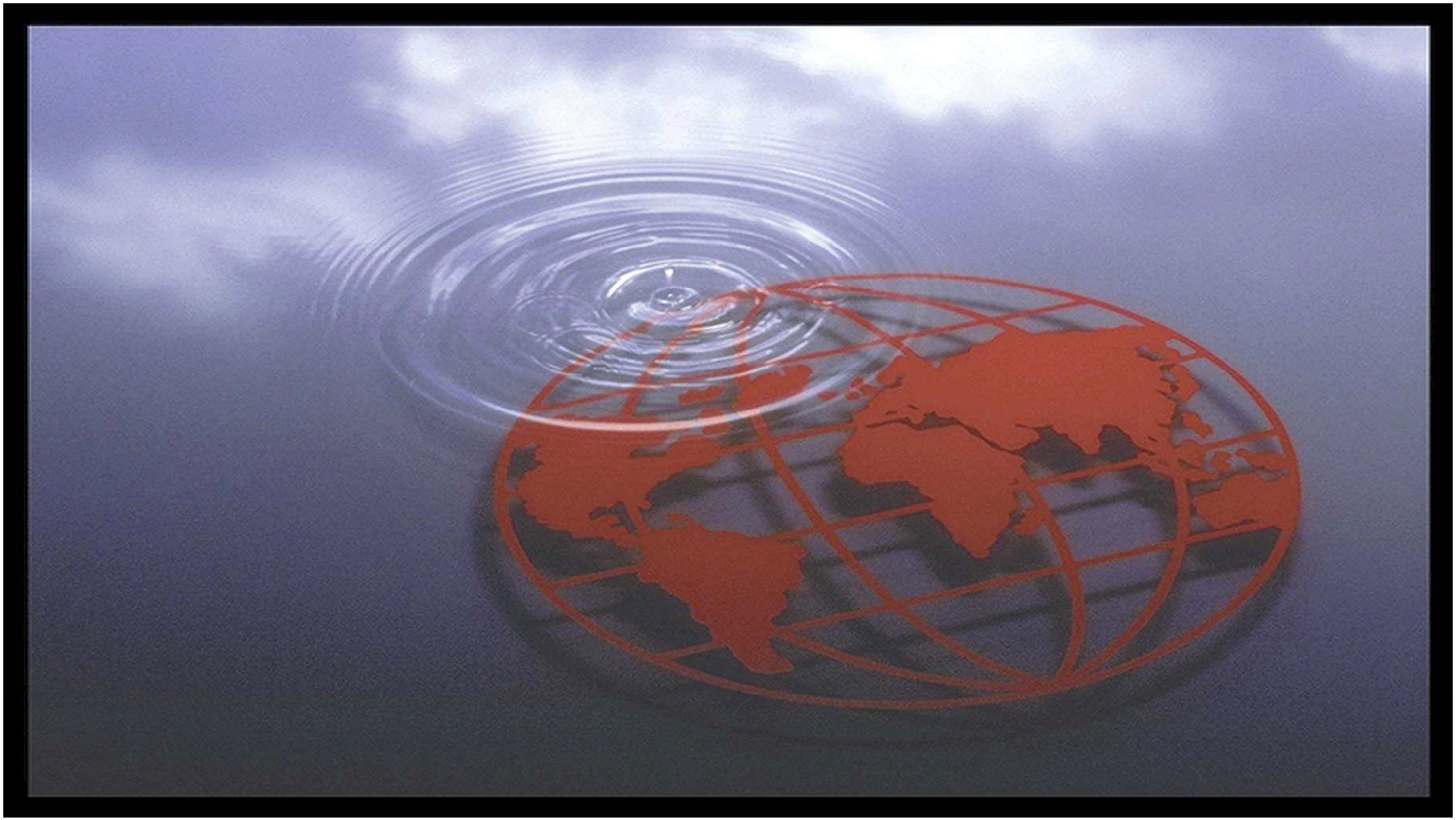
Over Three Decades of Industry-led Collaborative Research



Global Leadership in Cost, Process and Performance Management

Over Three Decades of Industry-led Collaborative Research

Information Quality for Enterprise

Ashok Vadgama
President CAM-I

Wayne McCleve
Manager Data Quality
Freescale Semiconductor

Over Three Decades of Industry-led Collaborative Research

Discussion Points

- Critical Need for Information
- Analyzing and Reporting
- Data Value Chain – Customer and supplier
- Application of Data Analysis and reporting
- NPI approach
- Impact and cost of Bad Data
- Implication of ERP
- Architecture
- Data Management framework
- Data Readiness
- Driving change

Over Three Decades of Industry-led Collaborative Research

What is CAM-I

Industry-led collaborative research consortium producing the “best-of-the industry” solution, techniques, products, tools, and resources for over 30 years
It is internationally recognized for Best Practice Output

- Process Based Management
- CMS (Cost Management Systems)
- Technical Programs
- Robust Design

The strength of CAM-I is dependent on strong, diverse, large corporate membership and participation

Over Three Decades of Industry-led Collaborative Research

CAM-I Sponsor Companies

- ALG Software
- Acorn Systems
- Arkonas
- ATI
- Boeing Company
- CALIBRE Systems
- Costvision
- CMA (Canada)
- Delta Solutions
- DFW International Airport
- Executive Management Association
- Gayle Force Consulting
- Grant Thornton LLP
- IBM Corporation
- ISMI
- On Semiconductor
- RGS Associates, Inc.
- Rockwell Collins
- Royal Australian Navy
- SAP AG
- SAS/Better Management. COM
- Transportation Security Administration
- U. S. Air Force
- U. S. Army
- U. S. Coast Guard
- U. S. Marine Corps
- U. S. Navy
- U. S. Patent and Trade Office
- Yorkshire Forward

Over Three Decades of Industry-led Collaborative Research

Value of Information

- **Information = (Data + Definition + Presentation)**
- **Knowledge = (People + Information + Significance)**
- **Wisdom = (People + Knowledge + Action)**

Larry P. English (Improving Data Warehouse and Business Information Quality)

Over Three Decades of Industry-led Collaborative Research

Critical Need for Information Quality

- **Information which is used by decision makers to create competitive advantage**
- **The focus on outsourcing – need good information**
- **Bottom line impact - reduce budget, savings**
- **Financial and statutory**
- **Quantify your projects for ROI etc**
- **Activity Based Planning & Budgets**
- **Your suppliers want to know things like – purchase, sent where, timing of order, status of order, price, product etc.**
- **Data Quest report on IT failure - # 2 problem is Data**

Over Three Decades of Industry-led Collaborative Research

Process Based Management at CAM-I and ATI

Provide sponsoring members the ability to develop and apply leading techniques and practices for implementing Process Based Management (PBM) in a collaborative environment

Program Deliverables:

- Implementation Roadmap
- Assessment Model
- Training
- Certification

Over Three Decades of Industry-led Collaborative Research

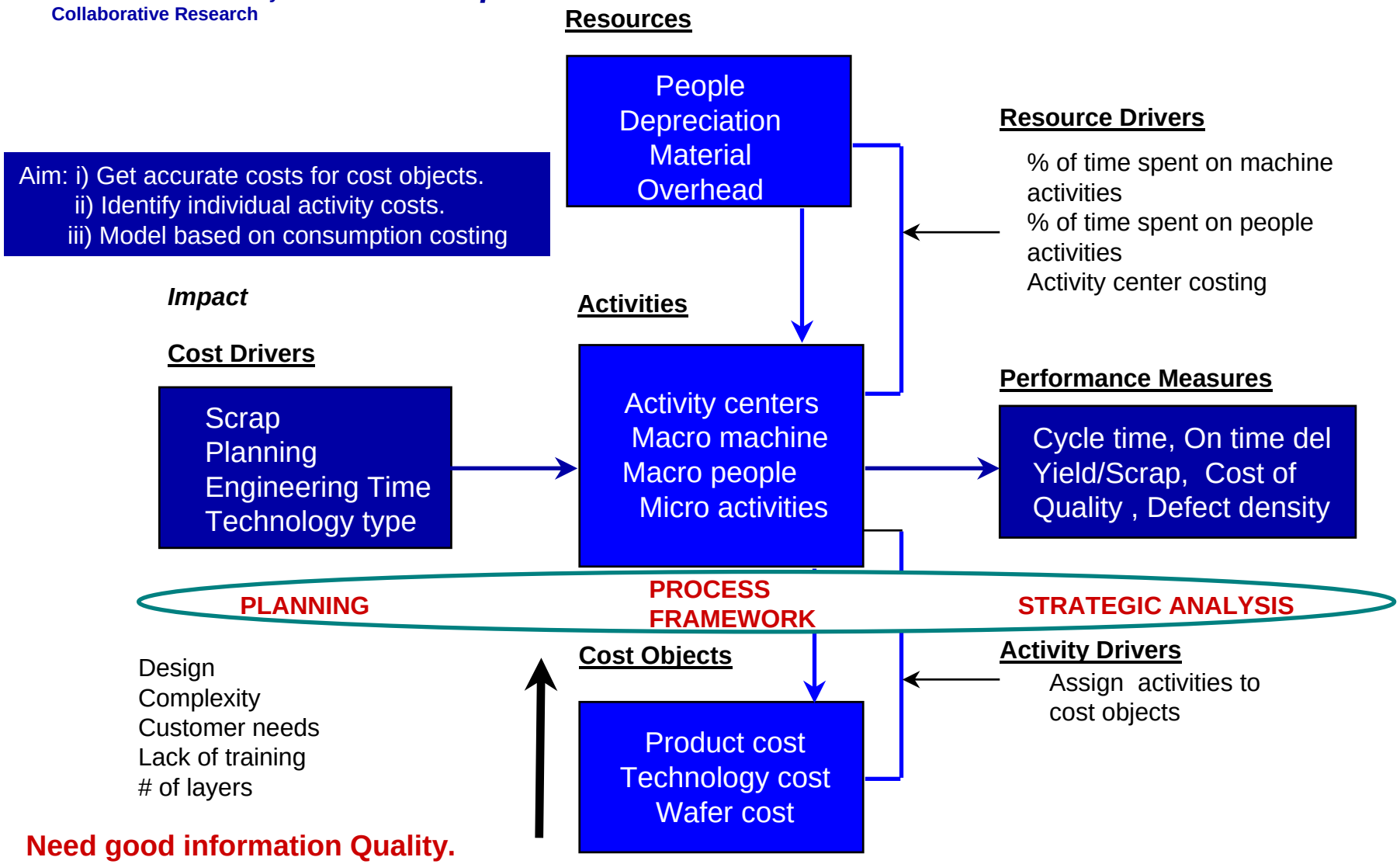
CAM - Current Focus

- Process Based Management
- Target Costing (TC) Implementation
- Cost Measurement Standards Development
- Public Sector Best Practices Interest Group
- Cost of Quality
- Resource Consumption Accounting Study (RCA)
- Risk Management
- Supply Chain - Capital Investment and Recovery
- Change, Adaptation & Learning

CAM - I Cross used at Motorola

Over Three Decades of Industry-led Collaborative Research

Operational view/Financial



Need good information Quality.

Global Leadership in Cost, Process and Performance Management

Over Three Decades of Industry-led Collaborative Research

Activity Based data used to feed into other models or initiatives

INFORMATION	Senior Mgrs.	Fab/Mfg. Mgrs.	Section Mgrs.	Finance	Design & Tech Groups	TPM/ OEE
Use for target costing	X	X		X	X	
Capacity management by using activities		X	X	X		
Management of costs	X	X	X	X		
Process cost by activity	X	X		X	X	
Portfolio management	X			X		
Resource deployment	X	X				
Improvement agendas	X				X	
Using data for DFM					X	
Increased asset utilization, capital efficiency						X

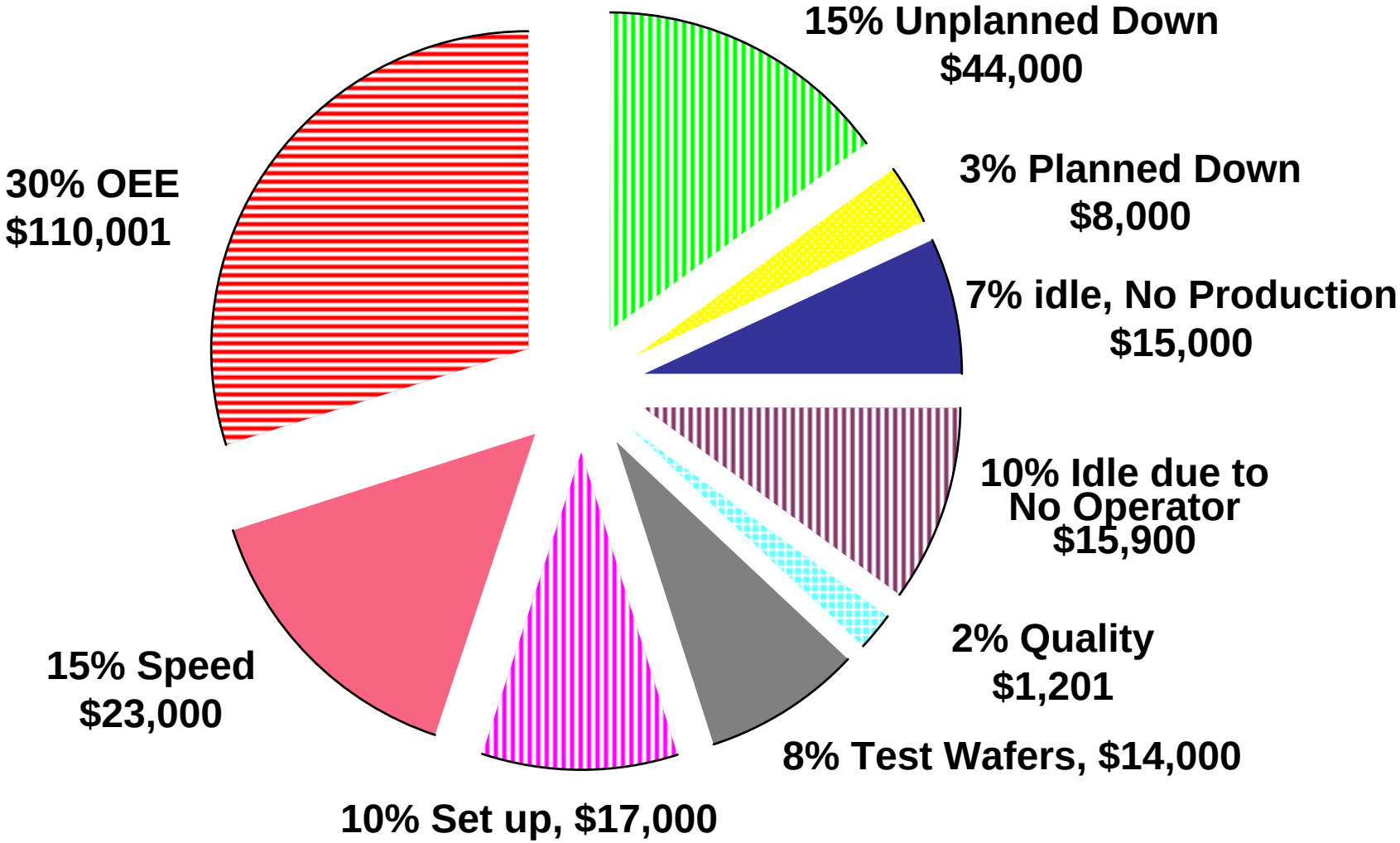
ABM output and use of data

Over Three Decades of Industry-led Collaborative Research

OUTPUT AND INFORMATION	Direct Use	Indirect Use	First cut Model Months	Working Model in Place - Mths	Data used for Decision Mths	BENEFITS OF USE
Product Cost	X		3	6	8	Accurate product cost
Process (Activity Cost)	X		3	6	6	Product cost forecasting/cost per box
Linkage To Improvement efforts		X	3	6	8	Complement improvement initiatives
OEE (Overall Equipment Effectiveness)	X	X	6	8	14	Cycle time and On time delivery
Value Add/NVA classification	X		3	6	12	Continuous improvement
Cost of Ownership	X		5	6	10	Cycle time and On time delivery
TFE linkage		X	5	8	10	Data driven decisions on cost
Performance Measures		X	6	8	12	Individual goal objective alignment/scorecard
Linkage to Cost reduction efforts		X	6	10	12	Complement improvement initiatives
Target Costing		X	6	8	18	Pricing models
Cost Driver analysis (root cause)	X		6	9	10	Effectiveness
Distribution Channel Cost	X		6	9	12	Maximizing value of distribution channels
Category Management	X		6	9	12	Portfolio management
Value Add Services	X		8	12	12	Pricing and customer retention
Factory Modeling		X	8	12	18	Simulation and modeling
Resource Redirection		X	8	12	12	Alignment of resources
Customer segment profitability	X		8	12	15	Customer accounting
Complement Trade Off decisions		X	9	12	15	Cost modeling
Make Buy Decisions		X	9	12	15	Outsource or build here
Activity Based Budgeting	X		10	15	18	Leveraging zero based budgeting
Cost per Touch/Cost per Pick		X	12	15	18	Target focus on specific area
Balanced Scorecard		X	12	18	30	Balanced metrics approach for synergy
Cost of Diversity		X	12	15	18	Optimization
Supply Chain Linkage		X	12	15	20	Understanding cost of SC boxes
Cost of Quality	X		12	15	15	Augment cost to quality efforts
ECR linkage		X	12	15	24	Customer satisfaction
E Com		X	18	24	30	Enable ECR (Efficient Consumer Response)

ABC link to Utilization

Over Three Decades of Industry-led Collaborative Research



Over Three Decades of Industry-led Collaborative Research

Data Management

- Project Management methodologies for all data sets
- Fix data problems, remember data is your real cost driver
- Participate in the enterprise system roadmap, making use of Activity Based Analysis
- Predicative use of data to target the future for NPI etc.
- Finance key partner to this effort
- Metrics for operation aligned and observed closely with project deliverables – team alignment to performance metrics, rewards
- Monthly operation review to encompass ABM progress review - communication Strategy WEB, etc.

Cost of Bad Data

- **Cost of bad data could equate up to 15% to 18% of total operating expense**
- **Studies show that as much as 25% of IT budget can be attributable to bad data**
- **The data must be cleaned up and standardized for a global effort. *We cannot keep on massaging the data and using spreadsheets to hide our inability to provide data quality.***
- **Configuration Management is the way a business documents, controls and manages all its procedures, data and processes**

Over Three Decades of Industry-led Collaborative Research

Cost of Bad Data

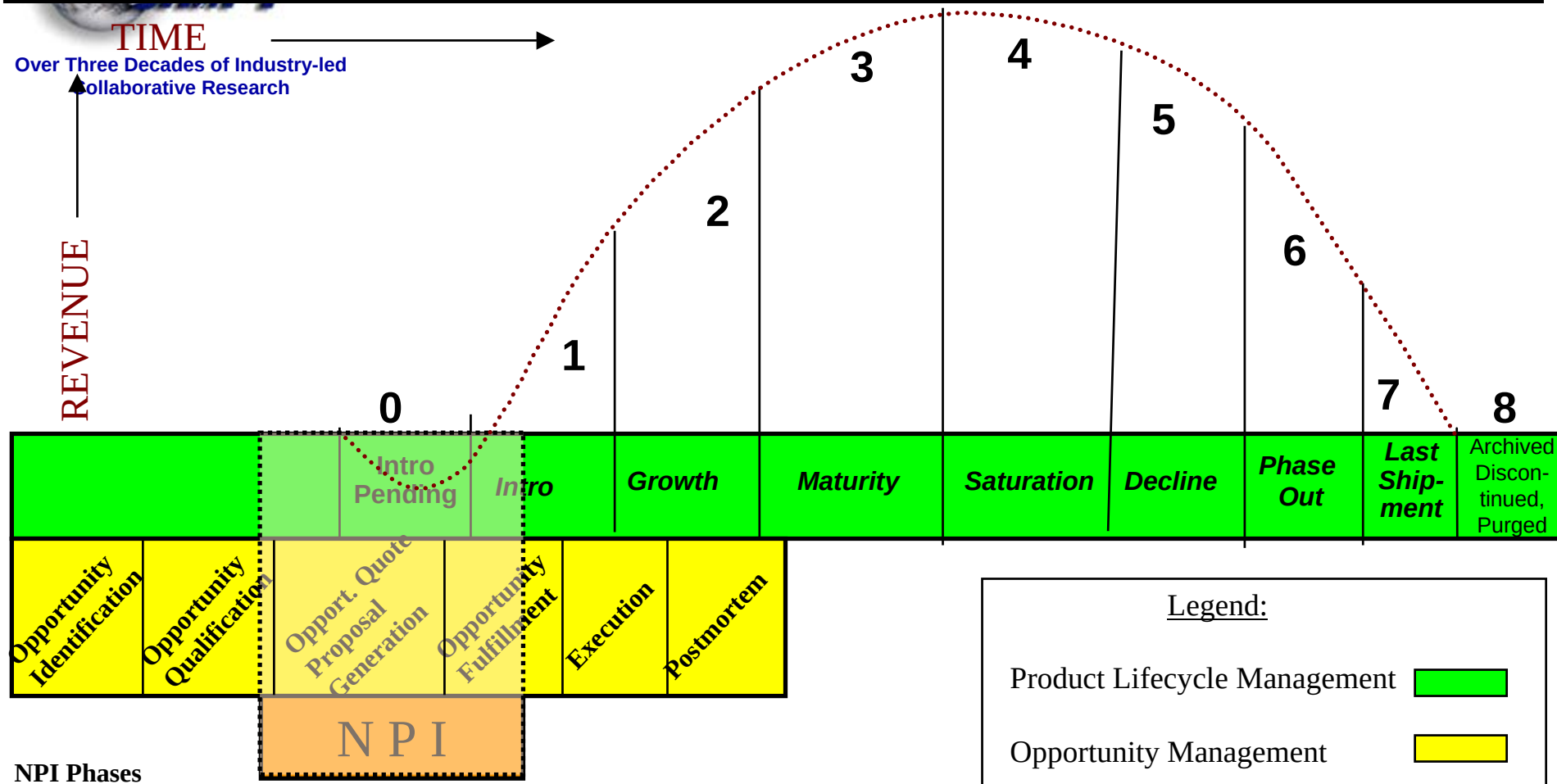
This exercise validated the benchmark that more than 15% of total IT cost is due to bad data

Updated by Alvin Lee, Oct08,1999	Transactions*		Total Time Spent* (Client Side)			Total Time Spent* (I.T. Side)			Financial Cost*	Cost of Bad Data*
Applications*	# transactions Per Week	# of Human Interactions	# of end users	% spent on data	% spent on bad data	# of I.T. support	% spent on data	% spent on bad data		
CIM System										
HTND			1000	10%	4%	20	30%	10%	$ 9,332,224	$ 3,016,489
ASDF			1000	10%	2%	20	30%	10%	$ 8,663,728	$ 1,564,875
FINANCE										
SDFD			100	10%	4%	1	10%	2%	$ 713,000	$ 281,640
SEDD			100	10%	3%	1	10%	2%	$ 713,000	$ 211,580
ERTY	7	37	1	1%	3%	1	1%	1%	$ 6,700	$ 2,630
W3ER	54	0	10	50%	10%	2	10%	5%	$ 370,000	$ 77,600
Planning										
SD23	10000	0	156	10%	1%	5	50%	25%	$ 1,387,000	$ 197,900
WESD23	10000	0	500	25%	3%	3	15%	7%	$ 8,901,500	$ 1,068,300
SEER	315,000	242,000	450	40%	4%	24	30%	10%	$ 13,224,000	$ 1,432,800
WET	65 65	5000	450	65%	1%	7	10%	2%	$ 20,644,000	$ 326,000
QWTY	500,000	0	1000	2%	0.50%	3	95%	5%	$ 1,719,500	$ 361,100
WYUU	10000	15	50	30%	4%	5	20%	4%	$ 1,126,417	$ 154,257
Operation										
XCDF	60830	1155775	2500	4%	2%	8	40%	25%	$ 8,749,092	$ 3,670,502
SWE	4000	1000	200	0%	1%	6	0.01%	0.00%	$ 120,042	$ 141,200
TYU	140,000,000	0	1400	5%	3%	2	30%	15%	$ 5,482,204	$ 2,977,206
GJJ	700	35	4	30%	2%	1	80%	40%	$ 260,000	$ 36,000
FGJ			200	10%	2%	10	0.3	0.1	$ 10,771,340	$ 533,227

ROI - ERP

- **Planning Systems – By populating the description field and de-populating other fields, people and system implications for Planning, Sales and Marketing and Finance.**
- **Modular approach**
  - **Increased efficiencies, reduction in cost of bad data**
  - **Enabler to the overall procurement project**
  - **Expenditure for Systems say $100M, COBD (18%)**
- **Other systems – e.g contact database**
  - **Request per month = 1100**
  - **Replacing 2 transactions per request**
  - **Transaction cost is $69 each**
  - **Total saving = 1100 x 12 x 2 x $69 = $1.82M**

Product Lifecycle Management, Opportunity Management and New Product Introduction Integration



NPI Phases

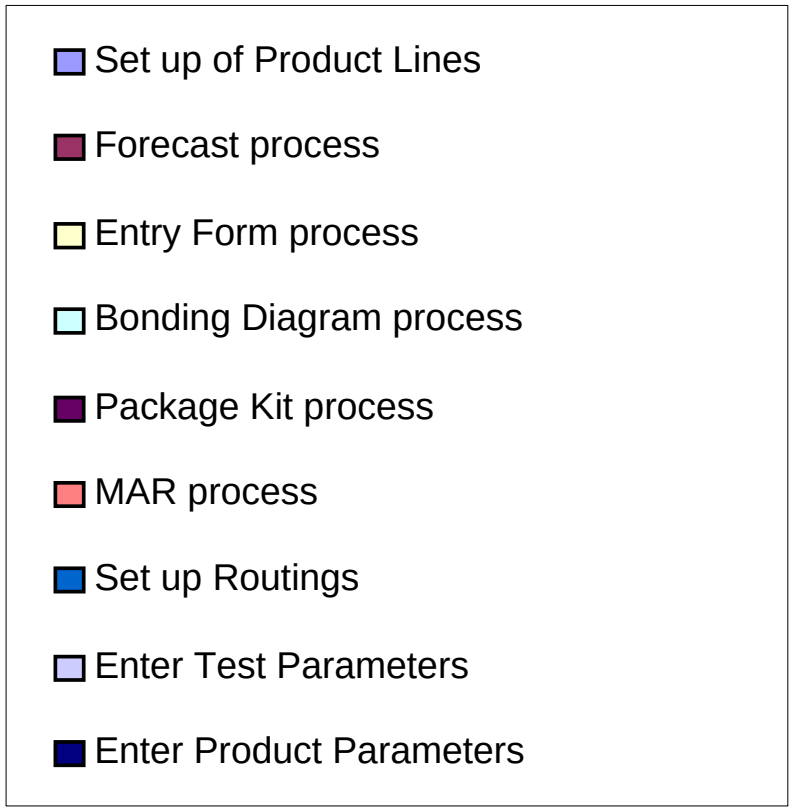
Concept and Selection	Definition	Planning and Scheduling	Execution/ Development	Validation	Ramp-Up and Phase Over	Production Support
Selection	Definition	Planning	Execution	Validation	Ramp-Up	Closure

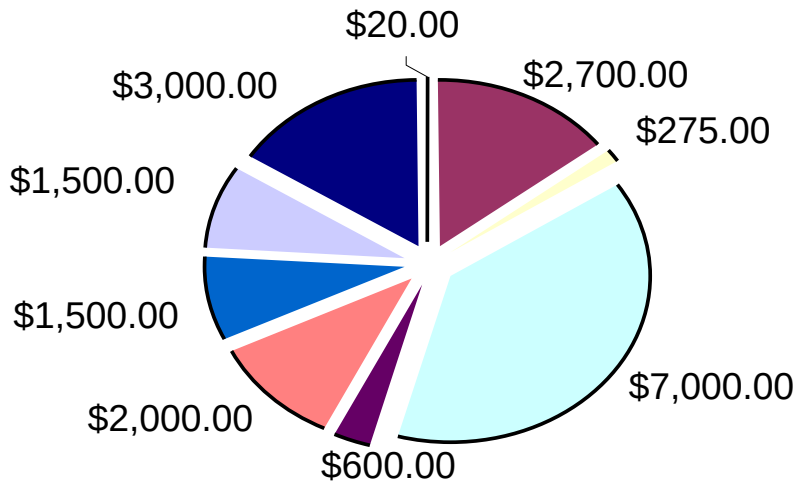
Legend:

- Product Lifecycle Management
- Opportunity Management
- New Product Introduction
- Dante Phases

Over Three Decades of Industry-led Collaborative Research

Typical Activities for Creating Parts

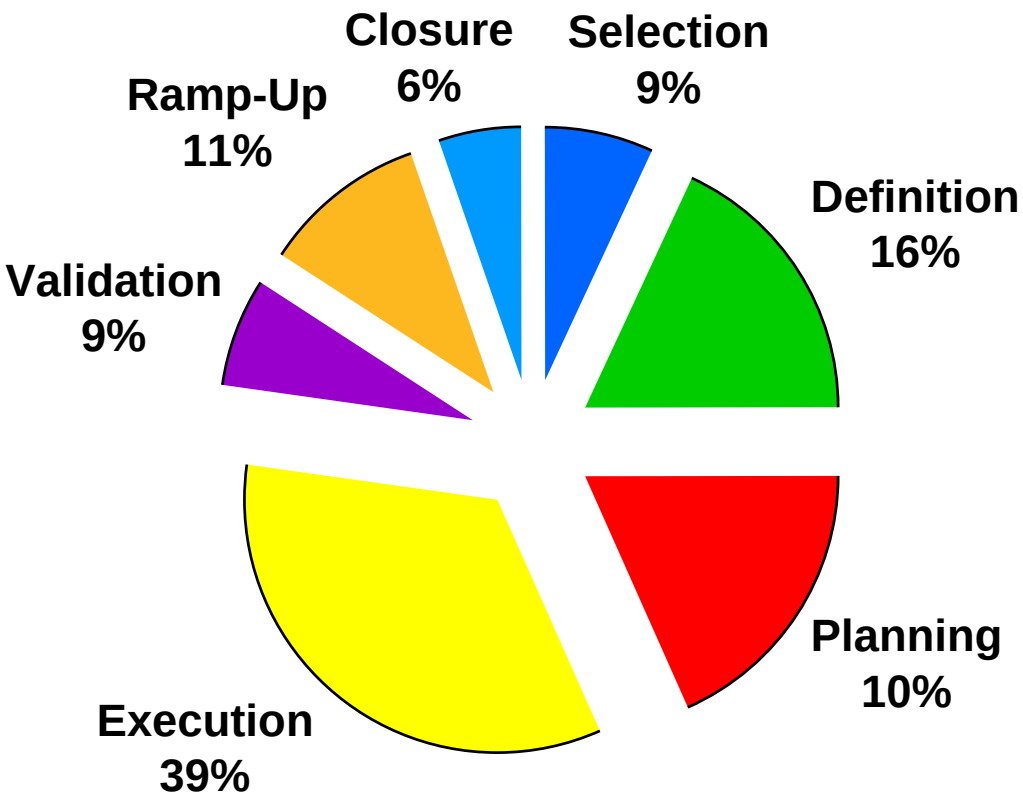




Over Three Decades of Industry-led Collaborative Research

Cycle Time

% Cycle Time Spent per NPI Phase



ERP Approach

- **Out-of-the-box software (No Modifications / Re-coding / Enhancements)**
- **Minimize bolt-on software**
- **Fixed timeframe & scope with phased implementation**
- **Program to be extended to fully replace all legacy systems once a track record of success is demonstrated**
- **Resources report to Functional Managers, not Centralized Program**

Over Three Decades of Industry-led Collaborative Research

Global Leadership in Cost, Process and Performance Management

Enterprise Architecture & Tools

Over Three Decades of Industry-led Collaborative Research

Business Architecture

Linking IT to the business to ensure both vertical & horizontal alignment with strategies, goals, & initiatives

Data Architecture

Developing & deploying data standards, models, & processes for ensuring trustworthy, timely, & seamless data that enables informed business decisions

System/Application Architecture

Driving application strategies and roadmaps that automate the use of the information resource in support of ”integrated” business functions

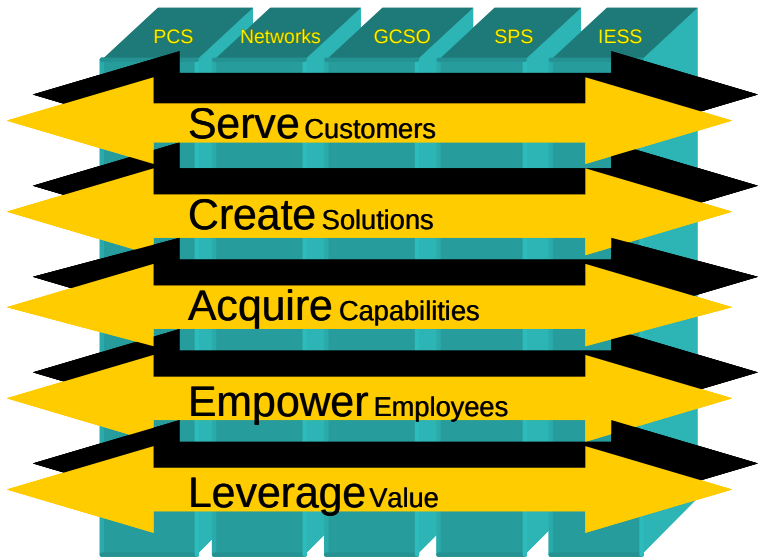
Over Three Decades of Industry-led Collaborative Research

Horizontal Capabilities & Domains

- **What are capabilities?**

  High-level functions a company must perform to compete as an integrated business in the digital economy

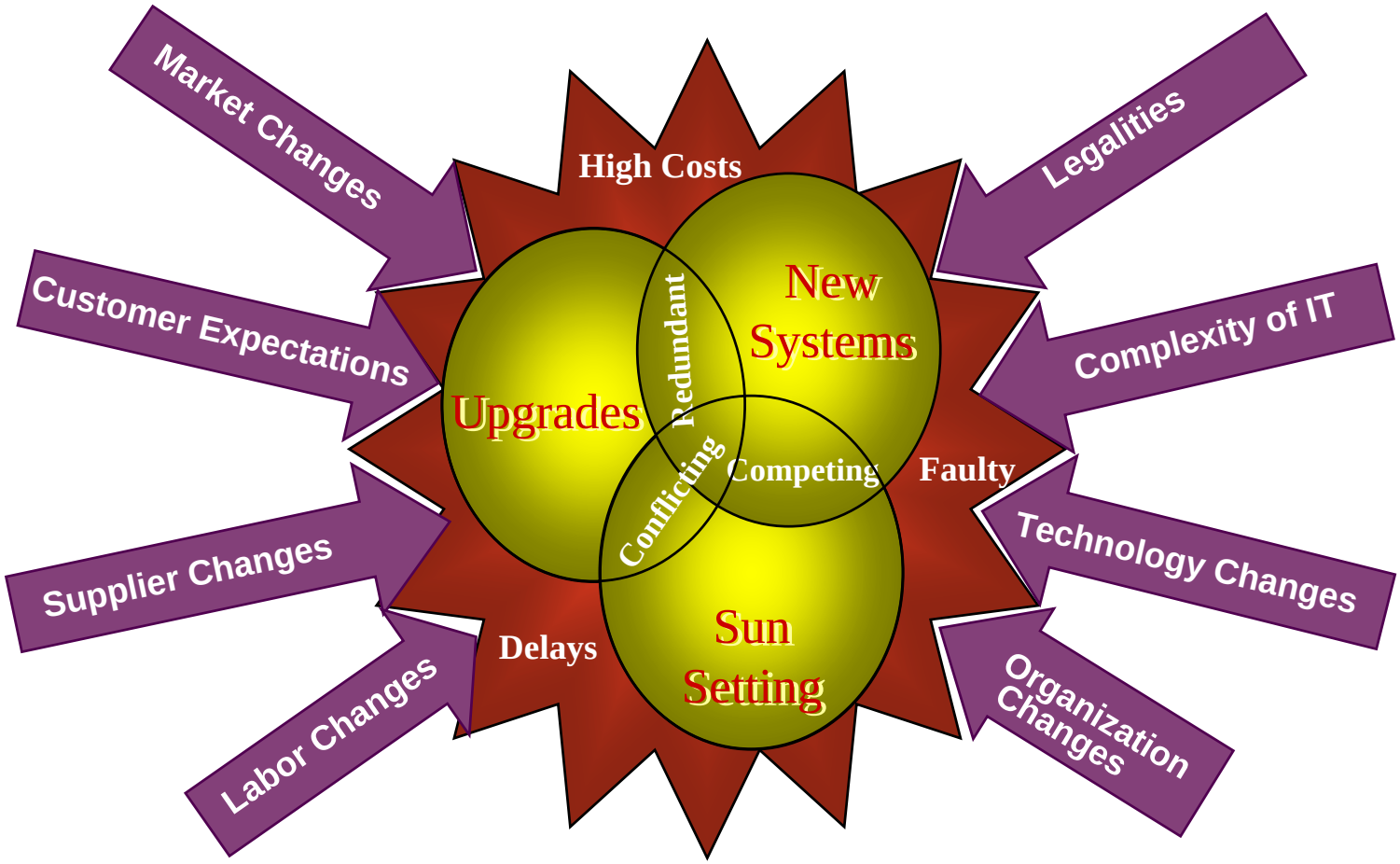
- **We have grouped capabilities into 5 Domains:**



Domains are not separate from our businesses - they are a horizontal approach to our business and their purpose is to improve our business capabilities.

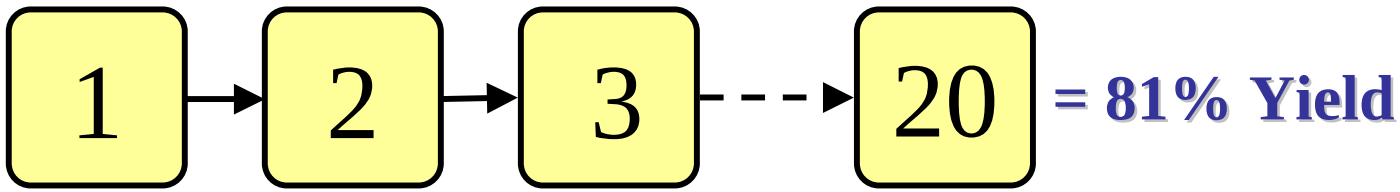
Over Three Decades of Industry-led Collaborative Research

Internal and external factors forcing a multitude of concurrent IT system changes driving the need for comprehensive project and architecture management.



Over Three Decades of Industry-led Collaborative Research

Data Supply Chain Tolerance Analysis

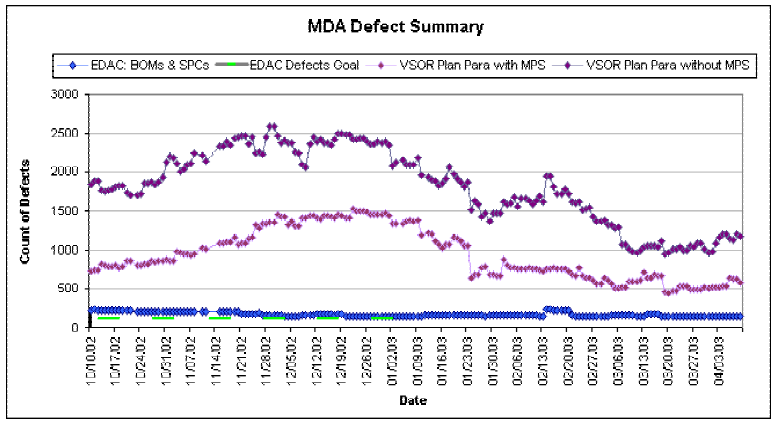


(20 manufacturing steps at 99% Yield each)

- **Chips ~200 steps. 99% Yield at Each Step will Result in Final Yield = 13% Yield**
- ***The Same Relationship is True with Data!***
- **Error Rates are Higher (5-10% is common)**

Over Three Decades of Industry-led Collaborative Research

Performance Criteria and Measurement Systems

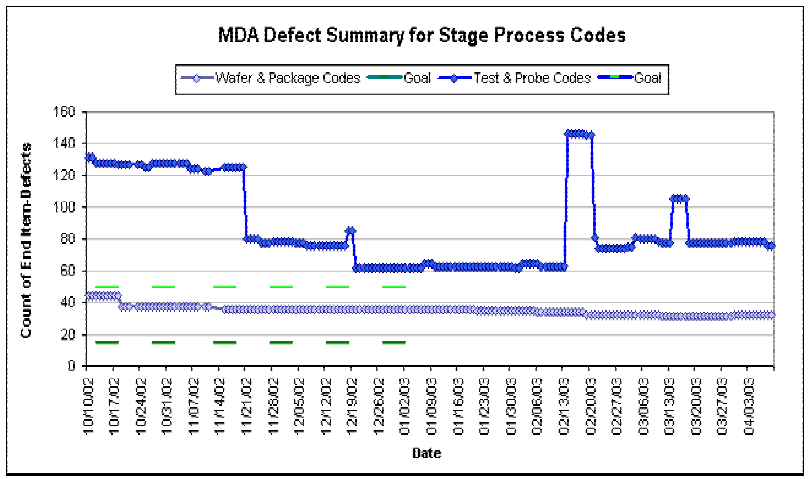


Analyze your financials and Data

- Performance to business rules
- Data quality trends
- Defect detection

Continuous improvement through root cause analysis to drive corrective actions

Executive Dashboards



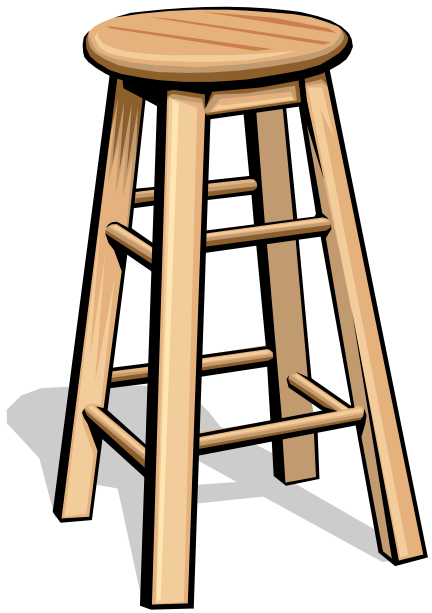
Over Three Decades of Industry-led Collaborative Research

Data Projects

Four types of Data Projects

- **Data Readiness**
- **Data Processes**
- **Data Systems**
- **Data Architecture**

Data Purge
Data Rationalization
Data Creation
Data Conversion



Over Three Decades of Industry-led Collaborative Research

Data Readiness Process

CONCEPT BUY-IN

DEFINE SCOPE

CUSTOMER BUY-IN

CHOOSE PROJECT LEADER

GATHER PROJECT REQMTS

IDENTIFY PROJECT MEMBERS

Business Rules

IDENTIFY DATA DEFINITION

DATA THREAD ANALYSIS

Mediated Tools

FUNCTIONAL SPEC BUY-IN

IDENTIFY SOR

Data Tractability Integrated Tools

METRIC

DEFINE AND SUBMIT IT REQUIREMENTS

PROCESS/ SYSTEM PILOT

CLEAN UP EFFORT

Institutionalization

BUY- OFF FROM CUSTOMER

TRAINING IS IDENTIFIED

DATA STEWARD IS IN PLACE

PROJECT CLOSED

Measurement

Business Process Understanding

Over Three Decades of Industry-led Collaborative Research

Elements of a Robust Process

- **Documented and Improved Over Time: Configuration Management**
- **No More Than Two Signatures**
- **Defined Capacity and Capability**
- **Can Be Linked to Peoples Roles: Accountability!**
- **Easy to Learn/use Online Training**
- **Web Enabled**

Example - Data Process Design

Over Three Decades of Industry-led Collaborative Research

Business / Data Process Checklist

Business Process Checklist *Process Name Here*	Data Process Checklist *Process Name Here*	1
Business Process for this request	Data element(s) for this request	
What data or information is needed to start the process?	List all systems through which this data element will flow.	
What data or information is required during the business proces?	How is the data used in each system?	
What are the outputs of the business process? Ex: Document, Decision, Positin, etc.	For each system, what are the data outputs?	
How is the data or information obtained? Is it manually entered? Is it calculated within a system?	How is the data obtained? Is it manually entered? Is it calculated within a system?	
Are there any links/ dependencies to other business processes?	How often must the data be fed to downstream systems?	
Who owns creating, maintaining, or updating the business process?	Who will own the data?	
Who is responsible for the execution of the steps in the business process?	How will the data owner create a new data element? Need a detailed description.	
How will any changes be made to the process? Need a detailed description.	How will the data owner change the data element? Need a detailed description.	

Over Three Decades of Industry-led Collaborative Research

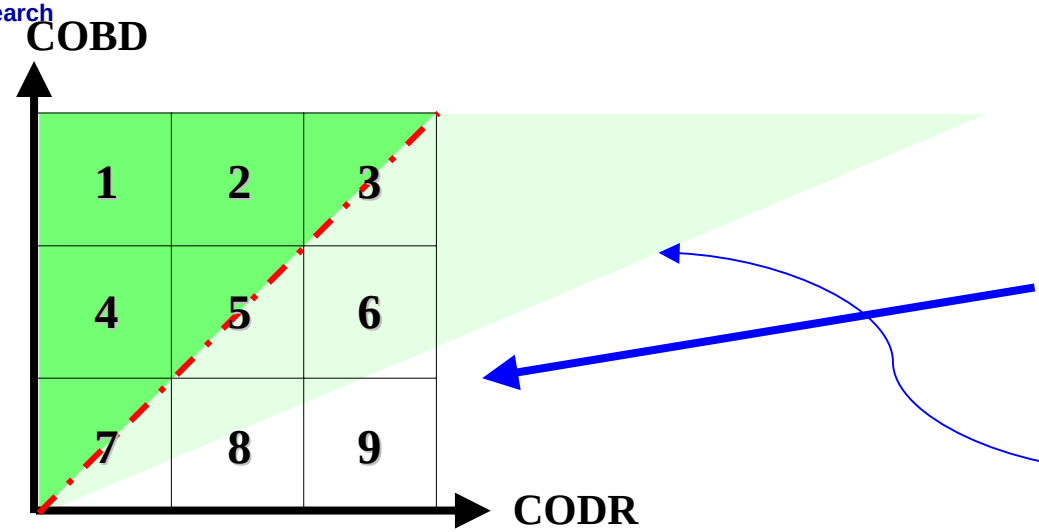
Prioritizing Data Projects

- **Priority Cube**
  A method to calculate the relative priority or opportunity by domain of addressing data readiness.
- **Requirement**
  Opportunity prioritization must be based on the business value or ROI of the data readiness effort and relative importance to the successful execution of the sector's business goals.
- **CODR: Cost of Data Readiness**
  The cost by domain of making the data "clean". The cost to purge, rationalize, create, convert or otherwise make the data ready for the domain.
- **COBD: Cost of Bad Data**
  The cost by domain if the data is incorrect, missing etc., (Bad Data). Comparison of COBD vs. CODR yields an ROI.
- **Criticality**
  The relative importance to the sector's goals / scorecard. How critical is "good data" within a given domain to the successful execution of the sector's goals. (Essential, Important, Nice to have)

Prioritizing Data Projects

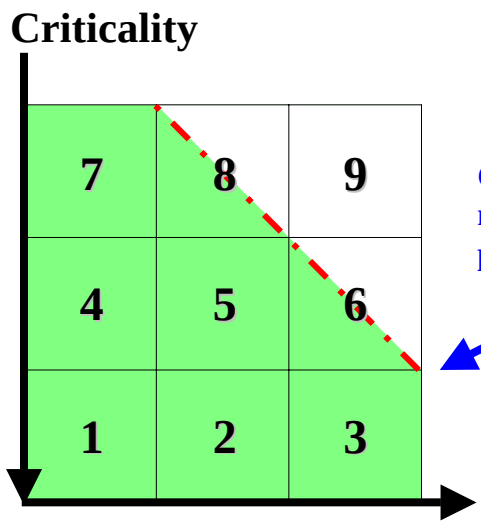
Over Three Decades of Industry-led Collaborative Research

Stewardship

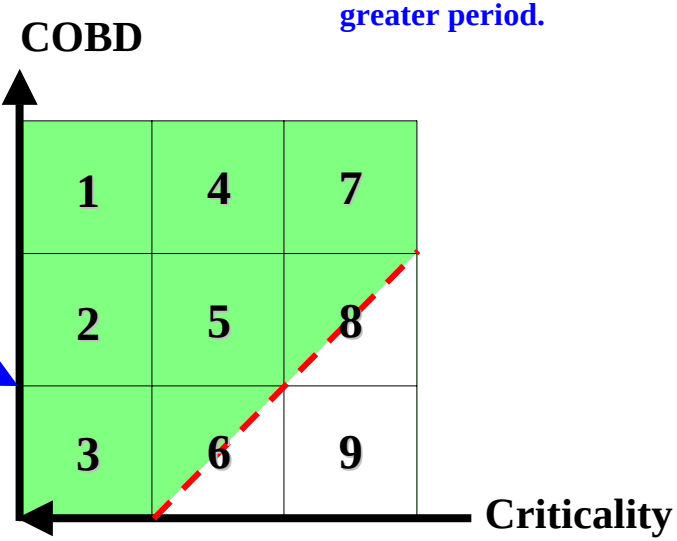


Domains that fall above the line have positive ROI within the period of the effort but because CODR is fixed and COBD usually increases over time the indicated prioritization is used.

Represents +ROI area when measured over greater period.



Criticality usually carries more weight than cost for projects.



Over Three Decades of Industry-led Collaborative Research

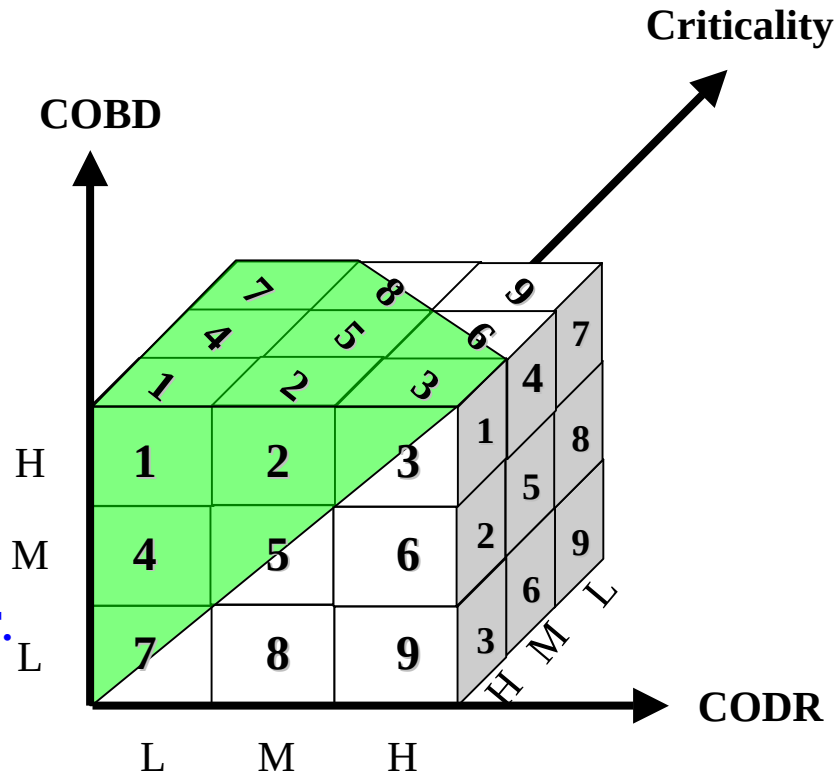
Prioritizing Data Projects

Calculated domain priority is a product of the three grid rankings:

Priority = COBD * CODR * CRIT.

= ROI * CRITICALITY

= Business Benefit * Business Goals



e.g. Top opportunity would be a domain with high COBD, low CODR and high Criticality.

Over Three Decades of Industry-led Collaborative Research

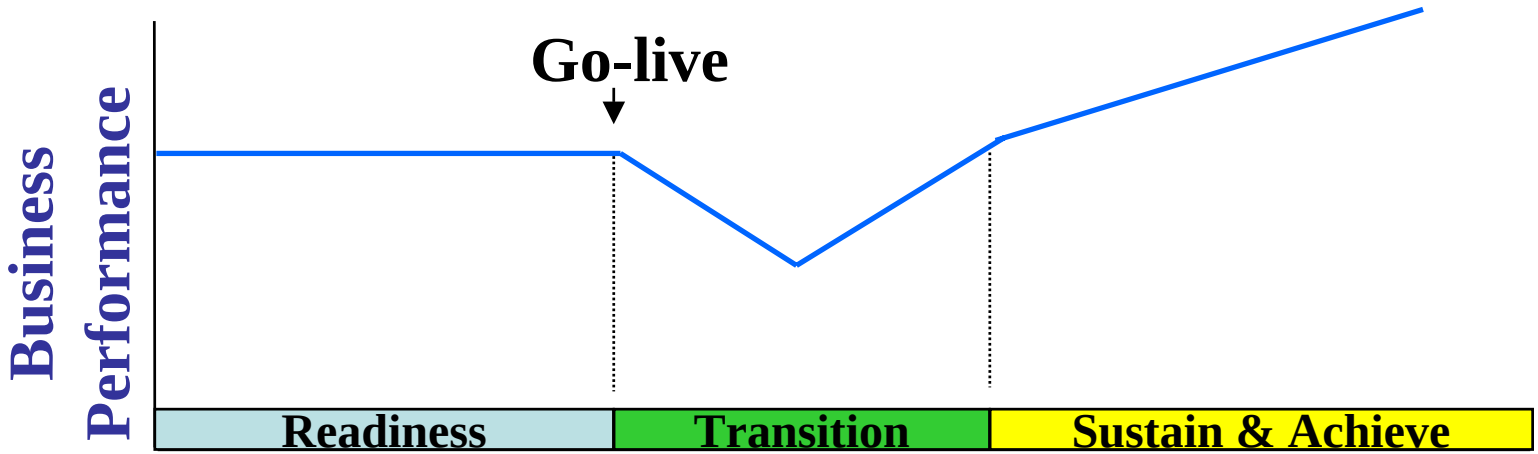
Prioritizing Data Projects

Domain	COBD	CODR													Criticality							Calculated Priority
Price	H	H	M	M	M	H	M	L	M	L	L	L	L	H	H	M	H	L	H	H	M	1
Materials / BOM	H	H	L	H	M	H	H	L	L	L	M	L	M	L	H	L	H	H	H	H	M	1
Customer DB (Thru Cus5)	H	H	H	M	M	M	M	M	M	M	M	L	M	M	H	H	H	M	H	M	H	2
Cost Data	H	M	H	H	M	H	M	H	H	M	M	M	H	H	H	M	H	M	M	H	M	3
NPI Data	M	H	H	M	M	L	M	M	H	M	M	L	H	M	H	H	H	L	H	M	H	5
Inventory	M	M	L	H	M	H	M	H	M	M	H	H	M	M	H	L	H	H	M	H	M	6
Mfg Data	H	M	H	M	M	H	H	H	H	H	M	H	H	H	M	L	H	M	M	M	H	6
Logistics	M	M	M	M	H	M	M	L	L	H	L	H	L	L	M	L	H	L	M	M	M	8
Document Data	M	M	H	L	L	M	M	M	M	H	M	M	L	M	M	M	M	L	M	M	M	10
Customer Contact	M	L	M	H	L	L	H	H	H	M	H	L	H	H	M	H	H	M	L	L	H	12
Vendor	M	M	H	M	L	M	M	L	M	M	L	L	M	M	L	M	M	L	L	M	L	12
Quality Data	M	M	M	L	H	M	L	H	M	M	M	H	H	H	M	M	M	L	H	M	M	12
Finance Fixed Assets	M	L	H	H	L	M	L	L	M	M	L	M	L	M	L	L	M	M	L	L	L	12
HR Data	M	M	M	H	L	L	M	L	L	M	L	L	M	L	L	L	H	H	L	L	L	12
Product Line	L	L	L	L	H	H	L	L	M	L	M	L	M	M	M	M	M	L	H	H	L	14
Data Book	L	H	M	M	L	L	L	M	H	M	H	L	L	H	M	H	M	M	L	L	H	16

Over Three Decades of Industry-led Collaborative Research

Change Readiness

Reduces Transition Risks



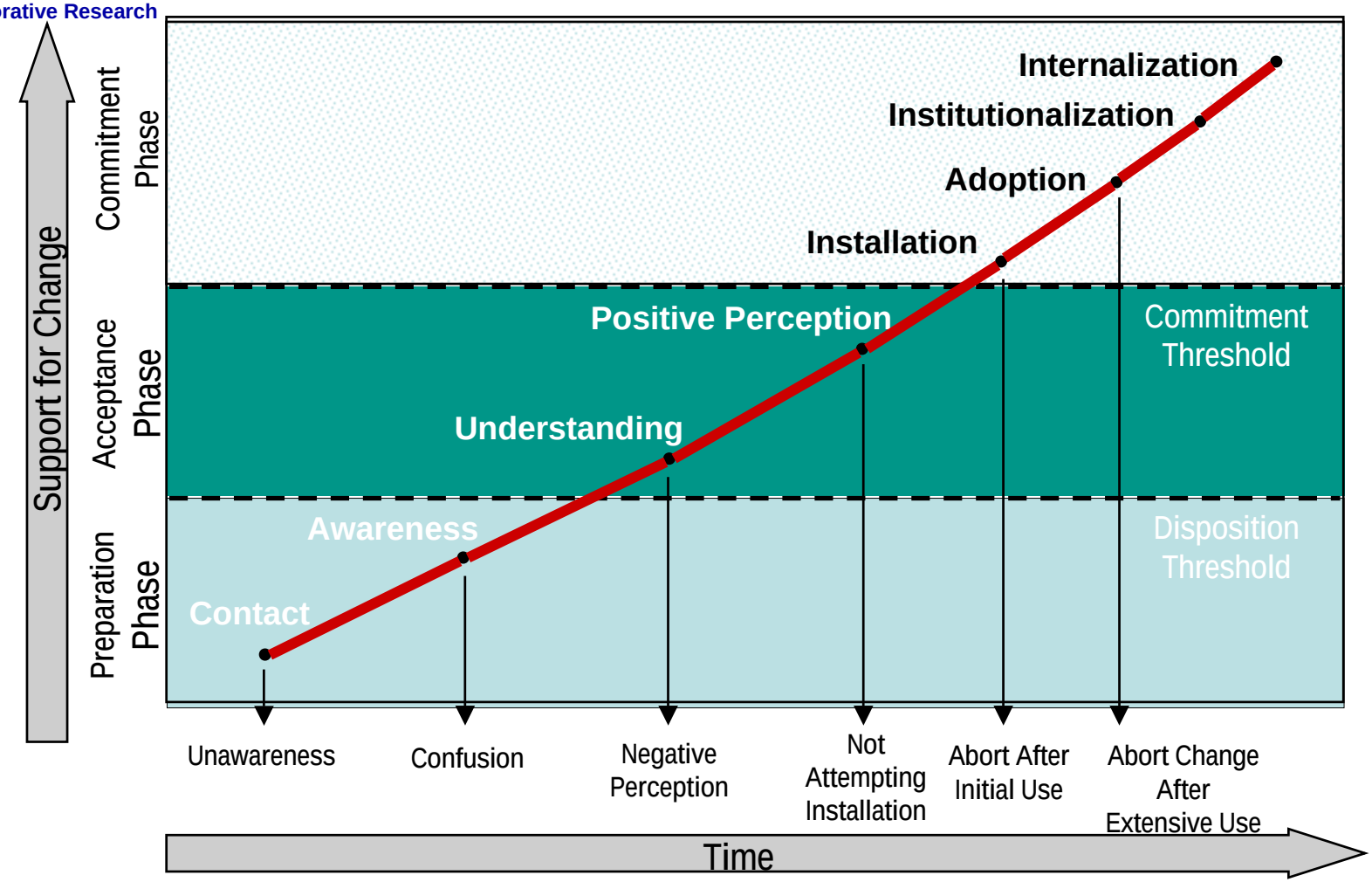
- Metrics/Assessment
- Stakeholder Engagement Plan
- Site Workplans and Checklists
- Go Live Evaluation
- Startup Support Plan

- Metrics/Assessment
- Training
- Site Workplans and Checklists
- Post Implementation Plan

- Post Go Live "Checkout" sessions
- As-needed Training and Help Desk Support
- Change Control Process

Culture Change – Stages of Commitment

Over Three Decades of Industry-led Collaborative Research



These concepts are based on the research and theory of Daryl R. Conner of Organization Development Research (ODR).
The actual change band is developed from the "Commitment Model" as outlined in Conner's book, *Managing at the Speed of Change - 1993.*

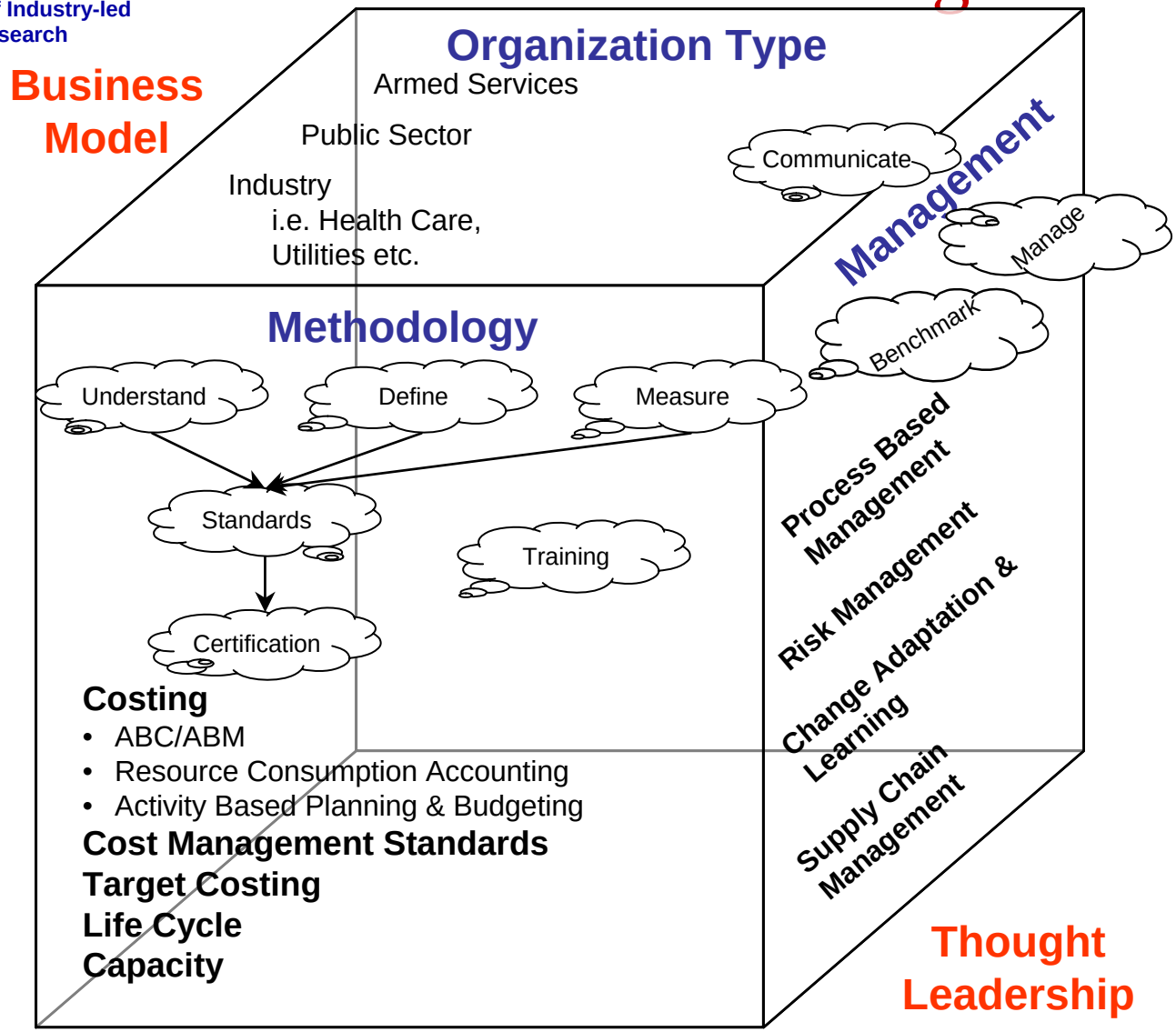
Over Three Decades of Industry-led Collaborative Research

Data Recommendations

- Measure the Quality of Your Business Data
- Measure the Cost of Data to Your Organization
- Estimate the Cost of Poor Quality Data
- Define Data Owners, Processes, Stewards
- No Optionalism Mentality
- Turn Your Data into an Asset

CAM-I Vision - Cost, Process and Performance Management

Over Three Decades of Industry-led Collaborative Research



Global Leadership in Cost, Process and Performance Management

Over Three Decades of Industry-led Collaborative Research

CAM-I - Future Areas

- **Process Based Management Implementation**
- **Strategic Benchmarking –** Customer Profitability, Supply chain
- **Lean Principles in Cost Management, Six Sigma**
- **Armed Services Interest Group** – work on the eight principles
- **Extended Enterprise -** Strategic Supply Chain Management
- **Resource Consumption Accounting**
- **Performance Measurement & Management**
- **Cost of Quality, Information Quality**
- **Training and Certification**
- **Integrating Business Processes into Technology Business Processes and ABC to reduce costs**

Over Three Decades of Industry-led Collaborative Research

Affiliations and Partnerships

- **AICPA –** American Institute of Certified Public Accountants
- **AIG –** Advanced Implementation Group for Activity Based Management
- **APQC –** American Productivity & Quality Center
- **ATI** – Advanced Technology Institute
- **AGA** – Association of Government accountants
- **CMA Canada -** Certified Management Accountants
- **IMA –** Institute of Management Accountants
- **ASQ** – American Society for Quality
- **Universities –** Kellogg, Naval Postgraduate School, US Coast Guard Academy, Arizona State University, Metro State University, California State University Northridge, UT Austin, GLIM (Great Lakes Institute of Management)

Over Three Decades of Industry-led Collaborative Research

Ashok G. Vadgama
Phone: 512-329-5167
Email – ashok@cam-i.org
www.cam-i.org

Wayne McCleve
Phone: 480-413-7491
Email – wayne.mccleve@freescale.com