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M&V - the ESCO approach

**Measurement and Verification of Energy Efficiency Projects
Association of Energy Engineers Technical Round Table Series, II**

Honeywell

ESCO M&V World View

- Monitor Performance
- Monitor & Manage Risks
- Maintain Customer Satisfaction
 - Over a long run of years

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Industry Descriptions related to M&V

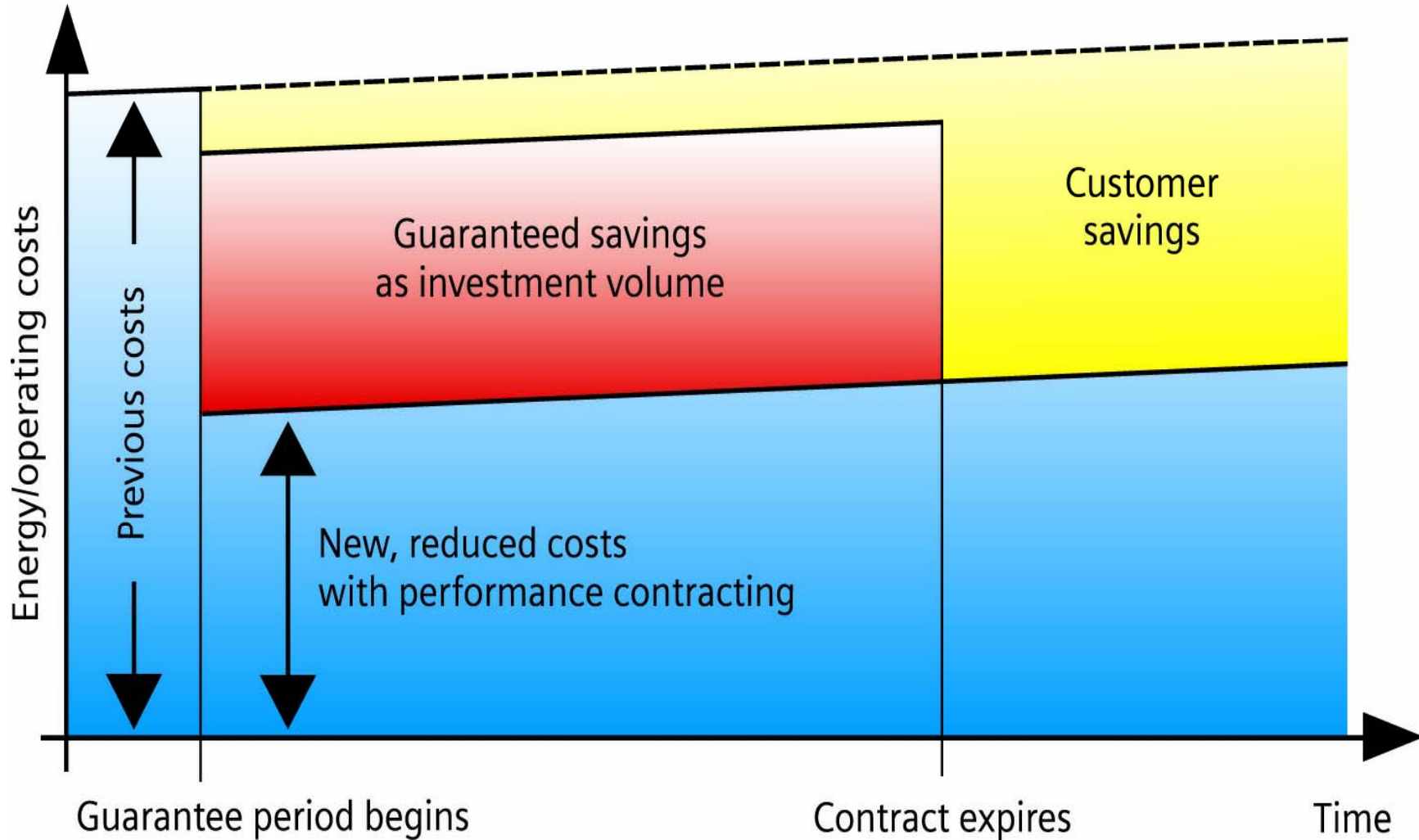
- “Measurement & Verification is the process of using measurements to reliably determine actual saving created within an individual facility by an energy management program.” [Ref: IPMVP Vol. 1, 2012, Ch 2, p. 4]
- “...transparently, reliably and consistently reporting a project’s savings.” [Ref: IPMVP Vol. 1, 2012, p. viii]
- “...defines the measurements and computations to determine payments or demonstrate compliance with a guaranteed level of performance.” [Ref: IPMVP Vol. 1, 2012, App. D, p. 117]
- “ to **improve savings**, achieve greater persistence of savings over time, and lower variations in savings...” [Ref: IPMVP Vol. 1, 2012, Ch 2, p. 5]

Industry Descriptions related to M&V

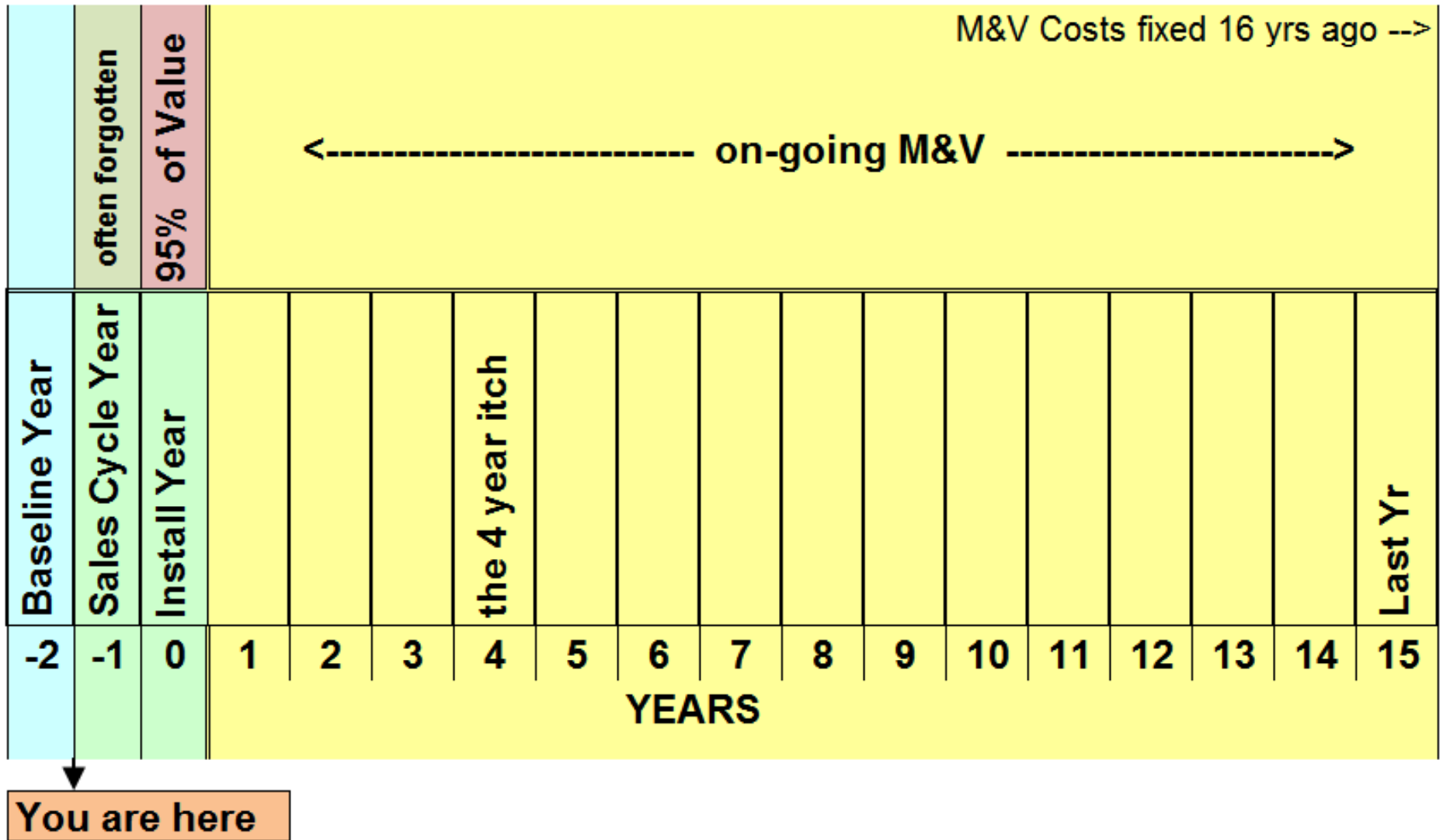
- "...M&V can:
.....
 - Reduce uncertainties to reasonable levels
 - Monitor equipment performance
 - Find **additional savings**
 - **Improve** operations and maintenance (O&M)
 - Verify that the cost savings guarantee is met
 - Allow for future adjustments, as needed

[M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 3.0, April 2008, p.2-1]
- "...reliably measuring the energy and demand savings due to building energy management projects." *[ASHRAE Guideline 14-2002, p. 4]*
- "A critical aspect of the savings measurement for this purpose is its **timeliness**." *[ASHRAE Guideline 14-2002, p. 4]*

ESP over the Long Run



ESP over the Long Run



M&V Risk Management

For sake of discussion, define...

Risk as an attribute that is Practical and Analytical

Dread as an attribute that is Psychological and Attitudinal.

Both are modifiers of human behavior but don't mix them up.

$$\text{RISK} = \text{SEV} \times \text{OCC} \times \text{DET} \times \text{CTL}$$

SEV severity consequence

OCC occurrence likelihood of occurrence

DET detection ease of detection

CTL control ease of controlling mitigation or adjustment if risk-event does occur

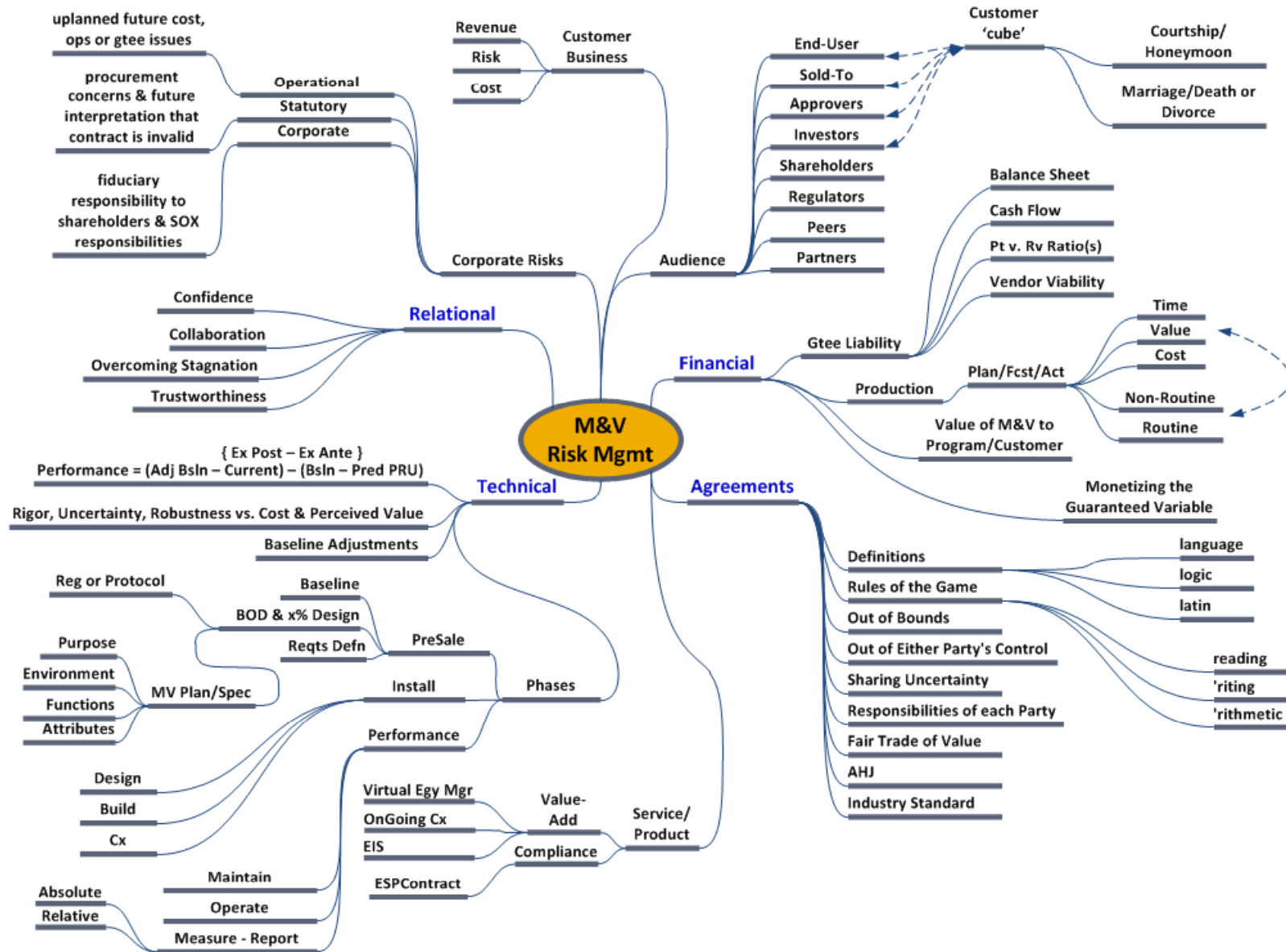
Dread is often more likely to be healed by the qualities of trustworthiness and the creation of confidence amongst the project participants, than a scientific process alone.

ESP M&V Over the Long Run

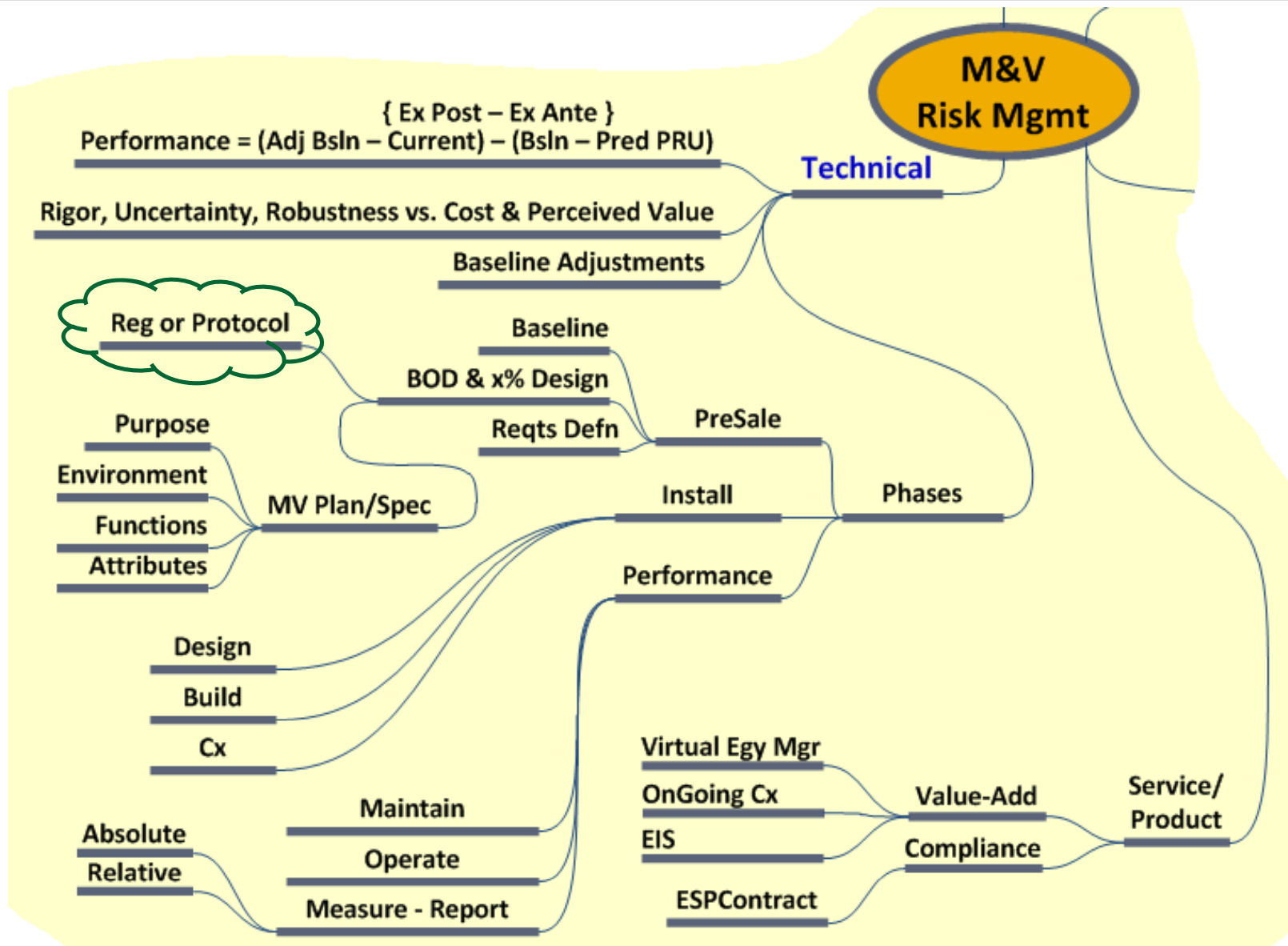
Performance & Customer Satisfaction & Risk Mgmt

<u>Base</u>	-	<u>Current</u>	±	<u>Adjustments</u>
Technical		Technical		Technical
Financial		Financial		Financial
Agreements		Agreements		Agreements
Relationship		Relationship		Relationship

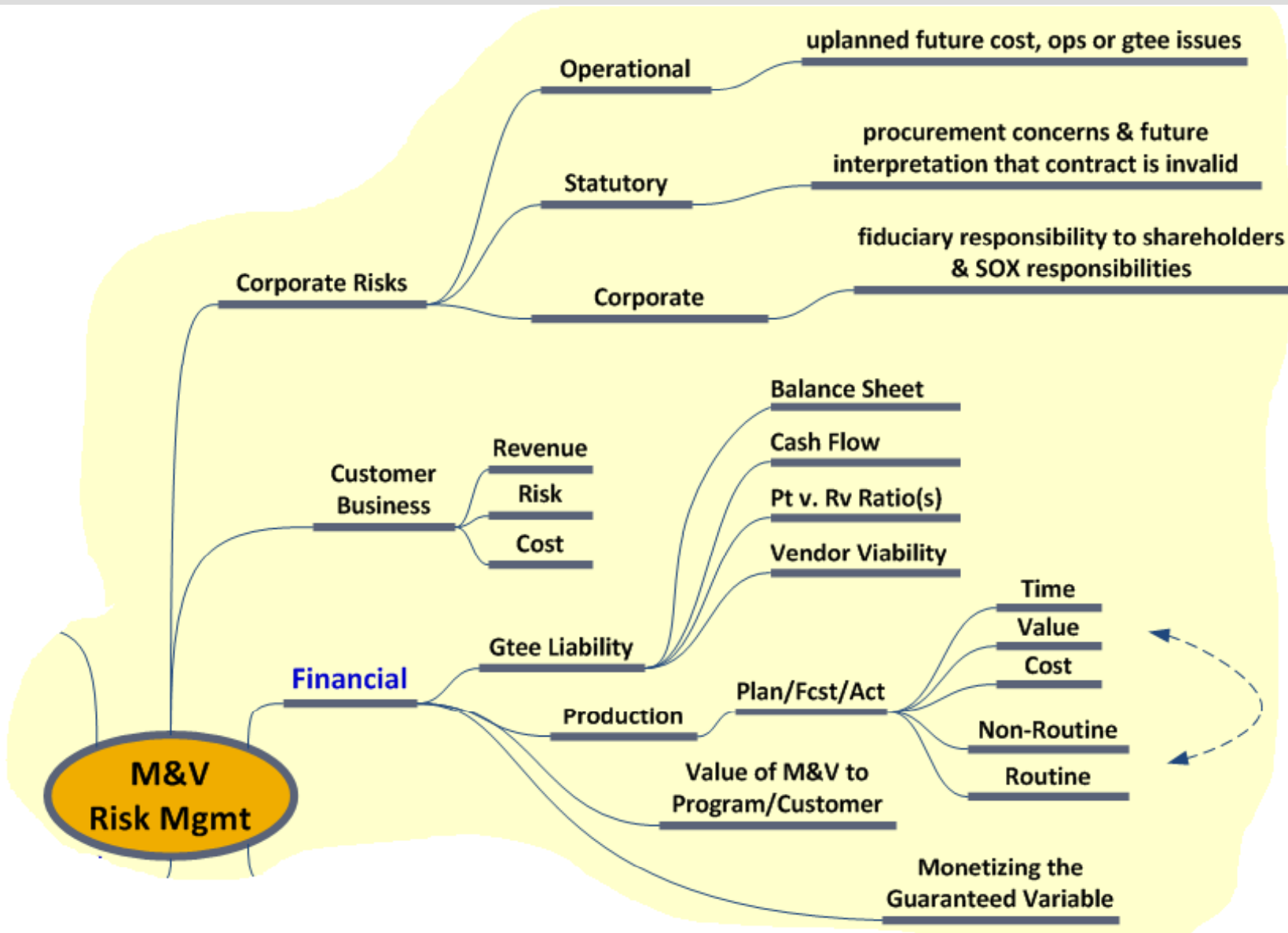
ESCO M&V Program Parameters



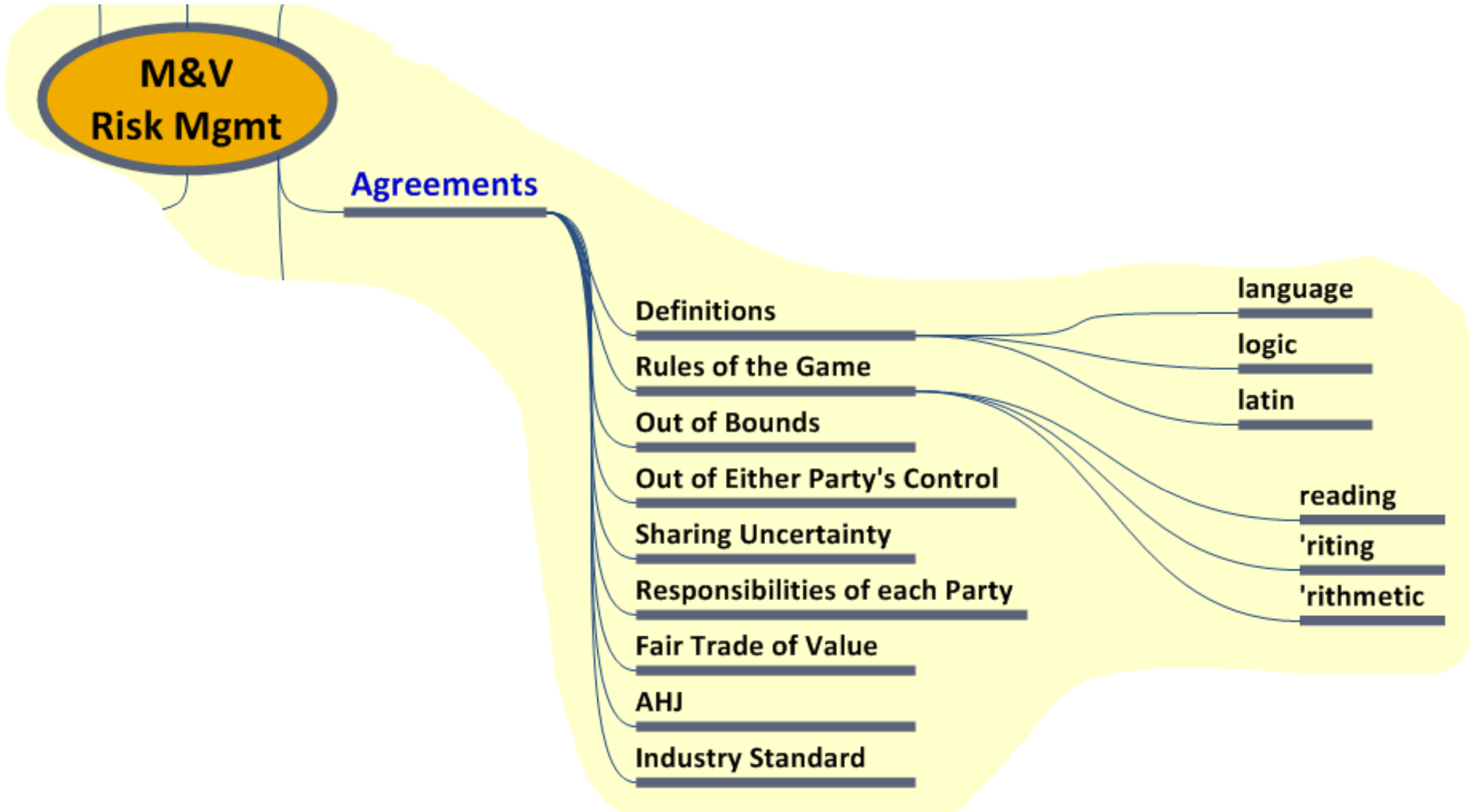
Technical



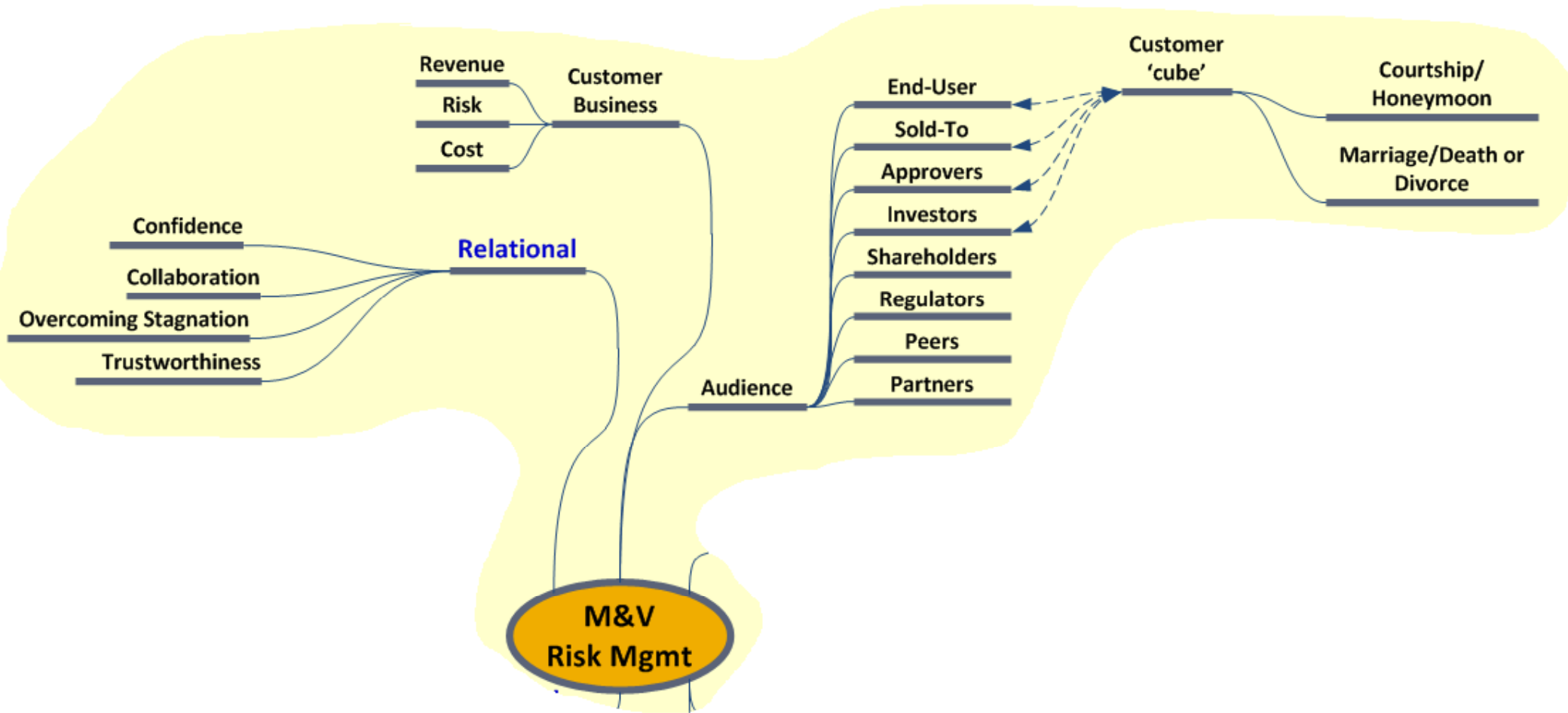
Financial



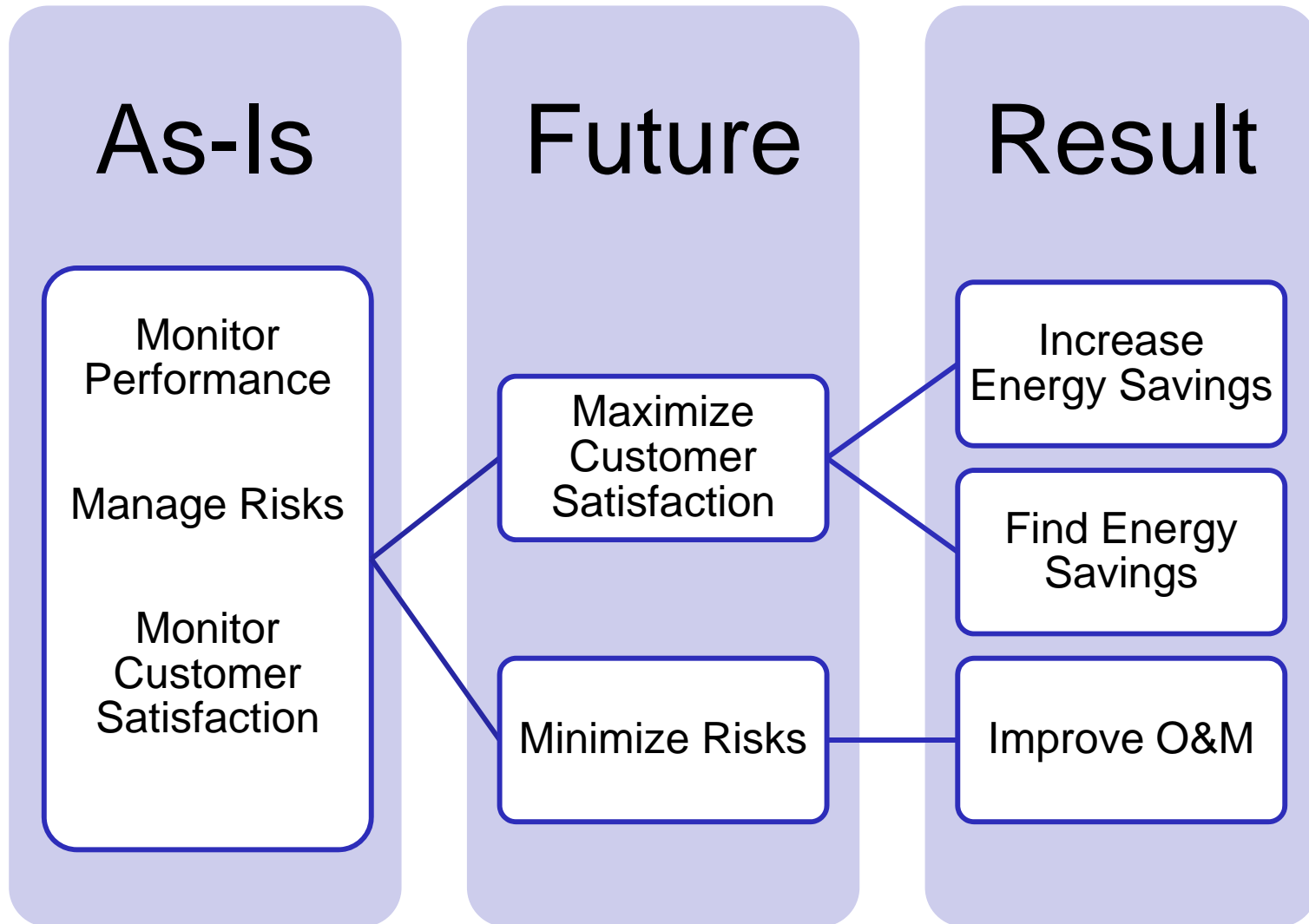
M&V Plan & Operational Agreements



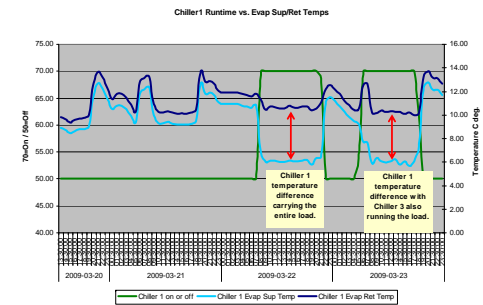
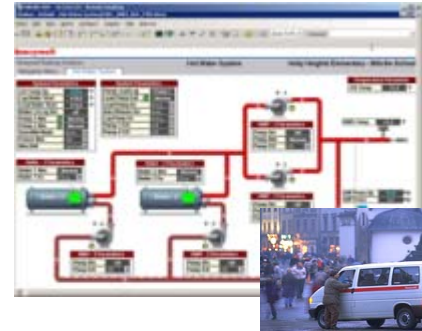
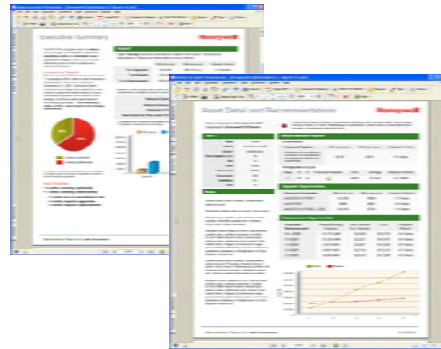
Relational



M&V Evolves



M&V Increases Energy Savings



DATA

into

KNOWLEDGE

into

ACTION

into

RESULTS

- Controller Information
- Alarm Events
- Status/Temp Trending
- kWh Trending
- Service Call Trending
- Automation Programming
- Corporate Standards
- Multiple Controller Inputs

- Equipment Efficiency Calculations
- Energy Benchmarking
- Historical Referencing
- Alarm History Review
- Trend Review
- PM Performance Tracking
- Service History Review
- Multiple Controller Capabilities

- Equipment Commands
- Program Alterations
- Service Dispatching
- Dispatch Tracking
- Confirm Programming Standards
- Provide Recommendations
- Status Review
- Bypass Utilization Review
- Report Generation

- Remote Resolution
- Increased Uptime
- Lower Equipment Runtime
- Adherence to Corporate Standards
- Targeted Service Management
- Prioritized Service Management
- Increased Knowledge of Building Ops
- Increased Productivity
- Maximized Equipment Life
- Better Performance to Goals
- Better PM Performance
- Lower Energy Costs
- Increased Responsiveness

Thanks for listening!

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