



Interoperability Needs for Systems and Software Assurance: From Enterprise SOA to Multiple Independent Clouds.

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Preview

- ▶ Some discussion on the effectiveness and efficiency of an industrial sector with respect to firm interdependencies
- ▶ Some discussion on two types of alliance networks: prominence and entrepreneurial based alliances
- ▶ Interoperability w.r.t. Interdependencies and alliance networks
- ▶ How SOA started and how it appears as of today
- ▶ Take home message for cloud security

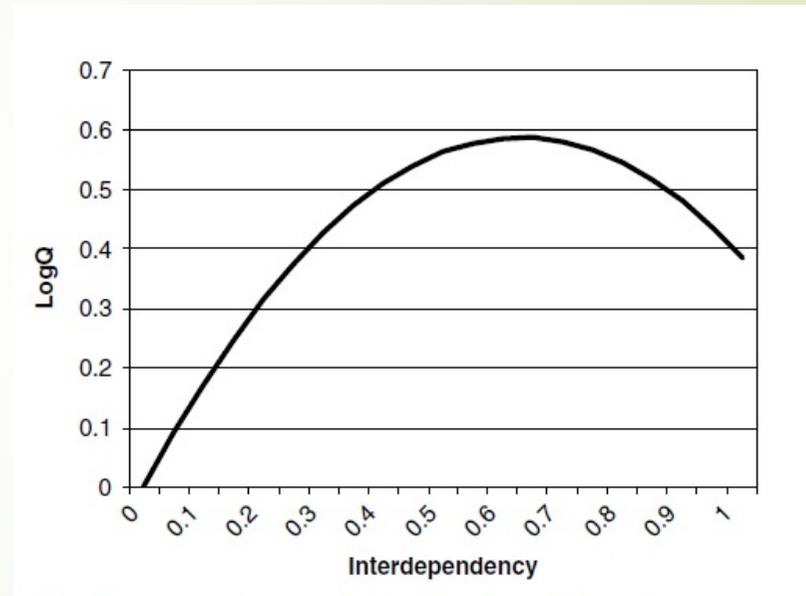


Interdependencies

- ▶ Interdependencies appear in many forms (standards being just one) and affect organizations at three levels
 - ▶ Interdependencies appear in organizational form and strategic decisions.
 - ▶ Potential/realized interdependencies in an organization's (broadly defined) production technology
 - ▶ (Substantial) interdependencies at (operational) product/process levels such as product architecture, R&D, standards compliance.
- ▶ Complex products and complex organizational environments tend to have more interdependencies.

Interdependencies

- ▶ Three empirical research results that confirm game-theory based propositions are important:
 - ▶ Profitability peaks at moderate level of interdependencies
 - ▶ Variance in profits increase with interdependencies
 - ▶ Industries with higher interdependencies have a more positively skewed performance distribution



Lennox, et al (2006)



Interdependencies

- ▶ Some points to discuss with respect to this figure
 - ▶ Simple industries with high efficiency vs. very complex industries with low efficiency
 - ▶ Effective brokerage (the case of Toyota)
 - ▶ A series of decisions made by firms and critical events that modify the set of potential interdependencies
 - ▶ First mover's advantage is contingent
 - ▶ Trade secrets are effective
 - ▶ Effects of brokerage and closure through organizational learning
 - ▶ Effects of a national business systems



Alliances

- ▶ Alliance networks are sources of
 - ▶ Information
 - ▶ Resources
 - ▶ Legitimacy
- ▶ Alliance networks
 - ▶ Influence firm and industry performance.
 - ▶ May also have negative performance effects.
- ▶ The structural design of an alliance and its effect on members' performance is contingent upon environmental conditions.



Alliances

- ▶ There are basically two types of alliance networks
 - ▶ Prominent networks – Firms pursue a strategy that enables them to attain a certain prominence in their network. Benefits arise with respect to Access to high quality key information and otherwise unavailable resources that are available to the a few prominent members.
 - ▶ Entrepreneurial networks – Firms pursue a strategy that enables them to attain an entrepreneurial position in their network. Benefits arise with respect to diversity of information, control of information flow and opportunities to create further interactions.
- ▶ Both types have room for these two strategies. But a given alliance network would probably concentrate on one aspect to be efficient and maintain its member base.



Alliances

- Major features of prominent alliance networks
 - Significantly increased access to key and valuable information of high quality to those less prominent,
 - Affiliation based benefits for the more prominent firms to establish their own competitive and strategic agenda as the defining norm in the industry
- In detail
 - Legitimacy concerns are resolved for the both the more and less prominent. The more prominent firms ensure they are in contact with those of their status and the less prominent gain legitimacy through their membership in the alliance
 - Formation of ties with similar firms lead to alignment of interests, facilitating mobilization of resources
 - The more prominent members facilitate favorable contracts with the less prominent members, thus maintain their bargaining power
 - The more prominent members can (to a degree) control the trajectory of the industry



Alliances

- Major feature of entrepreneurial alliance networks
 - Opportunities to take advantage of both information and resource diffusion between different and unconnected groups within the network
- In detail
 - Firms connect with otherwise disconnected firms, creating opportunities for brokerage,
 - Diversity of information arises from not only access but also from differences in firm characteristics,
 - By recombining diverse information, firms can discover gaps in market and develop new products and services,
 - There are many micro-flows of information, each controlled by separate brokers.
 - Strong cohesive type development is slow and complete alliance mobilization is often impossible



Alliances

- ▶ Two notes
 - ▶ Firms can participate in more than one alliance.
 - ▶ A firm could (in theory) effectively manage its portfolio of alliances, acting as an analyser of its environment.
 - ▶ A particular alliance's type could shift back and forth based on its membership and governance.
- ▶ Some research results
 - ▶ Following instant environmental change, firms focused on prominent alliance networks show performance decline, and firms focused on entrepreneurial alliance networks show performance increase
 - ▶ Radical environmental change will have more impact on entrepreneurial alliance networks, as they are not able to mobilize easily
 - ▶ Firms that pursue an active analyser strategy will perform more
 - ▶ Firms that try to pursue a dual-strategy of being both prominent and entrepreneurial will have the worst performance



Interoperability

- ▶ Interoperability creates usually
 - ▶ A lot of operational interdependencies
 - ▶ Some interdependencies with respect to product architecture
 - ▶ A small number of hard strategic interdependencies
- ▶ Services interoperability is much harder to achieve than product interoperability and create more higher level interdependencies
- ▶ Creating interoperability requires effective information sharing among rivals and an active, iterative management of interdependencies



Interoperability

- ▶ Both types of alliances can develop interoperability.
 - ▶ Entrepreneurial alliances may develop better designs of interoperability, addressing diverse needs
 - ▶ Prominent alliance networks develop and endorse their own design faster, addressing the needs of their leading members
 - ▶ Information on interoperability solutions can easily spill-over from one type to the other
- ▶ Prominent alliance networks are better at maintaining interoperability.



Interoperability w.r.t Software (Security) Assurance

- Software assurance is a difficult area to work in.
- Software security assurance relies on three major activities
 - Secure coding – To analyse existing defects and find root causes, and modify the software development process (through standards) to eliminate these root causes.
 - <https://www.securecoding.cert.org/confluence/display/seccode/CERT+Coding+Standards>
 - Vulnerability analysis – Discovery, classification and remediation of software vulnerabilities.
 - http://www.cert.org/vuls/discovery/workshop_2010.html
 - Malicious code analysis – To understand what malicious code does and analyze the aims of the attackers.
 - <http://computer-forensics.sans.org/blog/2011/06/03/malicious-code-analysis-intervie>



Interoperability w.r.t Software (Security) Assurance

- ▶ To be more specific, interoperability needs for systems and software security assurance create interdependencies at multiple levels
 - ▶ Shared or compatible secure coding practices based on languages and application domains create significant interdependencies in the product development process and in the end product.
 - ▶ Vulnerability analysis and malicious code analysis require in-depth work, best done jointly. The exact organizational configuration of joint work may change, but interdependencies on tools, techniques and relations will be created.
- ▶ Alliances are needed to manage and if possible effectively broker these interdependencies.



A Review of SOA

- ▶ SOA started with a value offering that is very similar (if not the same) of public clouds.
- ▶ Several interdependencies appeared, mostly of technical nature and of operational context.
- ▶ New alliances (prominent or entrepreneurial) were formed or existing alliances focused on SOA
 - ▶ The Open Group
 - ▶ OASIS
 - ▶ W3C
- ▶ Prominent alliance networks led by established industry companies controlled the trajectory of SOA.
- ▶ Compared to clouds, SOA started with a «public cloud» idea, ended up with «many private clouds with information exchange».

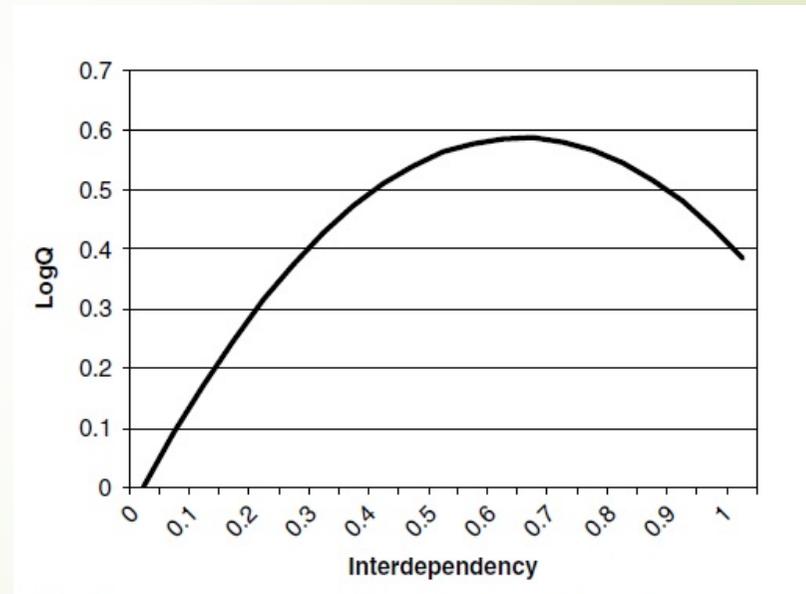


A Review of SOA

- ▶ Because of this trajectory, SOA security needs to address a more or less limited, slowly changing environment of in-house corporate systems.
- ▶ Similar problems exist, and many standards are shared with cloud computing security.
 - ▶ End to end transport security
 - ▶ Compatibility of data storage conditions (i.e. Encryption) at two ends
 - ▶ Cross-domain identity management and access control
 - ▶ Reliability and availability
 - ▶ Transparency and assurance
- ▶ SOA integration through an ESB has contextualized many problems in terms of ESB policies and common protocols.

Take home message for clouds

- ▶ In terms of clouds and cloud security
 - ▶ Technical complexity of *realized* cloud services is about to explode.
 - ▶ Market complexity is about to explode.
 - ▶ Therefore interdependencies will probably increase to diminish average firm productivity in the short term.



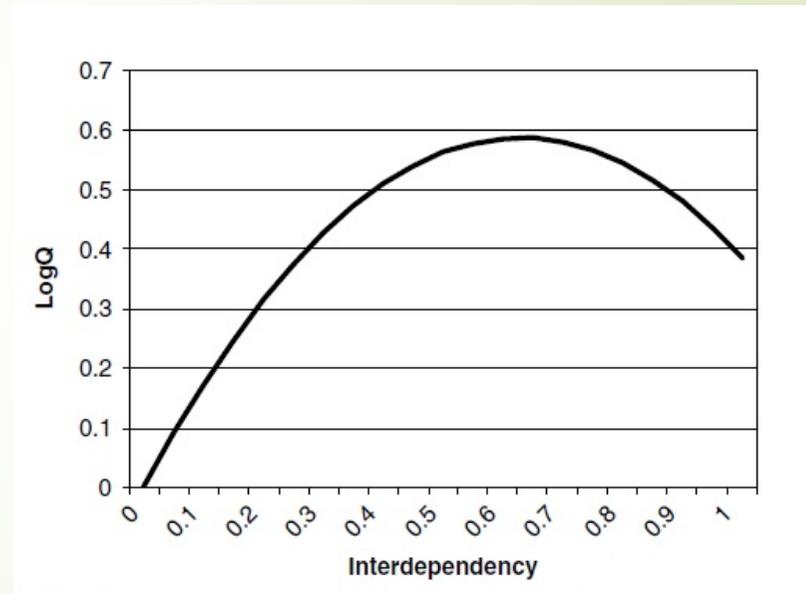
Take home message for clouds

- Existing alliances on cloud security are limited in number and on scope.
 - Most are prominent alliance networks with very specific focus.
 - CSA is probably an entrepreneurial network about to become a prominent network.



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Q&A

