A capability-based view of service transitions

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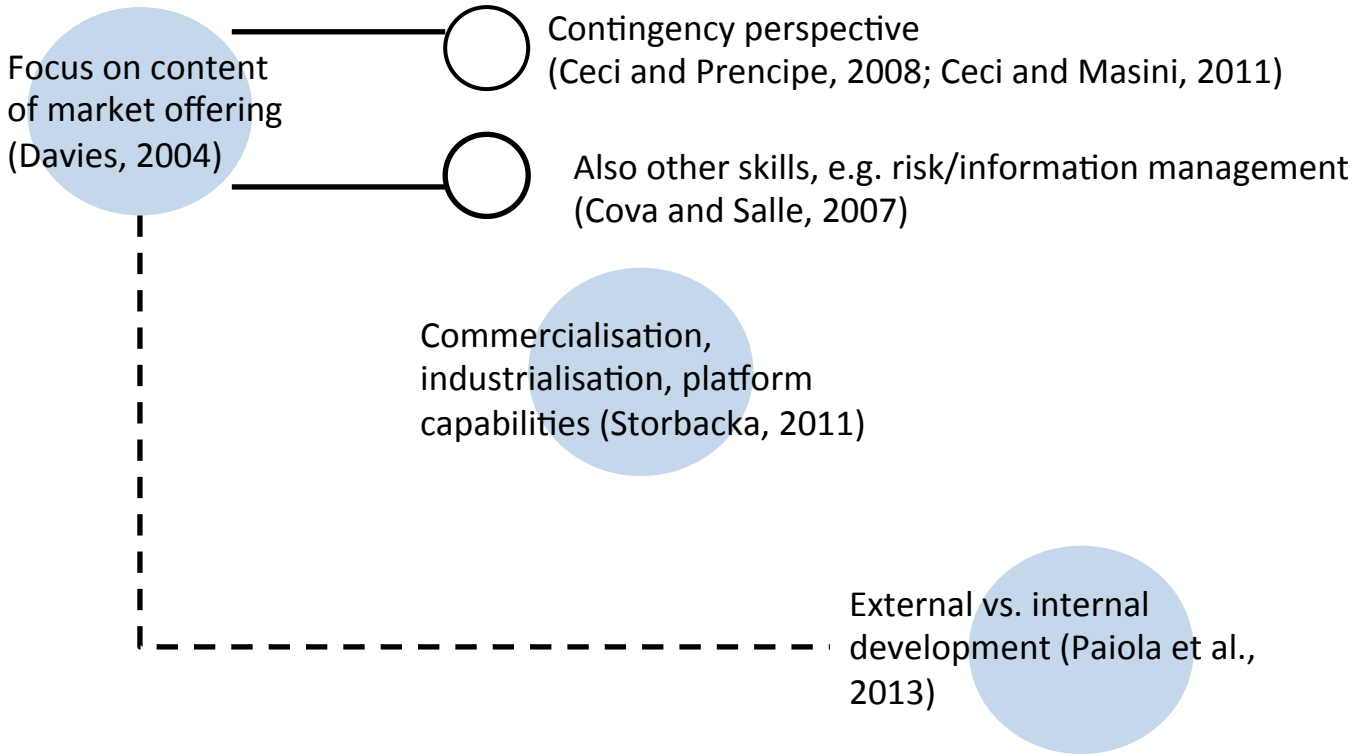
Background

LITERATURE ON INTEGRATED SOLUTIONS



Background

BROADER LITERATURE

Touched upon by studies discussing challenges of servitization

Five configurations of capabilities (Raddats et al., 2015)

Conceptualisation of service-related capabilities (Spring and Araujo, 2013)

Kindström (2010)
- promote and explain service value prop.
- relationship building
- consciousness of customer portfolio
- design a dynamic service portfolio

Ulaga and Reinartz (2011)
- data processing
- risk assessment and mitigation
- design-to-service
- hybrid offering sale & development

Parida et al. (2014)
- business model design
- network management
- integrated development
- service delivery network management

LIMITATIONS

- No unanimity regarding the key capabilities for servitization
- Lack of empirical evidence on how firms orchestrate and configure service resources and capabilities in practice
- General focus on services in the aggregate
- Performance outcomes rarely measured explicitly

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The capability audit tool

When transitioning towards a service business model…

Manufacturers find it necessary to innovate their **value proposition**	Focus on outcomes for the customers
They do so in a broader context of an emerging **ecosystem**	Need to understand and track ecosystem
To deliver the enhanced value proposition, they have to innovate their **value delivery system**	Networks of firms with shared capabilities
The new value proposition and value delivery system imply greater risk or **accountability spread**	Greater responsibility and less control

- 4 key categories of capabilities
- 12 bundles of capabilities
- 36 individual capabilities

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The capability audit tool

Area	Capability Dimensions		
ECOSYSTEM AWARENESS	• ***How well do you know the members of your ecosystem?***		
	Customer perspective	Partner perspective	Influencer perspective
	• ***How well do you understand the economics of your ecosystem?***		
	Value creation perspective	Value capture perspective	Power perspective
	• ***How well do you understand the dynamics of your ecosystem?***		
	Dynamics perspective	Skills and assets perspective	Competition perspective
VALUE PROPOSITION	• ***How well do you understand your client's business model and the broader ecosystem?***		
	Value creation perspective	Value capture perspective	Constraint perspective
	• ***How clearly can you articulate your value proposition and the associated benefits?***		
	Customer recognition perspective	Internal recognition perspective	Cost perspective
	• ***Have you clearly and unambiguously demonstrated your delivery skills in relation to your value proposition?***		
	Customer confidence perspective	Demonstrated capability perspective	Pilot capability perspective
VALUE DELIVERY	• ***How well have you defined the value proposition and designed the value delivery system?***		
	Internal capability perspective	Ecosystem capability perspective	Technology perspective
	• ***How well have you identified partners and developed appropriate governance mechanisms?***		
	Partnership perspective	Trust perspective	Governance perspective
	• ***How well do you co-ordinate multi-party delivery?***		
	Incentive perspective	Partnership perspective	Cultural perspective
ACCOUNTABILITY SPREAD	• ***How well do you understand the risks associated with your value delivery system?***		
	Performance risk perspective	Financial risk perspective	Long-term risk perspective
	• ***How good are your systems for measuring and quantifying risk?***		
	Measurement perspective	Data access perspective	Data quality perspective
	• ***How well do you price and flow risk to your ecosystem partners?***		
	Risk ownership perspective	Risk pricing perspective	Risk mitigation perspective

Methodology

Study context

- Aerospace and Defence Industry
- 138 companies listed in the Standard &Poor's Capital IQ database
- (i) aerospace & defence as primary industry, (ii) publicly listed, (iii) > 100 employees

- 10-Ks describe the business priorities, capabilities and processes important to the firm. Extensively used by analysts and investors
- Any reference to service-related capabilities in 10-Ks can be deemed to be important for the company

10-K or Annual Report Narratives

- Information in AR narratives is often unstructured and difficult / time-consuming to extract
- **Content analysis** methodology and supporting software (*Wordstat 7* from Provalis Research)

"*Technique for making interferences by objectively and systematically identifying specified characteristics of message*" (Holsti, 1969)

- Used in management field for analysis of corporate documents (Bowman, 1984) and textual communications of managers (D'Aveni and MacMillan, 1990) since 1980s
- Recently used to study different issues, e.g. planning for mergers and acquisitions (e.g. Vaara and Monin, 2010)

Content analysis for coding of capabilities

Creation of Content Analysis Database

1

- 2 document types: 10-Ks and Annual Reports
- Focus on latest document
- Multiple sources (*Capital IQ database, SEC website, company websites*)
- Direct contact (email, telephone) for missing documents
- 39 companies excluded from sample because: (i) not reachable, (ii) no English version of document available, (ii) only reported financial data
- **99 companies in final sample**

Creation of Content Analysis Dictionary

2

- Drew out key terms for each service-relevant capability
- Identified alternative terminology, e.g. partnership, agreement, arrangement, consortium, contract, joint-venture
- Identified alternative spelling, e.g. organization and organisation, program and programme
- Defined 'rules' based on closeness of key terms within documents to get more accurate hits
- **96 rules, 829 key terms**

3

Irrelevant uses, duplicates, negative connotations, forward looking statements removed

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Examples of coding hits

VALUE DELIVERY

- **Development of Internal capabilities**

"*We combine deep customer knowledge, subject matter expertise, engineering science and technical skills, and multiple technology partnerships to provide our customers with innovative solutions for ever-changing needs*". Exelis, Inc.

"*We believe we create value for our customers through our industry leading on-time delivery capabilities, our continuous focus on quality, our global sourcing capabilities and our ability to get the parts where they need to be when the customer needs them*". KLX, inc.

- **Governed network of partners**

"*The Company is engaging suppliers and customers to properly align requirements, ensuring uninterrupted delivery of compliant products*". Avorp Industries, inc.

- **Strength of organisational culture**

"*We have a strong, value based culture that drives our business performance*". Kongsberg Gruppen ASA

ACCOUNTABILITY SPREAD

- **Risk allocation**

"*From an economic and financial point of view, the partnership presents the following characteristics: The Group finances the development phases and shares the "program" risk with the customer*". Latécotére SA

- **Risk pricing**

"*Generally, fixed-price contracts offer higher margins than cost-plus contracts in return for accepting the risk that increased or unexpected costs may reduce anticipated profits or cause us to sustain losses on the contracts*". Esterline Technologies Corp.

- **Risk mitigation**

"*We attempt to mitigate these risks with our suppliers by entering into long-term agreements and leveraging company-wide agreements to achieve economies of scale, and by negotiating flexible pricing terms in our customer contracts*". General Dynamics Corp.

Content analysis for coding of service offerings

Content Analysis Database

- Long business descriptions from Capital IQ

	Service Category	Examples
1	Trading and Distribution Services	Trading, sale of used assets, distribution, licensing, direct selling
2	Logistic Services	Logistics, transportation, delivery, packaging, warehousing, order fulfilment, supply chain management, inventory management, inventory planning, inventory control, material handling
3	Procurement and Purchasing Services	Procurement, purchasing, sourcing, vendor management
4	Maintenance and Support Services	Maintenance, repair, calibration, overhaul, MRO, spare parts, accessories, helpdesk, documentation, technical/operational support, fuelling
5	Certification and Testing Services	Certification, testing, inspection, auditing, quality assurance
6	Design and Development Services	Design, development, research, engineering, reengineering, prototyping
7	Consultancy Services	Consultancy, advice, process optimisation, problem analysis, simulation
8	General Outsourcing Services	Site management, site operation, infrastructure management, management oversight, staffing services, data collection, data management, information management, surveillance, planning
9	Financial Services	Financing, leasing, rental, financial clearing, warranty
10	Renewal and Upgrade Services	Product modification, conversion, enhancement, upgrade, refurbishing, reconditioning, retrofitting
11	End-of-life Services	Remanufacturing, recycling, decommissioning, disassembly, demolition, disposal
12	Installation and Implementation Services	Installation, implementation, configuration, commissioning, relocation
13	System Integration	System integration, integrated solutions
14	Training Services	Training, education
15	Operations and Management Services	Product operation, asset management, fleet management, lifecycle management, project management, programme management

1 → 2 → 3

Content Analysis Dictionary

- 15 categories of services that aerospace and defence firms may offer
- Search terms /rules for each service category

Context for correct use manually examined

- **9 non-servitized companies and 7 pure service companies**
- **83 servitized companies**

Modified from Benedettini et al. (2015) - Service categorisations address specific types of industries (Rabetino et al., in press)

Preliminary Results

One-way ANOVA

serv_group	Summary of breadth Mean	Std. Dev.	Freq.
1	2.7857143	1.8530684	28
2	3.3103448	1.8728025	29
3	5.1153846	2.4384737	26
Total	3.6987952	2.2617441	83

- **serv_group1**: <4 services. **serv_group2**: 4 ÷ 6 services. **serv_group3**: > 6 services
- **Breadth**: number of different capabilities possessed by the company

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	79.8948511	2	39.9474255	9.41	0.0002
Within groups	339.575028	80	4.24468786		
Total	419.46988	82	5.11548634		

Bartlett's test for equal variances: chi2(2) = 2.5956 Prob>chi2 = 0.273

Statistically significant difference in capability breadth across the three groups

Comparison of breadth by serv_group (Bonferroni)

Row Mean-Col Mean	1	2
2	.524631 1.000	
3	2.32967 0.000	1.80504 0.005

- ***Non-significant comparison serv_group2 vs. serv_group1***
- ***Significant comparisons serv_group3 vs. serv_group1 and serv_group2***

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Preliminary Results

One-way ANOVA

- **Product Unrelated Services:**

Trading and Distribution Services
Logistics Services
Procurement and Purchasing Services
General Outsourcing Services
Financial Services
End-of-life Services
Management and Operation Services

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	85.8201765	2	42.9100882	56.68	0.0000
Within groups	60.5653657	80	.757067071		
Total	146.385542	82	1.78518954		

Bartlett's test for equal variances: chi2(2) = 4.6105 Prob>chi2 = 0.100

Statistically significant difference in product unrelated services across the three groups

Comparison of unrel_serv_ by serv_group
(Bonferroni)

Row Mean-Col Mean	1	2
2	.359606 0.368	
3	2.35165 0.000	1.99204 0.000

- *Non-significant comparison serv_group2 vs. serv_group1*
- *Significant comparisons serv_group3 vs. serv_group1 and serv_group2*

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Preliminary Results

Exploratory Factor Analysis

(Principal Component Factoring, Varimax Rotation)

- ***6 Factors*** with eigenvalue >1 (Guttman-Kaiser rule)
- Supported by scree plot
- Representing 62.11% of the variance in the dataset

Sampling Adequacy

- 18 variables (capabilities) and 83 observations (companies)
- KMO (Kaiser-Meyer-Olkin) test
  Overall = 0.5578
  The variables have enough in common to warrant a factor analysis

Preliminary Results

Capabilities	Factor Loadings						
	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Communality
Strength of organisational culture	**0.6152**						0.72
Risk measurement	**0.6508**						0.61
Risk mitigation	**0.7453**						0.63
Risk allocation		**0.8085**					0.70
Risk pricing		**0.7456**					0.58
Presence of internal incentives			**0.8221**				0.73
Understanding of long-term risk			**0.6550**				0.61
Development of internal capabilities				**0.6077**			0.72
Understanding of performance risk				**0.6728**			**0.56**
Business partnering					**0.8367**		0.72
Governed network of partners					**0.6364**		0.73
Contribution of ecosystem partners						**0.9219**	**0.86**
Eigenvalues	2.4608	2.2969	1.6309	1.5160	1.0292	1.003	
% of variance	0.1354	0.1213	0.1069	0.0944	0.0647	0.0647	

loadings < |0.6| are omitted

Small samples (<100) may be perfectly adequate MacCallum et al. (1999)

Preliminary Results

- Logical grouping of capabilities
- Face validity of factor analysis:

Factor 1: RISK BEARING

Strength of organisational culture
Risk measurement
Risk mitigation

Factor 2: RISK TRANSFER

Risk allocation
Risk pricing

Factor 3: LONG-TERM PROSPECT

Presence of internal incentives
Understanding of long-term risk

Factor 4: INTERNAL RESOURCE PRIORITIES

Development of internal capabilities
Understanding of performance risk

Factor 5: COLLABORATION WITH BUSINESS PARTNERS

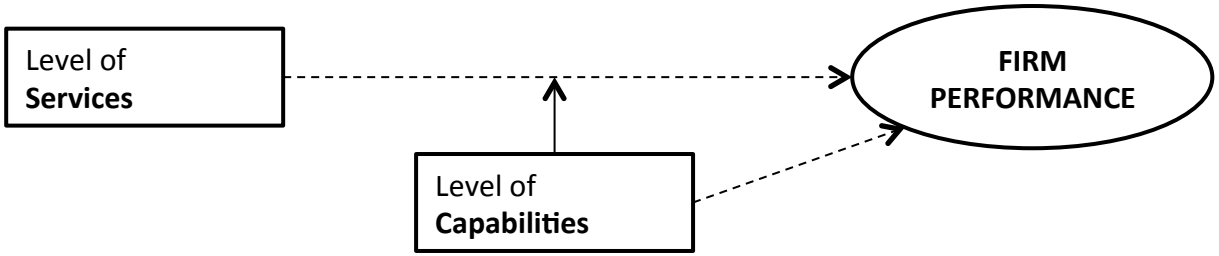
Business partnering
Governed network of business partners

Factor 6: ECOSYSTEM SUPPORT

Contribution of ecosystem partners

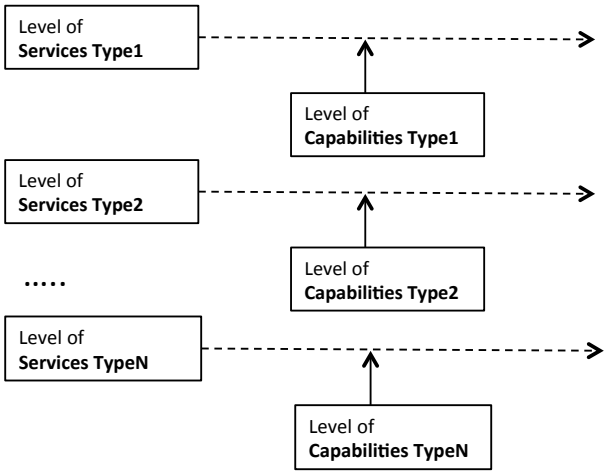
Next Steps

Regression Model



Controls

- Firm Size
- Supply Chain Position
- Type of customers



Conclusions

- Evidence of link between level of servitization (n. services) and firm-level 'Value Delivery' and 'Accountability Spread' capabilities
- However, no link until companies offer less than 7 services
- Possible explanation: small service offerings dominated by product-related services
- Underlying structure of measured capabilities condensed in 6 latent factors
- Logical groupings of characteristics loading in the factors – face validity of factor analysis

FUTURE WORK

- Coding of 'Ecosystem Awareness' and 'Value Proposition' categories of capabilities
- Validate the coding of capabilities
  (i) Intercoder Reliability
  (ii) Interviews with sample companies
  (iii) Differences between 10-Ks and ARs
- Define construct for Supply Chain position, type of customers and other potential controls
- Develop specific hypotheses and run regression

Thank you for your attention!

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Cambridge Service Week 2015, 1-7 October 2015
Industry Day, 6 October 2015
Academic Conference, 1-2 October 2015

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