# Uncovering Causality in Narratives of Collaboration: Actor-Network Theory and Event Structure Analysis

*Marisa Ponti*

**Abstract**: Uncovering the underlying order in organizational change narratives to determine event causalities is a long-standing methodological problem. The order emerged within a narrative from the reconstruction of sequences of events can be taken as evidence of the causal relations between specified aspects of reality. This evidentiary status of causality attributed to narratives may be taken for granted when using actor-network theory (ANT) as a methodology, because ANT descriptions and explanations cannot be separated. This article suggests that the use of ANT benefits from merging CALLON's processes of translation and event structure analysis (ESA). Proposed is an approach for merging the two, which provides an interpretation of main ESA concepts in ANT terms. This article describes the application of this approach in a case study, and argues that the conceptual tools offered by ANT and ESA tap into the potential of narratives to be simultaneously descriptive and explanatory by fostering an explicit deployment of temporal order, connectedness, and unfolding of events.

**Table of Contents**

## 1. Introduction

Empirical studies narratives written by social scientists aim to describe entities and their connections "in a single coherent story" (STONE, 1979, p.3), and provide support for a theoretical argument (BÜTHE, 2002). Many scholars use Actor network theory (ANT) methodologies to describe and explain the entanglement of the social and the technological, develop in-depth case studies, and write narratives to describe connections among entities at a fine-grained level

of description (WALSHAM, 1997). ANT is a sociotechnical approach from science and technology studies (STS), founded by Bruno LATOUR, Michel CALLON, and John LAW. [1]

The use of narratives to support an argument raises methodological issues that need closer attention (BÜTHE, 2002). This article focuses on uncovering the underlying order in narratives when describing the natural processes of social phenomena and their metamorphoses. The order emerged within a narrative from the reconstruction of sequences of events is evidence of the causal relations between specified aspects of reality. This evidentiary status of causality attributed to narratives may be taken for granted when using ANT as a methodology. ANT founder, LATOUR (1991, 1993, 1996, 2005), has affirmed that descriptions and explanations cannot be separated. Their simultaneity stems from ANT's avoidance of explanations that seek the "explanatory" outside the empirical account (e.g., references to general and abstract principles). In ANT, the "explanatory" must be something that is included in the data. This position does not recognize that data speaks for itself or that a larger context exists. It only suggests that analysts should follow the actions of the "actors" and avoid imposing general and abstract principles on what they study (LATOUR, 1999, 2005). LATOUR (2005) clarified that explaining equates to uncovering relations among things and provides an understanding of how things provoke other things. Also, in an effort to provide the necessary energy to act, bad descriptions require an explanation, in which an external entity is brought to bear on the entities already described. LATOUR (2005) engaged in an argument between a student and Socratic professor against the need to add explanations. He told the student that researchers need to explain things, but they should not write descriptions that simply replicate studied phenomena. Instead, researchers should write rich descriptions that "show" fluid associations among things, revealing what gives actors the energy necessary to act. For researchers who embrace the ethos of ANT from where we learn from actors only, avoiding imposing an external view of the world on them, methodological questions arise: How can we "show" associations among things within narratives? And, which devices can we use to uncover implicit causality in narratives without employing external explanatory frameworks? In other words, how can we harness the temporal sequences of events in narratives for explanatory purposes? Researchers can encounter difficulties, because ANT does not prescribe one data analysis technique, and methods chosen must allow the identification and description of the full range of associations among the actors involved in a studied situation. [2]

The main purposes of this article is to analyze the problems and challenges raised by the questions (listed above) and suggest that researchers using ANT as a methodology benefit from merging CALLON's (1986) processes of translation and event structure analysis (ESA) (HEISE, 1988, 1989) to solve the problems and challenges. The concept of translation refers to a process of organization and transformation of elements, by which actors try to overcome differences, misunderstandings, incoherence, and resistance (CALLON, 1986). ESA is a qualitative method for analyzing and understanding the logical sequence of events through which social activities unfold (HEISE, 1988, 1989). [3]

I propose that the combination of the concept of translation and ESA can provide a way to harness the explanatory power of narratives. It is beyond the scope of this article to address all the implications of this suggestion; further debate and work are necessary and my aim is to stimulate these. In this article, I focus on aspects that seem to have the most potential for achieving new advantages in enhancing the explanatory capability of narratives. This article, therefore, has two main parts. In the first part (see Sections 2, 3, 4, and 5), after discussing the limited explanatory capacity of narratives reliant on temporal ordering and connectedness, I sketch key ideas of ANT and ESA, and then propose an approach to merging the two. In the second part (see Sections 6 and 7), I provide an illustration of how I applied this approach to the analysis of a case study. I conclude with final considerations. [4]

## 2. The Weak Nexus between Narratives and Causal Explanation

Social scientists often have problems in trying to find underlying order in narratives when they describe the natural processes of social phenomena. Specifically, they can be concerned with explaining the causes and processes of phenomena, such as organizational change and collaboration. Attempting to foreground the importance of processes neglected by the main empirical traditions of sociology, and to reintegrate process in empirical practice, historical sociologists (GIDDENS, 1979; ABRAMS, 1982; ABBOTT, 1990) called into question quantitative analysis by underpinning a concept of causality derived from logical positivism. The empirical work based on this type of analysis considers the social world as made up of fixed entities with varying characteristics and investigates how these characteristics (the "variables") in turn, cause others (ABBOTT, 1992). Causal relationships infer when two or more variables differ in consistent ways across observations. However, there are instances in which the objects of study do not lend themselves to conventional models of quantitative analysis. For example, issues or developments that are emergent or complex defy quantitative analysis, even though we sense something is recurrent and generalized. [5]

The focus on social processes and the attention to process analysis led historical sociologists to suggest the importance of temporality and narrative to analyze and understand how sequences of actions constituting events are organized and changed over time (ABBOTT, 1990, 1992; ABRAMS, 1982). Narratives allow reconstructing sequential order of actions, which otherwise would look like discrete elements, into a coherent whole that gives meaning to and explains each element (STONE, 1979). Narratives allow a form of sequential causation, because in each narrative a beginning, intervening actions, and an end descend from the beginning or the intervening actions. This temporal ordering can allow for explanations of events, because when an action is linked to past or subsequent actions in a narrative, one can understand what caused it and its consequences (GRIFFIN, 1993). However, GRIFFIN argued that the internal explanatory logic of narratives is fraught with methodological problems caused by reliance on temporal order and connectedness of social actions. He pointed out that this reliance tends to assume explicitly that antecedents of an action can be

determinants of that action, even though chronological order does not necessarily suggest causal relationship. The difference between an antecedent and a causal action can be unclear in a narrative. GRIFFIN argued that it is necessary to "unpack" narratives (ABRAMS, 1982, p.200) by breaking events into constituent parts, which are series of actions that reconstruct analytically the causality from events in a verifiable manner. This "unpacking" process implies that specific events must be abstracted from the concrete structure of narratives and analyzed (GRIFFIN, 1993). Explicitness and specificity allow analysts to understand and debate another analyst's decisions. In particular, GRIFFIN maintained that causal interpretations can be built by answering factual and counterfactual questions about sequences of specific events. Counterfactual questions examine what would happen concretely if a different concrete circumstance occurred. Additionally, when plausible counterfactual questions are asked, other questions are implied or asked. For example, responding to the question, "Suppose Event A does not occur. Can Event B occur anyway?" implies reasoning and responds to questions such as, "What is *theoretically* expected to follow from this counterfactual action or condition?" and "How can *comparable* and *analogous* events help us understand this particular counterfactual condition?" How do these kinds of actors *typically* respond to these actions? What has been the actor's consistent *pattern* of action? (p.1103; emphases in original). If the absence or modification of a concrete circumstance has changed the course of an event, the circumstance is deemed essential to the particular configuration as it actually happened, and a cause of what happened (GRIFFIN, 1993). This type of questioning can help us transcend temporality of events and understand why they unfold in certain ways, building explanations that can be comparative and generalized (GRIFFIN, 2007). The process of asking counterfactual questions resembles LATOUR's[1] insight that social research can be understood as a form of detective work (AUSTRIN & FARNSWORTH, 2005) aimed at tracing and unraveling unsuspected elements and practices that constitute networks. [6]

Questions fostering an explicit deployment of temporal order, connectedness, and unfolding of events can be viewed as a launching pad to uncover implicit causality in narratives without the need of external explanatory frameworks. This approach helps analysts tap into the potential of narratives to be simultaneously descriptive and explanatory. To undertake this process of harnessing the explanatory power of narratives, I followed GRIFFIN's (1993) suggestion of using ESA (see Section 4), and combined it with CALLON's (1986) processes of translation. In the next section, I summarize key concepts of ANT before describing my interpretation of the main ESA concepts in ANT terms. [7]

---

1   LATOUR (1991) used the counterfactual method to describe the example of the hotel room keys attached to cumbersome weights. This method is one of the arguments that he used to suggest that nonhumans "have" agency. By endowing the door-closer, LATOUR created a counterfactual: if room keys were not unwieldy objects deforming hotel customers' pockets, hotel customers would forget to leave their keys at the front desk.

### 3. Actor-Network Theory

ANT is an approach founded by Bruno LATOUR, Michel CALLON, and John
LAW in Science and Technology Studies to describe and explain the
entanglement of the social and the technological. ANT aims at collapsing
dualities. For example, between social and technological, and between object and
subject within entities—both people and objects are unfixed and do not have
significance in and of themselves, but achieve significance by creating relations
with each other (LAW, 2001). ANT is not a stable and unified theory, because its
founders have frequently revised elements of this approach. Therefore, rather
than treating ANT as a reified set of concepts (LAW, 1999), it is advisable to use
it as a range of practices to examine empirically in detail how relations among
people, things, institutions, and ideas are created, maintained, and changed over
time. [8]

For the purpose of this article and for those who are unfamiliar with ANT, it is
helpful to accompany the term ANT with a few "core" concepts that have
remained relatively stable; I have used these concepts in the analysis mentioned
in the second part of this article (see Sections 6, 7). [9]

An "actor" is a semiotic definition, which means that it can be literally anything, as
long as it is a source of action and influences other entities (LATOUR, 1996,
1987). Actors can be small or big, single or multiple, individual or collective, or
human or nonhuman. CALLON (2005, p.4) affirmed that an actor is "made up
[not only] of human bodies but also of prostheses, tools, equipment, technical
devices, algorithms, etc." The heterogeneity implied by the notion of "actor"
allows describing relations as both material and semiotic. For example, the
interactions in a school involve people, subject matters, concepts, tools, and
technical equipment. This assemblage of heterogeneous actors forms a network.
"Network" is also a semiotic definition. LATOUR (1996) clarified that this term
should not be confused with social network analysis (SNA). He explained, in ANT,
"network" is a definition used to claim that modern society has a thread-like
character that cannot be captured by the notions of levels, structures, or systems.
"Actor" and "network" are linked in order to dissolve dualities, for example
between agency and structure and between micro and macro (LATOUR, 1996). [10]

Actors, both human and nonhuman, are stakeholders and bring interests with
them. When different interests align, a network tends to stabilize and work
smoothly. As CALLON (1991) posited, the higher the extent of alignment, the
more actors work together. However, alignment of interests does not entail that
actors have the same interests. Rather, it indicates that actors can work together
despite the heterogeneity of their interests (CALLON, 1991). Hence, social order
is an effect arising from a demonstrated alignment of interests achieved by actors
in a network. ANT is concerned with the ways in which actors achieve and sustain
a stable order and it is interested in understanding how the different interests of
all the relevant actors in a network can be aligned. Actors align their different
interests and sort conflicts amongst themselves through a process of
"translation." Actors transform (translate) network elements to (re)formulate their

interests to be attainable through a proposed network. During this process, actors establish roles and identities and define conditions for mutual relationships. CALLON (1986) identified four processes of translation in the creation of a network: problematization, *interessement*, enrollment, and mobilization. During the process of *problematization*, actors define a relevant problem and identify the critical actors. During *interessement*, the critical actors try to persuade others to invest in or follow their program. During *enrollment*, the critical actors bestow qualities and motivations to actors and establish roles During *mobilization*, the formed network gains wider acceptance by making durable and potentially irreversible translations. Irreversibility takes place when it becomes impossible to go back to a point where alternative possibilities exist (CALLON, 1991). For example, a technology reaches a state of irreversibility when it becomes an essential part of human life, e.g., a telephone. [11]

Translation involves constant negotiations among human actors and delegates of nonhuman actors to establish a common set of definitions and meanings, and to allow dialogue and understanding of the network phenomenon. The process of negotiation is marked by the presence of an actor who is functionally indispensable to the construction and performance of a network. This actor is the obligatory point of passage through which all the other actors have to move through (e.g., to accept a program) in order to meet their interests. The outcome of successful negotiations is an actor-network characterized by aligned interests. The extent of this alignment describes the extent of agreement achieved by the actors, and thus the extent of convergence of a network. As a result of their agreement, actors inscribe aligned interests into something durable (LAW, 1992) —such as programs, specification documents, and physical artifacts that lead to technological and social outcomes (CALLON, 1986; LAW & CALLON, 1992). [12]

## 4. Event Structure Analysis

ESA is a qualitative method for analyzing and understanding the logical sequence of events through which social activities unfold (HEISE, 1988, 1989). ESA has been used mainly to analyze historical processes, individual motivational processes, and organizational changes (HAGER, 1998). ESA deploys temporal order, connectedness, and unfolding of events in a narrative; it helps infer causal links among actions constituting events, and identifies their contingencies and consequences (GRIFFIN, 2007). To do so, ESA helps researchers "unpack" and recompose events, to construct a causal interpretation of what happened and why. To engage in this process of "unpacking" and reconstitution, ESA consists of two types of analysis. One is compositional analysis, which helps describe how events in a narrative associate people, things, and actions. The second is linking analysis, which helps identify the type of linkages between events. The two types of are independent. Events can be linked without decomposing them, although decomposition may clarify each event and help link them. [13]

The linking analysis is conducted with the support of *Ethno*, software designed for this type of analysis (HEISE & DURIG, 1997). *Ethno* diagrams help identify the events that are pivotal in a certain process. After entering a chronological list of

events in the software, the researcher is prompted to link the events in causal chains. The program asks a series of yes/no questions; these questions prompt the researcher to clarify whether a previous event is required for each subsequent event. For example, for a given pair of events, *Ethno* asks, "Does Event A require an Event B or a similar event?," or "Suppose that Event A did not occur. Could Event B occur anyway?" (HEISE, 2007). After the events are entered and linked into the software, *Ethno* produces a diagram that represents the causal connections among the sequences of events. The diagram helps the researcher focus on causal relationships and critical points in the narrative, which would be difficult to identify just from the temporal sequence of events. It is important to keep in mind that *Ethno* does not produce the causal connections that make up the diagram, because ESA relies on the interpretation of data. This method tries to combine the researchers' interpretation of causal relations and formal logic in a way that allows replication of the analysis and comparison across contexts. Researchers decide which events to enter into the software and how they are causally linked. *Ethno* can only probe the analyst for deductions about the causality between events, thus the program depends on the analyst to have knowledge about the relations among events and to make the decisions that will produce the diagram of causal connections. [14]

## 5. Merging ANT and ESA: Understanding Translation of Interests through Series of Events

In ESA the unit of analysis is an event, which is considered a process (HEISE & DURIG, 1997). In ANT a network is also a process, in which an actor is associated to another one by an action performed under certain circumstances. Therefore, an event can be conceptualized as a network. For example, the three events—I came, I saw, I conquered—which describe Julius CAESAR's contribution to the expansion of the Roman Empire, are networks in ANT, because CAESAR was not located in his body alone but in a network of relations with his surroundings (HEISE, 2005). [15]

As events are processes, analysis of events focuses on the processes and the transactions that form an organization (HEISE & DURIG, 1997). This assumption fits an ANT-informed study of phenomena, such as organizational change and collaboration, specifically when the aim is to examine how actors translate their interests during the process. The analysis of how interests are translated (i.e., negotiated, modified, opposed, or aligned) can be daunting, because many actors can be involved. And even when a relatively small number of actors form a network, their associations develop into a dense web of relationships. My approach to understanding this complex entanglement of relationships suggests the analysis of translation as a social process. ESA helps view each translation phase as a sequential series of events. Given that a network is a process in which actors are associated to one another by what they do to each other, an event can be conceptualized as a network of actors involved in translation. Decomposing a complex translation in a manageable number of events equates to breaking events down into subplots and identifying basic relationships among a

more restricted number of actors. Dealing with events means dealing with
occurances that can be significant in understanding the translation phase. [16]

Table 1 illustrates my interpretation of the main ESA concepts in ANT terms.
Events may be causally linked to each other, and parallel series of events may
occur simultaneously. Some events may be critical turning points in the process
of translation. Some events lead to multiple streams of events, and events may
converge on a significant event. I assume that an analysis of the events
embedded in problematization, *interessement*, enrollment, and mobilization can
lead to a better understanding of the translation of interests that occur throughout
a process. For example, a process such as collaboration is a set of relations
following a contingent development path—from members gaining entry, to
sustaining and recognizing benefits of working together. Therefore, creating a
diagram of how these events link to each other can provide insights into how
interests are translated.

| ESA | ANT |
| --- | --- |
| Social change | Translation: Social process of construction of a social order through transformation of one order into an emergent one |
| Constituted by events = transactions among people and entities involved in happenings | Constituted by events as networks = associations of actors (human and nonhuman) involved in happenings |
| Event as a happening in which people use means to transform people and/or things from one condition to another | Event as a network = a basic step in translation, in which actors use resources to transform people and things from one order to another |
| An event consists of functional linkages between people and entities involved in a happening | A network consists of functional linkages among actors involved in a happening |
| These functional linkages influence the interrelations between events | These functional linkages influence the interrelations between events and eventually the process of translation |
| Translation as a sequence of events: <br> Each phase (problematization, *interessement*, etc.) = chain of events <br> Analysis of each phase = analysis of the logical interrelations between events, and of the functional linkages between actors and instruments involved in each event | |

Table 1: Interpretation of ESA concepts in ANT terms [17]

To analyze events, inspired by grammarians who elaborated syntactic-semantic
representations of sentences, HEISE and DURIG (1997) suggested that events in
a narrative are represented by meaningful sentences, thus the analysis of these
sentences provide a formal basis for describing events. The authority of the event

frame derives from the fact that people use the included categories to construct
sentences describing events, and languages have syntactic rules defining how
these categories link within a sentence[2]. The event frame is compatible with the
ethos of ANT. There is parallelism between this approach and the sociotechnical
graph suggested by LATOUR, MAUGUIN, and TEIL (1992). For example, both
the event frame and the sociotechnical graph are inspired by sociological and
linguistic traditions. Furthermore, phenomena of interest are identified through
sentences in their syntagmatic dimension, which means the combination of
components in a meaningful syntactic-semantic relation. [18]

## 6. Applying ANT and ESA: The Case of Semantic Opac

This section illustrates how the combination of ANT and ESA was applied to
examine how sociotechnical aspects of work organization influenced the
foundation, formulation, sustainment, and conclusion of collaboration
(SONNENWALD, 2007) between library and information science (LIS) academics
and practitioners in a distributed project. In this case study, I used ANT to
conceptualize collaboration as a heterogeneous actor-network held together by
both human and nonhuman actors, and to examine the strategies that actors
used to seek and enroll allies and resources into a network through negotiations
of interests, which are processes of translation. The methodological position
adopted in this study is informed by ANT and supports the idea that collaboration
is best studied by tracing how sociotechnical aspects interplayed with ways in
which actors negotiated their interests to initiate, sustain, and conclude
collaboration. The sociotechnical aspects examined in this study were identified
by a review of scholarly literature on inter-organizational research collaboration in
academia and between academia and community-based organizations (PONTI,
2010a). [19]

This section began with a narrative summary of the project and the identification
of the interests of human and nonhuman actors. This summary is an abridgment
of a long and detailed narrative produced in the case study—based on semi-
structured interviews with project participants and analysis of texts concerning the
project (e.g., journal papers, websites, and e-mails)—to describe how the actors
constructed collaboration, and how the actor-network resulted from this process
(PONTI, 2010b). This long narrative was structured in terms of the four processes
of translation articulated by CALLON (1986) and the four stages of research
collaboration identified by SONNENWALD (2007). This structure allowed
highlighting the influence of sociotechnical aspects on how different actors joined
their efforts to achieve a common goal across the stages of collaboration. For
brevity, I do not use this structure to present the summary but list the
chronological sequence of events entered in *Ethno* for the analysis (Table 2). I
then employ ANT and ESA with the support of *Ethno* to analyze a small set of
sequences of events[3]. [20]

---

2   FRANZOSI (2004) uses a similar system called "semantic grammar" or "story grammar," which
    consists of the linguistic frame action-actor-action to analyze narratives.

3   For the sake of brevity, it is not possible to present the complete analysis of the case study in
    this paper. Such analysis is in PONTI (2010b).

## 6.1 Case study

Semantic Opac (SemOP1) is a distributed and collaborative project that was conducted in Italy from 2003 to 2004. Human actors included a core group of project coordinators consisting of three information professionals and one LIS professor, each working at different institutions and in different geographical locations. Other human actors included 13 LIS master's program students and several external library professionals, all of whom were research assistants on SemOP1. Nonhuman actors included an LIS graduate course in electronic documentation, a sample of Italian open public access catalogs (OPACs), subject indexing, an evaluation checklist, a computer lab, and project inscriptions (e.g., papers produced by project participants as an outcome of the project). An OPAC is a specialized software package designed to allow any library user to search the library's catalog database for items, to find items' location, to research if the catalog is linked to the circulation system, and to research whether items can borrowed or not (TEDD, 1993). Subject indexing refers to the act of describing or identifying a document in terms of its subject content by using controlled vocabularies, including classification schemes and thesauri, as defined by LIS professionals. [21]

I identified those nonhuman entities as actors because they played an active role in the project—either at the start or during the development of collaboration, or at the completion of collaboration by involving potentially interested volunteers for a follow-on project. [22]

SemOP1 was initiated because the project coordinators thought it was important to evaluate subject access and search functionality in Web OPAC interfaces. The project coordinators believed that the use of subject-based search features in Italian OPAC interfaces was inadequate; they also believed that it was time to rethink how Italian OPACs were built and managed. They recommended minimum requirements to add to online catalogs search features which accommodate subject indexes. [23]

During the *interessement* and enrollment processes of translation, the coordinators persuaded other actors to participate and agree on goals of the projects. During those processes, not only did actors negotiate their existing interests, but they also developed new interests through negotiation. [24]

The project coordinators created an evaluation checklist of possible semantic search features; this is available only in Italian at: http://www-dimat.unipv.it/biblio/sem/lista.htm. The checklist was the obligatory point of passage (CALLON, 1986) for the master's students, as well as for the other actors, in the project. The required checklist was an artifact inscribing principles of subject indexing and classification, which were applied during each evaluation. The checklist embedded rules about what a good OPAC interface should be, and its correct application was crucial in order for it to act as a point of alignment of the actors' interests. [25]

Together, all the actors, both human and nonhuman, were expected to form and sustain a network to evaluate a non-random sample of 25 percent of all OPACs registered in Italy[4]. Data collected by the students were entered in a spreadsheet and sent to a coordinator in charge of data processing and analysis. [26]

### 6.2 Constructing SemOP1 event structure

The long and detailed narrative produced in the case study was reduced to short sequences of single events, which occurred during each process of translation and stage of research collaboration. In listing the events, I built a record of 33 happenings (Table 2) that, based on the data, were likely to have contributed causally, or have influenced the stages of foundation, formulation, development, and conclusion of collaboration within each process. Although based on the long narratives, the list of events is a different project inscription. It includes only the events that appear to be potentially causally important to the creation of the actor-network in SemOP1. The following categories of events were included in the temporal sequence:

1.  Those that expressed problematization.
2.  Those that aimed to persuade actors to be enrolled in collaboration.
3.  Those that aimed to carry out collaboration and bring it to conclusion.
4.  Those that aimed to sustain possibilities for further collaboration after the completion of the project. [27]

For each event, I also identified key sociotechnical aspects of work affecting the "actors" activities and choices in each event. [28]

The next step in the analysis was entering the list of events into the *Ethno* software. I responded to 119 questions—mainly counterfactual[5]—asked by *Ethno* to link all the events. An example of counterfactual reasoning is within *Ethno's* analysis. Here, I argued that cumbersome university funding mechanisms that discourage the LIS professor from applying for project grants were linked to the decision of setting up an unfunded and unaffiliated project, with the project coordinators joining forces. This claim was based on the data collected through interviews with the LIS professor, which elicited the following counterfactual argument—had mechanisms for university funding been less bureaucratically cumbersome, labor-intensive, and costly for applicants; the LIS professor would have applied and SemOP1 might have been affiliated and organized differently. [29]

After linking all the events, *Ethno* produced a diagram of the event structure, which Figure 1 is based. As noted earlier, the causal connections among events are not generated by *Ethno*, but represent my interpretation of a configuration of events, through a process of inference-making that relies on my understanding of

---

4   Italian OPACs is a section of AIB-WEB, the website of the Italian Library Association. It contains the Directory of Italian OPACs, created in 1997 and maintained by a mostly voluntary editorial board. The directory is available at http://www.aib.it/aib/opac/repertorio.htm.

5   *Ethno* allows asking four types of questions: prerequisite, implication, historical causation and counterfactual (HEISE, 2007).

the data and knowledge of the phenomenon under study. In fact, *Ethno* relies on
the understanding of either a native member of a specific culture, or *verstehen* of
outside researchers (HEISE, 1991).

| Stage of Research Collaboration | Events | Translation Processes | Sociotechnical Aspects of Work |
|---|---|---|---|
| Foundation | Two library professionals exchange views by e-mail about the lack of proper subject indexing in Web-based OPACs interfaces. | Problematization | Lack of resources and institutional commitment |
| Foundation | The two library professionals lack financial and human resources for conducting the evaluation. | Problematization | Lack of resources and institutional commitment |
| Foundation | A LIS professor looks for a topic for his electronic documentation course in the graduate program in library and information science. | Problematization | Lack of institutional commitment |
| Foundation | The LIS professor wants to provide a research experience to his 13 master's students. | Problematization | Lack of resources and institutional commitment—Changing traditional educational practices |
| Foundation | The LIS professor e-mails one of the two library professionals asking for a topic. | Problematization | Lack of institutional commitment |
| Foundation | The LIS professor has known the library professional for a long time. | Problematization | Previous ties |

| Stage of Research Collaboration | Events | Translation Processes | Sociotechnical Aspects of Work |
|---|---|---|---|
| Foundation | The library professional puts forward the idea of the evaluation of OPACs. | Problematization Interessement | Lack of resources and institutional commitment |
| Foundation | The LIS professor makes his class available for the evaluation. | Problematization Interessement | Lack of institutional commitment—Incentives, rewards, and voluntary participation—Changing traditional educational practices |
| Formulation | The three coordinators set up the Semantic OPAC 1 project. | Enrollment | Lack of resources and institutional commitment—Incentives, rewards, and voluntary participation |
| Sustainment | The coordinators invite the Subject Indexing Group to participate in the project. | *Interessement* Enrollment | Previous ties—Opportunity for external expertise |
| Sustainment | The coordinators develop by email a checklist of features which are necessary to ensure effective use of subject access. | Enrollment | Nature of work (loosely coupled) |
| Sustainment | The checklist inscribes rules about effective use of subject access. | Obligatory point of passage | |
| Sustainment | The students must use the checklist for the evaluation | Obligatory point of passage | Nature of work |

| Stage of Research Collaboration | Events | Translation Processes | Sociotechnical Aspects of Work |
|---|---|---|---|
| Sustainment | The coordinators invite external library professionals to participate in the project. | Enrollment | Lack of resources and institutional commitment— Opportunity for external expertise — Incentives, rewards, and voluntary participation |
| Sustainment | Four external library professionals volunteer to collaborate in various forms. | Enrollment | Opportunity for external expertise — Incentives, rewards, and voluntary participation |
| Sustainment | The project participants are geographically distributed. | Enrollment | Nature of work and collocated and remote collaboration |
| Sustainment | A coordinator sets up a web-based mailing list for communication. | Enrollment | Nature of work and collocated and remote collaboration |
| Sustainment | The coordinators explain the checklist to the students during a collocated kick-off meeting at the start of the course. | Enrollment | Nature of work and collocated and remote collaboration |
| Sustainment | The coordinators assign the students a sample of OPACS for evaluation. | Enrollment | Nature of work and collocated and remote collaboration |

| Stage of Research Collaboration | Events | Translation Processes | Sociotechnical Aspects of Work |
|---|---|---|---|
| Sustainment | The students must complete the evaluation to pass the course. | Enrollment | Nature of work and collocated and remote collaboration |
| Sustainment | The students work individually on their task, either from home or from wherever they have an Internet connection. | Enrollment | Nature of work and collocated and remote collaboration |
| Sustainment | The students encounter problems with the use of the checklist. | Enrollment | Nature of work and collocated and remote collaboration |
| Sustainment | The checklist introduces unplanned complications in the project. | Enrollment | Nature of work and collocated and remote collaboration |
| Sustainment | The students and the LIS professor discuss the checklist both in collocated informal groups and in the classroom. | Enrollment | Nature of work and collocated and remote collaboration— Lack of need for formal coordination mechanisms |
| Sustainment | The students discuss aspects of the project with the coordinators, especially the remote ones, in the mailing list. | Enrollment | Nature of work and collocated and remote collaboration— Changing traditional educational practices |
| Sustainment | At the end of the evaluation, the students enter the data in a spreadsheet | Enrollment | Nature of work |

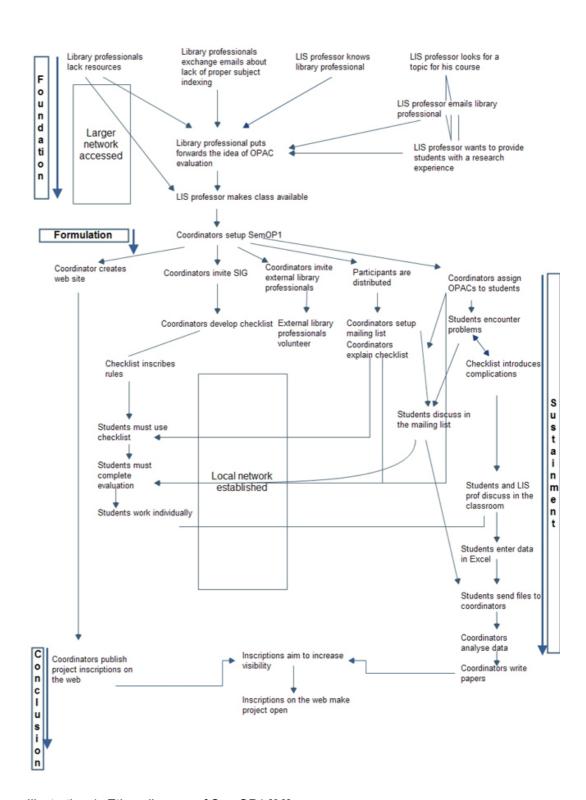| Stage of Research Collaboration | Events | Translation Processes | Sociotechnical Aspects of Work |
|---|---|---|---|
| Sustainment | The students send their files to the coordinators by e-mail. | Enrollment | Nature of work |
| Sustainment | The coordinators analyze the data. | Enrollment | Nature of work |
| Sustainment | A coordinator creates a project website on his departmental server. | Mobilization | Lack of resources and institutional commitment |
| Conclusion | The coordinators write papers on the findings of the evaluation. | Mobilization | Incentives, rewards, and voluntary participation |
| Conclusion | The coordinators publish all project inscriptions on the project website. | Mobilization | Lack of institutional intellectual property— Incentives, rewards, and voluntary participation |
| Conclusion | The project inscriptions aim to increase the visibility of the project. | Mobilization | Lack of institutional intellectual property— Incentives, rewards, and voluntary participation |
| Conclusion | The project inscriptions make the project open to new collaborations. | Mobilization | Lack of resources and institutional commitment— Lack of institutional intellectual property |

Table 2: List of events in SemOP1

Illustration 1: *Ethno* diagram of SemOP1 [30]

## 7. Analysis of Small Sequences of Events: Lack of Resources and Institutional Commitment

The initiation and sustainment of SemOP1 arose from the alliance of two library professionals driven by professional interests, and one LIS professor driven by teaching and learning concerns. According to the event diagram (see Figure 1), two unrelated but temporally closed events resulted in the decision of joining forces and setting up the SemOP1 project. Specifically, the library professionals exchanged e-mails about the lack of proper subject indexing, and the LIS professor searched for a course topic. The library professionals then introduces the idea of OPAC evaluations, and the LIS professor makes this class available to students. Thus, the coordinators set up SemOP1. [31]

What caused the alliance to occur? ESA connects logically; library professionals lack resources and the LIS professor makes class available. This alliance shows that the library professionals' lack of human and financial resources and the LIS professor's need to interact with people with similar backgrounds and interests, set in motion the decision to join forces and setup the project. SemOP1 was setup as an unaffiliated project, because the coordinators initiated and developed it without institutional support. In an interview, the LIS professor explained that SemOP1 was not granted external funding, had no budget, nor expenditures. Participation was on a volunteer basis, except for the students who received course credit for their participation. The project coordinators and the external library professionals (except for the LIS professor) worked mostly outside regular working hours and used software and hardware either from work, at the different employers' locations, or from home. There were no support staff, no contract or other legal agreements tying anyone or their institutions to the project, and no reporting operations and obligations that would arise if the project had been funded. SemOP1 achieved temporary stability because the coordinators were successful in aligning the interests of the network and making the project work well. The institutions employing the coordinators were neutral, in the sense that they did not exert pressures and expectations on the actors. Thus, they did not respond to the coordinators' ideas with an "anti-program of action" (LATOUR, 1991). They were not asked to take part in the project, because the coordinators knew they were not interested. And because the institutions were not involved, the coordinators did not make any requests to them. The coordinators enjoyed *carte blanche* to set up and work on the project; this was linked to the lack of institutional commitment, which provided them with an opportunity to use network contacts and aggregate many small and distributed resources. Project participants were able to leverage this lack of institutional commitment to their advantage. For example, academic practices, including standards about co-authorship and publication venues, did not influence the choices of the participating faculty member. He chose the collaborators and the subject matter, as well as where and how to publish his work with little concern for academic expectations regarding scientific publications. [32]

If the coordinators had sought financial support in the form of grants, might they have been successful in the Italian context LIS? The accounts of the coordinators

provide a clear perspective on this crucial point. In Italy, LIS is a low priority discipline receiving little or no grant funding, and given the focus of the LIS professor's department subjects (e.g., ancient books and history of libraries), the probability of success for obtaining funding for SemOP1 would have been minimal. As the LIS professor clarified, preparing a proposal is time-consuming and the expected return on labor (e.g., 2,000 euros) does not compensate for the time involved; it is a disincentive to him. For the same reason, the coordinators did not attempt to pursue funding from other national organizations, such as private companies or international organizations (e.g., European Union). When asked about applying for funding to sustain the project in the future, the LIS professor said that the "effort must be worth the trouble," because the application process would be costly and time-consuming. [33]

The constraining role of academic institutions seems to be clear in this respect. Universities constrained the coordinators choices by restraining resource allocation through cumbersome mechanisms that discourage people from applying for funding, because the transaction costs that they should incur (e.g., the time and effort it requires to understand the rules, to find suitable partners, and to write the proposal) far exceed the gains they would obtain. If we add that the SemOP1 did not touch interests perceived as important by universities, the result is the establishment of an unaffiliated project that is not embedded in a network of interdependence among institutions. The project remained standalone, apart from a broader organizational or national strategy. [34]

### 7.1 The opportunity for external expertise

Independence from institutional practices is an element of risk for a project's sustainability, or an element of freedom. SemOP1 participants did not have to conform to rules or institutional requirements, but they did not receive support or legitimacy. However, although all organizations and projects are shaped within environments that pose technical and institutional constraints, we should not downplay the role of individual agency. SemOP1 reveals that individuals can make choices even when the technical and institutional environment does not offer incentives or support. The coordinated activity of individual participants sustains emergent networks; a possible explanation for this is twofold. On one hand, the lack of institutional support limited the organizational capacity of the project and underscored a process of bottom-up mobilization of heterogeneous "things," e.g., from students' enrollment to the use of the departmental server to host the project website. On another hand, this lack of support also afforded the coordinators autonomy from their institutions. Similarly, lack of people who can dedicate time to a project could be an ongoing problem for its sustainability, but this feature also encouraged the core group to create space for other part-time actors who brought their professional expertise to the project and quickly became useful. Because SemOP1 was unaffiliated and lacked full-time staff, this created opportunities for part-time staff, allowing the project to make use of the professional expertise of some collaborators, and to enable novices, e.g., the students, to develop such expertise. An external library professional stated that the emerging and self-organizing nature of the project opened the door to her and

other external library professionals. She appreciated the opportunity of being engaged in the project even though she was not paid for it. [35]

This analysis, my initial claim, that the autonomy and expertise of SemOP1 participants enabled them to compensate for the lack of institutional commitment, created a basis for the joint-work. However, enrolling new actors requires an ongoing process of realignment of interests to keep the order of the network stable, through an ongoing negotiation of actors' identities and modes of interactions. Achieving and maintaining a convergence of interests with new actors is what the coordinators needed to do to ensure the continuity of the project. Taking notice of this dual effect of the lack of institutionalization is critical in order to understand how other spontaneous and autonomous projects involving LIS academics and library professionals can be developed because it influences the type of research conducted (e.g., choice of research topic and recruitment of participants). [36]

## 7.2 Lack of institutional intellectual property

In SemOP1, the coordinators created all the project inscriptions, including the data collection instrument, the spreadsheet with findings, and the publications openly accessible on the project website to increase the visibility of the project and encourage sharing and use. Specifically, coordinators published project inscriptions on the Web, which opens the project. This series of events involved the mobilization of the actors, the literary inscriptions they produced in the course of the project, and the use of these inscriptions as speakers or representatives of the project. Following CALLON (1986), the human and nonhuman actors involved in SemOP1 together with the project inscriptions resulted from the project (e.g., evaluation findings and publications) could form a single spokesperson. The mobilization of these inscriptions served to increase the visibility of the project and motivate other interested library professionals to be involved in future initiatives because they were mobile, immutable, and combinable (LATOUR, 1987). SemOP1 inscriptions are mobile because they are freely available on the Internet; they are immutable because they remain relatively stable over space and time; they are combinable because they can be transformed into other forms of inscriptions (e.g., new data, new journal papers, and a revised checklist). [37]

By sharing these inscriptions, the project is no longer fixed or closed, but open to follow-on collaborations with other LIS professionals and researchers. In ANT terms, these inscriptions turned into actors that borrowed their force from human allies to become representatives of their work. By opening them up to other potentially interested actors, they can be contested and disproved at any time. They can also act at a distance to instigate further problematization and enrollment, as the LIS professor remarked when discussing potential involvement of other librarians and researchers who may say, "Yes, we are interested; we want to collaborate," or "I saw this in an article; tell us what we can do to improve." By sharing inscriptions, anyone with an interest in the project can participate—and that may increase the project's impact, whether it be librarians seeking to improve the search capabilities of their OPACs, or looking at the

details of a method that can enable them to carry out evaluations, or software
developers wishing to provide better software for OPACs. [38]

The lack of institutional intellectual property allowed ownership of data and
documentation less complicated. Since data was produced in an unaffiliated
project without grant funding, data ownership was decided among the project
participants. In SemOP1, the coordinators decided that all project participants
owned the data and that all data and findings should be released to all; they
believed it was beneficial to the project and to the Italian community of LIS
professionals. There was no concern for "free riders," because the coordinators
did not spend efforts on obtaining grant funding and the investment of resources
was limited (BORGMAN, 2007). For them, it was the most logical choice to
release the data and all the other documents to the public. Although an open
discussion among all the project participants on making project materials openly
accessible did not occur, the interviewed students and external library
professionals agreed with this decision, and thought that the project could reach a
larger audience and make the work more visible than it could have been by
appearing in a subscription journal only. [39]

The lack of institutional intellectual property ownership also appears to encourage
this "ethos of sharing." Italy is one of the few countries in the world enacting a
"professor's privilege" system, in which university employees are generally sole
owners of their intellectual property and are not pressured by the university to
protect intellectual property through copyright, licenses, patents, or other
agreements. Professors' privileges allow flexibility to greatly determine the
creation and fate of their intellectual property, which can be important in
collaborative projects. Professors' privileges may also allow universities the
flexibility to reward efforts that bring small benefits to departments, which can be
important in projects with no external funding. However, the lack of institutional
commitment in SemOP1 shows that universities may not act in this direction. [40]

## 8. Conclusion

This analytic project provides an example of how to integrate empirical data with
the substantial meta-theoretical material in ANT and ESA. ANT does not provide
hard and fast rules to "operationalize" the described principles and approaches;
nor does it offer a set of clear rules to guide researchers through the research
process (LAW, 1992). How researchers try to uncover and define which networks
exist in a given setting, how actors translate their ideas and interests, and which
forms these translations take depend on the specific research situation. In this
case study, a concern was to apply data analysis techniques that would be
consistent with the goals of ANT, in that their underpinnings would not conflict
with this framework. Although ANT does not prescribe one data analysis
technique, analysts need to choose methods that allow the identification and
description of the full range of associations among the actors involved in a
project. ESA helps analyze these associations through the identification of
sequences of events. Furthermore, the tools provided by ANT and ESA hold
promise for illuminating complex social processes and harness the explanatory

power of narratives by fostering an explicit deployment of temporal order, connectedness, and unfolding of events, which allows examining closely how entities interact, negotiate, form, contest, and break alliances. ESA forces the researcher to clarify the difference between an antecedent and a causal action by unpacking events into constituent parts and reconstructing analytically the causality from events in a replicable and verifiable manner (GRIFFIN, 1993). ESA extracts a generative model from a narrative indicating how different sequences of events might lead to the same outcome. One of the advantages of ESA and its software companion *Ethno* is illustrating the reasoning processes applied when specifying event prerequisites in the course of linking analysis. By presenting the reasoning behind "why events are, or are not" prerequisites for one another, the diagram produced via *Ethno* is a summary device that reveals broader implications. [41]

As noted in the introduction, it is beyond the scope of this article to address all the implications of the suggested combination of ANT and ESA. Further debate and work are necessary. I contend that the conceptual resources of ANT may highlight the socio-material construction processes involved in social phenomena to it possible to unpack heterogeneous associations of human and nonhuman actors involved in events. In this respect, ESA helps ANT weave together humans and nonhumans in a narrative[6]. As the case study shows, each event is a single unit comprising human and nonhuman entities linked to one another, with their respective interests at stake. Each event is seen as a contingent process involving negotiations between people, who can be creators or sponsors of an event, or users of an entity, and nonhuman entities represented by their delegates, each holding different interests in a specific situation. The articulation of actors' interests can be problematic because ANT does not provide guidelines on how to identify stakeholders in a specific context in the first place (POULOUDI, GANDECHA, ATKINSON & PAPAZAFEIROPOULOU, 2004). According to VIDGEN and McMASTER (1996), LATOUR (1987, p.109) does not assume that the identification of interests poses problems, or that interests are defined as *inter-èsse* (I.e., "in-between" in Latin). This view is problematic because it suggests the objective existence of goals that trigger the interests of actors and effect their actions, rather than seeing goals and interests as being constructed and accomplished through activities (VIDGEN & MCMASTER, 1996). A conceptual framework is needed to understand and describe how interests mediate between actors' goals and activities, and how they are being transformed through these activities. A conceptual approach that allows the analysis of interests beyond their discursive and material dimensions can help capture their relational enactment in the construction and transformation of network activities. [42]

---

6   LATOUR (1991, p.111) lamented that the lack of a narrative resource was the main difficulty in
    weaving technology and society together.

## Acknowledgments

## References

Abbott, Andrew (1990). Conceptions of time and events in social science methods: Causal and narrative approaches. *Historical Methods*, *23*, 140-150.

Abbott, Andrew (1992). From causes to events: Notes on narrative positivism. *Sociological Methods & Research*, *20*, 428-455.

Abrams, Philip (1982). *Historical sociology*. Ithaca, NY: Cornell University Press.

Austrin, Terry & Farnsworth, John (2005). Hybrid genres: Fieldwork, detection and the method of Bruno Latour. *Qualitative Research*, *5*, 147-165.

Borgman, Christine L. (2007). *Scholarship in the digital age: Information, infrastructure, and the internet*. Cambridge, MA: MIT Press.

Büthe, Tim (2002). Taking temporality seriously: Modeling history and the use of narratives as evidence. *American Political Science Review*, *96*, 481-493.

Callon, Michel (1986). Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St Brieuc bay. In John Law (Ed.), *Power, action and belief: A new sociology of knowledge?* (pp.196-233). London: Routledge & Kegan.

Callon, Michel (1991). Techno economic networks and irreversibility. In John Law (Ed.), *A sociology of monsters: Essays on power, technology and domination* (pp.132-161). London: Routledge & Kegan.

Callon, Michel (2005). Why virtualism paves the way to political impotence: A reply to Daniel Miller's critique of the *laws of the markets*. *Economic Sociology: European Electronic Newsletter*, *6*, 3-20.

Franzosi, Roberto (2004). *From words to numbers: Narrative, data, and social science*. New York, NY: Cambridge University Press.

Giddens, Anthony (1979). *Central problems in social theory*. Berkeley, CA: University of California Press.

Griffin, Larry J. (1993). Narrative, event-structure analysis and causal interpretation in historical sociology. *American Journal of Sociology*, *98*, 1094-1133.

Griffin, Larry J. (2007). Historical sociology, narrative and event-structure analysis: Fifteen years later. *Sociologica*, *3*, doi: 10.2383/25956, http://www.sociologica.mulino.it/journal/article/index/Article/Journal:ARTICLE:118/Item/Journal:ART ICLE:118 [Date of access: August 17, 2010].

Hager, Mark A. (1998). Event structure analysis as a tool for understanding organizational life histories. Prepared for Presentation at *1998 Annual Meetings of the Association for Research on Nonprofit Organizations and Voluntary Action, November 5-7. Seattle, WA*.

Heise, David R. (1988). Computer analysis of cultural structures. *Social Science Computer Review*, *6*, 183-196.

Heise, David R. (1989). Modeling event structures. *Journal of Mathematical Sociology*, *14*, 139-169.

Heise, David R. (1991). Event structure analysis: A qualitative model of quantitative research. In Nigel Fielding & Raymond Lee (Eds.), *Using computers in qualitative research* (pp.136-163). Newbury Park, CA: Sage.

Heise, David R. (2005). *Event structure analysis—A short ETHNO tutorial*. David R. Heise's World Wide Web site at Indiana University, Bloomington, IN, http://www.indiana.edu/~socpsy/ESA/Tutorial.html [Date of access: August 10, 2010].

Heise, David R. (2007). *Event structure analysis*. David R. Heise's World Wide Web site at Indiana University, Bloomington, IN, http://www.indiana.edu/~socpsy/ESA/EthnoHelp.pdf [Date of access: August 10, 2010].

Heise, David R. & Durig, Alex (1997). A frame for organizational actions and macroactions. *Journal of Mathematical Sociology*, *22*, 95-123.

Latour, Bruno (1987). *Science in action: How to follow scientists and engineers through society*. Cambridge, MA: Harvard University Press.

Latour, Bruno (1991). Technology is society made durable. In John Law (Ed.), *A sociology of monsters: Essays on power, technology and domination* (pp.103-131). London: Routledge & Kegan.

Latour, Bruno (1993). *We have never been modern*. London: Harvester Wheatsheaf.

Latour, Bruno (1996). On actor-network theory. A few clarifications. *Soziale Welt*, *47*, 369-381.

Latour, Bruno (1999). On recalling ANT. In John Law & John Hassard (Eds), *Actor-network theory and after* (pp.15-25). Oxford: Blackwell.

Latour, Bruno (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford, UK: Oxford University Press.

Latour, Bruno; Mauguin, Philippe & Teil, Geneviève (1992). A note on sociotechnical graphs. *Social Studies of Science, 22*, 33-57.

Law, John (1992). *Notes on the theory of the actor network: Ordering, strategy and heterogeneity*. Centre for Science Studies, Lancaster University, Lancaster LA1 4YN, UK, http://www.comp.lancs.ac.uk/sociology/papers/Law-Notes-on-ANT.pdf [Date of access: January 20, 2010].

Law, John (1999). After ANT: Complexity, naming and topology. In John Law & John Hassard (Eds), *Actor-network theory and after* (pp.1-14). Oxford: Blackwell.

Law, John (2001). *Networks, relations, cyborgs: On the social study of technology*. Centre for Science Studies, Lancaster University, Lancaster LA1 4YN, UK, http://www.comp.lancs.ac.uk/sociology/papers/Law-Networks-Relations-Cyborgs.pdf [Date of access: January 12, 2011].

Law, John & Callon, Michel (1992). The life and death of an aircraft: A network analysis of technical change. In Wiebe E. Bijker & John Law (Eds.), *Shaping technology/building society: Studies in sociotechnical change* (pp.21-52). Cambridge, MA: MIT Press.

Ponti, Marisa (2010a). Sociotechnical influences on virtual research environments. *International Journal of e-Collaboration (IJeC)*, *6*(2), 33-44.

Ponti, Marisa (2010b). Actors in collaboration: Sociotechnical influence on practice-research collaboration. *Doctoral dissertation, Valfrid Series n. 43*, Borås, Sweden: Valfrid, http://gupea.ub.gu.se/handle/2077/22135.

Pouloudi, Athanasia; Gandecha, Reshma; Atkinson, Christopher & Papazafeiropoulou, Anastasia (2004). How stakeholder analysis can be mobilized with actor network theory to identify actors. In Bonnie Kaplan, Duane P. Truex III, David Wastell, Trevor Wood-Harper & Janice I. DeGross (Eds.)*, Information systems research: Relevant theory and informed practice* (pp.705-710). Boston, MA: Kluwer.

Sonnenwald, Diane H. (2007). Scientific collaboration: A synthesis of challenges and strategies. *Annual Review of Information Science and Technology*, *41*, 643-681.

Stone, Lawrence (1979). The revival of narrative: Reflections on a new old history. *Past and Present*, *85*, 3-24.

Tedd, L. A. (1993). *An introduction to computer-based library systems*. New York: Wiley.

Vidgen, Richard & McMaster, Tom (1996). Black-boxes, nonhuman stakeholders and the translation of IT through mediation. In Wanda J. Orlikowski, Geoff Walsham, Matthew R. Jones & Janice I.DeGross (Eds.), *Information technology and changes in organisational work* (pp.250-271)*.* London: Chapman and Hall.

Walsham, Geoff (1997). Actor-network theory and IS research: Current status and future prospects. In Allen S. Lee, Jonathan Liebenau & Janice I. DeGross (Eds.)*, Information systems and qualitative research* (pp.466-480). London: Chapman and Hall.

## Author

*Marisa PONTI* (Ph.D., University of Gothenburg) is Senior Lecturer in the Department of Applied Information Technology, Chalmers University of Technology I University of Gothenburg. Her intellectual interests include digital media and collaboration in education and science, virtual ethnography, actor-network theory

Contact:

Marisa Ponti (Ph.D. University of Gothenburg)

Department of Applied Information Technology Chalmers University of Technology I University of Gothenburg
SE-412 96 Göteborg
Sweden

Tel. : +4631 7726033

E-mail: marisa.ponti@ituniv.se
URL:
http://www.ait.gu.se/english/contact/staff/maris a-ponti/

## Citation