

# Adaptation of Porter's Five Forces Model for Risk Management

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- Application of a strategic management framework to systems engineering.
- Tailoring of Porter's Five Forces Model for competitive analysis to risk management for program systems engineering.
- Intersection of different fields – business and engineering – through the RM5 model.

*Fusing left-brain skills with right-brain insights is considered the 'killer app' in a new economy that will put a premium on creative breakthroughs. "We're convinced true innovation comes at the intersection of different fields," according to Laszlo Bock, vice president of people operations at Google.*

Source: Marco R. della Cava, *USA Today*, "Retrain your brain from 'left' to 'right' to fit into new economy", 14 July 2009.

# DEVELOPMENT BACKGROUND



Developed under ARH\* SEP and RMP development.



Further refined on Ares SEMP development.



Published in ARJ and presented at Aerospace & Defense conferences.

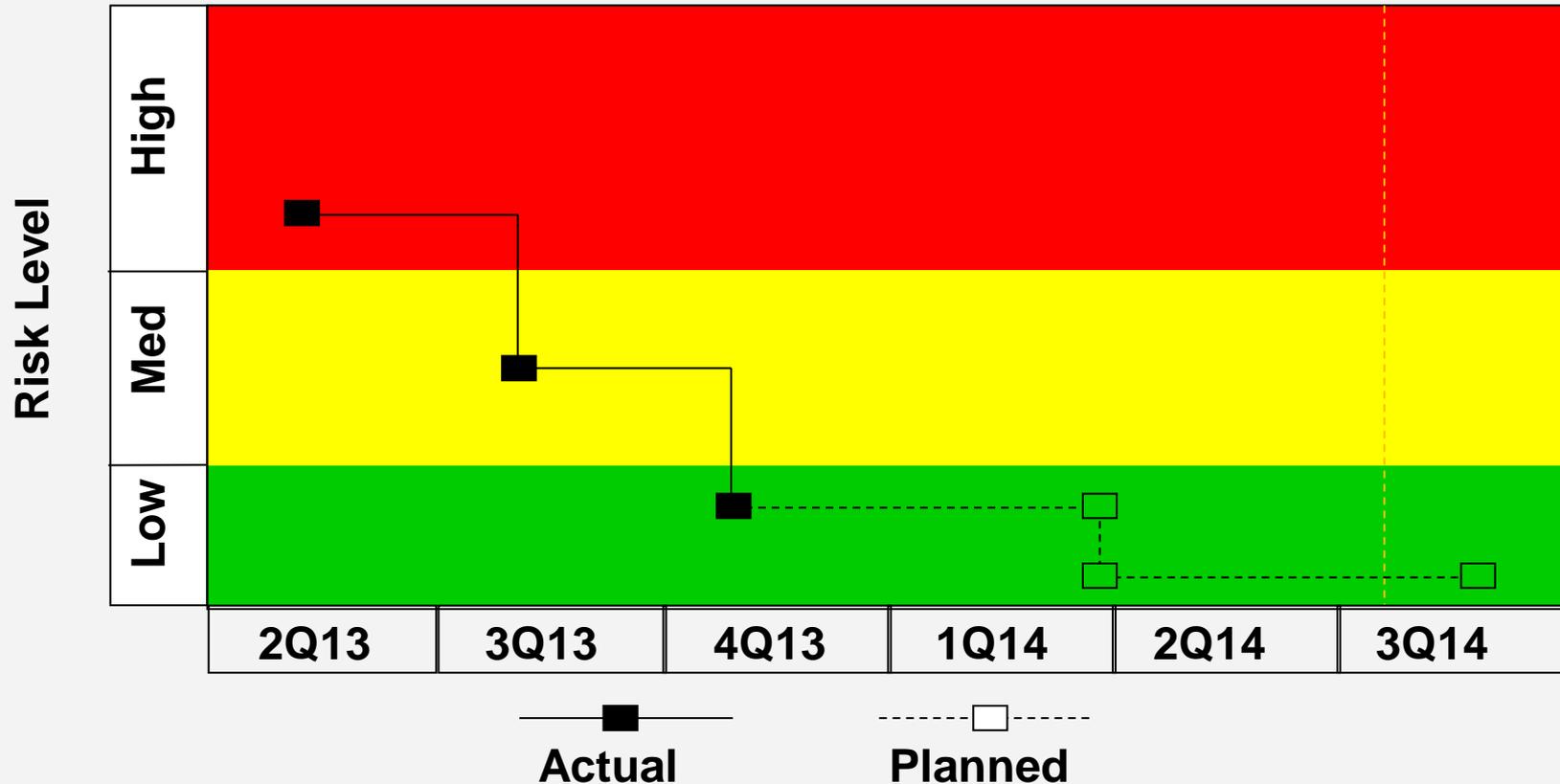
\* Acronym list attached.

# TRADITIONAL RISK MATRIX

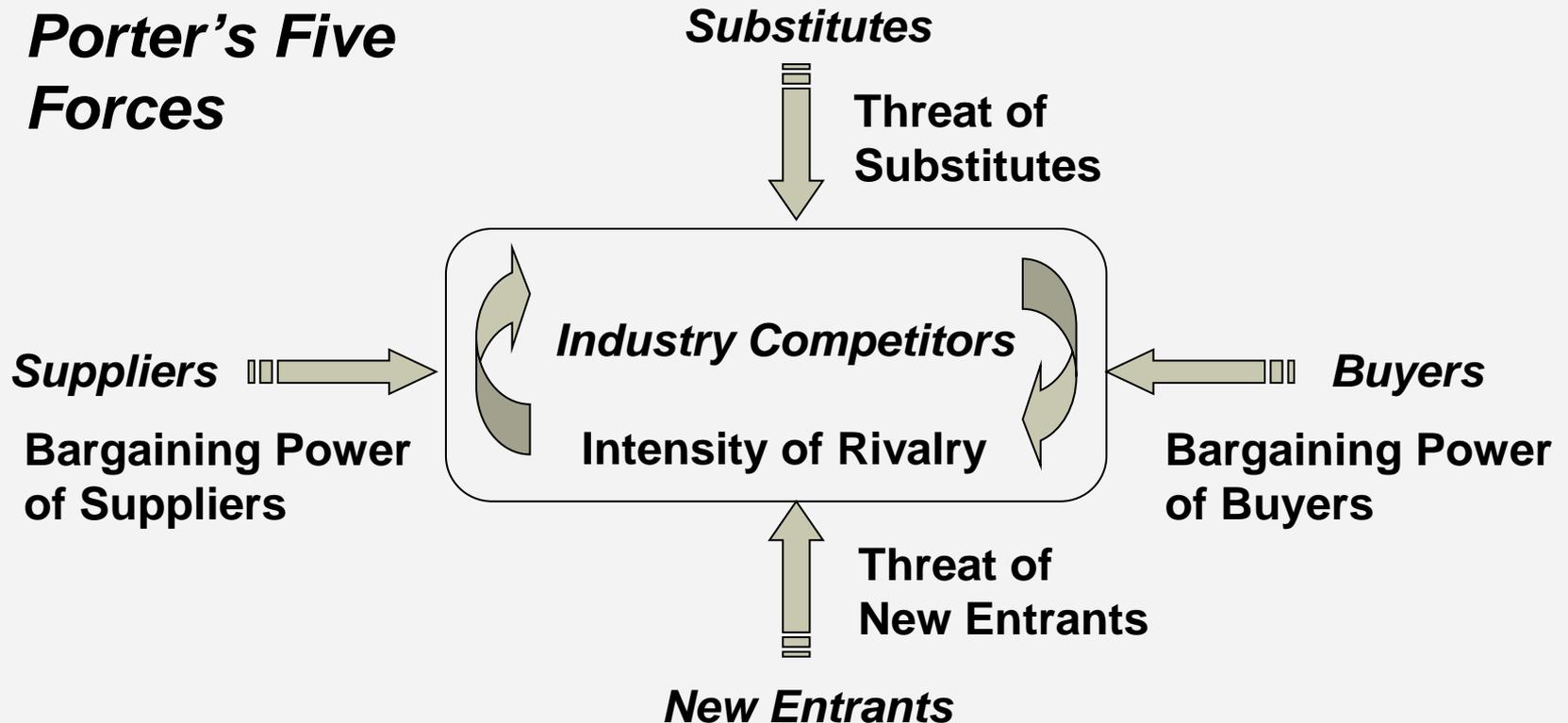
Probability (Likelihood)	5	G	Y	R	R	R
	4	G	Y	Y	R	R
	3	G	G	Y	Y	R
	2	G	G	G	Y	Y
	1	G	G	G	G	Y
			1	2	3	4
Consequence (Impact)						

- Typically a *cost/schedule/technical* focus.
- Brainstorming these and related domains is inhibited.
- Fails to consider spectrum of program's risk forces.

# TYPICAL RISK BURNDOWN CHART

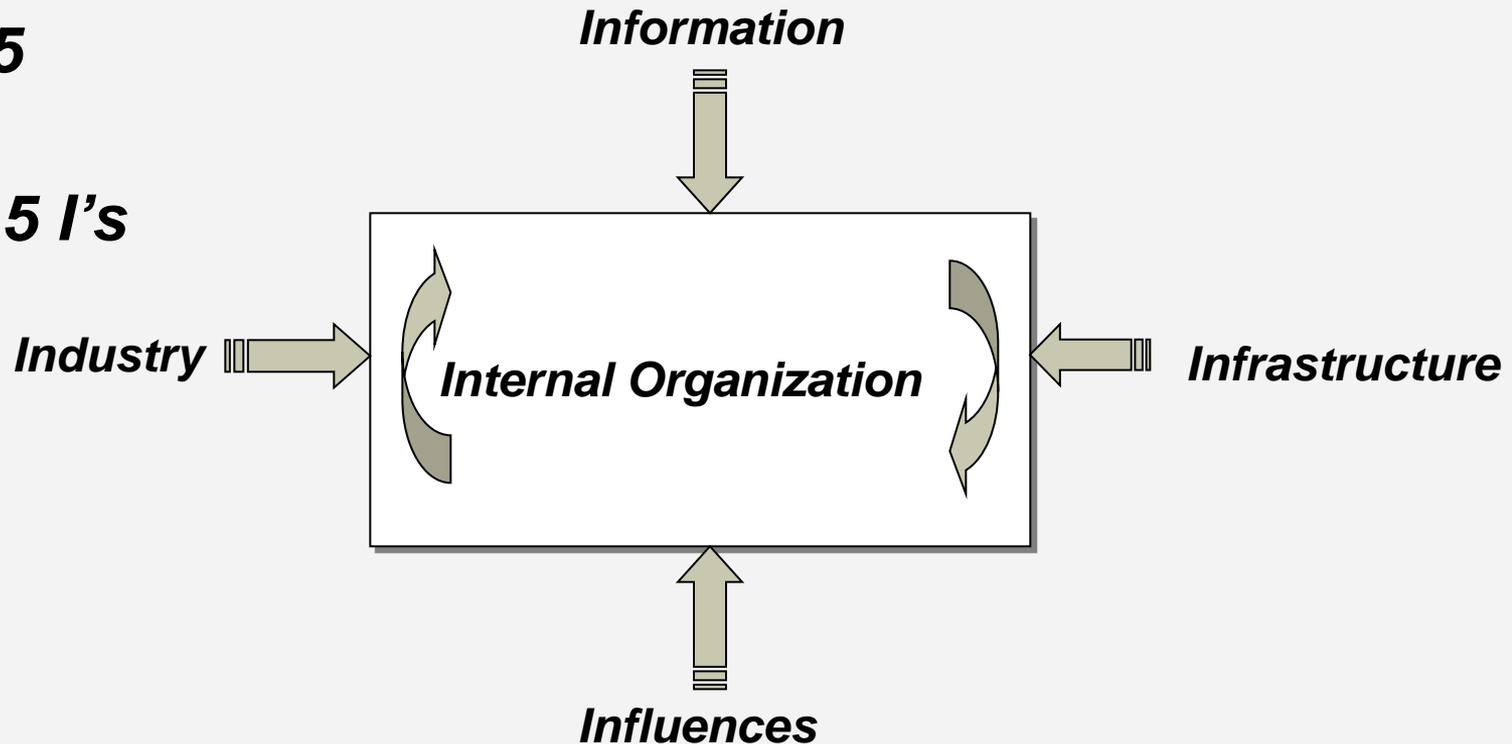


- Clear depiction of managing risks over time; however ...
- Useful only to the extent data includes most significant risks.
- Major threats may be remain unidentified & untracked.



- Five key categories of forces as threats to competitive advantage.
- Clear representation of external and internal forces.
- Sufficiently generic for consideration of risks as threats.

## **RM5 & the 5 I's**

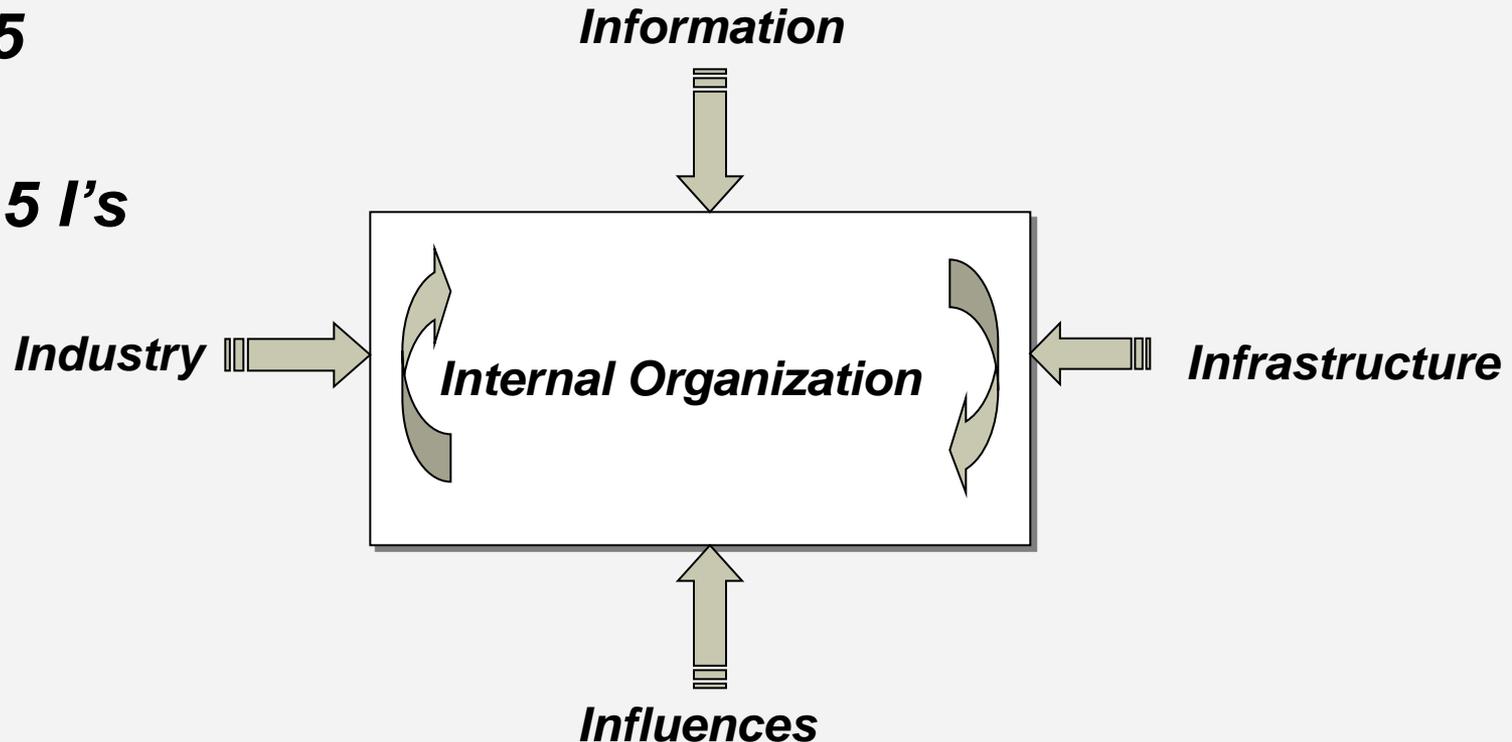


### Five Key Risk Categories:

1. Information risks -- software availability and functionality, information system backup, network security, IS complexity (e.g. SAP).
2. Internal Organization – enterprise functions of task sharing, personnel loads, cross training, assignment duration.

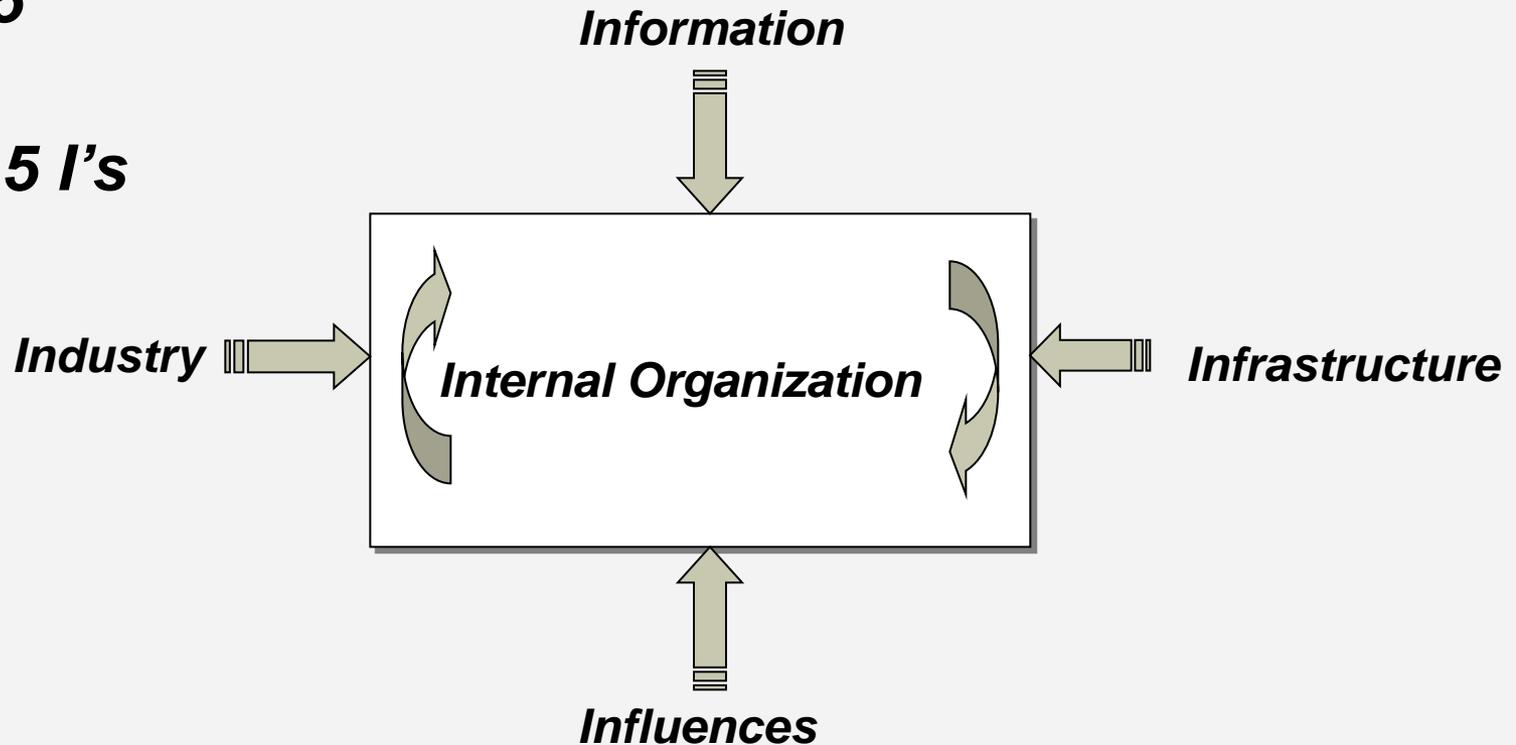
# ADAPTATION TO RISK MANAGEMENT (CONTINUED)

## ***RM5 & the 5 I's***



3. Industry risks -- associated with contractor and subcontractor organizations, technology maturity, product support, contracting.
4. Infrastructure -- refers to physical security, communications networks, event recovery, safety.

## ***RM5 & the 5 I's***

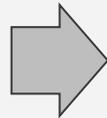


5. Influences include external demands (e.g. meetings, travel), senior leadership support, policy mandates.

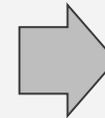
# RECAP OF RM5 TAILORING

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Porter's Model  
commonly used  
to identify and  
score industry  
threats

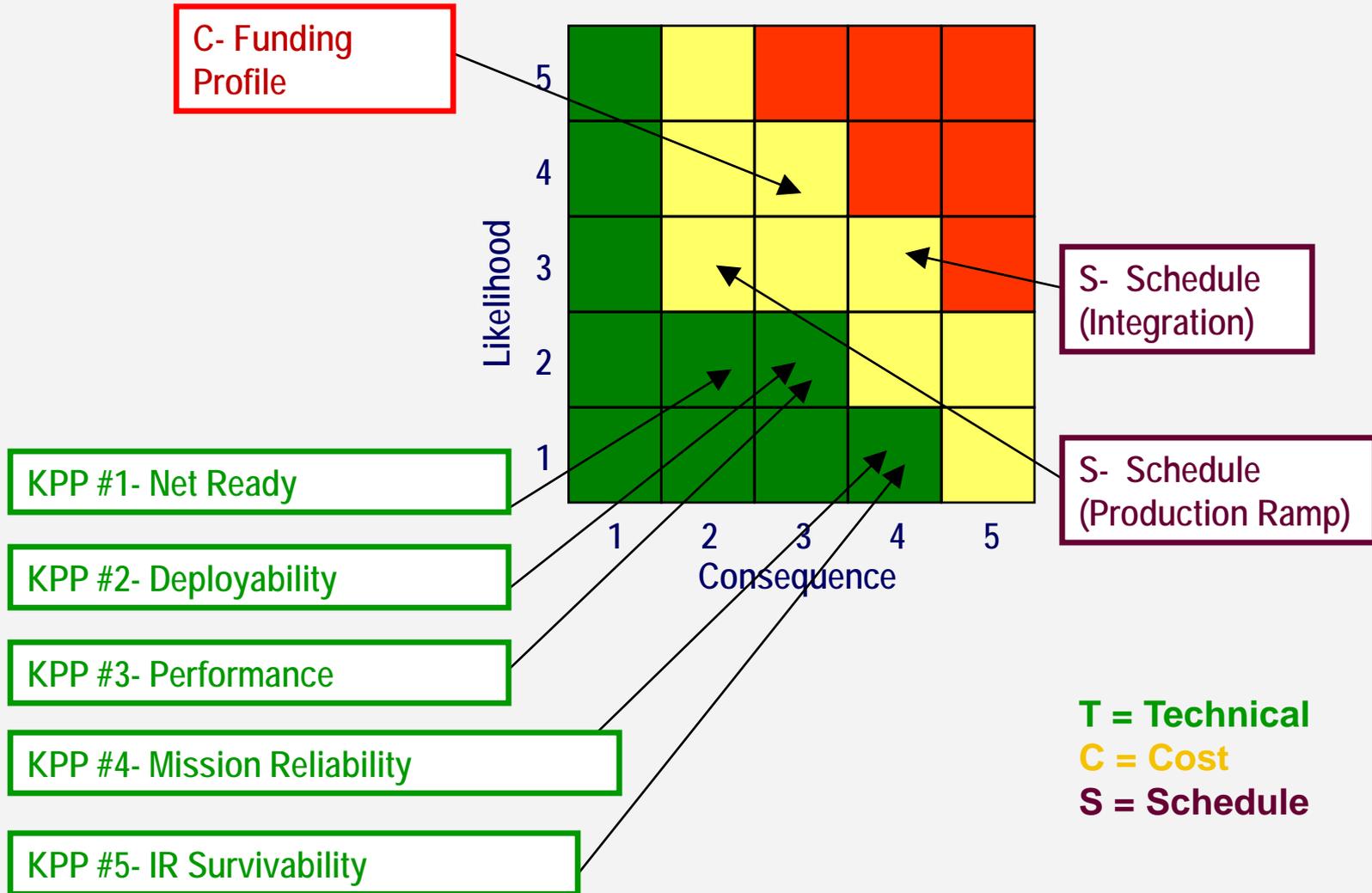


The five forces  
framework  
logically applies  
to program risk

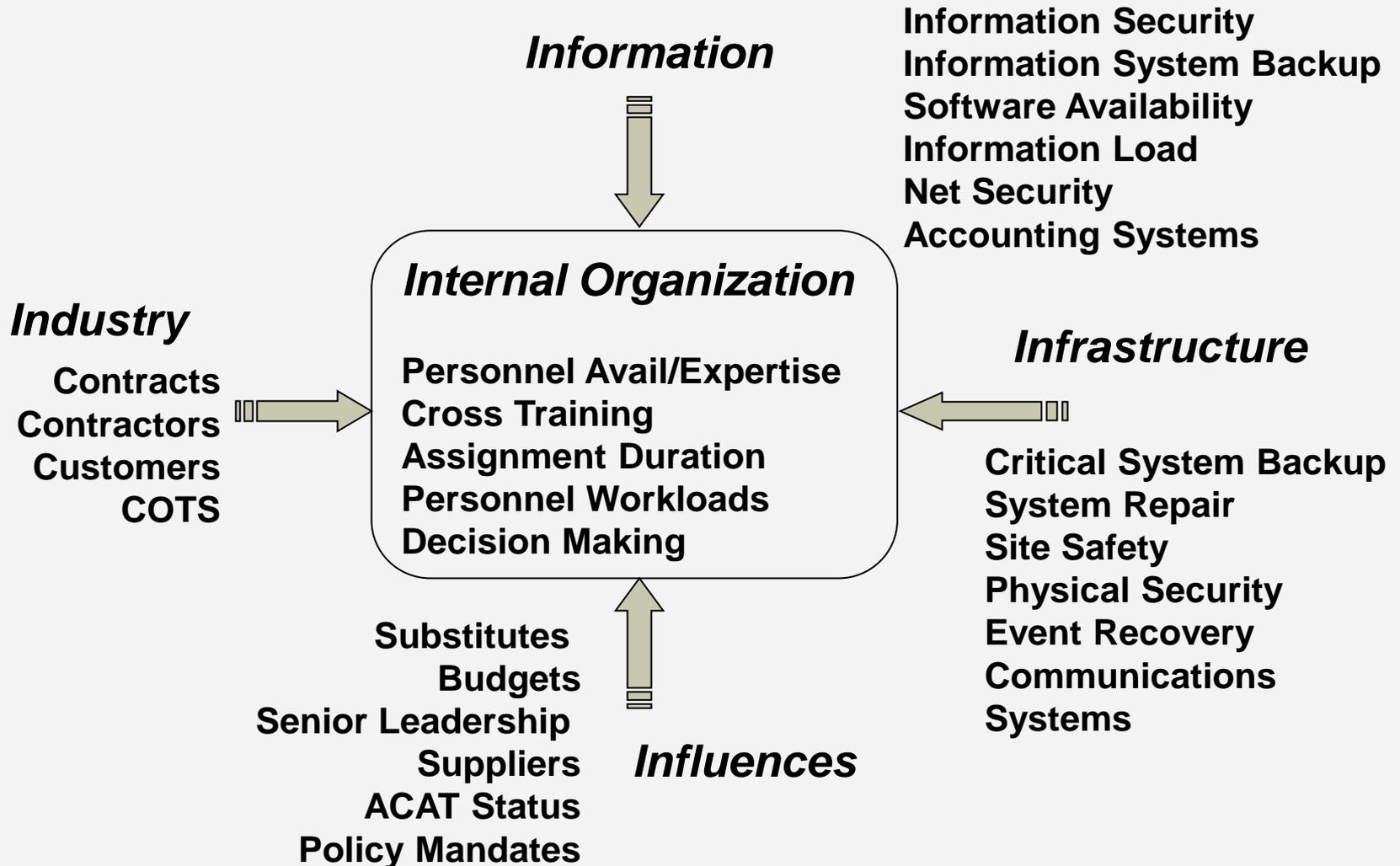


Evolution to RM5  
adapted for  
program risk  
identification &  
assessment

# ARH RISK MATRIX (PRE - MS B)

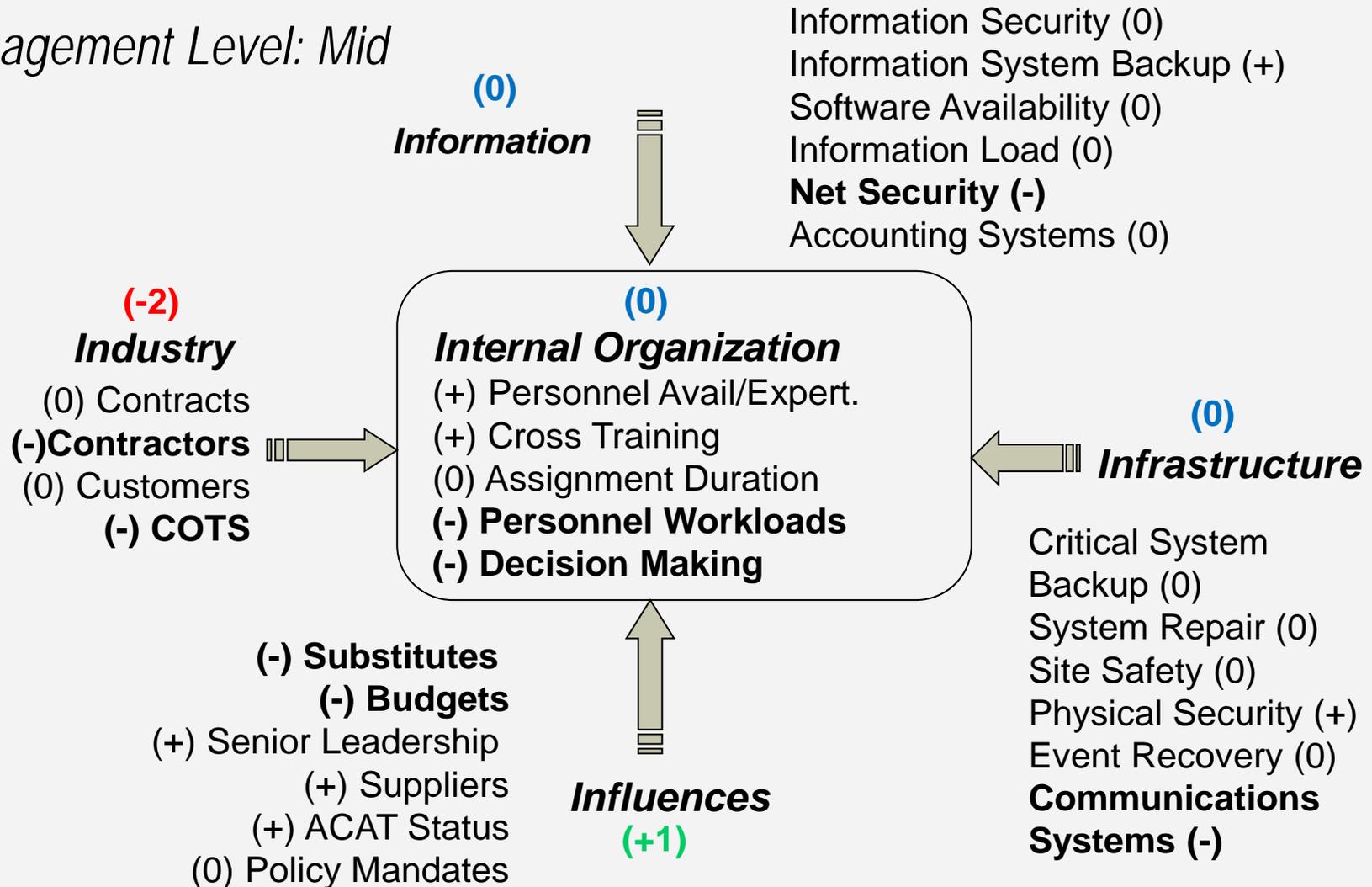


# RM5 RISK IDENTIFICATION



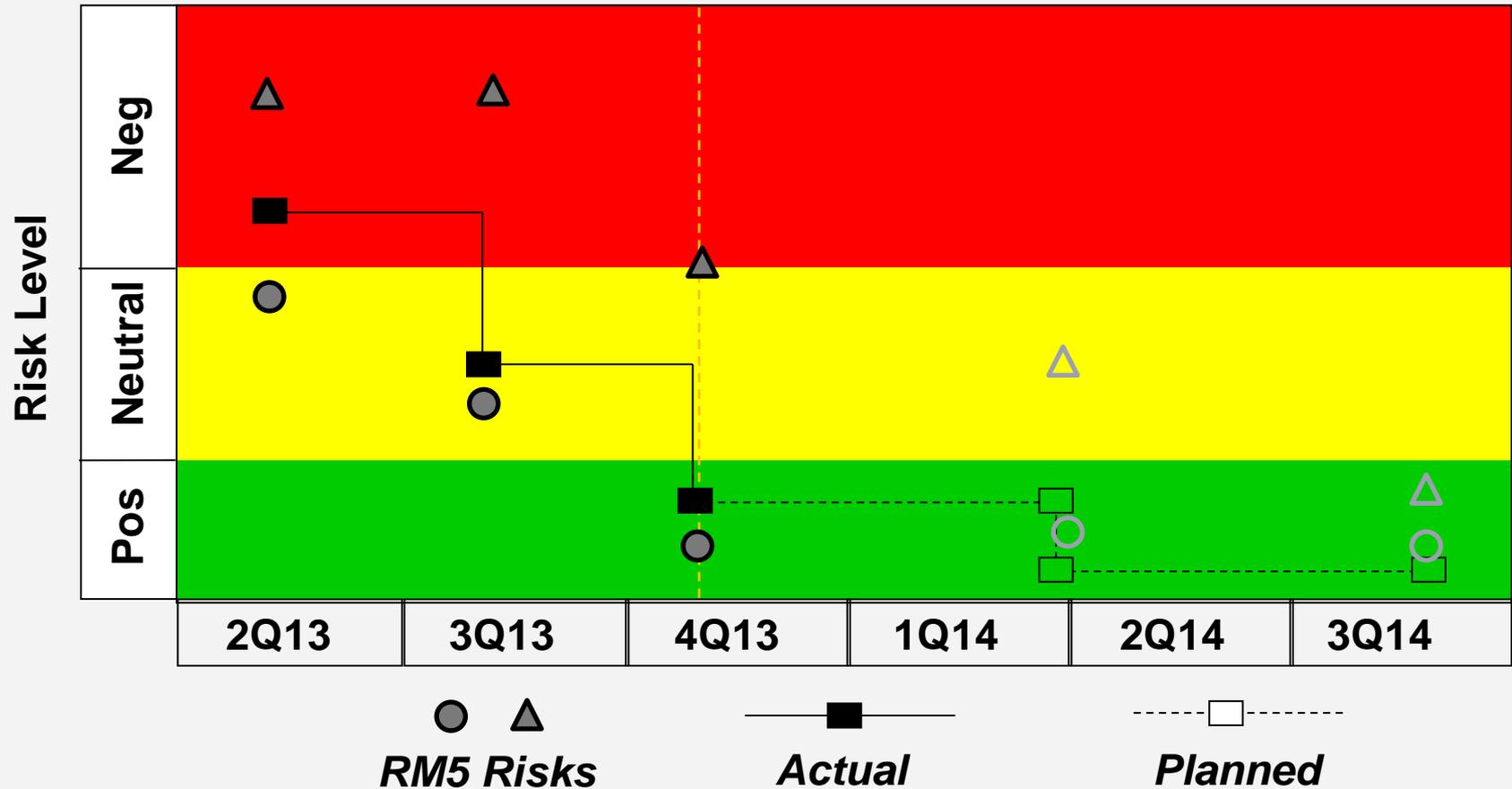
# RM5 RISK SCORING

*Management Level: Mid*



# RM5 BURNDOWN

(NOTIONAL & NOT TO SCALE)



- Tracking of significant risks beyond traditional cost/sched/tech.
- Higher confidence that relevant risks are considered.
- Resources allocated to newly discovered threats.

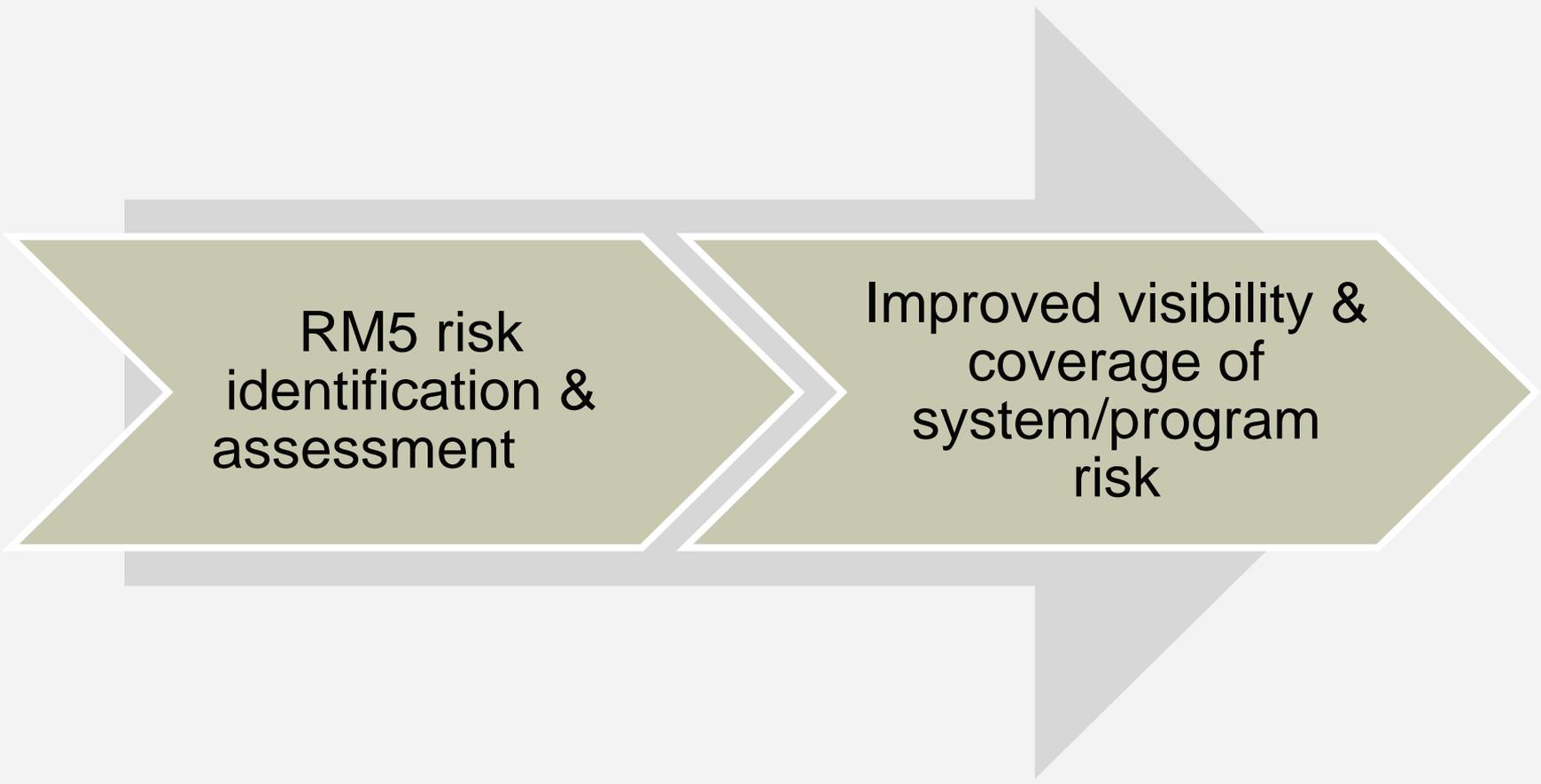
# APPLICATION OF RM5

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- Think beyond historical cost, schedule, technical norms.
- Apply structured identification through Delphi approach, mind mapping, keyword brainstorming.
- Subject matter experts, experienced systems engineers, DAWIA certified personnel.
- Scoring and weighting of risks similar to Porter's model.
- +, 0 and – used to indicate a positive, neutral, or negative condition.

# UTILITY OF RM5

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RM5 risk  
identification &  
assessment

Improved visibility &  
coverage of  
system/program  
risk

# RESULTS FOR ARH

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## Initial assessment

- Market research was indicating **COTS/GOTS** technical maturity lower than originally assessed. This raised likelihood of future, unplanned subsystem development with consequence of depleted resources.
- **Substitute** technologies and platforms lacking. Likelihood of a gap in fielded capabilities was evident, with consequence of compromised operational missions.
- **Enterprise Communications Systems** for proposal evaluation team were limited compared to typical office systems with email and instant messaging. This raised likelihood that critical information during proposal assessment could remain isolated, with consequence of unreported risks or opportunities.

## Current status

- Program was cancelled owing to **Nunn-McCurdy breach**. Limited sales to Iraqi armed forces planned.
- Significant issues among 5 I's were immature **COTS** systems (Industry), lack of **substitutes** (Influences), extended **assignment duration** (Internal), ineffective **decision making** (Internal), and **physical security** concern (Infrastructure).

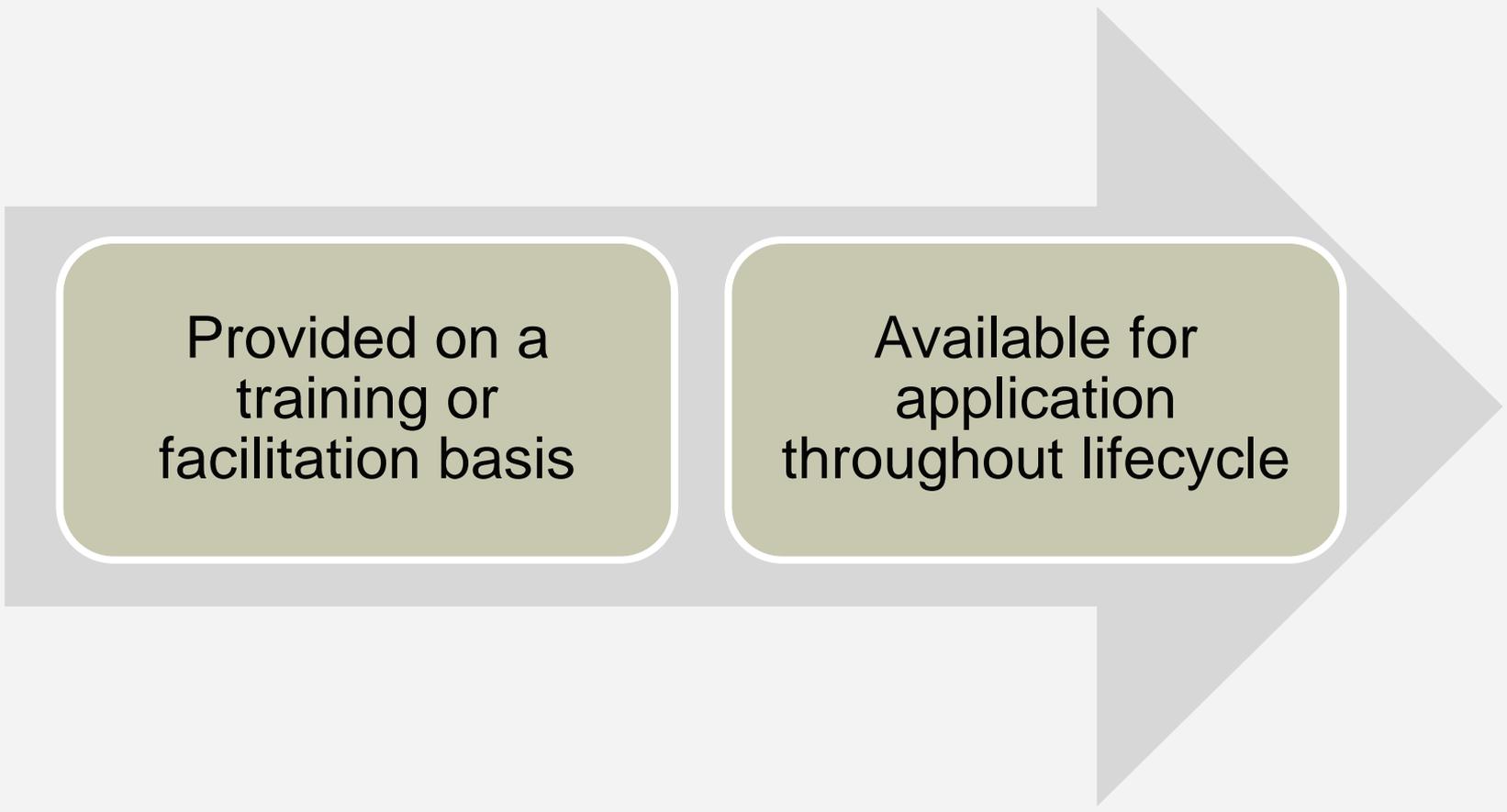
# ADDITIONAL RM5 USES

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- Other uses for the model include applying it specifically to **identification of existing, rather than projected, program issues**. This could provide managers a snapshot of information that would otherwise escape attention and provide them with the insight to head off problems.
- Likewise, *RM5* could be used to **identify opportunities\* which were previously unrecognized** and could support or provide visibility to a program.
- In all of the stated cases, the **potential for cost savings or revenue generation** is apparent since reducing risks or capturing opportunities are means to improving the bottom line.
- Furthermore, having a model to **complement existing SE tools** provides an additional decision aid to validate current assumptions or to promote ideation for new process / product development.

\* *Determine Likelihood & Benefit*

# AVAILABILITY OF RM5



Provided on a  
training or  
facilitation basis

The diagram features a large, light gray arrow pointing to the right. Inside the arrow's shaft are two rounded rectangular boxes with a light olive green background and a white border. The first box on the left contains the text 'Provided on a training or facilitation basis'. The second box on the right contains the text 'Available for application throughout lifecycle'.

Available for  
application  
throughout lifecycle

# BACKUP

## ADDITIONAL STRATEGIC MGMT MODELS

# SWOT ANALYSIS

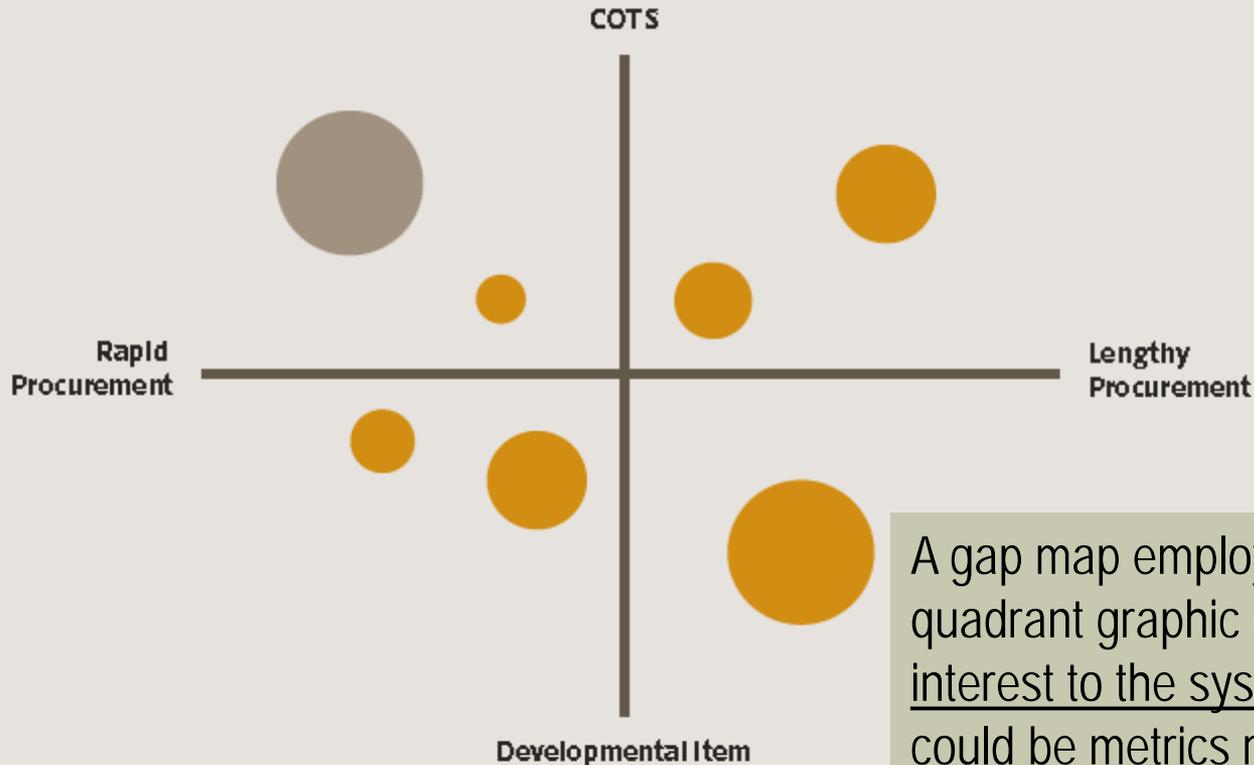
**FIGURE 5. SWOT ANALYSIS**

<b>Strengths</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>
Subject matter experts	Insufficient funding	Contract Personnel	Budget cuts
Certified processes	Process software outdated	Develop software internally	International standards
Market demand	Production limitations	Outsource production	Loss in quality

SWOT analysis can be performed by compiling a list of organizational attributes applied to each of these categories. This allows management to determine where resources need to be allocated to either shore up or scale back attributes to optimize program performance.

# GAP ANALYSIS

FIGURE 6. GAP MAP



A gap map employs a two-axis, four-quadrant graphic depicting variables of interest to the systems engineer. Variables could be metrics relating to cost, schedule, and performance, for example; The systems engineer determines what is of value or interest.

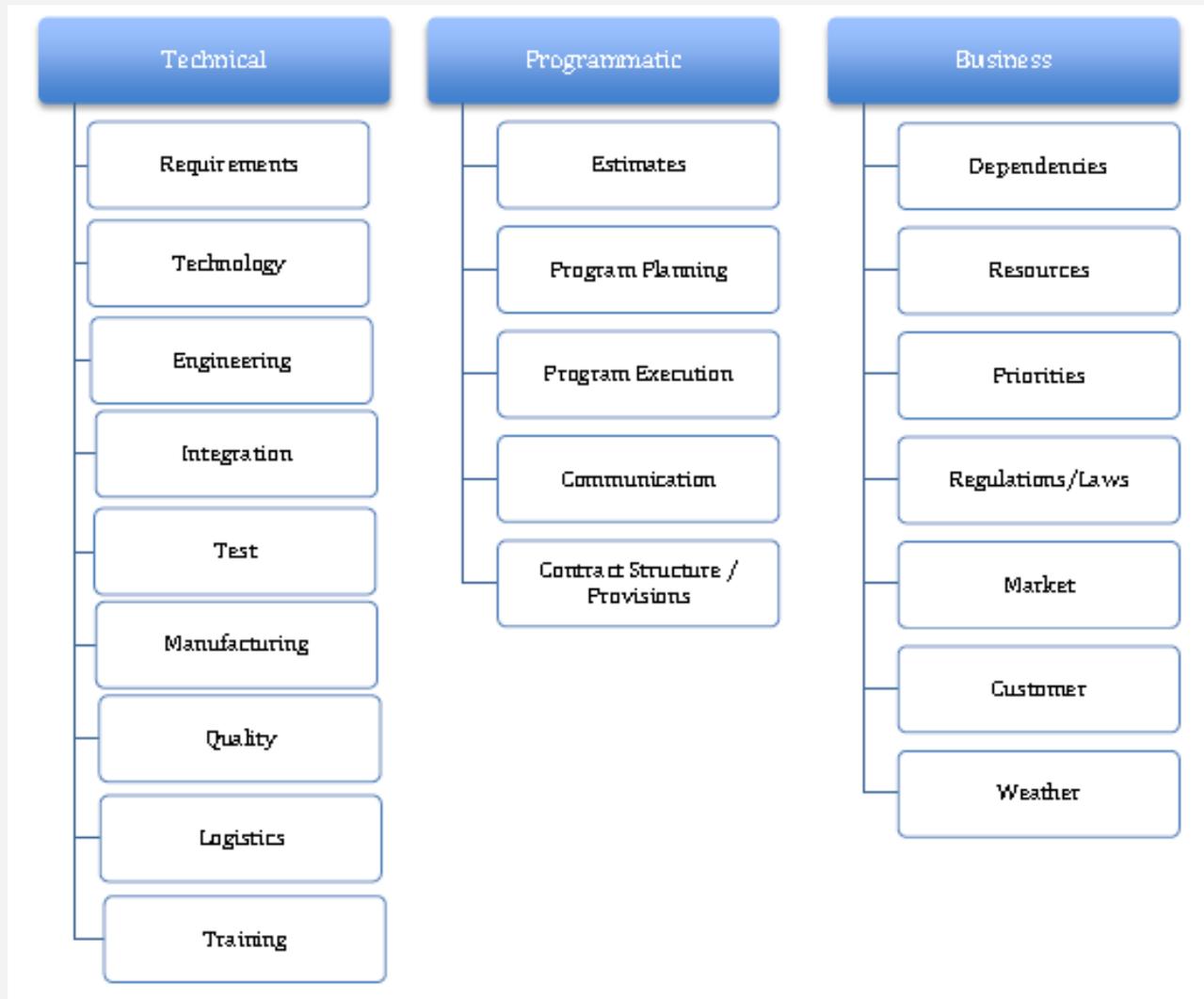
# VALUE CHAIN ANALYSIS

**FIGURE 7. VALUE CHAIN**



The value chain is comprised of the functions performed to create a product or service. A margin is depicted to highlight the value added for the customer. This would be a useful model for trade studies to represent alternative approaches and determine which produces the greatest margin or best value.

# DoD RISK TAXONOMY





# CONTACT INFORMATION

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# ACRONYMS

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5 I's – Industry, Influences, Internal Organization,  
Infrastructure, Information  
ACAT – Acquisition Category  
ARH – Armed Reconnaissance Helicopter  
COTS – Commercial Off the Shelf  
DAU – Defense Acquisition University  
DAWIA – Defense Acquisition Workforce Improvement  
Act  
GOTS – Government Off the Shelf  
SE – Systems Engineering  
SEMP – Systems Engineering Management Plan  
SEP – Systems Engineering Plan

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