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# TOWARDS A SOCIO-TECHNICAL COMPREHENSION OF IS/IT RISKS

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## Abstract

*IS/IT can cause several types of risk. Traditionally, risks are analysed from a techno-scientific perspective. In these approaches, socio-technical interactions are largely ignored. This research in progress intends to explore the use of a socio-technical approach, the Actor-Network Theory (ANT), for the problem of creating knowledge about IS/IT risk. The objectives are to understand how Operational Risk (OR) knowledge/tools were constructed in the Basel Case (a worldwide effort) and to explore whether and how the ANT can contribute to greater efficacy in creating knowledge about IS/IT risk.*

**Keywords:** IS/IT risk, operational risk, actor-network theory

## Motivation, Original Contribution, Objectives, Research Question, and Audience

Information Systems (IS)/Information Technology (IT) can cause damage at many levels in financial institutions: strategy, image, legal statute, operational (Basel 2000). The proliferation of risks leads to the need to develop means of analysing them. Conversely, Neumann (1995) warns against forms of risk assessment where there is an overestimation or an underestimation of risks.

We intend to deal with the issue of IS/IT risks in the context of the very new topic of Operational Risk (OR) in financial institutions. For this purpose, the Basel Case, which involves the development of knowledge/tools to identify and measure OR in financial institutions, will be analysed. Since 1998, the Basel Committee<sup>1</sup> (Committee) has been leading this process (Basel 1998). The risks associated with IS/IT are considered OR, which also includes the risk of losses resulting from inadequate or failed internal processes, people and external events (Basel 2001).

Many technical approaches try to assess OR by quantifying, for example, past damages generated by IS/IT or internal processes. In these approaches, socio-technical interactions are largely ignored at the levels of the causes of damages and of the process of creating knowledge about risk. The original contribution of this research is to deal with the issue of socio-technical interactions and IS/IT related risks. We expect to show that ANT can be used as a tool to improve the perception of socio-technical interactions and assist in the process of creating knowledge about IS/IT risk.

The underlying question of the research is whether and how Actor-Network Theory can be used to understand/aid the processes of IS/IT risk tools/methodologies/knowledge creation.

These challenges have led to an analysis of the Basel Case, based on ANT, in order to explore how social and technical factors interact and shape the operational risk tools/methodologies/knowledge. An interpretative study of the empirical case is being carried out.

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<sup>1</sup>A committee of Central Banks and Bank Supervisors/Regulators from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, The Netherlands, Sweden, Switzerland, the United Kingdom and the United States. It usually meets at the Bank for International Settlements in Basel, where its permanent Secretariat is located. ([www.bis.org](http://www.bis.org)).

Professionals who deal with the creation of IS/IT related risk knowledge/tools are the main intended audience of this research.

This article describes the research in progress. The basis for the choice of the theoretical structure (ANT) is given below. Subsequently, the methodological options are exposed, followed by a description of the initial results of the data analysis and discussion. Finally, the conclusion outlines the next steps of the research.

## **The Relevance of ANT in the Understanding of Risk**

Risk is related to the degree of uncertainty about future damage. Therefore, knowledge about the causes, probabilities and impacts of possible damages is required (Loon 2000). However, the nature of risk and of the knowledge about risk is controversial. The literature around the risk domain structures the debate into two currents: the realist perspective and the social constructivist perspective.

Lupton (1999) states that according to the realist (techno-scientific) view, the dominant paradigm, risks are objective factors that exist independently of the observer and can be identified and assessed objectively and controlled through this knowledge.

From the social constructivist perspective, according to Lupton (1999), risk is not a totally objective reality, recognizable outside a belief system. The identification, assessment and administration of risks are constructed through pre-existing knowledge and worldviews. Risk, therefore, is not a static or objective phenomenon, but constantly negotiated and constructed as part of a social context in which the interactions that generate meaning occur.

One of the most influential authors in the area of risk, Ulrich Beck, in a recent work, restructures the debate around realism and social constructivism in the risk domain. For Beck (2000) risks have an ambivalent and complex nature and are simultaneously “real” and a social construct. Beck (2000) aligns himself with the ANT:

“I totally agree with him (Latour). Both of us see that the hybrid world we live in and constantly produce is, at the same time, a matter of cultural perception, moral judgement, politics, and technology, which have been constructed in actor-networks and have been made hard facts by ‘black boxing’.”

Therefore, ANT appears to be a more inclusive approach, which we aim to explore in the domain of IS/IT related Risks.

## **Research Methodology**

### ***Qualitative Approach***

This study is carried out as part of an interpretative study of the development of a technical-scientific model for assessing OR in Financial Institutions.

Our initial objective is to follow the main network builder, the Committee, to trace the unfolding actor-network and to examine the inscriptions produced. We are, thus, being guided by one of the most widespread of Latour’s teachings (Latour 1987): “follow the actors and identify”:

“How are causes and effects attributed? What points are linked to each other? What size and strength do these links have? Who is the most legitimate spokesperson? How all these elements are modified during the controversy?”

### ***Data Source***

One of the characteristics of the Basel Case, led by the Committee, is the participative process in the construction of the tools for measuring OR. The Committee draws up consultative documents based on and putting into context its propositions. These documents are, in the ANT vocabulary, obligatory points of passage. The interested community (consultancies, banks, universities, individuals, etc.) analyse these proposals and send comments to the Committee. These comments are analysed by the Committee, which draws up a new consultation document with new proposals. All the consultation documents and other initiatives are made

available on the Committee's Web Site ([www.bis.org](http://www.bis.org)). As to the commentaries, one section is still being divulged. However, this does not prejudice the analysis as the focus is on the construction of the main actor-network.

These consultative documents are used as the primary source of data. In addition, we consider as secondary sources of data commentaries, articles and books produced by specialists and institutions related to the Basel Case.

The textual analysis being carried out follows the ANT's tradition. In this context, the text is not considered a simple and transparent representation independent of reality. On the contrary, the text is one of the mechanisms for the construction of reality (Callon et al. 1986). The text allows the linkage and alignment of several heterogeneous elements (people, other texts, equipment, procedures and institutions) in the same place (Callon 1986). The text is the destination of many inscriptions that we intend to analyse.

### ***Data Analysis Steps***

The process of text analysis is being carried out in the following manner:

Phase 1: An initial general reading of the texts was carried out with the objective of gaining a general view of the case and the controversies.

Phase 2: An identification is made of which texts, themes and categories emerge to understand the case.

Phase 3: The results of the second stage are the basis for another reading, aiming to cut out the content of the texts selected on the basis of the categories and themes identified.

These three phases are not linear steps but evolve in many cycles. The following findings reflect the evolution of the dominant actor-network between 1998 and 2001.

## **Initial Findings**

### ***The Construction of the Problem***

What is the problem (risk identification, assessment, control, mitigation, etc) to be considered with a view to directing efforts? In the Basel Case there are controversies about the agenda around OR itself.

For the Committee, the fundamental point is to understand OR with the objective of developing tools for its measurement. Other participants question this agenda. For them, the main objective is to control OR and not to measure it.

The analysis of the construction process suggests that the complex problem, measuring operational risk, was an object of translation with the aim of making it "doable"<sup>2</sup> and objective. The strategy used to make the problem doable was to redefine it in terms of market risk.<sup>3</sup> Instead of recognizing operational risk as a result of the causes of potential damages, the option has been to recognize the risk in terms of the financially quantifiable damages that had occurred in the past. In this manner, the methodology for assessing operational risk could be structured starting from a statistical extrapolation of past data, placing the dominion of the problem in the collection of historical data, in quantitative - and not qualitative - measurements. Such a problem framing is influenced by the previous financial risk assessment culture, it does not consider the context as relevant for risk assessment and it is disciplinary (statistics) oriented instead of problem oriented.

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<sup>2</sup>A concept developed by Fujimura (1992) whilst studying cancer research. "She shows how problems and projects are processes constructed through time and space... Achieving doability thus means that investigators simultaneously align or fit their research problems across experimental or other research capacities, laboratory/work site organization and overall direction, and the broader worlds of fiscal, scientific, and extra-scientific support and interest" (Clarke and Fujimura, 1992)

<sup>3</sup>There is a long tradition in the assessment of market risk with quantitative models, developed since the beginning of the 1990s (Saunders 2000). "Market risk can be defined as the uncertainty of and Financial Institution's earnings resulting from changes in market conditions such as the price of an asset, interest rates, market volatility, and market liquidity" (Saunders 2000).

The choices which have made the problem doable have been the object of many controversies, given the totally different nature of operational risks when compared to market risk.

### ***The Construction of the Solution***

The analysis of the construction process also suggests that the specification of the proposed quantitative solution is influenced by a set of explicit and implicit factors (translated "actants") that are present in the dominant actor-network, as the need of: making the model universal (applicable in the various countries); standardizing to ease the application; quantifying the risk in money, to compare results among various institutions and reserve financial capital against losses. The model was also influenced by the need to make cooperation among supervisory bodies, Financial Institutions (administrators, accountants) and risk insurance companies viable. This set of "actants" and the action of shaping the problem as doable have influenced the financial quantitative solution that tends to be characterized as a "standardized package."<sup>4</sup>

Nevertheless, the discordant actors have proposed another solution based on another actor-network. The main characteristic of this solution is its qualitative nature, based on internal controls as the central OR measure. The qualitative solution is influenced by a set of explicit and implicit factors (translated "actants") that are present in the alternative actor-network, as the need of: considering the unique characteristics of each Financial Institution; acknowledging internal controls as the mechanism for loss protection; considering the causes and the contexts of damages. Many actors have considered that this approach represents better the nature of IS/IT potential damages than the dominant approach.

### ***The Co-Construction of the Social***

Another finding that emerges from the Basel Case is the simultaneous co-construction of the social, concurrently with the technical-scientific construction of the problem and solution described above. Since 1998, a technical-scientific knowledge about OR has been produced/tested and, in a parallel fashion, a set of institutions began to perceive and disseminate the need to measure and administrate OR; a community of specialists and institutions has been developed to research, apply and promote the development of knowledge on OR; a distinct body of knowledge or a specific discipline of OR was constituted and became autonomous; Financial Institutions have created a specific risk sector and a specific administrative process in order to enable the quantitative solution. An analysis of the Basel Case suggests that the co-construction of the social stimulates and makes viable the production and application of the quantitative knowledge/tools about OR.

The texts of the consultation documents drawn up by the Committee are a privileged place to suggest and convince: (1) which alliances are necessary, (2) how is the world mobilized to be treated mathematically in the quantitative models developed and (3) which mechanisms should be used for making the measurement of OR autonomous. These initiatives mobilize actors at the macro, meso and micro levels.

## **Discussion**

From this comprehension of the empirical case, the quantitative model for assessing operational risk in the Basel Case is a socio-technical hybrid whose properties are derived from the network of social and technical "actants" that has established itself during the process of heterogeneous construction. Socio-technical networking has shaped the problem as doable and the quantitative solution as a standardized package. Social and technical factors have affected developers since they have shaped what was considered as OR knowledge. This means that the objective problem approach and the quantitative solution that resulted from the technical-scientific approach are not free of social influences. These influences, for example, have excluded qualitative solutions.

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<sup>4</sup>Concept also developed by Fujimura (1992) whilst studying cancer research "(...) Standardized Packages, which facilitates both collective work by members of different social worlds and fact stabilization (...). It facilitates interactions and cooperative work between social worlds and increases its opportunities for being transferred into, and enrolling, other worlds; it serves as an interface between multiple social worlds" (Fujimura 1992). This concept is related to the notions of boundary object and immutable mobile.

Theoretically, the initial definition of operational risk should incorporate all dimensions<sup>5</sup> of risk associated with IS/IT. However, the social-technical networking has also excluded various types of undesired<sup>6</sup> events as sources of operational risk and, as result, various dimensions of the universe of risks associated to IS/IT.

## **Conclusion and Future Work**

The next steps of the research are still related to the data analysis cycle listed in topic 3.3, and we intend to extend the period of analysis until 2003.

One of the most important results of this research is that ANT can become the IS/IT risk knowledge designer more sensitive to exclusions. This is important to develop awareness about the possibility of underestimating or overestimating IS/IT risks. ANT can also help the designer in gaining awareness about the socio-political dimension of the risk knowledge creation process.

The findings of this research can lead to new approaches for IS/IT risk knowledge creation at the level of problem framework specification and solution development. For example, to enrich the technical-scientific approach, in order to consider social factors as part of the risk identification and assessment processes, and deal explicitly with them. Also, to acknowledge that socio-technical influences can constrain or enable the development of more problem oriented/risk sensible knowledge.

This extended understanding about the importance of socio-technical networking can establish Actor-Network Theory as an important tool for the process of IS/IT risk tools/methodologies/knowledge creation.

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<sup>5</sup>According to the Basel Committee [2000] IS/IT may cause the following types of damages: strategy, legal statute, operational, reputational.

<sup>6</sup>Undesired events can result in direct or indirect financial losses. It is considered, at the moment by the Committee, as source of operational risk only undesired events that result in direct financial loss.