

Management Summary

Relevancy research

Over the past few decades, companies have been facing many changes in the way of doing business. One profound change is of course the reliance on Information Technologies. Today almost every company uses applications in order to store information, to interact with customers or suppliers or simply to be more efficient. The servers and storage systems supporting these applications are stored in Data Centers.

Due to capacity limits in an ever growing IT market, many companies are currently faced with having to make decisions about their Data Center requirements; the critical question being, would it be better to build or extend their own Data Center or to buy the service from an outside provider? This decision has to be taken in the context of a fast-changing industry.

Exponential data growth is a reality for most Data Centers and server virtualization tends to be the default platform for the majority of Data Centers.

With colocation, hosting, and cloud computing, IT services have become increasingly commoditized. At the same time the economic impact of Data Center downtime will continue to grow at an unprecedented rate.

Finally in the current cost driven economy, IT infrastructure and operations professionals are faced with the increasing pressure to account for and reduce costs wherever possible. They have to provide more availability, more security and more services but with approximately the same budget.

Aim and methodology

Currently, dbi services is looking to expand its business and add in new services to its SLA (Service Level Agreements) by offering data hosting services. The aim of this research is to define the main criteria that will allow the orientation of IT Infrastructure and Operation professionals towards the best Data Center solution and therefore enabling dbi services to define the best hosting solution according to the market and internal needs.

The standard project approach methodology has been used for this document:

1. Introduction
2. Terminology, concepts and standards definition
3. Current situation evaluation
4. Evaluation of needs using a customer survey

5. Evaluation of Existing or possible solutions
6. Solution development
7. Possible market evolution
8. Conclusion, Recommendation/s

Conceptual framework

The working hypothesis behind this study is that a limited set of criteria allows the orientation of customers to a Data Center solution based on specific project needs. In this respect there is no good or bad solution in terms of Data Center solution choice, there are only solutions that best fit specific needs according to a limited set of criteria and according to an existing context.



Figure 1: Working hypothesis: Customer context or project context + Customer or Project needs = Data Center Solution

The customer or project context takes account of the existing infrastructure, the level of knowledge of the technical teams involved in the project, the existing compliance policy or even country laws.

In relation to Customer or Project needs, the aim is to identify the specific needs to be addressed in order to achieve the desired project result. These needs are categorized based on specific criteria such as: Proximity, costs, flexibility, security, availability and network capacity.

Based on these criteria it is possible to evaluate each Data Center solution in order to match customer needs with the best Data Center solution.

Results

The working hypothesis that a Data Center solution can be chosen according to a limited set of criteria taking into consideration customer or project context and customer or project needs seems to be confirmed. Indeed, although the tool developed in this thesis is not

able to take into consideration customer or project context, the high number of customers who answered that this tool provided either a solution “Very well” (34% of IT managers surveyed) or “Quite well” (50% of IT managers surveyed) fitting their needs tends to demonstrate that this working hypothesis is correct.

Even if the online tool (cf. <http://yourhostingchoice.ch/index.php/data-center-choice>) developed in the context of this thesis does not replace a personal analysis, the Data Center Decision Support application can contribute to the choice of the best Data Center solution. Although this tool has not been used in the strategic IT architecture choice of dbi services, the company made use of this work in order to orient its Data Center strategy. dbi services took the decision to collaborate with a Data Center colocation provider for its internal infrastructure.

Finally the results obtained through the Data Center survey not only provided a good global overview of customer experience regarding Data Center providers but also helped to understand customer needs, Data Center usage and market trends.

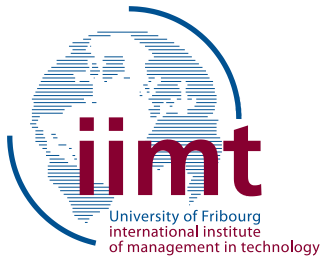
Conclusions

Depending on the industry, an organization that has its own Data Center can be seen as a key differentiator and therefore as a sustainable advantage over competitors. However building a Data Center is synonymous with significant capital expenditure. Currently it seems to make little or no sense from a strict economical point of view for a company to build its own Data Center.

In most cases outsourcing the entire Data Center or a specific service maybe a more cost effective option but carries some risks and somehow implies a loss of control over the infrastructure since it force the movement of critical data away from the organizational headquarters. Before going for a solution it is essential to evaluate the benefits and drawbacks as well as costs and risks of each solution.

From the Data Center provider point of view, it is clear that the Data Center industry is more than ever before a worldwide competition. Swiss Data Center companies have to compete against other Data Centers everywhere around the world. In order to be able to compete in such a highly competitive industry, an appropriate strategy has to be established and the main challenge will be to find USPs to be able to avoid focusing only on cost leadership.

Finally, even if using green technology and practices for a Data Center involves an increase in capital expenditure it will also drastically decrease operational expenditure.



Within the scope that the five Swiss nuclear power plants will be totally decommissioned at the end of their service life in 2034 and due to the potential electricity price increase, it becomes urgent for Swiss Data Center to improve their infrastructure energy efficiency.

Table of contents

Acknowledgments	I
Management Summary	II
Table of Contents	V
List of Figures	VIII
List of Tables	X
Abbreviations	XI
1 Introduction	1
1.1 dbi services	1
1.2 Challenge	1
1.3 Context	2
1.3.1 dbi service infrastructure strategy	2
1.3.2 dbi services building	2
1.4 Aims of this study	3
1.5 Questions raised	4
2 Terminology, concepts and standards	5
2.1 Terminology	5
2.1.1 IT Outsourcing	5
2.1.2 Data Center Outsourcing (DCO)	5
2.2 Data Center Outsourcing typology	5
2.2.1 Colocation	5
2.2.2 Hosting	6
2.3 Concepts	8
2.3.1 High Availability	8
2.3.2 Single Point Of Failure (SPOF)	9
2.3.3 Scalability	10
2.3.4 Clustered computer system	10
2.4 Standards	10
2.4.1 Infrastructure tier	10
3 Current situation	12
3.1 Introduction	12

3.2	Capacity needs	12
3.2.1	Data growth	12
3.2.2	Virtualization	13
3.2.3	Consolidation	14
3.3	Security and infrastructure availability	14
3.4	Costs reduction	15
3.5	Conclusion	16
4	Customers' needs	17
4.1	Introduction	17
4.2	Survey	17
4.2.1	Consideration and best practices	17
4.2.2	Workflow	18
4.2.3	Questions	20
4.3	Customer categories	24
4.3.1	Category 1	24
4.3.2	Category 2	24
4.3.3	Category 3	24
4.3.4	Category 4	24
4.4	Survey results	25
4.5	Conclusion	37
4.5.1	Customer needs	37
4.5.2	Customer interest to externalize a service	37
4.5.3	Why customers are working or not with Data Center providers?	37
4.5.4	Which kind of hosting service is the most favored?	37
4.5.5	Main criteria when choosing a Data Center Provider	38
4.5.6	Are there some typical customer profiles that use specific solution?	38
5	Existing solutions	39
5.1	Introduction	39
5.2	Solutions comparison	40
5.2.1	The Services Providers used for the comparison	40
5.2.2	Comparison Matrix	41
5.2.3	Support proximity	42

5.2.1	Headquarter proximity	44
5.2.2	Hardware Accessibility	45
5.2.3	Swiss or local country location	46
5.2.4	Capital Expenditure (Capex)	48
5.2.5	Operational Expenditure (Opex)	49
5.2.6	Easy Budget Planning	50
5.2.7	Operating System choice	52
5.2.8	Hardware configuration choice	53
5.2.9	In-house expertise requirement	54
5.2.10	Rapid elasticity	56
5.2.11	Short term need	57
5.2.12	Implementation time	59
5.2.13	Access Security	60
5.2.14	Infrastructure Availability	60
5.2.15	LAN Access	61
5.2.16	Maximum bandwidth	61
5.2.17	Ratio bandwidth price	63
5.2.18	Several public IPs possible	66
5.3	Conclusion	69
5.3.1	Buying key benefits	69
5.3.2	Building key benefit	70
5.3.3	Cost structure	71
5.3.4	Break-even point	72
6	Decision support tool	73
6.1	General explanations	73
6.1.1	Introduction	73
6.1.2	Matching algorithm	74
6.1.3	Weighting consideration	76
6.1.4	Complementary explanations	76
6.2	Physical Data Model	77
6.2.1	Schema	78
6.2.2	Explanations and normalisation	78

6.3	PHP Coding	84
6.3.1	survey.php	84
6.3.2	analyze.php	85
6.3.3	radar.php	86
6.3.4	check.php	86
6.3.5	style.css	87
7	Vision of the Data Center industry for the future in Switzerland	88
7.1	Bargaining power of suppliers	88
7.1.1	Electricity suppliers	89
7.1.2	Internet Access providers	96
7.2	Bargaining power of customers	97
7.3	Barriers to entry & exit	98
7.4	Threat of substitute products	98
7.5	Competitive rivalry within the industry	99
7.6	Conclusion	99
8	Conclusion	101
8.1	Summary	101
8.2	Limitation of this work	101
8.3	Possible industry evolution	102
8.4	Implications of the work for dbi services	104
8.5	Facts and figures	105
	Bibliography	CIX
	Appendix 1: Customer survey e-mail:	CXV
	Appendix 2: Survey.php	CXVI
	Appendix 3: Analyze.php	CXVIII
	Appendix 4: Radar.php	CXXIII
	Appendix 5: Check.php	CXXV
	Appendix 6 : style.css	CXXVII