

# Supply Chain Optimization

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Performance Based Studies Research Group



[www.pbsrg.com](http://www.pbsrg.com)

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# PBSRG

(Performance Based Studies Research Group)

- Conducting research since 1994
- 175 Publications
- 483 Presentations, 8,600 Attendees
- 683 Procurements
- \$808 Million Construction services
- \$1.7 Billion Non-construction services
- \$1.3B Euro (\$2B) construction test ongoing in the Netherlands
- Africa/Southeast Asia/Australia (7 universities)
- ASU procurement - \$100M over ten years
- GSA implementation in 2009
- 50 Different clients (public & private)
- 98% Customer satisfaction, 90% of PM/RM transactions minimized



# Event

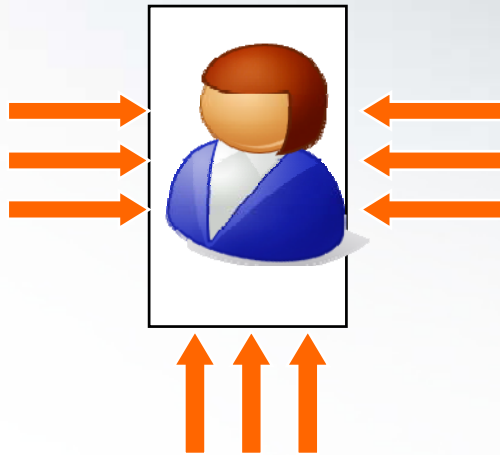


# Influence Vs. No Influence

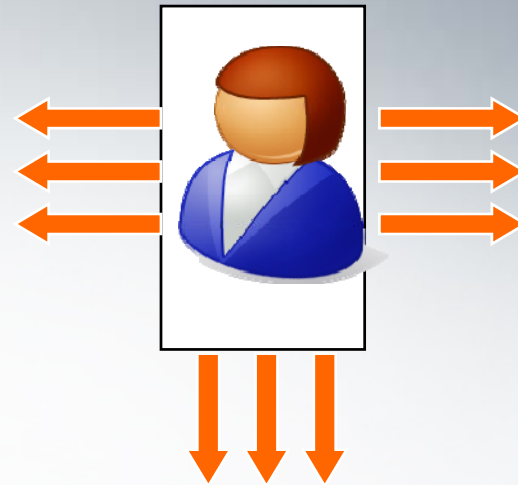


- **Chance?**
- **Being controlled?**
- **Controlling others?**
- **Does not adequately preplan?**
- **Blames others when problems occur?**

# Influence Vs. No Influence

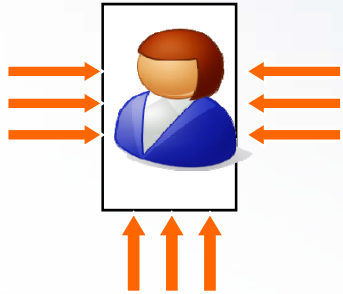


- Chance
- Controlled
- Controls others
- Does not adequately preplan
- Blames others

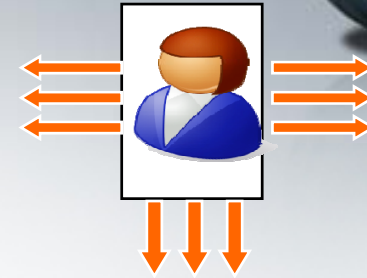
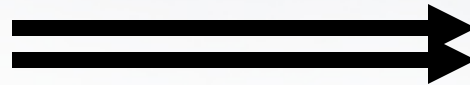


- Does not believe in chance
- They dictate their own future
- Cannot control others
- Preplans
- Identifies what they may have done wrong

# Change to Optimize



- Chance
- Controlled
- Controls others
- Does not adequately preplan
- Blames others



- Does not believe in chance
- They dictate their own future
- Cannot control others
- Preplans
- Identifies what they may have done wrong

# Industry Structure



Performance	High	<u><b>III. Negotiated-Bid</b></u>  Owner selects vendor Negotiates with vendor Vendor performs	<u><b>II. Value Based</b></u>  Best Value (Performance and price measurements) Quality control  <b>Contractor minimizes risk</b>
	Low	<u><b>IV. Unstable Market</b></u>	<u><b>I. Price Based</b></u>  Specifications, standards and qualification based Management & Inspection  <b>Client minimizes risk</b>
		Low	High
		Competition	

# Problem with Priced Based Systems



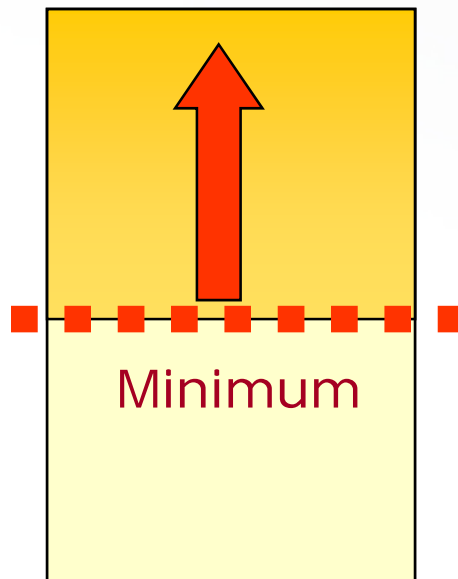
## Owners

*"The lowest possible quality that I want"*

High

Performance

Low



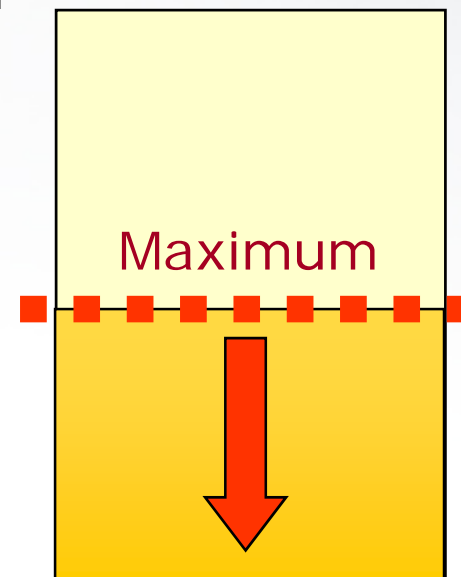
## Contractors

*"The highest possible value that you will get"*

High

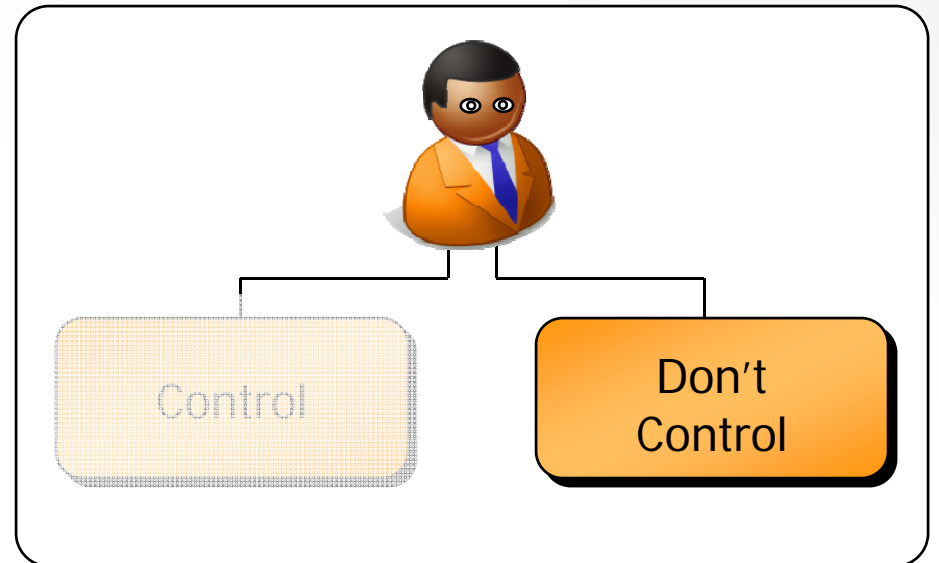
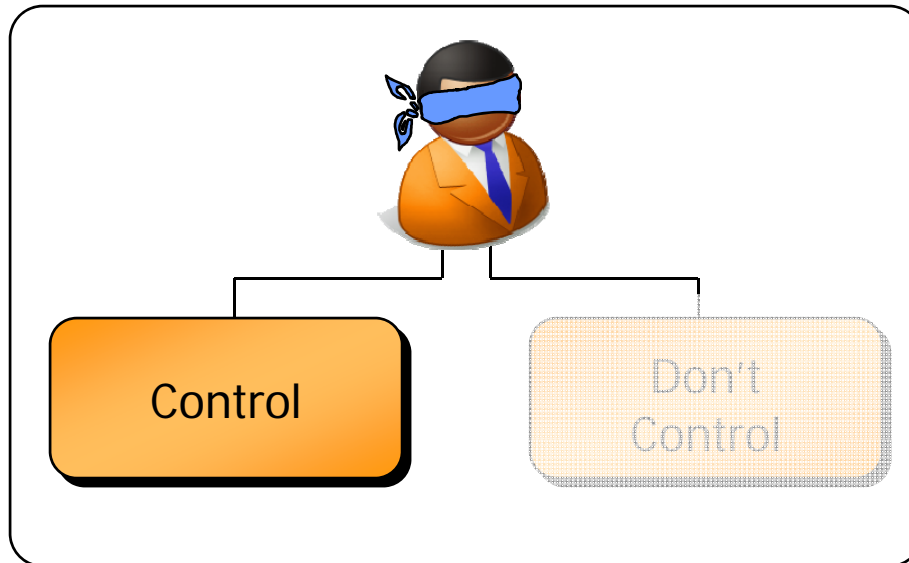
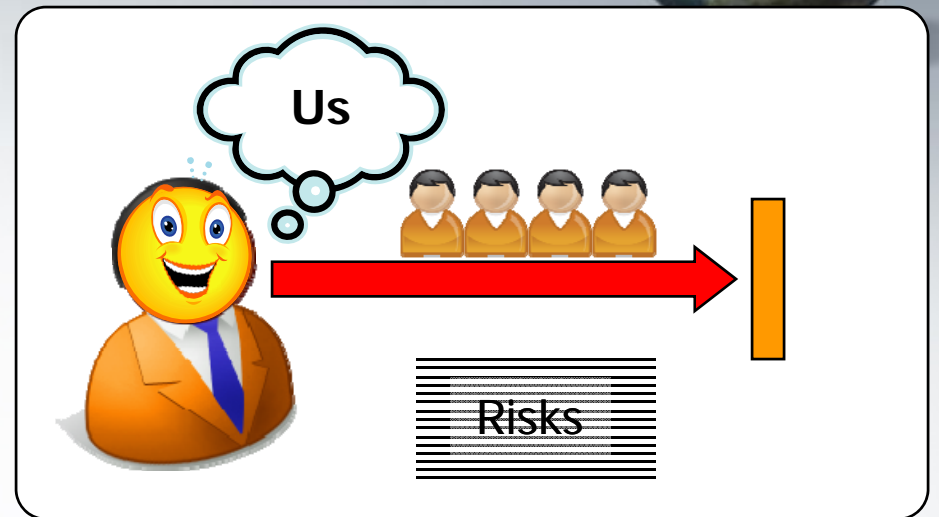
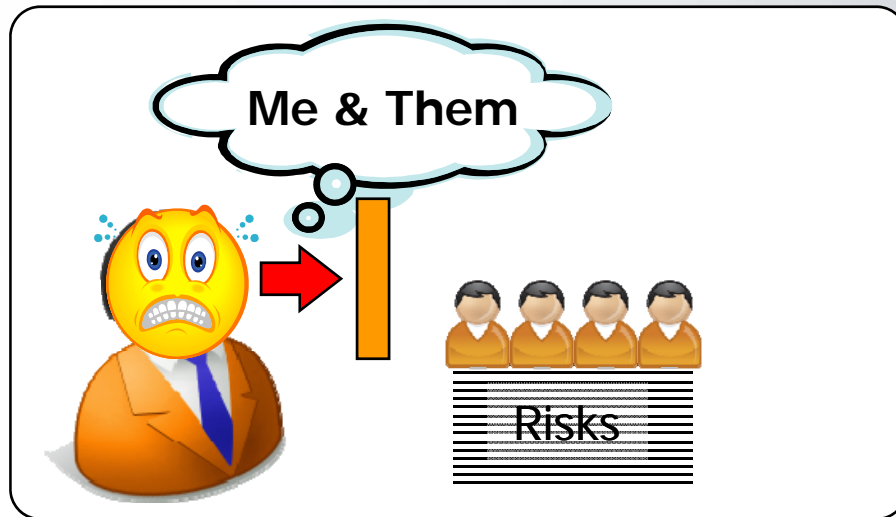
Performance

Low

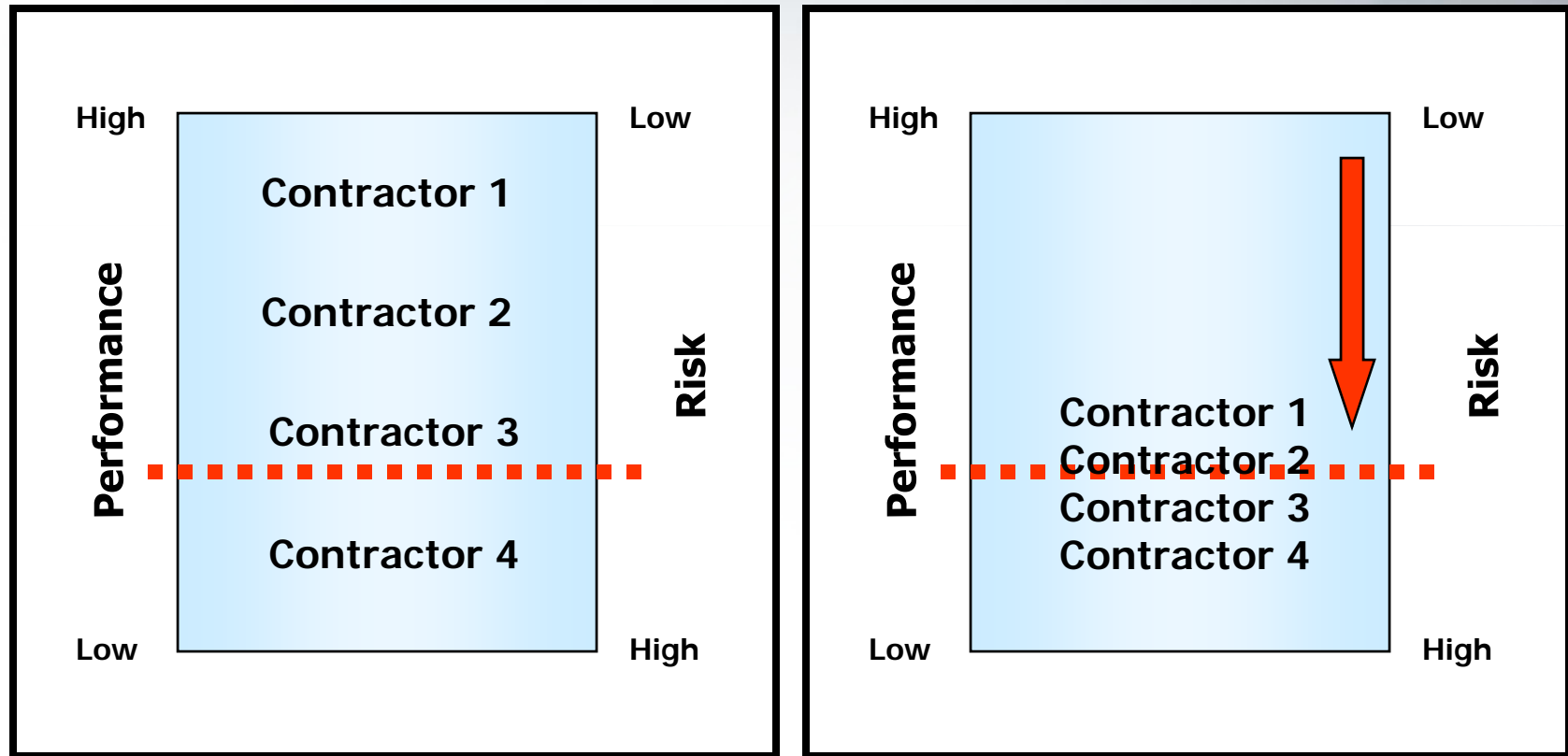




# Inexperienced vs Experienced



# Impact of Minimum Standards

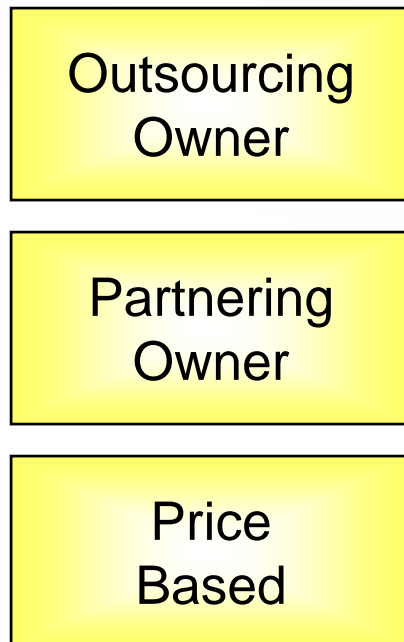


Decision making: what is the minimum standard, and do all contractors meet the minimum standards

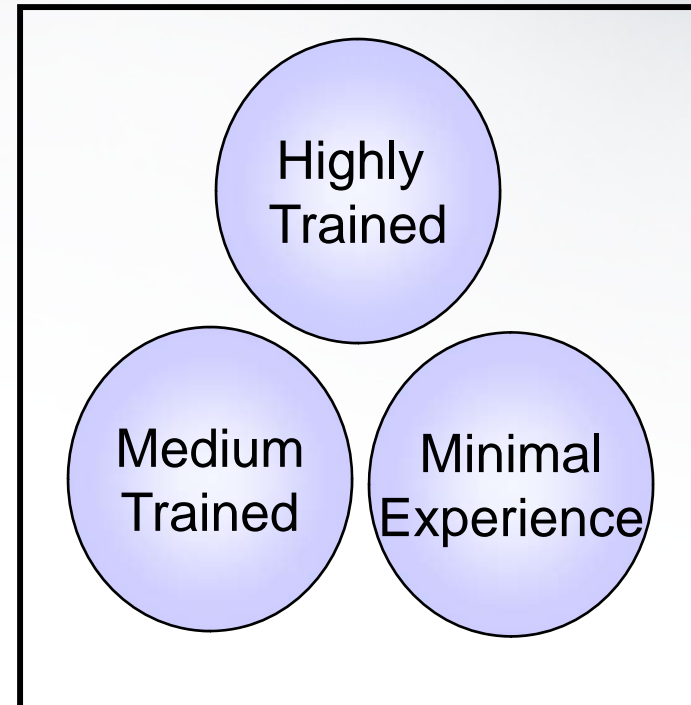
# Industry performance and capability



## Customers



## Vendor X



# "Best Value" Processes and Structures

Performance Information Procurement System (PIPS)



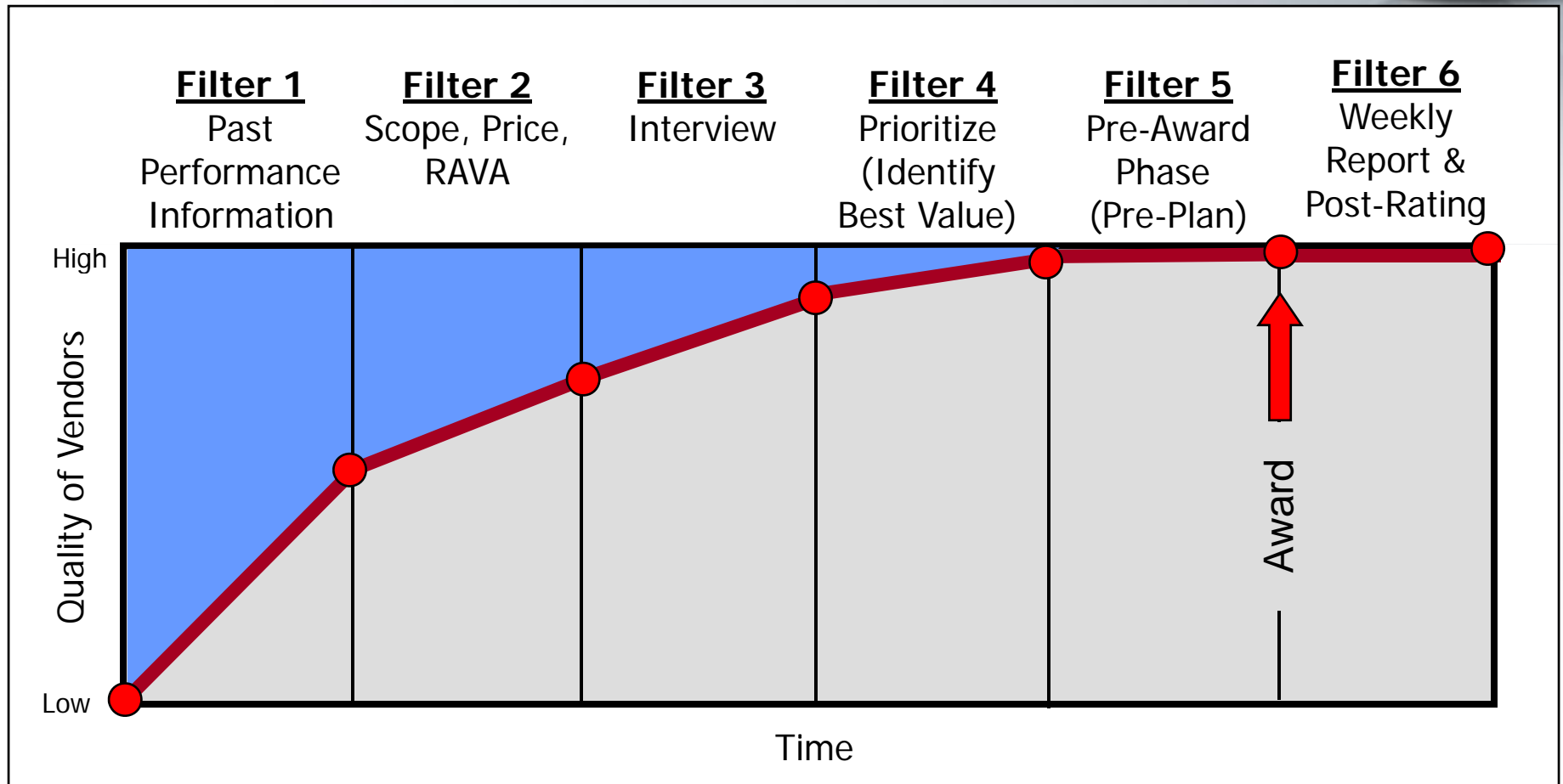
- Win: Minimize up to **90%** of project management/administration/busy work and minimize transaction costs by **20%**.
- Win: Increase vendor profit up to 100%
- Win: Minimize **risk to 2%** of projects not on time, not on cost, and client not satisfied
- Win: Cost does not increase with higher value

# Best Value System Performance Information Procurement System (PIPS) PM model, Risk Management model



Best Value also known as “sealed competitive bid” in State of Texas

# Performance Information Procurement System (PIPS)

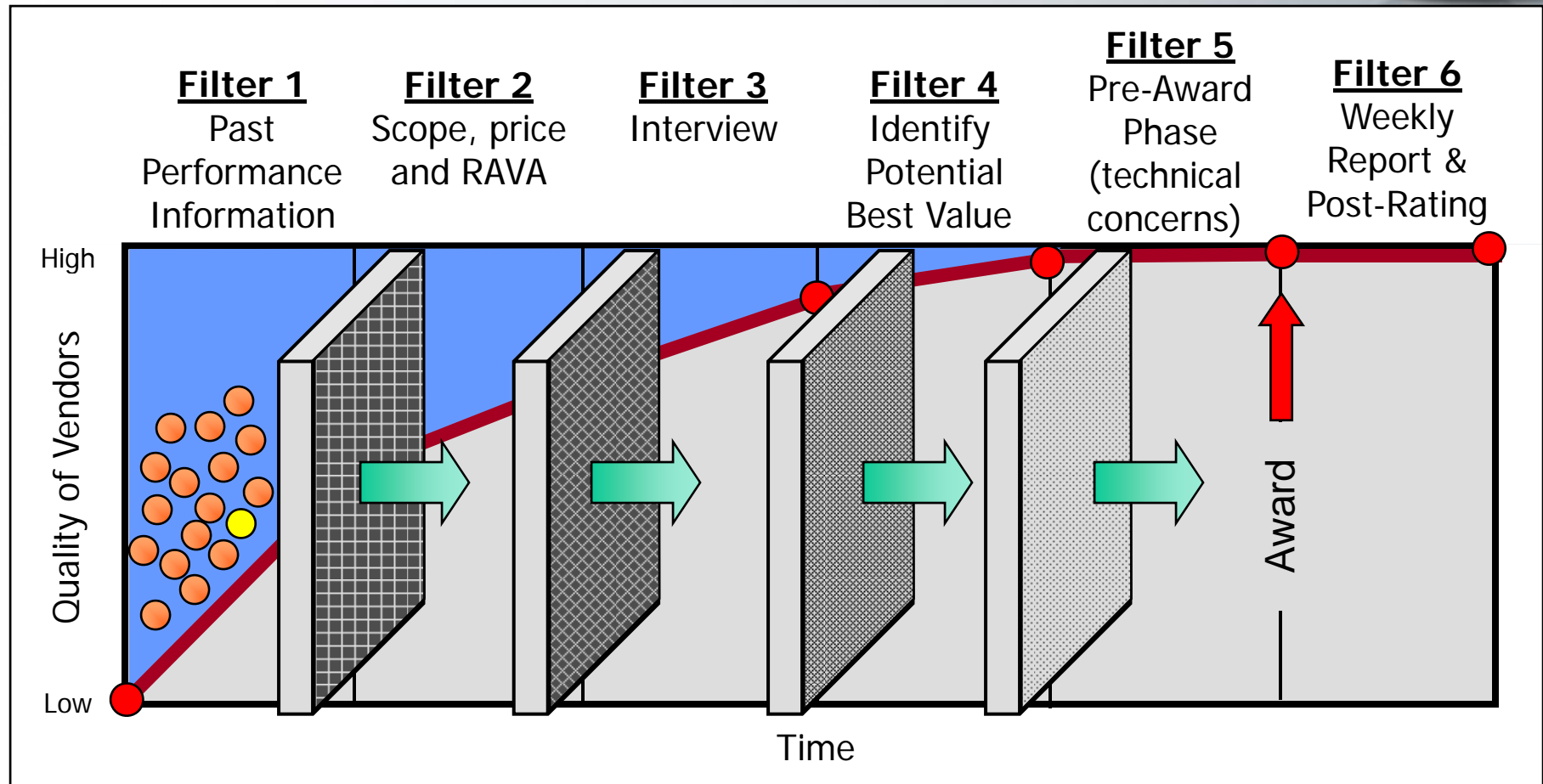


# Vendor Selection Criteria (Performance)



- Past performance information on the critical elements (15%)
- Scope( as understood by the vendor from RFP) (20%)
- Schedule with major milestones (10%)
- Risk assessment value added (RAVA) plan (25%)
- Interview of key personnel (30%)

# Remember – PIPS Has Multiple Filters





# High Performers are Experts in What They Do



- High performers know what they do (technical requirements)
- High performers know the only factor that can stop them from performing is “what they do not control”
- High performers think in terms of the complete job, beginning to end
- High performers know that everyone has to win
- High performers think in the best interest of everyone because their understanding leaves them no other option

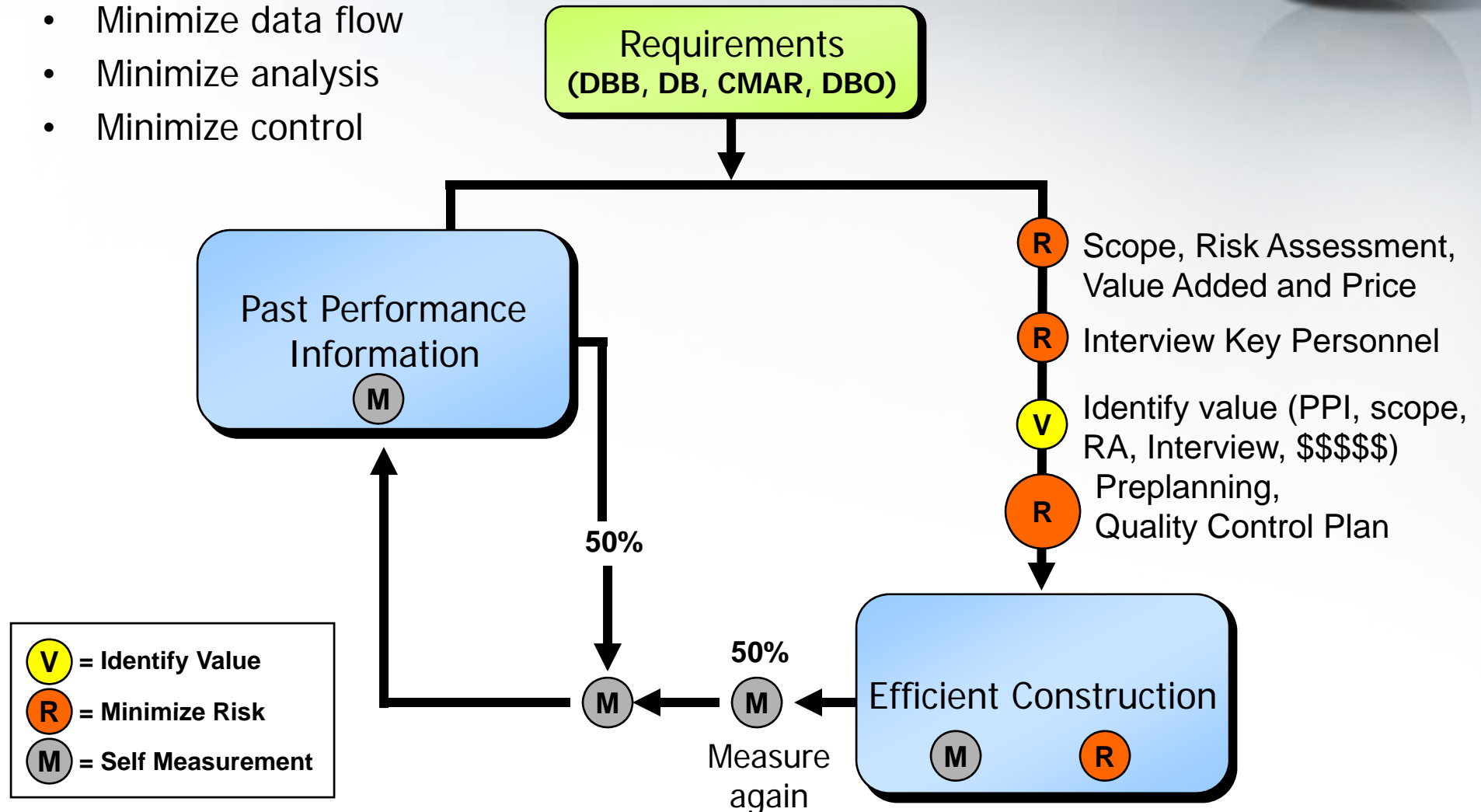
# Self Regulating Loop

(Six Sigma DMAIC Generated)



## Actions

- Minimize data flow
- Minimize analysis
- Minimize control



# Important Aspects of PIPS



- Vision beginning to end
- No technical risk
- 30K foot elevation analysis
- Preplan
- Schedule is risk focused
- Quality Control/Risk Management (minimize risk they don't control)
- Supply chain thinking
- Win-win

# Comstock Hall



- Scope = Replace existing lighting fixtures
- Budget = \$180,000



		1st	2nd	3rd	4th
No	Criteria	CH04	CH03	CH02	CH01
1	Price	\$ 72,400	\$ 70,350	\$ 87,850	\$ 96,575
2	Risk Assessment Plan	7.5	5.8	4.2	2.7
3	Schedule	35	30	35	25
4	PPI (1-10) Average	9.7	9.6	9.8	9.6
5	PPI (Jobs & People) Average	20	18	16	23

- Awarded to Gephart Electric
  - Estimated budget \$180,000
  - Award cost \$72,400 (-60%)

- Results:
  - On time
  - No cost change orders
  - Client highly satisfied



# Physics Tate Building



- Scope = Chilled water lines
- Budget = \$490,000

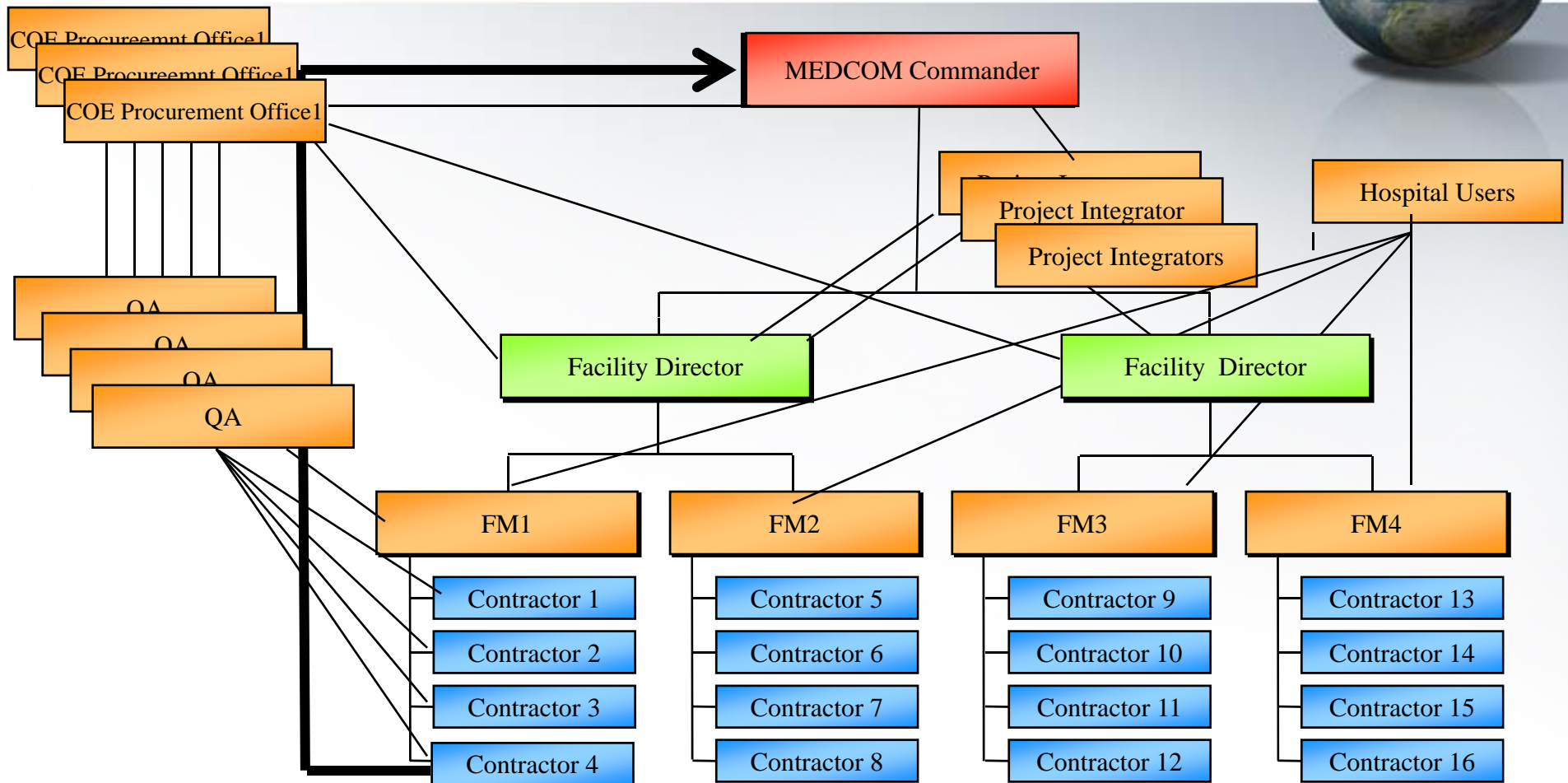


No	Criteria	1st	2nd	3rd
		T1	T3	T2
1	Price	\$ 465,700	\$ 489,545	\$ 538,500
2	Risk Assessment Plan	8.1	7.1	2.3
3	Schedule	75	61	120
4	PPI (1-10) Average	9.6	9.6	9.8
5	PPI (Jobs & People) Average	19	24	11

- Awarded to Metropolitan Mechanical
  - Estimated budget \$490,000
  - Award cost \$465,700 (-5%)
  - Award schedule 87 days
- Results:
  - On time
  - No cost change orders
  - Client is highly satisfied

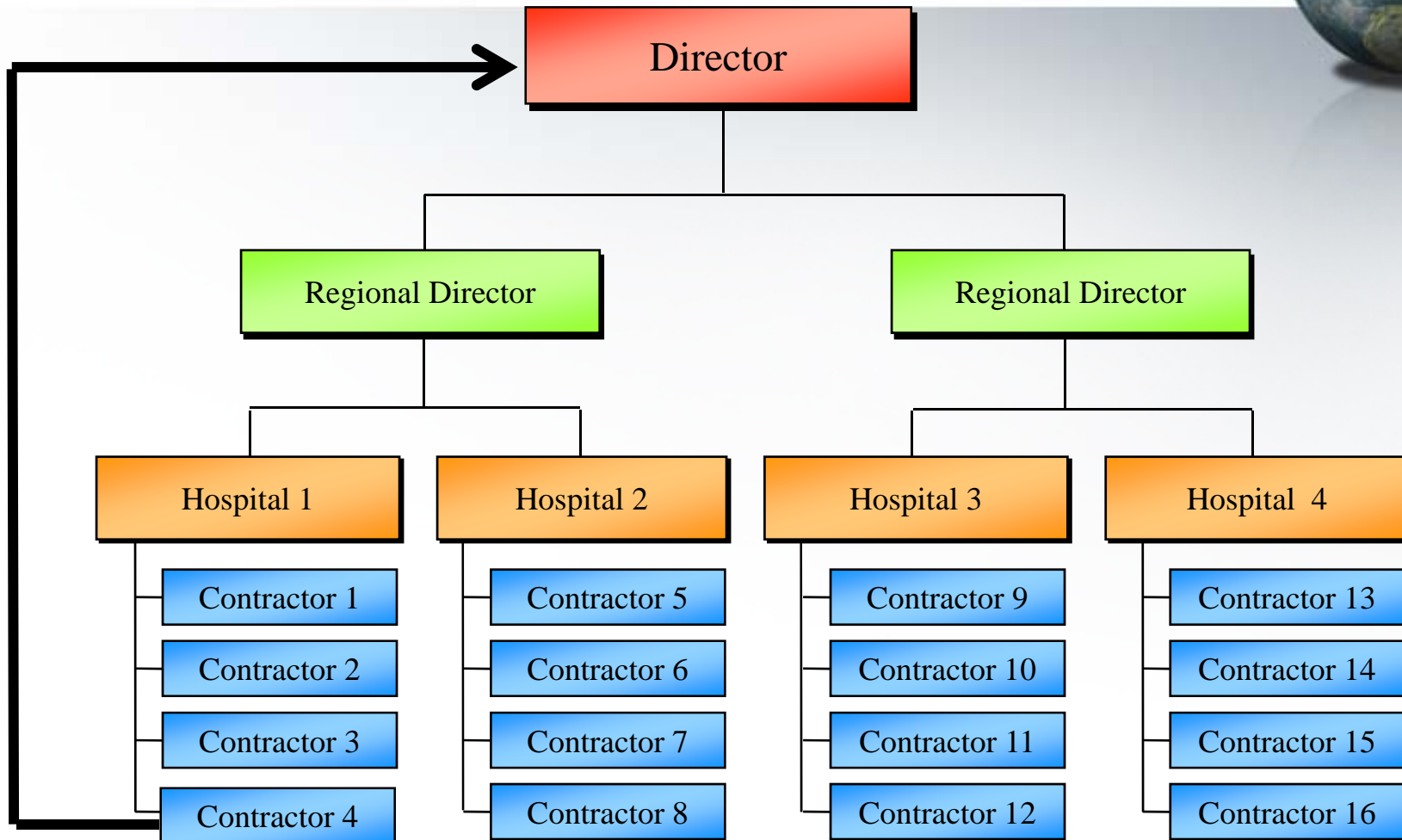


# MEDCOM Structure



# Case Study: US Army Medical Command

26 major hospitals, 200 projects, \$250M





# On Going Projects: Division Overview



DIVISION OVERVIEW		06/06/08
Original projects budget		\$355,788,650.88
Current estimated cost		\$370,969,089.86
Estimated cost over budget		\$15,180,438.98
% estimated cost over budget		4.27%
PROJECT OVERVIEW		
Total number of projects		148
% projects on time		40%
# of jobs delayed		89
% projects on budget		67%
# of jobs over awarded budget		49
# of projects missing owner ratings		8
AVERAGE PROJECT		
Project budget	\$	2,403,977.37
% over Awarded Budget		4.27%
% over budget due to owner		3.35%
% over budget due to contractor		0.10%
% over budget due to unforeseen		0.82%
Average length of project		500
% Delayed		23.11%
% Delayed due to owner		16.72%
% Delayed due to contractor		2.22%
% Delayed due to unforeseen		4.24%
# of risks		1.53
# owner generated risks		1.07
# of overdue risks		0.64
Owner rating		9.02
Risk number		2.81



# Top 10 Risk Projects



TOP 10 RISK RANKING PROJECTS (WRMC)							
No.	Project	Location	Risk #	Contractor	# Weeks on Top 10	NTP of Project	Risk Type
1	Addition to Third Floor Women's Health Care Suite	Ft. Lewis, WA (MAMC)	42.63	J & J Maintenance	31	10/18/2007	approval
2	Renew Health Clinic, Building 990	Yuma Proving Grounds, AZ	11.01	J & J Maintenance	21	9/11/2007	NTP
3	Renew Smith Dental Clinic	Ft. Carson, CO	8.04	John J. Kirlin	2	9/25/2008	Review
4	Repair HVAC Building 9782	Ft. Lewis, WA (MAMC)	8.00	J & J Maintenance	1	10/16/2008	approval
5	Repair Bldg 9921 A & B	Ft. Lewis, WA (MAMC)	7.95	J & J Maintenance	1	10/16/2009	approval
6	Repair Bldg 9912B	Ft. Lewis, WA (MAMC)	7.86	J & J Maintenance	1	10/16/2006	Scope
7	Condenser cooling water Sys.	Ft. Lewis, WA (MAMC)	7.77	J & J Maintenance	1	10/15/2008	Scope
8	Sea Level Aquifer P/T System	Ft. Lewis, WA (MAMC)	7.69	J & J Maintenance	1	9/16/2008	approval
9	Repair Team Center & Observation Room	Ft. Lewis, WA (MAMC)	7.39	J & J Maintenance	1	10/10/2008	approval
10	Physical Therapy/Ortho Clinic	Ft. Leavenworth, KS (MACH)	6.09	United Excel Corporation	1	6/16/2008	approval

# Modifications and Risks



AWARDS & MODIFICATIONS						
No.	Award / Modification	Date	Type	Days	\$\$	Description
1	Award 1	1/2/2007			\$9,500,000.00	Award
2	Modification 1	01/05/07		0	\$ 250,000.00	Risk 1
3	Modification 2	3/8/2007		20	\$ 100,000.00	Risk 2
4	Modification 3	5/10/2007		0	\$ 150,000.00	Risk 3
				Total Contract:		\$ 10,000,000.00
				% Billed:		50%
				% Completed		60%

No	Date Entered	Risk Items	Plan to Minimize Risk	Planned Resolution Date	Actual Date Resolved	Impact Days to Critical Path (Calendar)	Impact to Cost
0	3/17/2006	EXAMPLE: Risk A	Risk A Plan: 1) Problem background - why is this an unexpected project risk? 2) What will be done to minimize this? 3) Who is responsible for the plan? 4) What kind of impact will this have?	3/17/2006		0	\$ 10,000
1	12/25/2007	Delay in Workplan	Risk Plan B	1/3/2007	1/3/2007	0	\$ 250,000
2	3/1/2007	Contaminated Material	Risk Plan C	3/6/2007	3/7/2007	20	\$ 100,000
3	4/30/2007	Scope Change	Risk Plan D	5/5/2007	5/6/2007	0	\$ 150,000

# On-Going Projects: Regional Performance Lines



REGION OVERVIEW	CHPPM	PRMC	AMEDD	SRMC	WRMC	MRMC	NRMC	AFIP	Average
Total Number of Projects	3	28	7	49	38	26	27	1	22
Total Awarded Budget	\$27,782,738	\$ 44,409,340	\$ 18,452,757	\$148,750,286	\$133,683,925	\$ 60,138,879	\$118,356,664	\$9,754,941	\$70,166,191
Current Cost	\$27,910,447	\$ 47,054,360	\$ 20,198,239	\$155,289,910	\$139,654,057	\$ 63,259,537	\$121,621,485	\$9,823,830	\$73,101,483
PROJECT INFORMATION	CHPPM	PRMC	AMEDD	SRMC	WRMC	MRMC	NRMC	AFIP	Average
% Projects On Time	100%	64%	57%	53%	34%	31%	22%	0%	45%
% Projects On Budget	67%	61%	86%	47%	53%	46%	33%	0%	49%
% Delayed	0.00%	22.50%	13.70%	15.80%	21.50%	37.90%	32.80%	0.06%	18%
% Over Budget	0.46%	5.96%	9.46%	4.40%	4.47%	5.19%	2.76%	0.71%	4%
Average Risk Number	1.01	2.14	1.52	1.92	4.33	2.77	3.05	1.07	2.2
GENERAL INFORMATION	CHPPM	PRMC	AMEDD	SRMC	WRMC	MRMC	NRMC	AFIP	Average
# of QA's	1	14	5	17	14	8	14	1	9
# of Projects per QA	3.0	2.0	1.4	2.9	2.7	3.3	1.9	1.0	2
# of Facilities	1	2	4	9	8	9	10	1	6
Accurate Weekly Risk Reports	66%	60%	50%	60%	45%	37%	50%	0%	46%
Risk Management Plans	100%	68%	66%	77%	60%	55%	59%	100%	73%
Average Risk Resolving Time (days)	0.77	12.2	25.3	19.4	23.3	19	22	1.5	15
Projects with risk # more than 7	0	1	0	3	9	2	2	0	2

# High Performing QA's



QUALITY ASSURANCE OVERVIEW	QA 1	QA 2	QA 3	QA 4
Facility/Location	Aberdeen Proving Grounds, MD	Walter Reed, Washington DC (WRAMC)	Ft. Lewis, WA (MAMC)	Tripler AMC, Hawaii
Region	CHPPM	NRMC	WRMC	PRMC
Total Number of Projects	2	1	2	5
Total Awarded Budget	\$ 24,148,918	\$3,636,990	\$8,269,142	\$4,089,714
Current Cost	\$ 24,148,918	\$3,636,990	\$8,269,142	\$4,089,714
PROJECT OVERVIEW	QA 1	QA 2	QA 3	QA 4
% Projects On Time	100%	100%	100%	100%
% Projects On Budget	100%	100%	100%	100%
% Delayed	0%	0%	0%	0%
% Over Awarded Budget	0%	0%	0%	0%
Risk Number	1	1	1.00	1.00
GENERAL INFORMATION	QA 1	QA 2	QA 3	QA 4
% Accurate Weekly Reports	100%	100%	100%	100%
% Risk Management Plan	N/A	100%	100%	80%

# Low Performing QA's



QUALITY ASSURANCE OVERVIEW	QA 1	QA 2	QA 3	QA 4
Facility/Location	Ft. Lewis, WA (MAMC)	Walter Reed, D.C. (WRAMC)	Schofield Barracks, HI	WRAIR, Silver Spring, MD
Region	WRMC	NRMC	PRMC	MRMC
Total Number of Projects	2	2	1	3
Total Awarded Budget	\$2,542,733	\$4,126,449	\$1,048,173	\$6,477,469
Current Cost	\$3,864,104	\$4,823,428	\$1,094,061	\$7,591,316
PROJECT OVERVIEW	QA 1	QA 2	QA 3	QA 4
% Projects On Time	0%	0%	0%	0%
% Projects On Budget	0%	0%	0%	33%
% Delayed	150.00%	145%	89.6%	63%
% Over Awarded Budget	52%	16.89%	4.4%	17%
Risk Number	25.01	3.59	5.94	3.25
GENERAL INFORMATION	QA 1	QA 2	QA 3	QA 4
% Accurate Weekly Reports	50%	0%	0%	33%
% Risk Management Plan	N/A	0%	N/A	N/A

# RMP Comparison



PROJECT OVERVIEW	Without RMP	With RMP	% Progress
% projects on time	38%	56%	48%
% projects on budget	52%	70%	35%
AVERAGE PROJECT	Without RMP	With RMP	% Progress
<b>% over Awarded Budget</b>	<b>5.4%</b>	<b>1.7%</b>	68%
% over budget due to owner	3.83%	1.13%	71%
% over budget due to contractor	0.21%	0.04%	79%
% over budget due to unforeseen	1.33%	0.53%	61%
<b>% Days Delayed</b>	<b>30.6%</b>	<b>14.6%</b>	52%
% Delayed due to owner	19.72%	11.41%	42%
% Delayed due to contractor	4.64%	1.68%	64%
% Delayed due to unforeseen	6.20%	1.47%	76%
# of risks	1.98	1.29	35%
# owner generated risks	1.33	0.87	35%
Owner rating	9.10	9.34	3%
Risk number	<b>3.25</b>	<b>2.38</b>	27%

# University of Minnesota Results



- Number of procurements: 111
- Budget amount: \$31.4M
- Amount awarded: \$29.5M
- Number of years: 4
- Award below average bid price: 6%
- Award below budget: 7%
- Award to the lowest price: 60%
- Cost increase due to client: 6% (trying to spend budget)
- Cost increase due to contractors: 0%
- Time deviations: 0% due to contractors

# Arizona State University Food Services Contract

No	Summary Criteria	Out of	Vendor		
			Incumbent	B	C
1	RAVA Plan	10	5.91	7.09	6.31
2	Transition Milestone Schedule	10	5.17	6.96	6.33
3	Interview	25	15.77	16.78	13.53
4	Past Performance Information - Survey	10	9.80	9.99	9.82
5	Past Performance Information - #/Clients	Raw #	5.67	3.00	4.42
6	Past Performance Information - Financial	10	7.02	8.67	6.90
7	Financial Rating	10	4.00	8.00	8.00
8	Financial Return - Commissions	Raw \$	\$ 30,254,170	\$ 60,137,588	\$ 64,000,000
9	Capital Investment Plan	Raw \$	\$ 14,750,000	\$ 20,525,000	\$ 12,340,000
10	Equipment Replacement Reserve	Raw \$	\$ 7,213,342	\$ 4,100,001	\$ 8,171,811
Financial Totals			\$ 52,217,512	\$ 84,762,589	\$ 84,511,811

**\$32M more over ten years**

No	Summary Criteria	Weight/Out of	Vendor		
			Incumbent	Best Value	C
1	RAVA Plan	28	16.55	19.85	17.67
2	Transition Milestone Schedule	2	1.03	1.39	1.27
3	Interview	25	15.77	16.78	13.53
4	Past Performance Information - Survey	9	8.82	8.99	8.84
5	Past Performance Information - #/Clients	1	1.00	0.53	0.78
6	Past Performance Information - Financial	15	10.53	13.01	10.35
7	Financial Rating	5	2.00	4.00	4.00
8	Financial Return - Commissions	7	3.31	6.58	7.00
9	Capital Investment Plan	6	4.31	6.00	3.61
10	Equipment Replacement Reserve	2	1.77	1.00	2.00
		100	65.09	78.13	69.04



# After 1 Year: Monitoring/Evaluation based on measurements



- Increase sale of food by 14%
- Increased cash to ASU by 23%
- Minimized management cost by 80%
- Increased customer satisfaction by 37%
- Increased capital investment by 100%

No	Category	FY 06-07 Incumbent	FY 07-08 New Vendor	Difference	% Difference
1	Total Revenue (\$M)	\$ 27.02	\$ 30.83	\$ 3.81	14%
2	Total Return & Commissions (\$M)	\$ 2.17	\$ 2.67	\$ 0.50	23%
3	Capital Investment Contract (\$M)	\$ 14.75	\$ 30.83	\$ 18.08	109%
4	Capital Investment 2006 vs. 2007 (\$M)	\$ 0.26	\$ 5.70	\$ 5.44	2092%
5	ASU Administration (# of People)	7	1.5	-5.5	-79%
6	Customer (Student) Satisfaction (1-10)	5.2	7.1	1.9	37%
7	Myster Shopper Satisfaction	N/A	9.6	--	--

# ASU IT Networking Contract



ASU Maintenance Annual Cost	Qwest Maintenance Annual Cost	Total Annual Qwest Savings	Total Qwest Annual Value Added and Savings
\$13,981,934	\$12,500,000	<b>1,481,934</b>	<b>2,756,934</b>

- ASU IT Network Details
  - 76,000 Students and Faculty
  - 5 yr. Contract
  - 4 Different Campuses

Value Added	Estimated Annual Value
Voicemail Integrated w/email	\$75,000
Experts in other areas of Qwest to draw upon	\$75,000
Reduction of ~2000 sqft ASU office space & utilities	\$44,000
Skysong state-of-the-art Network Operations Center	\$100,000
New Contact Center Solution	\$400,000
University Benchmarking	\$50,000
Measurement & Reporting	\$50,000
Engineering & Design	\$150,000
Speech Enabled Voice Messaging	\$25,000
Conferencing & Collaboration Capabilities	\$9,000
IP Fax Capabilities	\$12,000
Unified Communications Management Toolset	\$85,000
Green initiatives (Kw savings)	\$200,000
<b>Total Additional Estimated Annual Value to ASU:</b>	<b>\$1,275,000</b>

# Dominant Information



- Dominant Performance Indicators
  - Overall cost of network
  - Top of the line networking
  - Network Sustainability/Accessibility
  - Customer Satisfaction
- Documentation of Deviations to financials



Dominant Measurements	ASU Current	Qwest Value Add
<b>Overall Cost of Network</b>		
Annual IT Spend Ratio (new vs maintenance)	17/83	48/52
<b>Top-of-the-line Networking</b>		
% Converged	7%	100%
% Mobility	2%	100%
% Equipment not out-of-date	58%	95%
<b>Network Sustainability/Accessibility</b>		
% Equipment not needing replacement (Not at end-of-maintenance)	88%	100%
<b>Customer Satisfaction</b>		
Speed/Quickness Available (Wired / Wireless):		
% 1Gb - Wired Connections	59%	98%
% of 300Mb - Wireless Connections	8%	32%

	Dev.	Cap, Exp.	Maint.	FOE Costs	Total
<b>Year 1 Exp.</b>		\$ 4,100,000	\$ 1,652,000	\$ 6,818,000	\$ 12,570,000
<b>Ex. Risk X</b>	\$ 100,000	\$ 100,000	\$ -	\$ -	\$ 100,000
<b>Ex. Risk X</b>	\$ 100,000	\$ 100,000	\$ (25,000)	\$ -	\$ 75,000
<b>Ex. Risk X</b>	\$ 50,000	\$ -	\$ 50,000	\$ -	\$ 50,000
<b>Ex. Risk X</b>	\$ 25,000	\$ 25,000	\$ -	\$ -	\$ 25,000
<b>New Year 1</b>	<b>\$ 275,000</b>	<b>\$ 4,325,000</b>	<b>\$ 1,677,000</b>	<b>\$ 6,818,000</b>	<b>\$ 12,820,000</b>

# Dominant Performance Results



- Increased performance, creativity, accountability, professionalism, value to the owner: 40%
- Minimized transactions, bureaucratic constraints, decision making, risk, and wasted effort: 30%
- Increased customer satisfaction: 44%

# Statement by ASU IT Visionary



- “Am I dreaming? Am I missing something? When do all the problems begin?”
- “Am I missing something, or have we just made one of the biggest changes with no problems?”
- “This is a unqualified success of the best value PIPS process!”

Adrian Sannier, ASU UTO Director

# Arizona State University turning into a measured university



- ASU has embraced and implemented the research internally
  - ASU Research Leaders
    - Business Services (Ray Jensen)
    - Procurement (John Riley)
- Major Tests
  - Dining Services - \$420M, 10 yr contract – largest in dining history
  - Sports Marketing - \$XXM, 10 yr contract
  - Student Recreational Center Equipment - \$840k, 5 yr contract – new outsourced model
  - Student Recreational Center Services
  - UTO IT Network – \$50M in process – first of its kind
  - Parking Structure - \$50M in process – first CPMG test at ASU (\$6M rebate due to process efficiency)
  - Furniture – late 2008 – measured, value, meet expectations
  - Document control/copy service

# New Paradigm, New Environment, Dominant Improvement



Performance High Low	<b>III. Negotiated-Bid</b> Owner selects vendor Negotiates with vendor Vendor performs	<b>II. Value Based</b> Best Value (Performance and price measurements) Quality control <b>Contractor minimizes risk</b>
	<b>IV. Unstable Market</b>	<b>I. Price Based</b> Specifications, standards and qualification based Management & Inspection <b>Client minimizes risk</b>
Low Competition High		

- Minimized decision making
- Concept that experts do not have risk
- Alignment instead of manage, direct, control, and influence
- Best value is win-win
- Simplicity, measurement, transfer of risk and control bring professionalism, and increased expertise, skill, and value
- Efficiency in all activities
- Competition determines value
- The answer is in the system, and not in the details



- The concept was here the entire time
- No one knew how to transfer the logic and common sense into something so "complex"





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