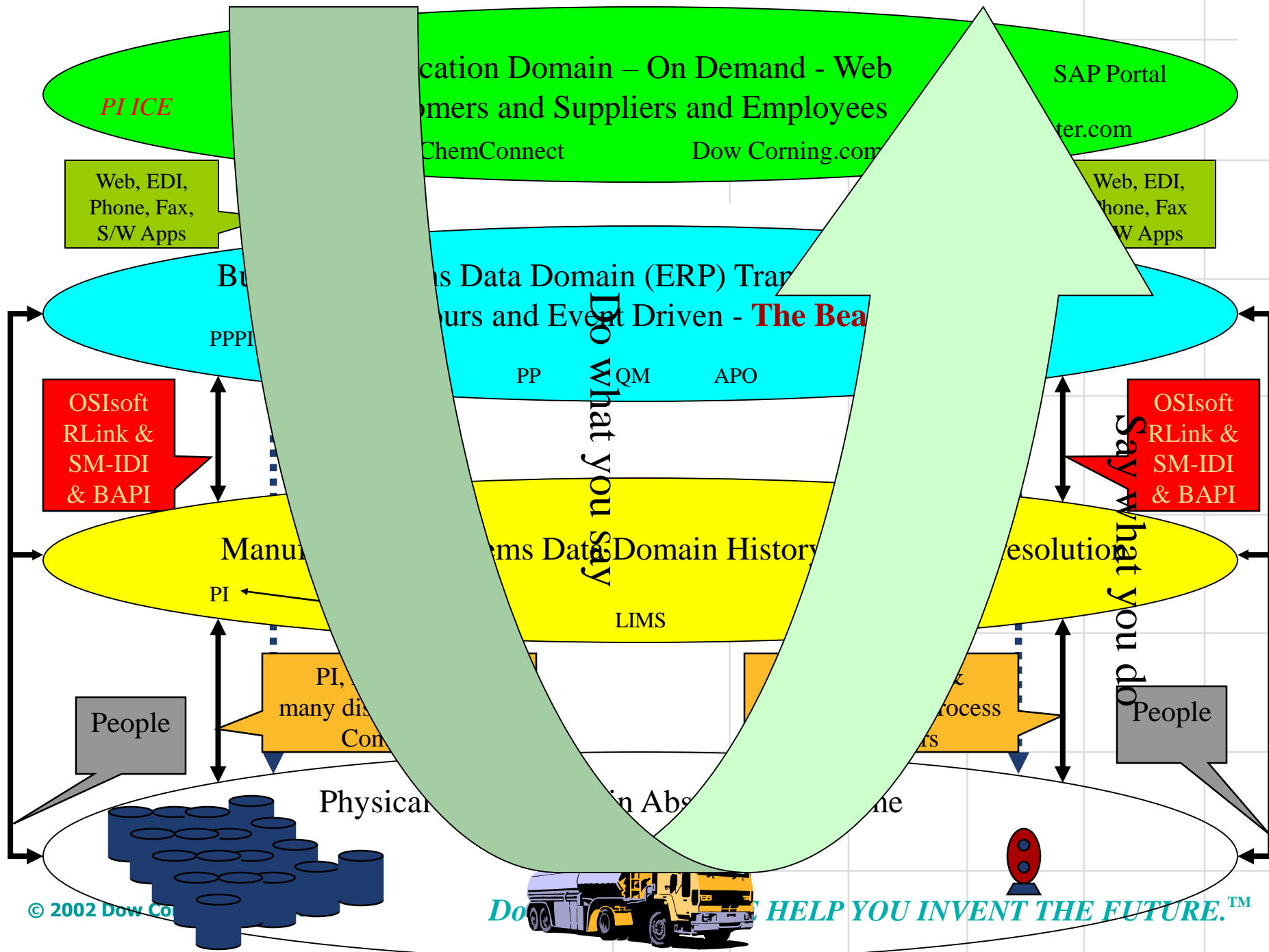*Dow Corning . . . WE HELP YOU INVENT THE FUTURE.*™

The way forward to Profitable E-Business

- Recognize and step up to integration efforts
- Use ERP as the "conduit" into E-commerce environments
- Identify some pilot applications which are based on customer demands
- Prove the concepts & deliver the benefits
- Get the discipline to maintain the "master" data
- Make the only difference in domains one of time
  - ERP reflects physical reality within 4 hours
  - Inventories are accurate and precise (need good measures)

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Dow Corning: Cost of Recommendation - estimated

- Implement OSIsoft PI and OSIsoft RLink
  - Average single plant – 40,000 USD* (30 plants @ DC)
  - Average single plant - 2 Effort Months
- Implement RF – per plant
  - 23,000 USD*
  - 18 Effort Days
- Get discipline – per plant
  - 10,000 USD for travel
  - 3 Effort months (Line employees and others)

* Capital and Expense

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PI ICE

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ROI

- Satisfied Customers – increased sales

- Lower maintenance costs (@ DC 800,000 USD per annum for a given supply chain - 4 plants)

- Lower operating expenses (not quantified at this time)

- 5,000,000 USD per annum from improved quality and lower reject rates – this is from the OSIsoft PI infrastructure for E-commerce

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Bottom Line

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Thank You

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