



Inherent Moral Hazards in Acquisition: Improving Contractor Cooperation in Government As The Integrator (GATI) Programs

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Research Overview

Problem

“Government As The Integrator” (GATI) is now preferred approach

Incentives among contractors may not align with program objectives

Poor contractor cooperation causes delays, overruns, poor performance

Government is still learning how to “play” the “game” of GATI acquisition

Solution

Align contractor incentives using customized incentive mechanisms

Combine different incentive mechanisms to be more effective

Contractors acting in their interests also serves program interests

Approach

Describe & analyze GATI contractor incentives using game theory

Use agent-based modelling to quantify the game outcomes

Simulate incentive mechanisms in context of a full acquisition program

Select the most promising combinations of mechanisms

Future Work

Interview acquisition program staff to gather data

Pilot most promising mechanisms and measure results

Acquisition Moral Hazard

mor•al haz•ard ● /'môrəl 'hazərd/ *n.* **1** (economics) lack of incentive to guard against risk where one is protected from its consequences

Actual Acquisition Story (*fictionalized*)

Acquisition Program:
Next-Generation Cruise Missile

Availability: Early next year

Related Program:
Next-Gen Missile Launcher

Availability: DELAYED
until year after next

Situation: Sensitive electronics in missiles degrade over time—unusable in five years

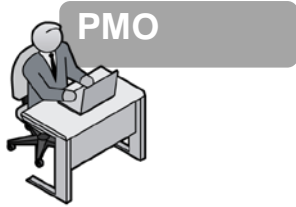
Decision:
Cruise missile PMO proceeds with production/deployment

Rationale: Cruise missile PMO can now claim to meet schedule

Result:
Significant portion of expensive missile's expected life is lost

Moral Hazard: Cruise missile PMO benefits themselves at expense of larger program—because the PMO doesn't bear the costs of the risk

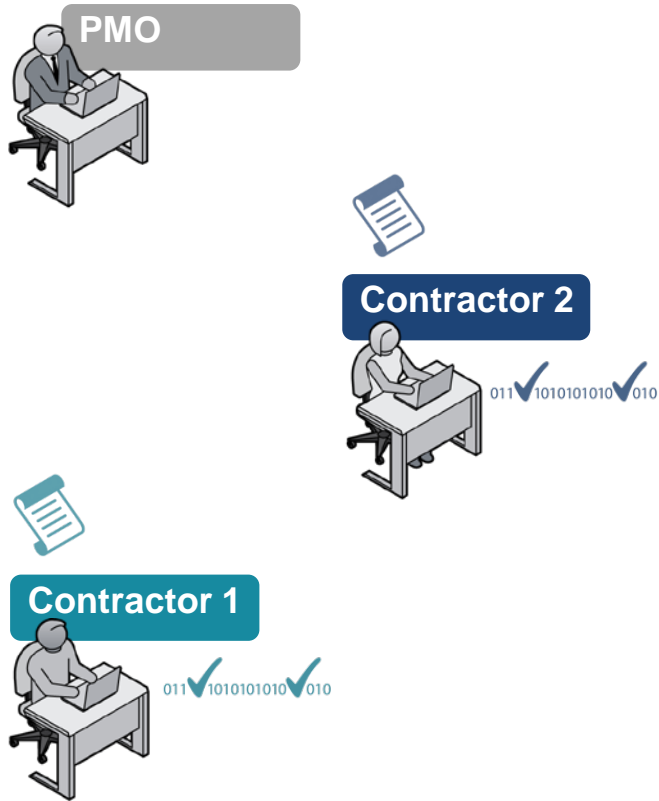
Research Approach



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A GATI program has a CPAF contract with the ability to change the award fee structure every six months.

Research Approach

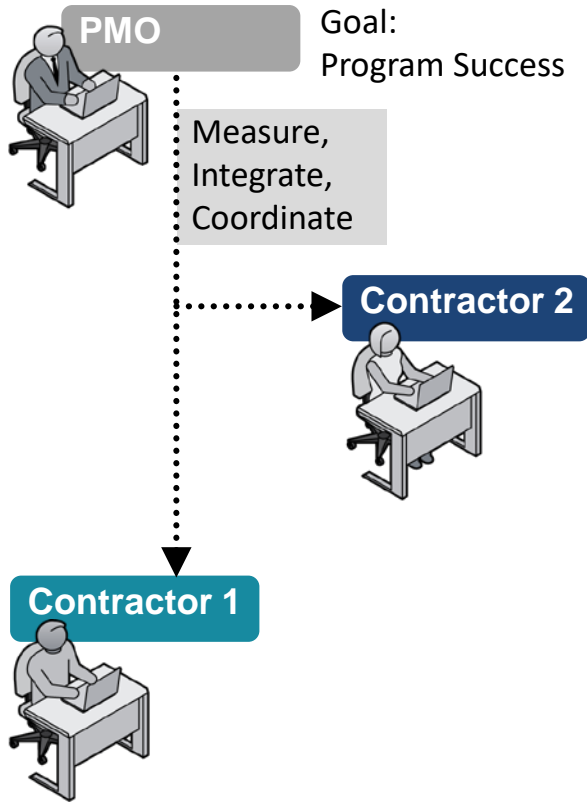


2

There are two contractors, each developing a subsystem, who must work cooperatively to produce the full system.

A "Giver/Receiver" list describes the schedule for the areas where the contractors must interface their subsystems.

Research Approach

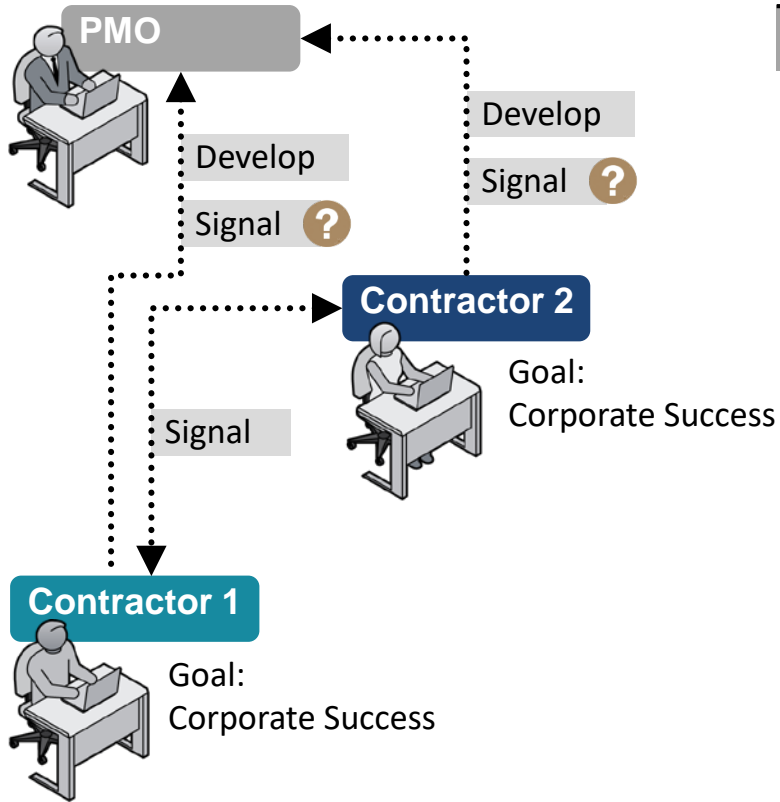


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The PMO wants to successfully achieve the program's cost, schedule, & performance goals, and to do so can

- measure the contractor's actions and performance,
- perform some integration actions themselves, and
- implement coordination actions to encourage contractor cooperation.

Research Approach

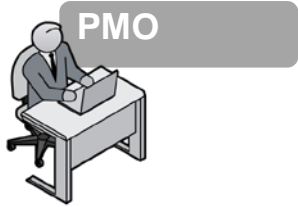


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The contractors want to maximize their own goals, and in doing so they both

- perform various development activities, and
- send (possibly deceptive) performance "signals" to the PMO about what they're doing.

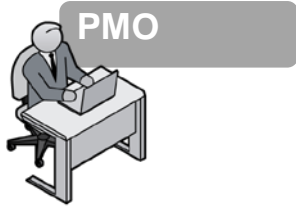
Research Approach



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While the contractors may want the program to succeed, they also have individual incentives to not cooperate with each other, such as concerns about disclosing proprietary information to a competitor, providing costly technical support, or agreeing on an interface that might simplify the other contractor's work, while making their own more difficult.

Research Approach



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If a contractor doesn't cooperate, they may

- a) delay work and desynchronize the schedule, b) refuse to provide the data they should provide to the other contractor, or
- c) choose an interface that undermines the other—but they will manipulate the PMO's measurements to avoid detection, and conceal their motives to avoid penalties for being uncooperative.

Research Approach



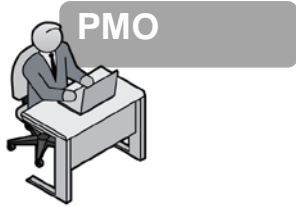
	Assist	Reject
Assist		
Reject		

Coordination Game

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Assuming that contractors not cooperating on interfaces will hurt the program, combining the benefits and impacts ("utilities") to both the contractors and the overall program can produce the following payoffs—which form what's called a "coordination" game, where participants tend to end up in one of two solutions (i.e., "Nash equilibria")—but only one of them is good for the program.

Research Approach

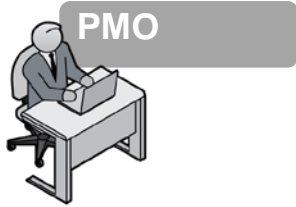


	Assist	Reject
Assist	(1, 3)	(3, 7)
Reject	(1, 3)	(7, 7)

Prisoner's Dilemma

8 If the contractors' incentives are slightly different due to the program's context (e.g., the level of distrust between them, or the criticality of the IP), the utilities can form another game called the "Prisoner's Dilemma," where participants end up in only one Nash equilibrium where neither cooperates— which is the worst outcome for the program.

Research Approach



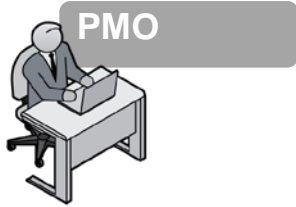
	Assist	Reject
Assist		
Reject		

Incentive Solution

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To prevent these undesirable outcomes, the PMO can incentivize the contractors to cooperate, using award fee incentives that change the game to one in which the only Nash equilibrium serves the interests of the program.

Research Approach



	Assist	Reject
Assist	↑ (3, 7)	↑ (3, 7)
Reject	↑ (3, 3)	↑ (7, 7)

Incentive Solution

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Some specific solution "mechanisms" for contractor cooperation issues include "Shared Destiny" (all players win or lose based on the outcome), "Assigned Fault" (some win and some lose based on a fault determination), or a "Risk Pool" (a reserve fund used to mitigate issues that arise).

Research Approach



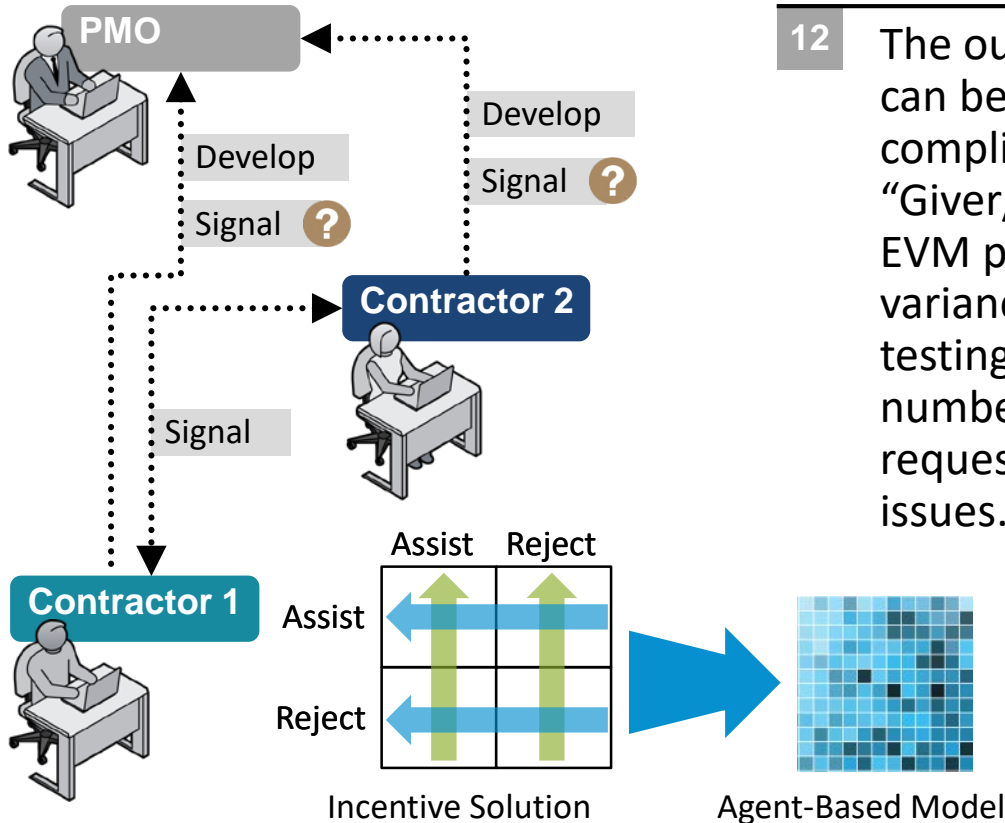
	Assist	Reject
Assist		
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Incentive Solution

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The effectiveness of the solution approaches can be tested by simulating a model of each mechanism in the context of the program with its specific incentive values, playing out all combinations of moves and counter-moves into the projected future and evaluating the outcome. The most promising mechanisms can be piloted with the collaborating program.

Research Approach **Future Work**



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The outcomes of the piloted efforts can be measured in terms of: 1) compliance with program's "Giver/Receiver" list schedule, 2) EVM performance and schedule variance, 3) defect counts from testing of that interface, and 4) the number of waivers/deviation requests submitted for interface issues.

Incentive Mechanisms in Combination

Distinct types of incentives affect contractors differently—and the combined impact can be more effective in influencing a range of contractors sufficiently to change their behavior.



Business: Future Business Incentives (*appeal to Executive Management*)

- **Example: Reputation Tracking:** Reputational impacts affect future business opportunities in the absence of award or incentive fee.



Money: Direct Financial Incentives (*appeal to Project Management*)

- **Example: Truth-Revealing Incentive Mechanism¹ (TRIM):** A sliding CPIF fee based on schedule (e.g., sooner completion, larger fee incentivizes early delivery).
- **Example: Shared Destiny:** All teams only receive as much award fee as the worst team gets, so all are incentivized to help the poorest performing team.



Social: Team Networking Incentives (*appeal to Project Teams*)

- **Example: Co-Location:** Teams with greatest potential for poor cooperation are co-located (and kept badge-less) to foster communication and trust.

¹Coughlan, Peter J., & Gates, William. (2009). Innovations in defense acquisition: asymmetric information and incentive contract design. Naval Postgraduate School, Monterey CA.

Acquisition Game Players

Program Management Office (PMO)



Other CP Customers



Component Performer (CP)

- Decisionmakers within CP
- High-Level Management
- Project Management
- Team Members



CP Collaborator
Collaborator Types

- Competitors
- Complementors



CP Supplier

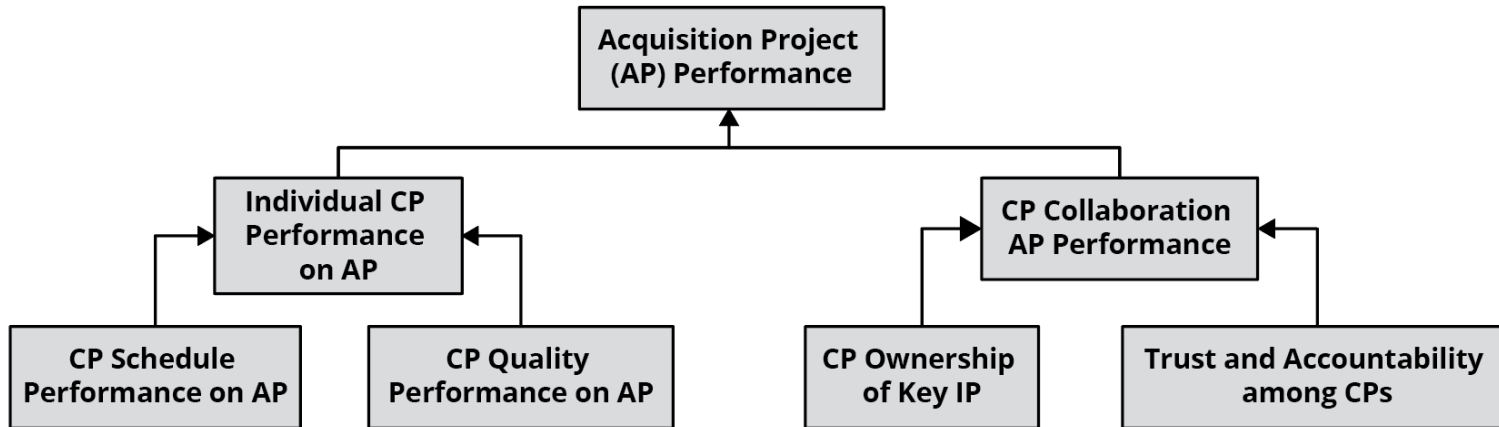


Key

- Contractual Relationship
- Associate Contractor Agreement

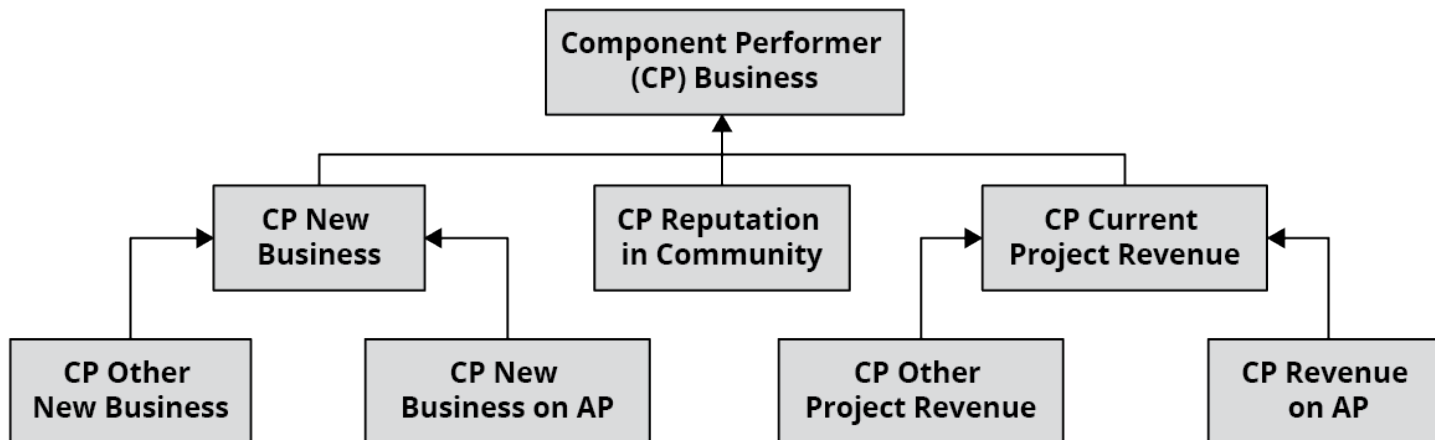
Drivers of Acquisition PMO Behavior

What contributes to the overall performance of an acquisition program?



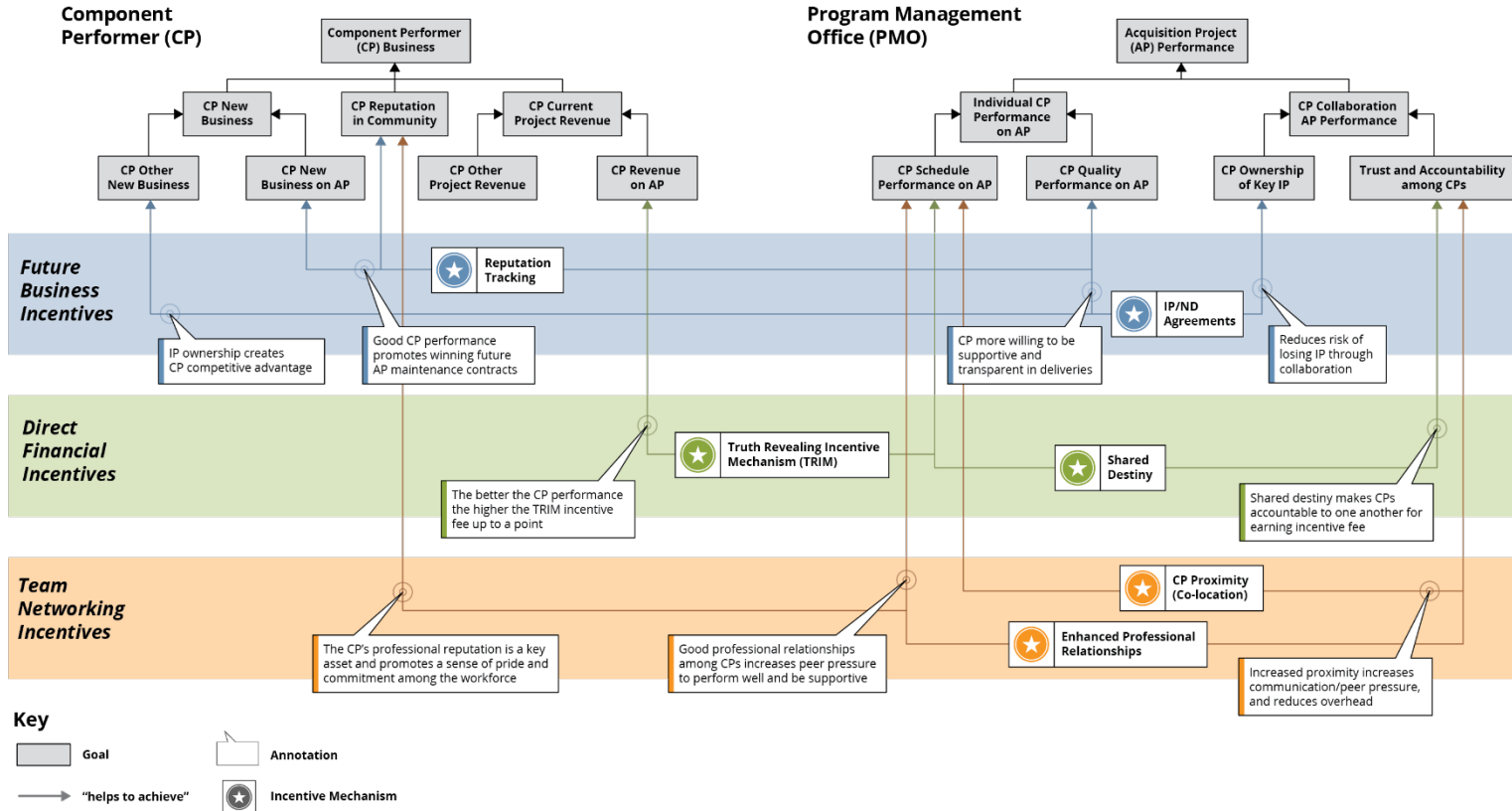
Drivers of Component Performer Behavior

What contributes to the overall business of a “component performer” (e.g., contractor)?



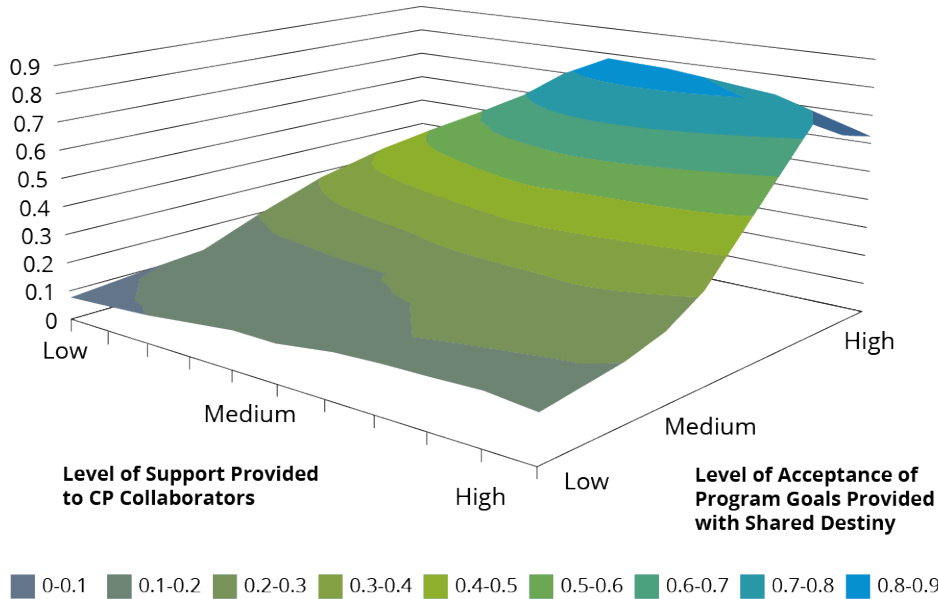
Mechanism-Based Incentive Alignment

How incentives can drive Acquisition Program and Component Performer behavior



Unintended Effects of Combining Incentive Mechanisms ₋₁

Composite Program Performance¹

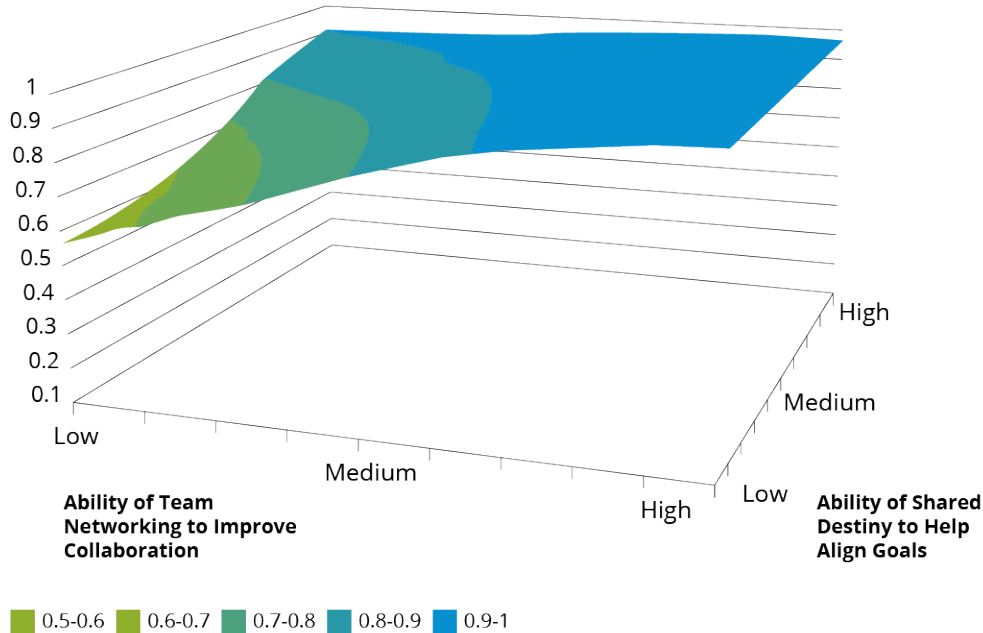


The result of combining the “Shared Destiny” and TRIM incentive mechanisms.

¹Composite Program Performance = Segment Schedule Performance Index * Segment Productivity Index * Extent Global Goals are Achieved

Unintended Effects of Combining Incentive Mechanisms -2

Composite Program Performance¹



The effects of combinations of different incentive mechanisms on program performance can be analyzed and predicted.

¹Composite Program Performance = Segment Schedule Performance Index * Segment Productivity Index * Extent Global Goals are Achieved

Key Research Insights

- **Moral Hazards:** Many problematic acquisition behaviors are “moral hazards”—and new moral hazards can (and likely will) arise with every new commitment that is made.
- **Trust and Relationships:** Incentives can promote trust and be self-reinforcing—but poor trust and poor relationships cause a downward spiral.
- **No Silver Bullet:** Specific incentives can achieve specific objectives—but there is no single perfect incentive.
- **Roles and Incentives:** Different incentive types appeal to different organizational roles. The most effective incentives depend on an organization’s values.
- **Multiple Types of Incentives:** Combinations of incentives can be more effective across a wide range of organizations with unknown business values.
- **Combining Incentives:** Incentives should be combined for maximum effect, but it gets complicated. Some incentives can undermine others.
- **Evolution of Incentives:** An incentive is one “weapon” in an ongoing “war,” where incentives become obsolete, and must evolve.
- **Modelling for Prediction:** Acquisition modeling & simulation can help predict the results of decisions, and analyze the results of proposed policy changes.

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Thank You!

