File ID	uvapub:84294
Filename	Summary (E)
Version	unknown

SOURCE (OR PART OF THE FOLLOWING SOURCE):

Type	PhD thesis
Title	De informatie-infrastructuur, waarborg voor de kwalitijd van de informatiehuishouding
Author(s)	J.H.J.M. Truijens
Faculty	FEB: Amsterdam Business School Research Institute (ABS-RI)
Year	2010

FULL BIBLIOGRAPHIC DETAILS:
　　　　http://hdl.handle.net/11245/1.336175

0.2 SUMMARY [3]

The title of this dissertation – the information infrastructure, guarantee for the qualitime of the information facilities – reveals the subject. The title word 'safeguard' refers to a steady quality, to permanent effectiveness and to flexibility and this is why quality has been rewritten to qualitime[4]. Summarising the research in a single sentence:

> *in 'IT-based' companies the information infrastructure is a safeguardfor the effectiveness and flexibility of the information services and structural changes can best be developped via the infrastructure.*

Inspired by the practice, fed by literature and tingled by shortcomings in methods and techniques, the understanding of information infrastructure is built up step-by-step and supplied with a theoretical basis.

The information infrastructure recital has been written in seven chapters. One note of the author beforehand is that where 'Information Facilities' refers to the facilities and the operational organisation as a whole, 'Information Services' solely refers to the service.

1- JUSTIFICATION

The first chapter defines which relationships exist between the subject of the dissertation, the chosen design and the markings in my forty years of professional experience within the information and communication technology. In those years, I was able to play two different roles: the role of practitioner and of scholar, which was demanding, chaotic, yet also fruitful and nearly always pleasant. In any case, three fascinating subjects have come forward in my practice: designing, complexity and the (im)possibility of planning. These subjects have defined the subject of my research to a considerable extent: 'how is it possible to keep the services of information both simple and effective', and 'how can be ensured that changes can be applied reasonably'?

2 – INTRODUCTION: PLAYING FIELD AND RESEARCH TERRITORY

In the second chapter the developments in the information and communication technology and the developments in the use thereof in organisations are sketched-out in a broader perspective. The dominating view: increasing interests, increasing dependencies and increasing costs. That view will be constructed from different angles, but especially from the developmental perspective, the economical perspective, the organisational perspective, the technological perspective and the management perspective. This might lead to the observation that a heightened need for planning is experienced, but in fact there is less grip on planning and there are less certainties for the future. The chapter concludes with the question whether flexibility and steadiness for the future can coexist.

3- RESEARCH QUESTION AND RESEARCH APPROACH

Chapter 3 is subdivided: 3[A] describes the research question, 3[B] the research approach.

---

[3]   Vertaling van drs. Martin Frederik, drs. Melissa Truijens en mr. Moïra Truijens.

[4]   Please note the following: the Dutch word for 'quality' is '*kwaliteit*' and the Dutch word for 'time' is '*tijd*'. As '*teit*' and '*tijd*' are pronounced in an identical way, readers of the original language version of this thesis will appreciate the pun, where the last syllable of the word '*kwaliteit*' is changed by the word '*tijd*' - in that sense referring to both time ánd quality.

3^A RESEARCH QUESTION

In the first part of chapter three the fascinating dilemma of renewal and stability is explored. There is an omnipresent need for compatibility and everywhere working methods and components crystallize into defined formats, coupling planes, rules and standards. This is where the research *question* appears.

Subsequently characteristics and working definition of the information infrastructure will be provided. After all, infrastructural provisions have a relatively permanent nature and are more or less commonly available, due to which they attribute to the mentioned stability. An extensive overview of literature will follow, arranged by the distinguished themes like 'sharing', organisation and organisational design, complexity and flexibility, range, costs, value and added value, structure and standardisation, and strategy. The literature mentions an acceleration in system development by the fixation of platforms and network functions, 'common systems' and 'sharing' of components of the information facilities. These primarily are standardisation effects. Further condition-creating characteristics are described that could be able to support 'business process redesign' (BPR). Organisational structures are (or can be) influenced by the possibilities to support coordination through delegation of authority and decentralisation of operations.

One may conclude from literature that the complexity of the Information facilities can be moderated through standardisation and the 'sharing' of services, which also creates thresholds for renewal. Network effects are an important phenomenon in this. The larger the 'installed base' of standardised components, the more profitable it will be to take part in these standards, but the harder it will be to adjust or remove these standards.

According to important authors as Weill and Broadbent, infrastructural components get more than a 50% share of investments in Information facilities. For that reason and due to the long term nature of infrastructure, infrastructure understanding is relevant for strategic discussions. With that, infrastructural planning becomes a relevant subject, for which very little literature is available. An infrastructure is created gradually, like through the stapling of new services on old ones or through new patterns of usage. Via changes in technology and due to unpredictable interactions between users and their services, the dynamics of change can be both large and surprising. That dynamic, the irreversibility and the unpredictability can be explained with the 'actor-network theory' (ANT). There are indications for the *un*planability of information infrastructure!

In a 'problem defining case' the developments of the insurance company Interpolis will be described from the moment of her creation onwards. On the basis of a number of interviews the conclusion can be drawn that the results of the computerisation are of both a functional and (infra)structural nature and have changed the professional relationship between the corporation, her intermediaries and her clients decisively. There were, as we will see, systematically improvements made to the structure of the Information facilities. Those changes – in the procedure, by simplification and by an improved (and more efficient) rate of automation – have always brought business benefits, which was the original goal.

The literature research and the Interpolis case have together led to the wording of the research subjects and have resulted in six questions.

Q1 Is there a general model of the Information facilities that explains (inflexibility)?

Q2 Can flexibility be achieved without losing functionality?
  What does that mean for the furnishing of the Information facilities?

Q3 Can flexibility be achieved by using existing methods? Which methods come 'closest'?

Q4 What is (the definition of) an information infrastructure?
  How does an information infrastructure develop itself?
  Is it possible to control this development? How: step by step, through a project, through a master planning, ...?

Q5 Can the information infrastructure contribute to the quali*time* of the information services?
  Can the information infrastructure contribute to the future success of the organisation?

Q6 Is there a method/approach to use the information infrastructure to design and construct the information facilities?

At the end of each chapter ends with an indication of which research questions have been answered.

3ᴮ RESEARCH APPROACH

The second part of the 3rd chapter, which deals with the research approach, will show along which lines the research was conducted and why that way was chosen. It starts with the question if, in light of the research question, a quantitative approach is possible. Self-initiated attempts to create insight into infrastructural investments and exploitation costs by means of a qualitative approach were not pursued when initial interviews made clear that trustworthy estimations could not be obtained. The causes of this have been named and explained, a cause to look with some scepsis to numbers in literature.

However, there is a different and better alternative to refrain from quantitative research. The information facilities are a social-technical 'system' in which not only IT 'actors' play a role. A problem definition more applicable to social and behavioural sciences would be more fitting.
  Besides this, structural changes in the information facilities have a long term effect to which a numerical snapshot would not provide more insight. Furthermore, not only numerical system effects apply, but also experiences and appreciations from available services and structuring measures. The value of an information infrastructure is indicated through a multitude of factors.

Numerous researches apply a positivistic research model, in which previously described assumptions on expected effects are being tested, which creates a level of predictability. However, these effects can be various. They require further exploration and cannot (exhaustively) be determined in advance. For that reason interpretative research applies. To that end, it is necessary to visualise the information services of an information intensive organisation in a clear and, looking at the previous questions, distinctive manner, and to mark the structural aspects of that.
  In a case study, that allows for interesting longitudinal observations, it will be investigated which functional and structural changes are being made, once the information management and the architecture which is part of that are drastically being adjusted and the information service will need to change radically. As distinct from what is common in the world of information science, this part of the research

will be limited to a single case. Relevant literature shows that this does not limit the research, if the case data is handled correctly.

4- STRUCTURE AND QUALITY OF THE INFORMATION FACILITIES

Chapter 4 deals with the core principles of structure, complexity, flexibility and quality, allowing research into the composition of the information services, the coherency and the cooperation of its components. It can be concluded that in the information service patterns emerge whose significance increases due to the dominance of their operation, through reuse and repeated appliance. These patterns create structures, often without design or management decisions. Scale – through number of applications and intensity of usage – enhance this effect, creating 'fixed values'.

There are other routes along which patterns in information service can come into existence. Packaged software usually has requirements for processing platforms and network functions, while also requiring specific desktop provisions. Designers, as a rule, look at existing component configurations and build upon that, thereby consolidating that foundation. What it comes down to is that the information facilities have a number of sets of configurations – patterns of components – that define the structure. The conclusion is that the information service is also build upon accumulated and linked components, making the information facilities look like a web, constructed of multiple connections. Within that web are configurations that are used multiple times, making them fixed components of that web. One can see those fixed components as a 'de facto' part of the information infrastructure.

With this model of information service complexity can be explained and measures aimed at complexity, especially on a portfolio level, can be founded. Steering on diversity, dependence and variability can be justified. With that the link to the notion of infrastructure has been created. The model can also be used to understand signs of aging, of which three types are distinguished. The conclusion can be drawn that the explicability of known phenomenons make the model plausible because of the fact that the explanations are based on it.

Subsequently the concepts quality and quali*time* are introduced and the concept of flexibility for the information service is defined in terms of the developed model. It appears that the structural features matter more than the functional ones. Translated into existing concepts it mostly comes down to the so-called 'ilities' that indicate the non-functional quality requirements, for instance the aspects of quality 'reliability', 'adaptability' and 'maintainability'. This means that the flexibility, commonly formulated as a functional demand or wish, needs to be put into effect through non-functional and structural measures.

5- INFORMATION SERVICE: DESIGN, PLANNING AND SET-UP

The fifth chapter is about architecture. It starts of proving the impossibility of planning when information service – as a whole – applies and declares the 'classical' information planning methodologies as an insolvable problem. With that the procedure of 'from overall blueprint to applicable systems' (or: from IST to SOLL situation) becomes an incorrect approach. Generally it can be concluded the stability of the information service cannot be reached through information planning. The same applies to flexibility.

Subsequently 'business process redesign' (BPR) will be examined for its contribution to quality and flexibility. The (too) high ambitions that characterise the com-

mencement of BPR-projects, carry with them the factors of failure: lack in change management, a 'quick win' and 'quick fix' approach instead of an orientation to long term effects, a lack of knowledge on available applications and data collections and a naive optimism on the actual realisation possibilities for ICT – BPR has simply proved to be a 'hype'.

Ever since the rise of information planning, architectures are the basis for the development and change of the information service, under the assumption that effectiveness and cohesion will be attained. Often similarities are sought between civil and digital architecture. The eagerness with which ICT staff quote from the (translated) work of the Roman architect Vitrivius and talk about 'firmitas', 'utilitas' and 'venustas[5] underline that. However, there are serious objections against the building metaphors that are used in the digital world that go beyond sloppily lending some jargon. The degree of interaction between user and service differ immensely, which ensures specific and irreversible paths of development. Also the abstractions, the models 'between reality and digitality' and the meta information differ.

A number of Dutch CIO's have spoken on the topic of architecture: architecture should help create order and differ between specific and general services, prevent duplication, reduce the number of applications, help reduce costs and help create stable and commonly usable services.

Architecture has been a 'hot topic' for a long time and much has been written and discussed about it. There are many different views about architecture, partly driven by the intended outcome: a system portfolio or singular system. The action radios aspect aside, one differs between descriptive and prescriptive architecture, a coherent and consistent set of principles and standards respectively a schematic view of a design in its essential components. One of the founders of the concept of IT architecture, Tapscott, distinguishes business architecture, information architecture, application architecture, 'work architecture' and technical architecture, which together form a single architecture. Those components consist of models, rules and guidelines.

SOA will be discussed briefly, that digital ailment, that has gotten a lot of attention, but still needs to 'break through'. SOA works on functional components that can be called and activated with the help from standardised services. A large number of (new) standards will be needed to fill the entire column, from the business process to 'public' data interchange bus.

At last different architecture approaches and definitions will be discussed. The conclusion is that radius of action and level of perception are important variables when architecture applies, and that scale, mostly due to engineering implications, actually does play a role. Also some architecture frameworks will be discussed (often a further detailing of Zachman schemes), that drive the architecture process and format the resulting architecture elements, but sometimes show 'grab bag' features of models and methods. They have in common that functional questions are analysed and modelled, often at the expense of the more structural questions and the 'illities'.

6- FOUNDATION AND SKELETON – THE INFORMATION INFRASTRUCTURE

In the sixth chapter the majority of the research questions will be answered. The question of flexibility will be reformulated which provides new points of view, in line with the 'static values' concept that was developed for this.

[5] In literature, translations to 'strength, use and elegance' or 'function, construction and experience' can be found.

The chapter is divided into the five parts. Between the preface 6^{INTRO} and the ending 6^{SLOT} the information infrastructure will be treated. In 6^{DEF} a new definition will be developed, in 6^{FLEX} the role of the information infrastructure will be discussed in a case study and in 6^{ONT} creation, design and development will be highlighted.

[6^{DEF}] The question of flexibility and stability is addressed by reasoning that 'fixed values' in the information facilities, when they are sufficiently relevant for the business, can be used for diverse goals and contribute to flexibility that way. For that, at ten different companies from different sectors, it has been rated which structural questions play a role in their information services and if there was a predefined plan for realisation of generic services. Also on the basis of an observation of internal and external standards a new definition of information infrastructure is given:

> *the information infrastructure of an organisation is that whole of facilities, people, methods and procedures in the area of information services, of which for reasons of organisational interest an agreement has been made that it is available for an extended period of time for common usage and will be administered.*

Subsequently three information infrastructural categories are distinguished: core services, collective services and conditional services.

[6^{FLEX}] From the longitudinal case study 'a conscious break' an infrastructural approach in large scale changes in the information services seems to be obvious. Preconditions for that are a sense of urgency and the support of top and business management and of the ICT community. The question if the results of this case study can be generalised, will again (also see chapter 3^B) be answered affirmatively.

[6^{ONT}] The obvious next question is what the activities for the planning should look like, given an infrastructural approach for changes in the information services. For this the possibilities of a general scenario planning will be explored and on the basis of a project from the case study, the applicability of scenario thinking will be made somewhat plausible.

In light of the long term aspects, which are intrinsically connected to an information infrastructure, and given the anchoring of the core services in the business, multilateral connections with the organisation are obvious. In the strategic sense that connection can be found in a 'resource based view' (RBV), in which one considers the organisation specific infrastructural services as a strategic capacity. On a tactical level there is a connection with the information and application architectures. On an operational level the connection exists of the anchoring of those infrastructural services in the administration processes.

7- EFFECTS AND CONTINUATION

The seventh and last chapter describes which conclusions can be drawn from the reflections in earlier chapters and from the results of the sixth chapter. This much is clear: a top-down approach and a 'from IST to SOLL' method does not work for radical changes of the information facilities. Large rounds of stock-taking, that in information intensive organisation can result in more than one thousand applications and detailed information, function and process models, also do not work in these situations. For that reason several organisational wide valid models from the TOGAF arsenal do not need to be developed. Merely the core services and the collective and the conditional services matter.

It is essential that the most important involved understand what the infrastructural approach comes down to: which core services are (candidate) components of the 'stable values' in the information services that are merged with the pivotal business functions, control other activities and are food for the support of other adjacent functions? The same question needs to be put to the collective and conditional services.

In the end the architectural views, the models used and the conversion of those into concrete facilities, into actual services and in real methods is what really matters. The question remains if the scale of models that are used nowadays is sufficiently rooted in the business, if it strengthens realistic communication, honours long term effects and leads to a (better) view of the pivotal services.

The Jacob's ladder of models that are commonly developed on the road from the reality to the digital work is familiar with several abstractions with accompanying questions of representation, that only hinder vertical translations and the identification of generic services. New models, that successfully show foundation and skeleton of the support function and that have both catalysing and multiplier potential still need to be developed.