4. Theoretical perspectives on technology, information and knowledge.

This chapter first presents the traditional distinction between a “voluntaristic” and a “deterministic” conceptual framework. Next, a social constructivist conceptual framework is incorporated into the understanding of the interaction between “the social” and “the technical.” An argument is made for understanding technology as an interaction, where technology as a political artifact is given explanatory power.
The concepts of knowledge, information and data are then analysed. Information is defined contextually in relation to knowledge in an area. Against this background, a sociological and political understanding of information and knowledge is included, where knowledge is seen in relation to institutionalisation processes in society but also as a resource of influence.

1.1 PERSPECTIVES ON THE CONCEPT OF TECHNOLOGY.

When the concept of technology is considered in relation to society, two positions are traditionally defined.

The first position operates with an understanding where technological research is carried out centrally at universities and in laboratories as basic research, after which these are neutrally put to use decentrally and by others. This position views technology as a neutral good that must be put to use in the “service of society”. Technical development is described and analysed on the basis of its own development logic, and technical innovations are seen as the primary source of societal change. This view of technology is clearly reflected in the state’s policy publications, where technology is explained functionally. This is a normative understanding in the sense that technical development in itself is seen as a good with positive effects for society as a whole. In this position, technology is chosen rationally on the basis of an assessment of whether the technology contributes to better goal achievement in relation to the functions of a system. The position has thus been said to have a voluntary element.

In the second position, both technological development and the application of new technology are seen as determined by economic and political conditions in society. This position has primarily drawn inspiration from Marxist movements in the 1960s and 1970s. The overall political and economic logic is extended to include technological development. The economic “rules of the game” determine development, including decisions regarding information technology.98

[98] This view can be placed within the capital logic paradigm. See Hans Jürgen Mendner (1976), who shows that how capitalist development imposes a specific course of development on the labor process.

In the two above-mentioned positions, which can be characterized as being based on a voluntarist and determinist view respectively, technology is not attributed explanatory power. The two positions appear in boxes 1 and 2 in Figure 4.1.

Theoretical position / **Perspective on technology**	**Voluntarism**	**Determinism**	**Contextualism/non-reductive**
Technology is not an explanatory e factor	1. Traditional theory (Finkelstein, Date)	2. “Structural determination ism” (Mendner)	3. The “Reinforcement” thesis (Danzig)
Technology as explanatory e factor	4.”Technology-e"	5. “Technology determinism” (Ellul)	Optimism 6. The “social” and the “technical” in an interaction relationship. (Bijker, Winner)

Figure **4-Error! Unknown argument for parameter. Overview** of theoretical positions divided by perspective on technology.

In Figure 4.1, a deterministic and voluntarist position is further distinguished, where technology is given explanatory power, cf. boxes 4 and 5. The position designated as technological optimism in box 4 has gradually slipped out of sight. This view is included because it is often forgotten that historically there has been a perception of technology as liberating. This view has been central since the industrial revolution and well into this century. Thus, the following formulation of technology appeared in 1877: “Technology must be perceived as an extension of our organs; with the help of these “extensions” we gain the opportunity to develop ourselves intellectually, morally and culturally. We acquire the opportunity to approach the utopias of human life.”99

Theoretical positions in this category can be seen in contrast to a more uncertain and hesitant attitude towards the possibilities of technology today.

If we consider the position designated as technological determinism in box 5, the perspective is turned 180 degrees. As in the technological optimism position, the focus is on the impact of technology on society, etc., but emphasis is placed on how technology leads to a “rational-instrumental” dominance. Ellul is an important representative here.100 Technology here constitutes a self-determining closed circle, and every problem created by technology is sought to be solved technically. This phenomenon is covered by the concept of “technique”: “The term technique, (...) does not mean machines, technology, in this or that procedure for attaining an end. In our technological society, technique is the totality of methods rationally arrived at (...) in every field of human activity”.101 According to Ellul, the technological society can be characterized by processes that are causally determined by “technique” and not governed by end goals.

Value issues and human control are not possible for Ellul. Explanations of technology from this perspective have gradually been taken off the table. The position does not provide concepts for either contextual interpretation or explanation according to the overall methodological starting point presented in chapter two.

~~The distinction between voluntarism~~ and determinism is considered too narrow in the present context. In Figure 4.1. a third theoretical perspective is thus distinguished - contextualism. By contextualism here is meant that technology is not explained on the basis of the

[99] Siggaard & Jensen, 1986, p. 11.
[100] Ellul, 1964.
[101] Ibid., p. 7.

human will or with reference to structural laws. Instead, the starting point is that technology must be understood based on interaction rooted in a social and political context. Furthermore, contextualism emphasizes that reductionist explanations cannot be used but instead that technology is determined by a number of contingent factors. Contextualism is in this context primarily a methodological perspective with a focus on the contingent nature of technology.

In box 3 I have placed the “reinforcement” position represented by Danziger.102 Like the positions in box 2, the focus is on structural conditions, but unlike the structural determinism in box 2, the level of ambition is lowered with regard to explanatory power.
There is a greater emphasis on information technology in relation to political processes in administration. It is assumed that there is a dominant coalition in a given political-administrative system:

> "This approach posits that there is a dominant interest or dominant coalition in any given local government. And the central assumption for reinforcement politics is that a resource like computing will primarily serve the interests of the dominant coalition, regardless of who controls the computing resources (...) Hence computing will reinforce the power and influence of those actors and groups who already have the most resources and power in the organization”103

This theoretical position is perceived as a contextual non-reductionist theoretical contribution, as influence on technology adoption is considered contingent in relation to existing positions of power.

The “Reinforcement” thesis was developed on the basis of studies of computer use in American state administrations. The results of this study showed that computer introduction led to a reinforcement of existing power structures via structural coupling between decisions about technological change and existing authoritative structures. Which group was favored was thus conditioned by the transformation of existing power relations.
It can thus be traditional hierarchical positions of power, the power position of a technical elite or other power factions in administrations.

In this perspective, the introduction of information technology is related exclusively to power interests in administrations. Explanations of technology introduction are reduced to effects of existing power positions. Technology is taken for granted here as a dependent variable to be explained. In relation to the CVR case, power positions are central, but I find that these explanations can only act as partial explanations.

Within contextualism, a social constructivist theoretical framework is presented in box 6. This position primarily stems from a critique of the positions of structural determinism and technological determinism in boxes 2 and 5, respectively. Social constructivism generally distances itself from “mono-causal” explanations, where either “the social” or “the technical” is designated as the “effective cause” to explain technology: “Speaking about “effects” or “consequences” of technology is highly problematic. Depending on specific contexts and conjectures technology is both cause and consequence; determining and determined.”104
Technology cannot therefore be conceptualized as being conditioned by, for example, power or a given economic rationality.

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[102] Danziger, et al., 1982.
[103] Ibid. p. 18.
[104] Donk & Meyer, 1994, p. 5.

Instead, a contextual perspective on technology is recommended, where “the technological” and “the social” should be considered in an interaction and “coevolution” perspective: “There is a dynamic interaction and coevolution between technological and social “systems”.105

In other words, technology is constructed in interaction between many different actors. With this in mind, it is recommended to focus on interaction and to a lesser extent on “technology”.
Trevor Pinch and Wiebe Bijker have introduced the concept of “the seamless Web”. [106] With this concept, technology and society are considered as a “web” or “network”, where it is impossible to separate the “technology” from the social context. Against this background, Pinch has introduced the concept of “technological frame”. With this concept, the intention is to capture how artifacts are constructed in concrete social contexts:

> "The concept of "technological frame" is intended to apply to the interactions between various actors. Thus it is not an individual characteristic, nor the characteristics of systems or institutions; frames are located between actors, not *in* actors or *above* actors. (...) A technological frame is built up when interaction around an artifact starts and continues”107

Central to the issue is this position's focus on knowledge and its central role in relation to the concept of technological framework. This is not only explicit knowledge but also everyday knowledge that is not necessarily or cannot be expressed explicitly: “a technological frame (is) a combination of current theories, tacit knowledge, engineering practices such as design methods and criteria, specialized testing procedures, goals, and also handling and using practice”.108

With this starting point, the concept of “interpretation flexibility” is introduced. This concept aims to capture the fact that technology can be constructed and interpreted in widely different ways:

> "Technological artifacts are culturally constructed and interpreted ... By this we mean not only that there is a flexibility in how people think of or interpret artifacts, but also that there is flexibility in how artifacts are designed. There is not just one way or one possible way or one best way of designing an artifact”109

The quote shows the concept of artifact as central within this position. The concept of artifacts is used for technology when it is given meaning in a specific social interaction relationship. In relation to the CVR case, the five models are thus considered artifacts. The models are part of collective meaning-making in communication in the administration.

A final central element is the concept of “closure.” This concept analyzes how interpretive flexibility disappears or ceases:

> "Closure, in the analysis of technology, means that the interpretive flexibility of an artifact diminishes. Consensus among the different relevant social groups about the dominant meaning of an artifact emerges and the pluralism of artifacts decreases... it is important to recognize that the closure is almost irreversible".110

A more specific definition of the method for analyzing technology will be presented in Chapter 6, where an actual operationalization is made for the analysis of the CVR case.

If the models presented in chapter two are considered as artifacts, the negotiations leading up to the adoption of the CVR Act can be seen as a series of different interpretations of how such a system should be built. There is not just one possible way to design this system. Relevant

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105 Ibid.

106 Bijker & Pinch, 1987, p. 30.

107 Bijker, 1990, p. 123.

108 Ibid. p. 119.

109 Bijker & Pinch, 1987, p. 40.

110 Bijker, 1990, p. 93.

Social groups here are ministries, each of which has an interpretation of the CVR considered as an artifact. Closing the interpretative flexibility is established with the CVR Act.

The problem with this theoretical position is the lack of focus on power and influence.
This criticism can be said to be formulated by Danziger's “reinforcement” thesis in box 4.
The problem with this position is a lack of conceptualization of technology.

More specifically, social constructivism can be criticized for not allowing all interpretations to be expressed. There is no flexibility in the interpretation, and thus a lack of conceptualization of how certain groups have greater influence on the interpretation and thus on the construction of artifacts.111 A similar criticism is formulated by Langdon Winner. The focus here is on the concept of “relevant social group”. The concept is taken from a pluralistic conceptual framework. A general criticism of this framework is, among other things, formulated via “non-decisions” by Bachrach and Baratz.112 There are decisions that are never accessed or put on the agenda. According to Winner, the consequence of social constructivism is that differences in power and influence cannot be conceptualized, whereby social constructivism is conservative at its core113:

> "By noticing which issues are never (or rarely) articulated or legitimized, observing which groups are consistently excluded from power, one begins to understand the enduring social structure upon which more obvious kinds of political behavior rest. Failing to do this, social scientists offer an account of politics and society that is implicitly conservative, an account that attends to the needs and machinations of the powerful as if that were all that mattered"114

Winner is often placed together with Ellul and Marcuse in box 5.115 I believe that Winner's contribution is thus mistakenly reduced to a “technological deterministic position” in which technology is designated as the effective cause. With the introduction of the concept of contextualism, I will place Winner as a central theorist in this context, as he is able to conceptualize technology as a political artifact.

The concept of political artifacts is used for technology when it is given meaning in interactional relationships in a political context. The concept of politics will be discussed in the following chapter. Considering Winner's position in relation to the "reinforcement" thesis, it is true that Winner is able to thematize variations in the design of technology. Considering the issues raised via the "reinforcement" thesis, these do not differ from other policy areas.

In his critique of Danziger’s position but also of the traditional conceptualization of technology use, Winner uses the concept of “sleepwalking” to characterize theoretical efforts to understand the social and political structuring properties of technology.116 Winner argues that the perspective in traditional technology theories has been limited by “making and use”. This is the case, among other things, in the traditional understanding of technology in section 1, where a distinction is made between a production and user perspective. In the production perspective, only a narrow group of researchers, technicians, etc. are seen as producing the technology. In the user perspective, technology is seen only as instrumental devices that lead to improved “performance” in already known areas. According to Winner, the conventional understanding of technology as neutral must be replaced by an understanding that focuses on how technology structures human activities:

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111 Hunter, 1995, p. 24.
112 Bachrach & Baratz, 1962.
113 This issue will be addressed later in the following chapter on administration.
114 Winner, 1992, p. 369.
115 Andersen, et al. 1994, Donk & Meyer, 1994.
116 Winner, 1986, p. 9.

> "The crucial weakness of the conventional idea is that it disregards the many ways in which technologies provide structure for human activity. Since according to accepted wisdom, patterns that take shape in the sphere of "making" are of interest to practitioners alone, and since the very essence of "use" is its occasional innocuous, nonstructuring occurrence, any further questioning seems irrelevant. If the experience of modern society shows us anything, however, it is that technologies are not merely aids to human activity, but also powerful forces acting to reshape that activity and its meaning."
> [117]

The instrumental and functional understanding of technology does not help us when the technology is placed in a concrete practice. The consequence of operating solely on this basis is that unintended side effects are not conceptualized. These side effects become apparent in the concrete practice: “later does the broader significance of the choice become clear, typically as a series of surprising “side effects” or “secondary consequences””.118

Winner's criticism is that technology as a political artifact is not given explanatory power. In relation to Danziger and the social constructivist position, his criticism is, in other words, that technology has been analyzed as a simple cause-effect relationship, where technology is assigned the role of the dependent variable caused by power in administration. What I want to focus on in this context is Winner's recommendation of a historical perspective, where technology is analyzed with a focus on how technology is given and provides structure in political contexts by some groups having greater influence on the design of technology than others.

The problem with the above positions is that there is a lack of focus on the distinctiveness of information technology. Following Winner, the claim here is that information systems as a form of technology differ radically from other forms of technology. Information systems can be considered as forms of technology that enable the materialization of knowledge. Against this background, the question of technology becomes not only a question of existing positions of power as in Danziger and not only a question of the design of concrete artifacts as in Pinch and Bijker and Winner. To shed light on this issue, I will first discuss the concepts of data, knowledge and information and then approach a conceptualization of the knowledge issue.

1.2 DATA, INFORMATION AND KNOWLEDGE

In the introduction, the following definition of information systems was introduced: acquisition, storage, processing and transmission of information. The problem with this definition is that it only conceptualizes the functions of an information system. “Data”, “information” and “knowledge” are concepts that are often taken for granted.

This was particularly pronounced in the traditional technology paradigm of “Management Information Systems”, where an instrumental understanding of data, information and knowledge is used exclusively. In this paradigm, the figure below is often used to depict the perception of data, information and knowledge. This perception has been criticized for operating with a perception of data and information in a database as an “objective” picture of “reality”.119. Winograd and Flores and Dahl/Mathissen criticize the assumed rationalist scientific position in this paradigm. Nurminen criticizes that only “facts” and not “values” are represented.

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[117] Ibid. p. 6.

[118] Ibid. p.9.

[119] Winograd & Flores, 1985, p. 17, Nurminen, 1988, p. 52. Dahlbom & Mathiasen, 1993, p. 9.

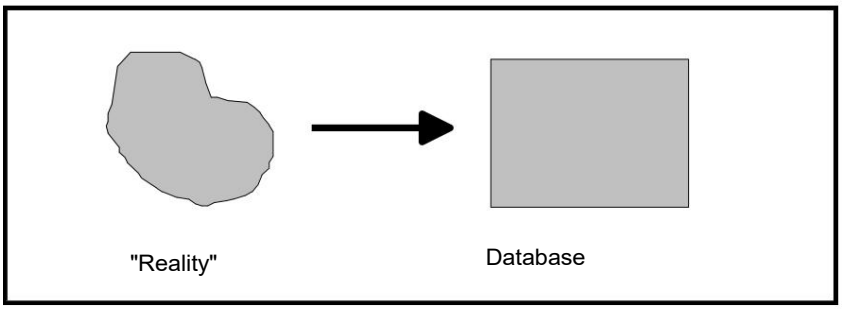

Figure **4-Error! Unknown argument for parameter.** Traditional view of data as 'objective picture' of 'reality'

Important in this context is to define data and information in relation to the context in which they are included. Thus, I will use a definition of the concept of information in contrast to the concept of data. Data is defined as physical quantities and is context-independent. Information will be defined as context-dependent and conventionally determined. Per Flensburg has formulated this precisely as a problem in relation to meaning, interpretation and action:

> "Data (are) symbols without any meaning. Data processing involves the manipulation of these symbols according to strict formal rules. This is what computers can be used for. Data that is placed in a syntactic structure provides information that is interpreted in different contexts by a person and leads to certain actions being carried out. Which actions depend on the interpretation and thus also on the knowledge that is associated with information" 120

As can be seen, it is central that the concept of information is related to actions that rely on the interpretation of data (data is transformed into information). The social and political context of data or, more broadly, signs is important. Equally important, however, is that they represent something. Data represents objects and conditions. For example, businesses are represented by industry, name, address, telephone number, etc. When this data is considered in a context and thus as information, it expresses a perception of the "world" seen in relation to the individual administration. In other words, information is considered part of the knowledge that the administration brings in symbolic linguistic form and uses to orient and understand itself in relation to a given area. The administration's data can thus be said to express its "worldview". Data considered as information will thus be perceived as knowledge in an area that can be brought into a syntactic-formal structure. In other words, information can be considered as a limited section of the "language".

Similar considerations have been made by Boisot121. The analytical framework established by Boisot aims to view data and information in a dynamic perspective, where a bridge is built between the study of concrete physical data and the study of how these take shape in social and political practice:

> "The analysis of data flows and of their institutionalization builds a bridge between the study of tangible objects and the study of meanings. As such it provides a foundation for what Giddens refers to as the process of structuring"122

Boisot takes as its starting point a widespread criticism of the representation paradigm within AI research, which sees human processing of data from a mechanical perspective. In this perspective, intelligence consists partly of representing "objects in the world" and partly of operations performed on these representations. This problem is analogous to the problem of representing reality as data described above. In contrast to the mechanical

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[120] Flensburg, 1987, p.108.
[121] Boisot, 1995.
[122] Boisot, 1995, see

representation model, Boisot's conceptual framework focuses on how data is shaped and processed:

> "How is data extracted from data by human information processing agents? Man intercepts data from his external environment in such a way that if it is subsequently processes, it acts upon him informationally rather than mechanically. Data processing is subject to two distinct yet interrelated economizing strategies"123

It appears that Boisot, in contrast to the mechanical representation model, emphasizes that a selection occurs when reality is perceived. This selection of data is determined contextually. Boisot characterizes the contextual determination by two strategies.
The strategies are coding and abstraction, respectively. The first concept, coding, is a context-specific selection of data and thus information and organizes sensory data into sensory categories. These categories are organized via abstraction into concepts. With a set of concepts and sensory categories, generalizations can then be made according to Boisot's concepts. With generalizations as a combination of sensory data categories and abstract concepts, data can then be used with specific goals in mind.

Coding is defined via selection from a repertoire of possibilities. Through selection, sensory data categories are organized:

> "The first coding, is an act of selection from a repertoire of possibilities that is performed with varying degrees of efficiency. Such coding organizes sense data into perceptual categories."124

The second concept Boisot uses is abstraction. The concept is defined as the economization of sensory categories. With the concepts of coding and abstraction, generalization is defined as a connection of abstract concepts and sensory data categories:

> "Abstaction leads to generalization, a process that links together ostensibly different categories, whether these are perceptual or conceptual, allowing them to be handled for sudden purposes as a single entity."125

In the figure 4.3 below, these processes are illustrated graphically. The figure also introduces the concept of time, marked by arrows. We start with the concrete sensory data that is perceived. By combining what is perceived with already abstract concepts and sensory categories, existing abstract concepts are formed.

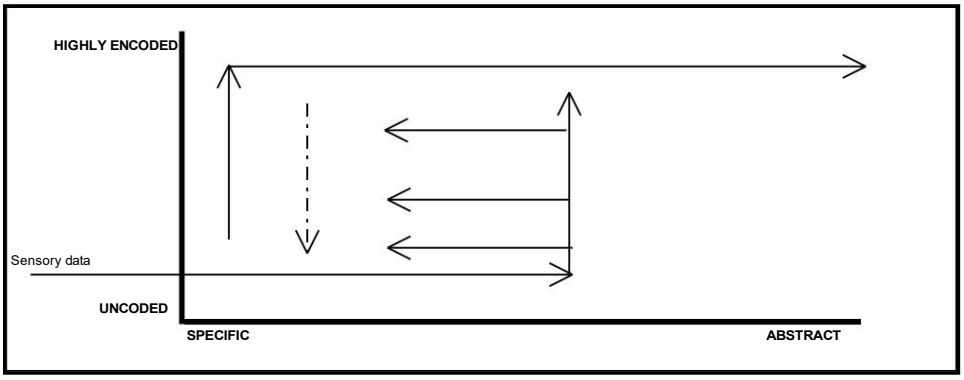

Figure **4-Error! Unknown argument for parameter.** Coding and abstraction spanned by abstract/ concrete and uncoded/highly coded.

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[123] Boisot, 1995, p. 39.
[124] Boisot, 1995, p. 39.
[125] Boisot, 1995, p. 39.

Of interest in the present context is of course the coding and abstraction that takes place in relation to administration. As abstract objects, administration operates with companies, people, buildings, etc., all of which gain renewed meaning with the use of information systems, as these abstract concepts can be brought into concrete form as artifacts.
This is marked by the arrow pointing downwards in the figure.

As an example of abstract concepts in relation to the CVR, legal entity and production unit appear as objects with properties, where the interest is directed towards the company as an object that must pay tax, VAT, customs duties, etc. In statistical contexts, it is the counts and analyses of companies that are of interest.

If we consider information technology in the model in Figure 4.3, it takes on a central role in relation to communication and information storage technologies of the past. Through the use of this technology, it is possible to materialize knowledge to an extent that has not been possible before. With this model, an alternative has been formulated to a simple mechanical understanding, where information is simply seen as a mirror image of reality.

In the above, the traditional view of information as a representation of reality is problematized. Via Boisot's concepts of coding and abstraction, information can be understood as artifacts. An attempt has been made to build a bridge between the study of concrete physical data and the study of how these take shape in a social and political practice. The central issue now becomes which information and thus which knowledge is shaped as elements in a political and social context.

1.3 INFORMATION AND KNOWLEDGE IN A SOCIOLOGICAL PERSPECTIVE.

The issue of information is viewed in this section not only from a philosophical perspective as above but from a broader sociological perspective of knowledge. In this perspective, the focus is on knowledge as a phenomenon that cannot simply be considered as a residual in relation to society but which plays a central role in relation to society's institutions. This will be done based on Daniel Bell's theory of the post-industrial society and later with the inclusion of Berger & Luckman's sociological position of knowledge. Against this background, it is possible to conceptualize how knowledge is institutionalized in society.

Knowledge viewed from Bell's perspective

Daniel Bell126 is probably one of the first theorists to have specifically focused on data, information and knowledge as essential characteristics of modern society, including his major work *The Coming of Postindustrial Society.127*

Important in relation to my problem is Bell's observation of theoretical knowledge as a central element in the organization of society. With the distinction between industrial and post-industrial society, Bell states:

> "Industrial society is the coordination of machines and men for the production of goods. Post-industrial society is organized around knowledge, for the purpose of social control and the directing of innovation and change; and this in turn gives rise to new social relationships and new structures, which have to be managed politically"128

For Bell, information technology is thus secondary to the concept of the post-industrial society or the information society. In other words, according to Bell, we cannot

[126] Bell, 1973.
[127] Bell, 1973.
[128] Bell, 1973, p. 20.

examine information technology without first determining what kind of society needs this technology.

Form of society:	Resources	Technology
Pre-industrial society	Raw materials	Crafts
Industrial society	Financial capital	Machine technology
Post-industrial society	Knowledge	Intellectual technology.

Figure **4-Error! Unknown argument for parameter.** Overview of Daniel Bell's placement of strategic resources and technology in relation to social form.

Figure 4.4 shows an overview of Bell's placement of strategic resources and technology in relation to social form. Bell contrasts the post-industrial society with the industrial society by the following main characteristics:

1. Transition from an economy based on the sale of agricultural and industrial products to a service economy based on knowledge.
2. In industrial societies, the main occupation was 'processing nature'. In post-industrial societies, society is about processing knowledge and information.

Information is defined at Bell as:

> 'By information I mean data processing in the broadest sense: the storage, retrieval and processing of data become the most important resources in all economic and social exchanges'129

Bell defines knowledge as:

> "By knowledge I understand an organized set of statements about facts or ideas, (....) which are conveyed to others through a communication medium in a systematic form. I thus delimit knowledge from news or entertainment. Knowledge consists of assessments (research or studies) or presentation of old assessments (textbooks, teaching and library and archival materials)"130

Bell bases the distinction between industrial and post-industrial societies on a "quantitative finding" of shifts in employment from primary and secondary occupations to service occupations.
As an innovation in this shift, Bell notes the introduction of methods for handling theoretical knowledge as well as the development of technology that can handle this knowledge.

The problem with Bell's position in relation to my overall methodological starting point is that he uses knowledge as an independent variable. He thus does not capture the interaction between knowledge and other determinants. He is thereby unable to conceptualize how the shaping of information technology and the distribution of information are also conditioned by phenomena of power and influence. Thus, it is a reductionist conceptual framework. If the concepts of power and influence are brought into relation to Bell's concepts, the distinction between industrial and post-industrial society must be considered questionable, since phenomena of power and influence cannot be said to have disappeared with the transition from industrial production to service production.

Hans Siggaard Jensen and Ole Skovsmose131 have attempted to "dig a sod deeper" in an attempt to arrive at a better conceptualization of information technology in relation to

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[129] Bell, 1973, p. 20.

[130] Bell, 1987, p.19.

[131] Jensen and Skovsmose, 1986, pp. 57 ff.

other forms of technology. They introduce the following typology: 1. tools, 2. energy technology, 3. social technologies and 4. information technologies.

First, we distance ourselves from defining technology narrowly as a tool, as this only includes computer screens, networks, hardware, software, etc. This is too narrow to fill out the concept of technology. The concept of technology in this sense is the traditional one, where technology is inserted as a human-nature relationship. Through the production of tools, humans gain power over nature. This is characteristic of tools and energy technology and to some extent social technologies such as the clock.

In terms of information technology, information can be viewed in two ways. There can be theories of information as concrete objects materialized as data in the form of bits on a wide variety of media, and information viewed as elements that are communicated and given meaning and significance in a social context. The first view of information is based on the “Information Theory”, founded by Claude E.
Shannon. In the article "A Mathematical Theory of Communication" he operates with a concept of information that focuses only on the statistical properties of a message:

> "The term information refers to the transmitted messages: voice or music transmitted by telephone or radio, images transmitted by television systems, digital data in computer systems and networks, and even nerve impulses in living organisms"132

What is characteristic of information theory is that it disregards the content.
“Having information about something” is ignored. Furthermore, the fact that information technology is part of human-made relationships, as information serves as a means of communication, is ignored. Purpose and intentions play an important role. For example, receiving information enables a person to make an assessment, make a choice and rule out alternatives.

Depending on the theoretical position, information technology and thus information have been treated differently. This also applies to information systems. An information system cannot be explained as simple tools that are part of the human-nature relationship. Data are physical quantities, but at the same time information as the materialization of knowledge is placed in a social context. Against this background, I will adopt a sociological perspective on information systems.

A sociological perspective on knowledge.

In the sociological conceptualization of knowledge, knowledge is defined as more than facts in a systematic form. In this approach, the focus is on everything that passes for knowledge in society. With this starting point, Berger and Luckman have developed the concept of socially constructed reality:

> “... a sociology of knowledge must deal with everything that passes for “knowledge” in a society, without taking into account the status of this “knowledge” as valid or invalid (no matter what criterion is used). And since all human knowledge is developed, transmitted and maintained in social situations, the sociology of knowledge must seek to understand the processes by which this happens in such a way that a self-evident “reality” solidifies for the man in the street. We claim, in other words, that a sociology of knowledge deals with the socially created reality.”133

In a sociological perspective, everyday knowledge is understood phenomenologically. Knowledge is considered as objectifications of subjective processes. In a more precise definition of objectifications seen in relation to human expressivity, it is said:

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132 Microsoft Encarta, “Information theory”
133 Ibid. p. 15.

> "Human expressiveness can be objectified, that is, it manifests itself in the products of human activity that are accessible to both producers and others as parts of a common world. Such objectifications register, more or less precisely, the subjective processes of those who have produced them, and make it possible to understand these processes even if one is not in a face-to-face situation where they can be perceived directly"134

As part of this objectification process, sign formation is included.

> "Signification, i.e. the human production of signs, is a special but particularly important case of objectification. A sign can be distinguished from other objectifications in that it has the expressed purpose of acting as a register of subjective meanings"135

Besides being a catalogue of subjective meanings, a central characteristic of signs is that they are independent of the here and now. This relationship is central to language considered as a sign system:

> "Because language is able to transcend the given "here and now", it can build bridges between different zones within everyday reality and integrate them into a meaningful whole. The transgressions have spatial, temporal and social dimensions"136

With the use of signs, a social store of knowledge is accumulated, which is transmitted from generation to generation. This store of knowledge is drawn upon in our day-to-day actions. With the division of labor in society, further stores of knowledge corresponding to special activities in society are developed. According to Berger and Luckman, an institutional programming takes place: “already in its linguistic basis, this knowledge is indispensable for the institutional programming of these economic activities”137

As an element in the dissemination of this knowledge store, individuals are introduced to specific knowledge areas in society by virtue of assigned roles. This applies not only in a narrow cognitive sense, but also in relation to norms, values, and so on. Through these roles, individuals function as mediators of specialized knowledge stores:

> “With society's historical accumulation of knowledge, we can assume that role-specific knowledge, due to the division of labor, will grow faster than knowledge that is generally relevant and accessible.
> The multiplication of specific tasks that the division of labor entails requires standardized solutions that are easy to learn and transfer. These in turn require specialized knowledge of specific situations and the relations between means and ends by which situations are socially defined. Specialists will always emerge, and each of them must know everything that is judged necessary for him to perform his specific task.”138

In the sociology of knowledge perspective, knowledge distribution is positioned as a necessary element in society's division of labor. As part of the institutional order, roles appear as necessary means of conveying institutionally objectified knowledge collections. Without these "filters," knowledge would flow freely in all directions.

A political-institutional perspective on knowledge

The problem of the distribution of knowledge is, however, not sufficiently elucidated with reference to the division of labor in a given society as described in Berger & Luckman. Boisot emphasizes that knowledge cannot be considered as a homogeneous quantity that is harmoniously placed in relation to the workers of society: “All social systems have their information hoarders and their proselytes; their respective effectiveness will depend on where they are placed in the system and on the institutional resources they command within in”.[139] The spread of knowledge in society is

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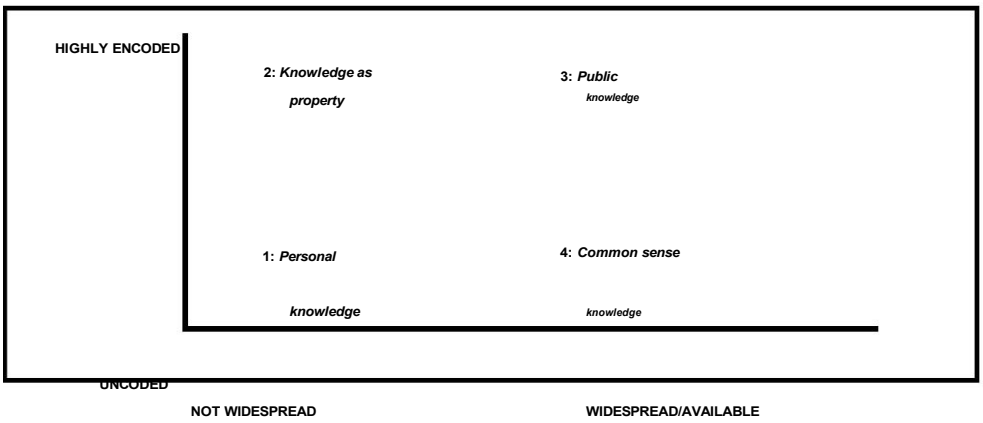
134 Berger and Luckman, 1966, p. 50.
135 Ibid. p. 51.
136 Ibid. p. 55.
137 Ibid. p. 85.
138 Ibid. p. 96.
139 Boisot, 1995, p. 133.

thus, according to Boisot, closely linked to the distribution of power. Power is defined in the traditional pluralist sense.
Based on Figure 4.5, Boisot has developed a typology of knowledge. The typology emerges through the distinctions uncoded/coded and non-widespread/widespread.



~~Figure 4-Error! Unknown argument for parameter.~~ Typology of knowledge.

Public knowledge appears in books, newspapers, etc. A characteristic of public knowledge is that the sender and receiver do not meet. This is anonymity. In relation to the scheme above, public knowledge is characterized by being able to be disseminated, and it is also characterized by a high degree of coding. “Common sense” knowledge, like public knowledge, is spread but does not appear with a high degree of coding. This is context-specific. Personal knowledge is characterized by being difficult to articulate. This is often expressed implicitly via sarcasm, irony, etc. Personal knowledge becomes objectified and can thus overflow into common sense via objectification in habits, culture, etc.
Knowledge as property has undergone coding:

> "We shall call the structured knowledge that emerges from idiosyncratic coding processes 'proprietary knowledge': once codified it becomes in effect technically diffusible but while it continues to reside in a single mind it cannot easily be appropriated by others (...) But where such knowledge does prove to be useful, however, it may now be traded and bargained over.”140

The key thing about knowledge as property, as coded knowledge, is that it can be formulated and has value for others. In relation to power, the key thing is that it can be controlled who gets what knowledge when:

> "Power holders aspire to institutional positions (....) that allow them to filter and regulate the information flows that reach different groups. (.) The potential social utility of new knowledge will often only effectively be exploited therefore where it turns out to be aligned with the personal utility of key power holders where this is expressed in specific institutional practices"141

In conclusion, I will consider knowledge and thus information as linked to institutional positions. “Information flow” is regulated via positions of power. In relation to information responsibility, the above problematizes how information responsibility and thus responsibility for knowledge can be used as a resource of influence in social and political practice.

1.4 SUMMARY

Initially, a distinction was presented in Figure 4.1 between whether technology has an explanatory role or not. Each ~~of these two perspectives on technology~~ was combined with a

[140] Boisot, 1995, p. 149.
[141] Boisot, 1995, p.136.

voluntarist, determinist and contextualist perspectives. This allowed six different theoretical positions to be defined. The use of a social constructivist position was argued for, as this provided a perspective that could understand technology contextually and thus as an interaction between “the social” and “the technical”.
Furthermore, arguments were made for the inclusion of technology understood as a political artifact. In this perspective, technology was assigned explanatory power in political processes.

In relation to the problem, an alternative to technology as “neutral aids” has been formulated. With the concept of artifact, it is possible to consider technology as phenomena that are formed in an interaction between “the social” and the “technical”. With regard to technology used as a
resource of influence, this was problematized by Winner, by defining technology as a political artifact in relation to opinion formation in a political context. The concepts of knowledge, information and data were then analyzed. Information was defined as contextual in contrast to physical data.
With regard to knowledge, Daniel Bell’s view of the information society was included. The problem with Bell’s view was a one-sided focus on the concept of knowledge. As an alternative, Berger & Luckmann’s view of knowledge was introduced. In this framework, it became possible to consider knowledge in relation to institutionalization processes with a focus on opinion formation. This position was criticized by Boisot, who pointed out that knowledge and thus the dissemination of information are conditioned by positions of power. This emphasized that information can be used as a resource of influence.

With this opening line, the next step will be to examine how technology and information, understood as artifacts, enter management as central elements when introducing integrated information systems.