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Software as a Service (SaaS) in Telecommunications: A risk management perspective

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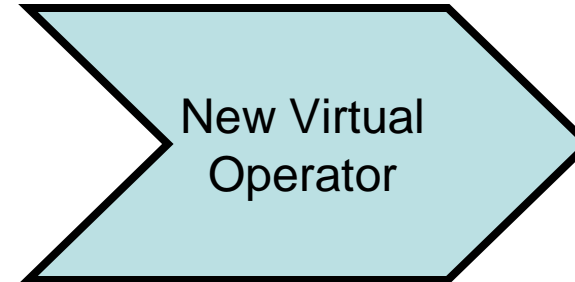
Background and Aim

- Software as a Service (SaaS) seems to be a rising trend, also in the telecom software domain
- One selling argument for SaaS is the financial flexibility provided by it
 - This can be seen as management of the financial risks related to software investments
- Can this flexibility be modelled using the Real Options approach?
- The case of a new virtual operator's OSS/BSS software investment
 - New operator → Future customer volume & revenue unsure
 - Virtual operator → No investment on network, the investment on OSS/BSS is a major part for capital demand

SaaS Background

- **“Software that's owned, delivered and managed remotely by one or more providers”** (SaaS definition by Gartner)
- Software licensing / projects
 - Selling software, which customers use at their premises
 - Additionally development / tailoring / integration / maintenance of software
- Software as a Service (SaaS)
 - A service provider sells access to *a single application*, which it hosts
 - Volume / usage / time based charging
 - Multi-tenant structure: All use the same application software (version) over a network
- Project: SaaS-Enabled CSP (SEC)
 - Analyzes the effects and possibilities of using SaaS in the OSS/BSS area
 - Time: 01/2009 – 03/2010; Budget: ca. 200 t€
 - Funded by Tekes, Nokia Siemens Networks, Mikkelin Puhelin and Qvantel Business Solutions
 - Responsible leader: prof. Pasi Tyrväinen Pasi.Tyrvaainen@jyu.fi

Software as a Project or as a Service: OSS/BSS Software



SW Project Business:

- Software installed at customer site
- Customer specific software installation
- Software tailored to the customer

Cost:

- Project X € + 20% annual maintenance fee

SaaS Business:

- Software at vendor site
- Multiple customers using the same software
- Only little tailoring (interfacing) per customer

Cost:

- Interfacing 30% * X € + x% of operator revenue (or Z€ / month / subscriber)

SaaS Value Chain and Risks



	New Operator	SW Vendor	Financer
SW project	<ul style="list-style-type: none"> ■ Uncertainty in customer/revenue growth ■ High initial investment in OSS/BSS → Delay in break-even, need for more capital 	<ul style="list-style-type: none"> ■ Revenue fluctuation ■ Project failure costs and sanctions ■ Customer failure costs 	<ul style="list-style-type: none"> ■ Lower need for funding but higher risk in revenue ■ Increased risk, high interest rates
SaaS	<ul style="list-style-type: none"> ■ Small initial investment ■ Payment bound to income: higher total costs with high revenue 	<ul style="list-style-type: none"> ■ Steady revenue stream ■ Larger customer portfolio ■ Delayed income → need for capital 	<ul style="list-style-type: none"> ■ Higher funding need but steady revenue ■ Reduced risk, lower interest rate

Investment Evaluation – Real Options

- Traditional investment calculation methods (e.g. NPV) are not able to handle the uncertainty and flexibility related to investments
 - Changes in future incomes are not included in calculations
 - Sensitivity calculations: e.g. estimates using different interest rates
- Utilizing options theory to include flexibility and uncertainty in investment calculations: **Real Options Analysis**
 - The possibilities and alternatives to make or change investment decisions
 - The strategic components related to investments
- Financial options background and analogy:
 - Possibility ('option'), but no obligation, to make an investment related decision
- Real options thinking vs. Real options valuation:
 - Qualitative modelling vs. quantitative calculation of investment options

Literature:

- Copeland, T. & Tufano, P. (2004): A Real-World Way to Manage Real Options. Harvard Business Review, March 2004.
- Howell, S. & Stark, A. & Newton, D. & Paxson, D. & Cavus, M. & Pereira, J. & Patel, K. (2001): Real Options. Evaluating Corporate Investment Opportunities in a Dynamic World. Pearson, London.

Case: The OSS/BSS Investment of a New Virtual Operator

- A New Virtual Operator startup is being considered
 - The granted licence enables starting the activities within the next 5 years
 - No own network → only OSS/BSS investment costs considered
- OSS/BSS can be bought as a project or as SaaS
 - What are the values of the these investment options - which option is more valuable?
 - When is it beneficial to invest?
- The operator is expected to be able to attract 0,1 million subscribers in the first year
- Average Revenue / subscriber (ARPU) is 20€ which doesn't change
- The number of potential customers varies: volatility is expected to be 40%
- Market interest rate is 5%
- OSS/BSS project: investment costs 3 m€ + annual maintenance 20% (0,6m€)
- OSS/BSS SaaS: initial costs 1 m€ + annual fee 10 % of revenue (subscribers x ARPU)

Revenue development – Binomial tree

	1	2	3	4	5
					9,9
				6,6	4,5
		3,0	4,5	3,0	2,0
	2,0	1,3	2,0	1,3	0,9
			0,9	0,6	0,4

- Year 1: 100 000 subscribers x 20 € ARPU = 2,0 m€
- Subsequent years:
 - Cox-Ross-Rubinstein (CRR) Binomial Model (for american style option)
 - Up movement ca. 1,5; down movement ca. 0,67

Evolution of variable costs

1	2	3	4	5	1	2	3	4	5
				0,6					0,99
			0,6	0,6				0,66	0,45
	0,6	0,6	0,6	0,6		0,30	0,45	0,30	0,45
0,6	0,6	0,6	0,6	0,6	0,20	0,13	0,20	0,13	0,20
	0,6	0,6	0,6	0,6		0,13	0,09	0,13	0,09
		0,6	0,6	0,6			0,09	0,06	0,09
			0,6	0,6				0,06	0,04
				0,6					0,04

- Left side: SW project

- Maintenance fee 20% of initial cost: $3 \text{ m€} \times 0,2 = 0,6 \text{ m€}$
- Cost doesn't depend on time of investment or on revenue

- Right side: SaaS

- Cost 10% of revenue (previous slide): $2 \text{ m€} \times 0,1 = 0,20 \text{ m€}$

Income - Costs

1	2	3	4	5	1	2	3	4	5
				9,3					8,92
			6,0	3,9			4,01	5,98	4,01
	2,4	3,9	2,4	1,4		2,69		2,69	1,80
1,4	0,7	1,4	0,7	0,3	1,80	1,21	1,80	1,21	0,81
		0,3	0,0	-0,2			0,81	0,54	0,36

- Left side: SW project
 - With low number of subscribers (low income) operation is not profitable

- Right side: SaaS
 - Also with low income operation is profitable

Profits of executing investment option

	1	2	3	4	5		1	2	3	4	5
					6,3						7,9
				3,0	0,9				3,0	5,0	3,0
		0,0	0,9	0,0	0,0			1,7		1,7	
0,0		0,0	0,0	0,0	0,0	0,8		0,8			0,8
		0,0		0,0	0,0			0,2		0,2	
			0,0		0,0				0,0		0,0
				0,0	0,0					0,0	
					0,0						0,0

- $\text{Max}(0; \text{revenue-variable_costs} - \text{investment_cost})$
- Investment costs
 - Left side: SW project 3m€
 - Right side: SaaS 1m€
 - With SaaS there would be profits already in the first year

Values of investment options

1	2	3	4	5	1	2	3	4	5
				6,3					7,9
			3,2	0,9				5,0	3,0
	0,8	1,6	0,4	0,0		1,8	3,1	1,7	0,8
0,4	0,1	0,2	0,0	0,0	1,1	0,5	0,9	0,4	0,0
		0,0	0,0	0,0			0,2	0,0	0,0
			0,0	0,0				0,0	0,0

- Value of option to execute the investment within the next 5 years (granted licence)
 - Max (execute; wait)
 - Wait value calculated with the option pricing portfolio formula $V_t = e^{-r\delta t} [w f_u + (1-w) f_d]$
- Which option is more valuable?
 - Given the parameters the SaaS investment option is more valuable (1,1 m€ vs. 0,4 m€)
- When to invest?
 - Bolded figures: Executing investment (previous slide) is more profitable than waiting

Conclusions

- SaaS can be considered as a means for risk management when making software investments
- The Real Options approach
 - Enables to include the presence of risk (e.g. income volatility) into investment calculations
 - Enables the evaluation of different investment options and investment timings
- Real Options case: The startup of a new Virtual Operator
 - SW project vs. SaaS
 - The value of the SaaS investment option is greater
 - SaaS investment brings profits earlier, and the investment opportunity becomes attractive earlier
- Future research: Analyzing risks from the SW vendor viewpoint