

The Impact of Governance Approaches on System-of-System Environments

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Outline of Presentation

- The Case
 - Evaluating an investment intended to improve the responsiveness of government to the changing demands of its citizens and businesses
- The Approach
 - Using a governance approach that takes into account not only
 - the *direct effects* of an investment in search capability, but also
 - its *indirect effects* on the agility of the government's responses
- The Analysis
 - Modeling the economic impact of architectural changes on the indirect effects
- Conclusions
 - The economic analysis supports the need for a different governance approach supported by collaborative system-of-system architectures

THE CASE

The Case of e-Government's Responsiveness

- The goal of e-Government:
 - Enabling the Government to become more responsive to its citizens and businesses, while at the same time reducing its costs.
 - *How can the government become more responsive to the questions asked of it by its citizens and businesses, using on-line search capabilities?*
- The challenge of this case:
 - To relate the value of investment in computational systems to governance approaches based on the Government responsiveness.
 - *How is government to value the investment, if Return on Investment (ROI) does not work because there are no direct revenues attributable to these capabilities?*
- A key issue:
 - The challenge that systems of systems present to governance within the Government environment.
 - *How is government to sustain the alignment of its systems-of-systems to dynamic and evolving demands arising within its larger environment?*

Thinking 'socio-technical ecosystems':

The modeling and analysis needs to be done of different tempos

The tempo at which social demands for value emerge

analysis of the 'multi-sided' demands of citizens and businesses for greater responsiveness from the government

Delivering responsiveness 'at the edge' where the demand is first met (through collaborations across organizations and departments)

The tempo at which government re-organizes

fitting together multiple perspectives on how particular collaborations supported by socio-technical SoS respond to demands

Identifying the risks to collaboration across multiple parts of the SoS (the way particular responses of government departments are coordinated)

The tempo at which technological systems are developed

establishing operational performance of software systems

Analyzing end-to-end uses of the search platform(s) (architectural trade-offs associated with different search methods)

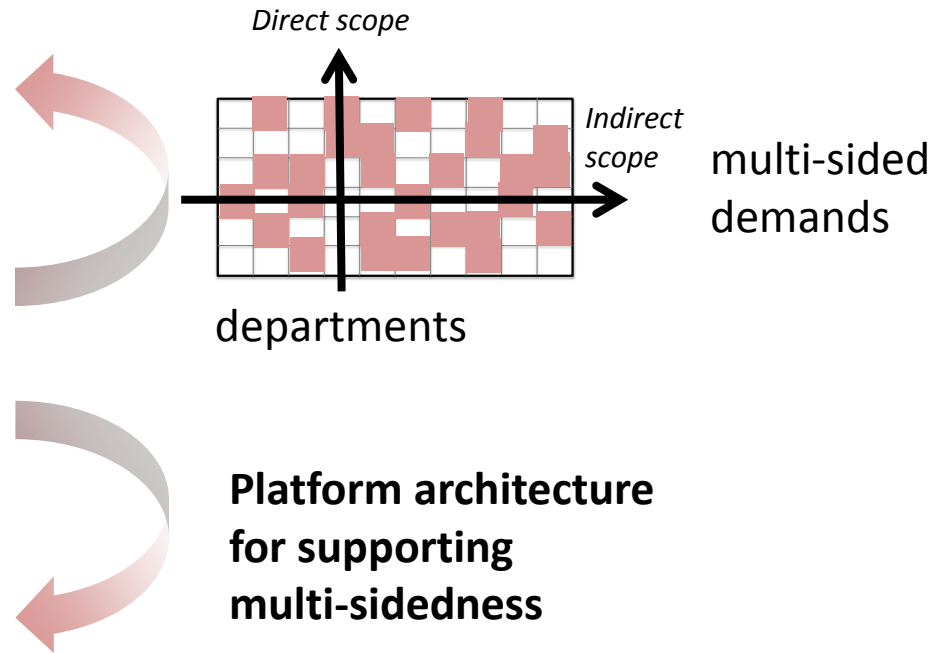
The challenge is alignment across the different tempos

Analyzing Alignment across tempos

The tempo at which social demands for value emerge

The tempo at which government re-organizes

The tempo at which technological systems are developed

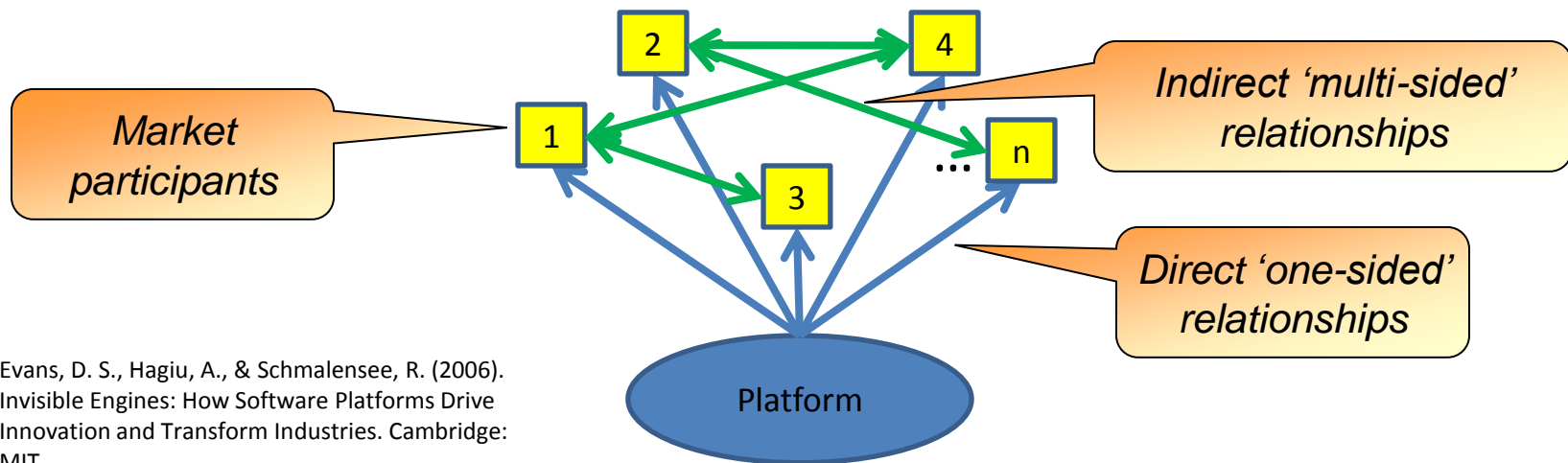


THE APPROACH

Multi-sided markets:

counting the value of indirect market relationships

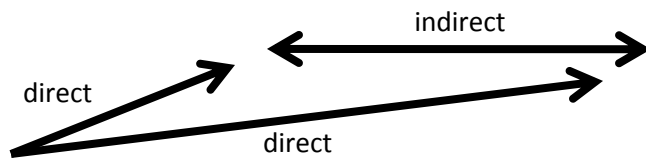
- A multi-sided market for a platform is one in which:
 - There is value in its direct ‘one-sided’ relationships with each market participant
 - There is greater value in its indirect ‘multi-sided’ relationships with collaborating market participants



Evans, D. S., Hagiu, A., & Schmalensee, R. (2006). Invisible Engines: How Software Platforms Drive Innovation and Transform Industries. Cambridge: MIT.

Examples of Multi-sided Markets

Platform	Complementors*	End-users*	Indirect Benefits
Credit Cards	Vendors	Card-holders	Transaction convenience
Smart Phones	Applications	Users	Personal organization
Sports Clubs	Teams, Services	Spectators	Family Social Event
Hospitals	Doctors, Services	Patients	Treatment for my condition
Airports	Services, Airlines	Travelers	Personal travel
Cable Networks	Content providers	Audiences	Personal viewing
C4ISTAR Network	Capabilities	Soldiers	Agile situational response
Microsoft	Developers	Customers	Personal computing



* Note that both End-users and Complementors are managerially and operationally independent

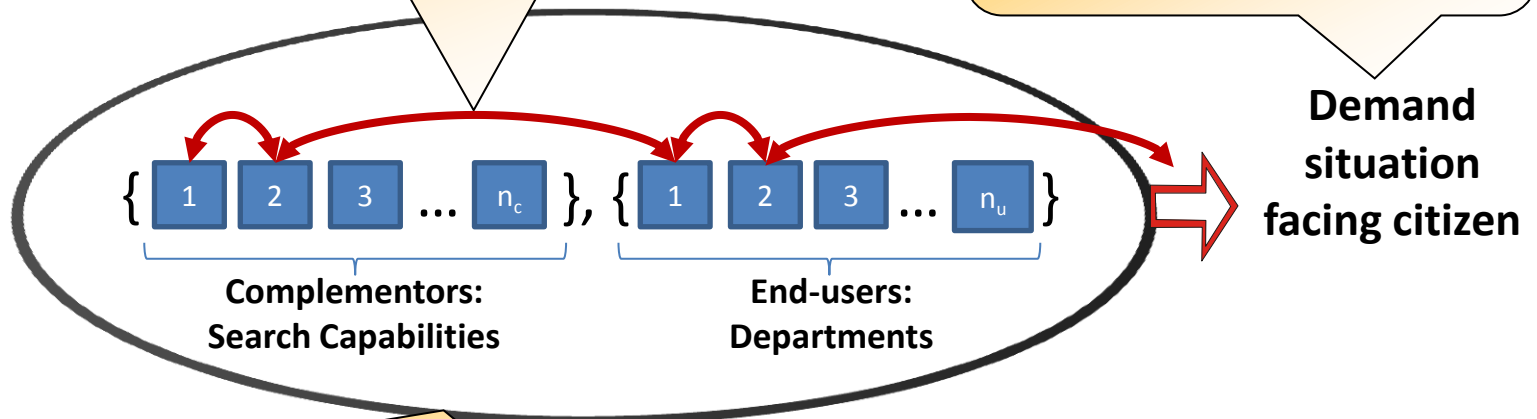
Source: Evans, D. S., Hagiu, A., & Schmalensee, R. (2006). *Invisible Engines: How Software Platforms Drive Innovation and Transform Industries*. Cambridge: MIT.

Multi-sided Platforms:

supporting the response to the citizen

A collaboration between departments using search capabilities to formulate a response

The context in which the demand from the citizen arises
e.g. what do I do about Swine Flu at my school



The Search Platform(s) need to be able to support the variety of ways collaborating departments wanted to use search platforms

Different types of response by departments:

increasingly dependent on the nature of the situation

- wholly **standardized** responses (i.e. frequently asked questions);
 - *Where and when do I get a vaccination?*
- responses that had to be **customized** to the particular circumstances (but still only involving one department);
 - *Why is there not enough vaccination available in my hospital?*
- responses dependent on **specialist knowledge** from more than one department,
 - *What are the contraindications of the vaccination?*
- problems needing **wholly new kinds of response**, frequently requiring collaboration with organizations outside government.
 - *What precautions do we need to take for our school excursion?*

The Multi-Sided Matrix:

was the variety of collaborations closed or open?

Each collaboration is a system-of-systems

Indirect interactions

Direct interactions

- School excursion: do we need any prophylaxis considerations?
- Why No/Not enough vaccine available from my physician/hospital/county?
- Contraindications for the vaccine and illness/drug/other vaccines?
- Vaccination: where and when do I get it?
- ...

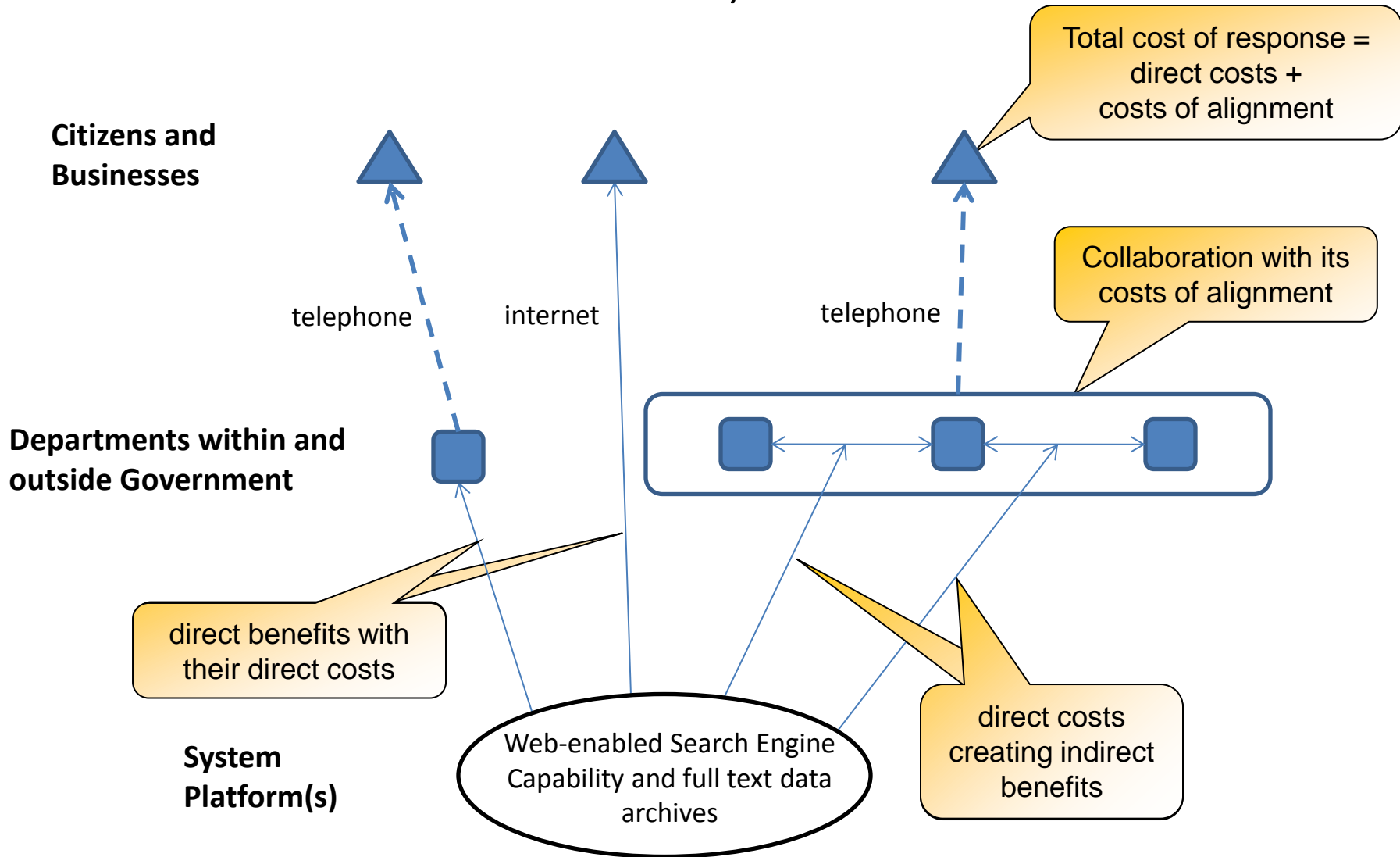
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	X	X	X					X	
X			X	X	X		X		
X									

Hotline Services Government Departments Non-Governmental Organizations Counties

The Transient nature of citizens' and business' concerns (for example Swine Flu) meant that the variety of collaborations was always open

Supporting Multi-Sidedness:

collaboration was not only within Government



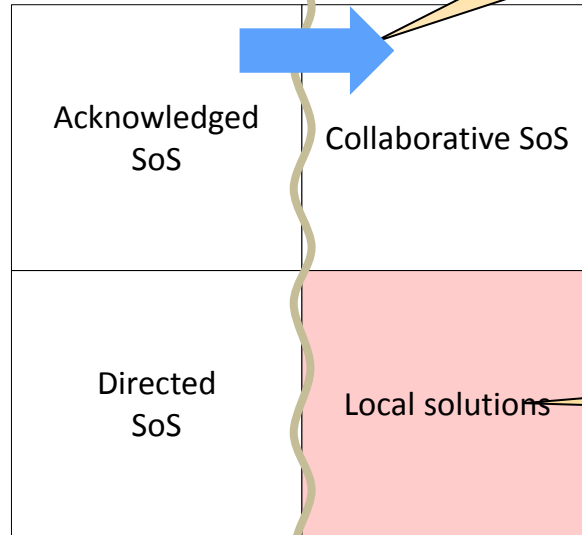
The Governance Challenge:

managing dynamic alignment

The eGovernment process was having to support open forms of governance.

Departments not all falling under the Government
(multiple enterprises)

Departments all falling under the Government
(single enterprise)



Expensive

Defined by a centrally agreed authority

Collaboration defined independently of the particular question (closed)

Collaboration defined by the particular nature of the question (open)

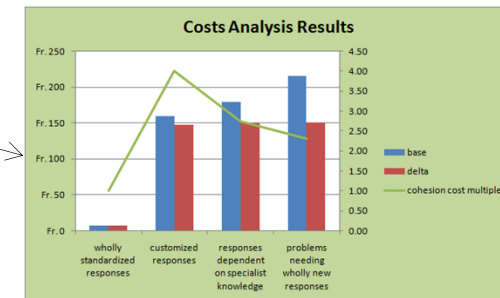
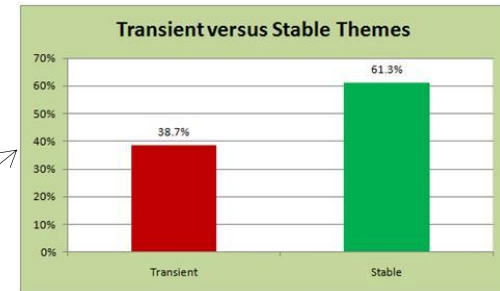
Delegated to an 'edge-driven' process

THE ANALYSIS

The Analysis Approach

Phase I: Demand Analysis

- Types of questions (stable, transient)
- Complexity of questions (4 categories)
- Costs of questions (direct, alignment)



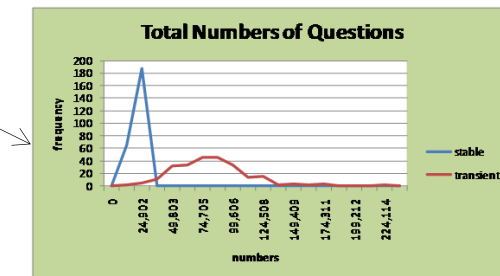
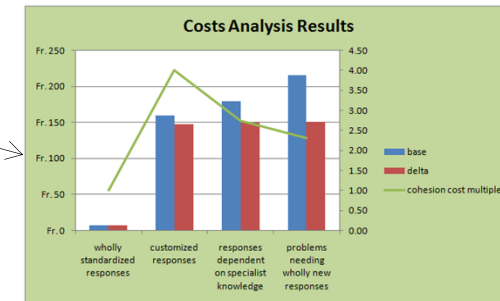
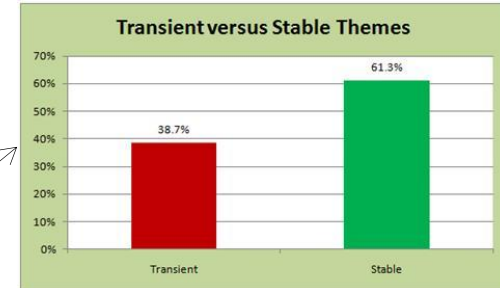
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Phase II: Demand Model

- Model of the number and variety of questions (Monte Carlo simulation)



The Analysis Approach

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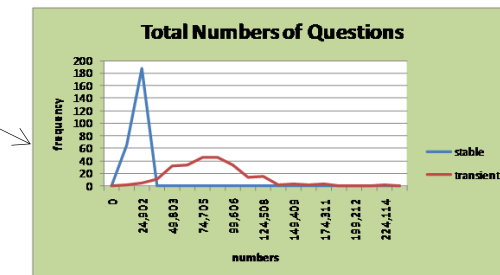
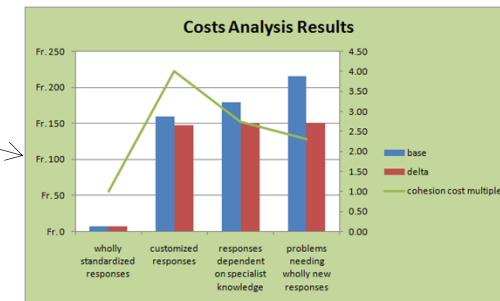
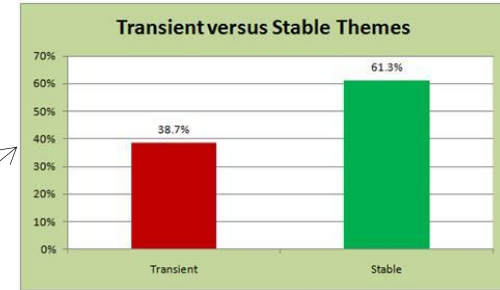
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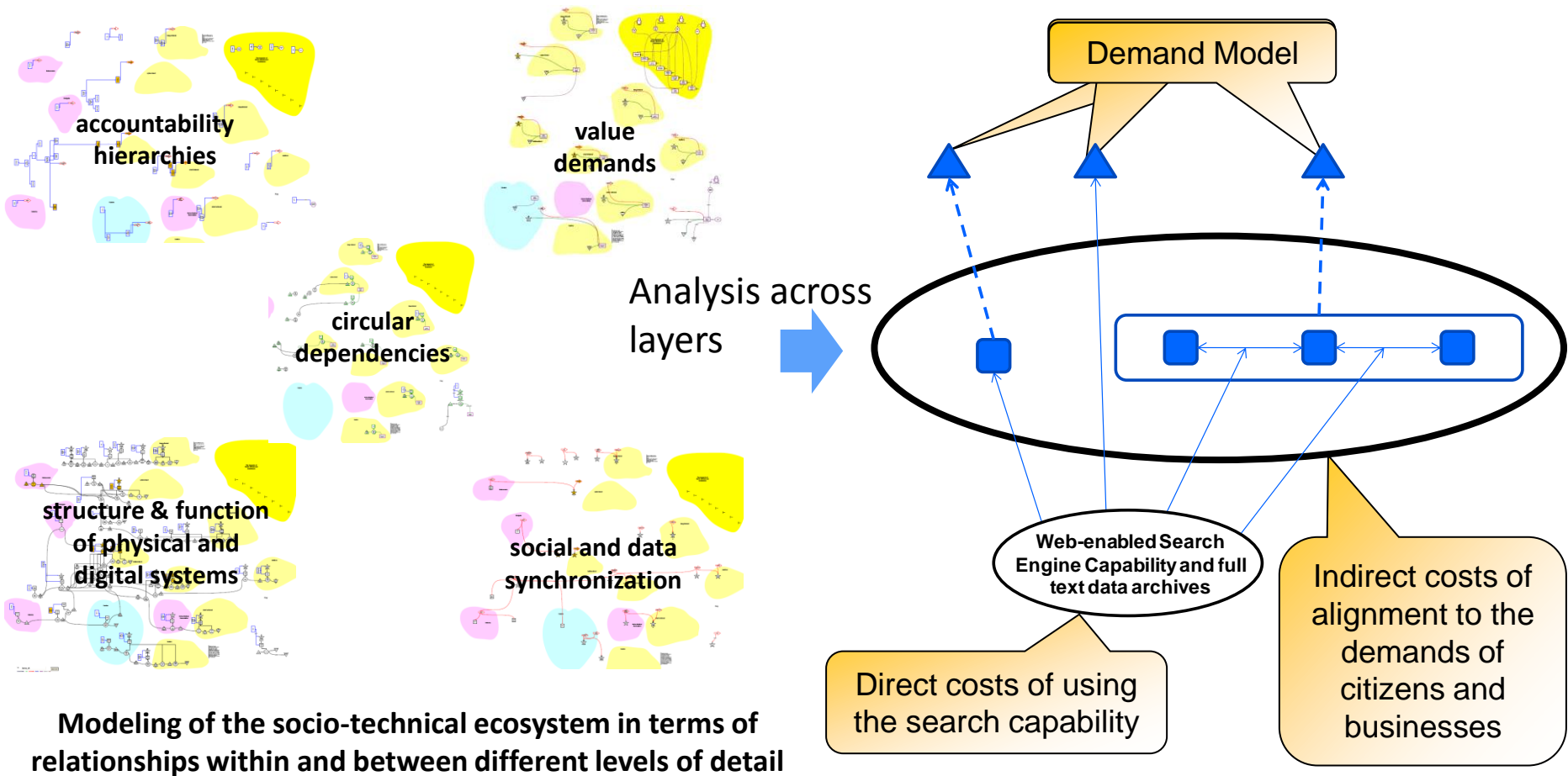
Phase III: Option Valuation

- Costs of different complexities of questions
- Average and variance on savings
- Fully discounted NPV + Real Option Analysis



Based on modeling the alignment processes

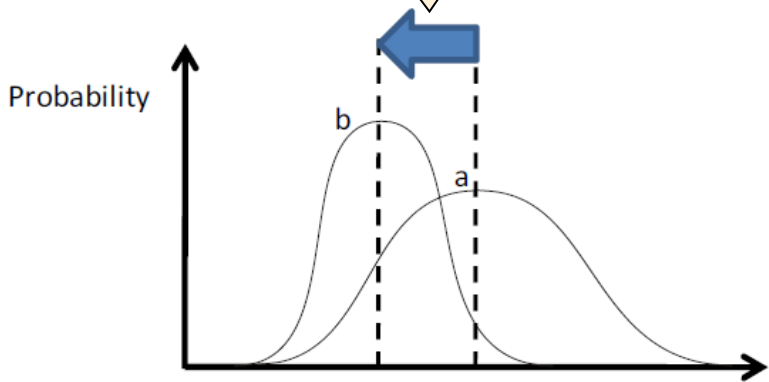
Modeling and analysis of the alignment processes: establishing the possible economies of alignment



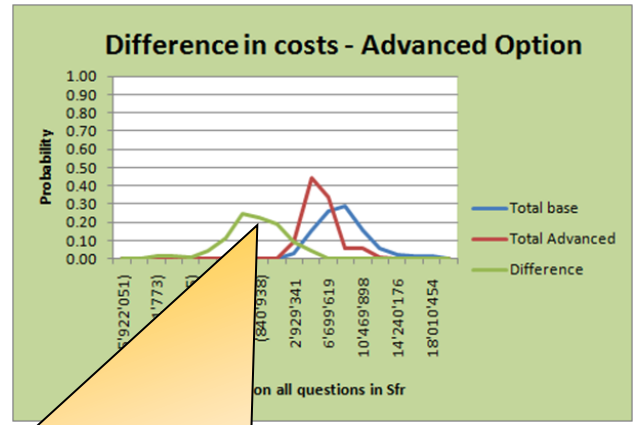
Results:

supporting collaborative forms of governance required investing in collaborative architecture

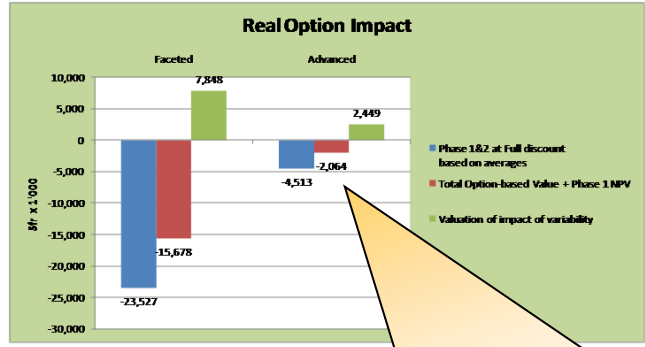
Investment reduced both the average total cost and the variation (spread) in the costs



Monte Carlo simulation of variation in Total (direct costs + alignment costs) across full range of questions



Using a collaborative architecture reduced the average costs of alignment very significantly



The reduction in variation was worth half as much again as the average reduction

CONCLUSIONS

Conclusions

- The importance of supporting collaborative processes became evident to the Government
 - The multi-sided character of the demands on the government departments created a clear need to take into account the costs of alignment.
 - The costs of alignment depended on the way the governance processes could dynamically align responses to changing and evolving demands.
- This meant considering both
 - The traditional economies of scale and scope available from any particular supporting department and systems platform, and
 - A governance approach that assumed variability in the needs of citizens and businesses, demanding economies of alignment in the resultant variation in the collaborations between departments and systems
- The imperative to manage the economies of alignment established the imperative for a collaborative architecture capable of supporting multi-sidedness