Information Shaping During Data Flows in Professional Kitchen Processes

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1. INTRODUCTION

Organisational knowledge include a documented part – as tools and documents – and a tacit component, which resides in individual skills, understanding and collaborative social arrangements (van Baalen, Bloemhof-Ruwaard, & van Heck 2005). Knowledge is always a result of the interpreter, which depends on the entire previous situation and on its position in a tradition (Winograd & Flores, 1986). When we focus on work practices, actors' social situation and traditional environment are formed in the work place and its community of practice. Knowing is not a stable disposition of actors, but rather an ongoing social accomplishment, constituted and reconstituted as actors engage the world of practice (Orlikowski 2002). Likewise, the community's shared knowledge and beliefs are constantly under construction (van Baalen et al., 2005).

In this paper, we focus on the use of information technology (IT) in a community of practice. The use of technology (or technologies-in-practice) is connected to the actors' experiences of awareness, knowledge, power, motivations, time, circumstances, and the technological artifacts (Orlikowski, 2000). We study the use of data flows in shaping organisational knowledge. The term "data" is used to refer to objective data items which can be documented, such as name or date. "Information" refers to interpreted data; for example, the data of the number of customers becomes information for the one who prepares lunch for them. Furthermore, "knowledge" refers to skilful to do something with information; for example, modifying menus.

The specific case which we focus on is the data flows in professional kitchens. The term professional kitchen is used here in reference to private catering companies, such as restaurants and personnel canteens, or institutional kitchens, such as those of schools, day-care centres and hospitals. The use of IT has reached almost all areas of working life; professional kitchens have been some of the last to exploit it. There is a variety of IT applications available for the needs of professional kitchens, which may be exploited for food production planning and instruction provision purposes: to design recipes and menus, to assess nutritional content, to manage raw material stocks, purchasing and cash register functions, etc. (Tuikkanen, Taskinen, Riihikoski, & Työppönen, 2005; Feinstein, McCool, & Cobanoglu, 2005; Cobanoglu & Heiberger 2003). Technology related trends in the restaurant industry are customer feed-back mechanisms, management of repeated business, management of marketing and service, IT and restaurant operations management, human resource management, (Oronsky & Chathoth 2006), nutritional analysis, cost-control techniques and systems, menu-mix management (Keiser, DeMicco, Cobanoglu, & Grimes 2007), and data mining (Collins, Cobanoglu, , & Malik, 2003).

We study data flows in professional kitchen processes. In this study, the professional kitchen processes were examined in two dimensions: (1) the iterative character of information, which means that information shaping is happened gradually within a repetition process, and (2) those reasons why iterativity is typical for professional kitchens. The current low level of exploiting technology makes professional kitchens an interesting case to study technology shaping in daily practices. Our focus is on how information is built iteratively through kitchen processes. This is partly achieved through planning tasks but is fully accomplished through the practical implementations of food production.

2. CASE: PROFESSIONAL KITCHENS

The practical objective of this study was to provide a holistic picture of data flows relating to the food production processes in Finnish professional kitchens, focusing on practical situations. The empirical information was gathered from professional

Table 1. Differences between the studied professional kitchens

Features of action		Professional kitchens							
		k 1	k 2	k 3	k 4	k 5	k 6	K 7	k 8
Scale	Local				x	x	x	x	x
	Nationwide	x	x	x					
Form of enterprise	Municipal organisation						x		
	Municipal unit					x		x	x
	Business	x	x	x	x				
Line of business	Institutional food service					x	x	x	x
	Profit making business	x	x	x	x				
Type of kitchen	Central kitchen						x	x	x
	Kitchen	x	x	x	x	x			

kitchens and aimed to generalise the results, pointing out those processes and data flows which are shared by all kitchens, and which recur in an identical form in food production planning, implementation and monitoring, thus enabling the formulation of a model at the general level. An additional objective was to establish what information is required to implement the processes in question, what type of information the processes produce, and what type of interactive communication there is between the said processes.

Eight professional kitchens were chosen as research objects, whose food production processes and related data were modelled. The research objects represented networking food service organisations operating in Finland. The research objects were selected so that there are differences between operation scale, form and function of enterprise (see Table 1). Due to their large size and special information management needs, these organisations rely on IT in their information management applications. The research objects consisted of national and local organisations that operate as businesses, municipal business units or municipal organisations. The research objects' kitchens were responsible for food production in personnel canteens, student canteens, restaurant chains, a la carte restaurants, health care institutions or hospitals. A number of these research objects operated as central kitchens, which means that they supplied food to several distribution kitchens. Some prepared meals to be served to their own clients, others combined both functions. On a daily basis, the number of food portions prepared varied from 300 to 7,000.

Empirical material for the study was collected by using theme interviews (based on Kvale 1983). The objective is to describe the kitchen data flows based on practical needs and that the kitchen workers know them in their own work situation. The interview themes were selected from views presented in recent Finnish professional literature on food production processes (Heikkinen 1995, Saarela, Hyvönen, Määttälä, & von Wright, 2005).The interviews focused on the following themes: food production planning, raw material acquisitions and storage, food preparation, food production monitoring, and food-related communication.

The interviewees were selected from among supervisors responsible for planning at the executive level, and food productions supervisors. They were interviewed since they are responsible for the progress of entire food production processes, their comprehensive view of the entire communication process and related information requirements and for their ability to verbally express their views and observations. The research material was collected from the eight research objects through 12 thematic interviews during 2005 -2006 with 17 interviewees. Most studied kitchens had more than one person who was responsible for planning and implementation of food production. Several informants in each of the research objects improve the quality of the interview material (see e.g. Rock 2001). The duration of each interview was approximately 90 minutes.

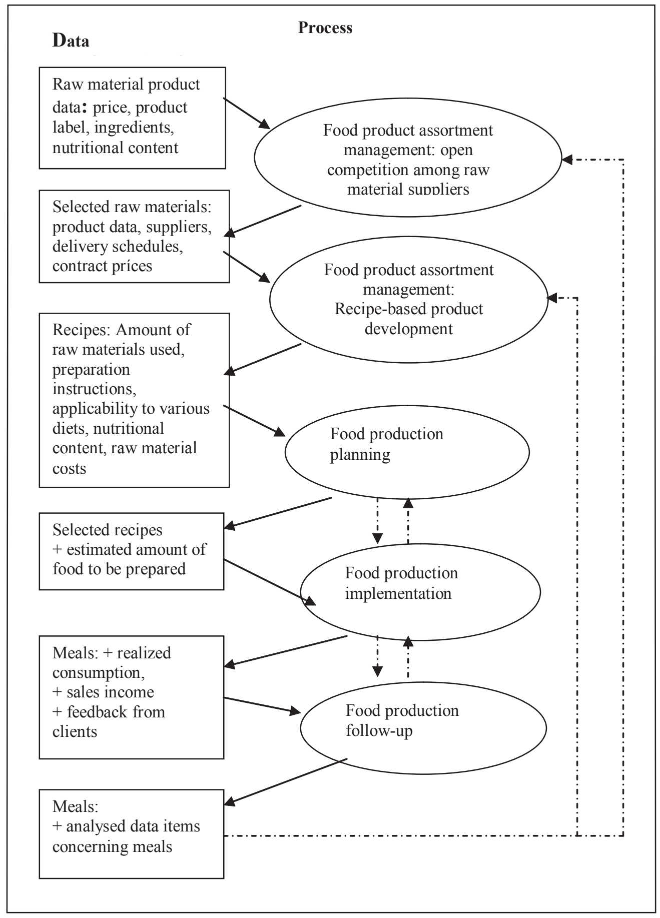
The analysis aimed to modelling the information flows, process-required information, and process-generated information of various professional kitchen types' food production processes. The modelling language consisted of UML 2 activity diagrams.. Modelling was based on a process division that was applied to the diagrams by the interviewers. Based on these, a maximum number of processes were drafted which the research objects had in common. To achieve a uniform level of abstraction, some processes were combined into higher level functions or divided into lower level functions. Modelling was used as a tool to find out similarities and differences between processes and used information.

3. COMPLETION OF THE INFORMATION USED IN PLANNING PROCESSES

Food production operations are usually viewed as series of stages consisting planning, purchasing, storage, production and service (Jones & Lockwood 1995, Saarela et al., 2005; Sivonen & Työppönen 2006). In this study the focus was information related to processes and the main food production processes were generated as: planning of offered food service activities, food product assortment management, food production planning, implementation and follow-up., This study indicates that decentralised kitchens need a large amount of planning work with plenty of information. The planning process was geared towards ensuring the profitability of food production, plus the high quality of food, throughout the organisation, under centralised instruction provision. A typical outcome was that information was edited and specified during the planning process. Planning took place in intertwining periods of varying durations.

The raw material information, as an example of one data flow, was essentially dependent on food production planning, instruction provision, implementation,

Figure 1. The processing and specification of raw material data flow during the food production processes



and follow-up data collected from production. Figure 1 sets out a simplified example of how the various raw material data items are processed and specified during the food production process. The raw material data consists of items that the kitchen receives from various suppliers, for example. The kitchen combines the raw material data items into recipes. The recipe data items undergo changing specifications up until the food preparation moment. The recipes are converted into meals during the food production implementation phase. Following this, the raw material data items constitute a portion of the follow-up data that is collected based on the meals prepared.

4. ITERATIVE CHARACTER OF PLANNING PROCESS

The information obtained is processed and handled in an iterative manner in professional kitchens' food production processes. Some of the information flows reverted to the beginning of the process in a specified form, constituting additional information for the subsequent planning round. During food production implementation, the plans were adjusted in accordance with changing situations and more detailed information (See Figure 1). The kitchens use an iterative approach on two levels: in long-term planning on the one hand, and almost simultaneously during food preparation, on the other hand. The kitchen personnel participate in the food production planning and implementation processes in the capacity of an information provider.

The nature of the food service industry, as a service industry, requires that the production processes are very flexible. Flexibility is needed throughout the food production process. It has to be possible to adjust the production process to fit the changes: e.g. menus have to be modified in cases of customers' feedback and the recipes have to be brought up to date.

5. DISCUSSION

One of the principal findings of this study was that professional kitchens' information flows are built though interaction between people and processes. Process-generated information, people's skills and competence are used to steer the subsequent process cycle, to make the processes increasingly effective in accordance with the clients' needs and requirements. The generation of information flows requires people's skills and competence, as well as their tacit knowledge to a significant degree. These skills and competencies are partly converted into a visible form with the aid of information systems. In addition, the implementation of an iterative food production process requires the use of tacit knowledge, as well as its manifestation into a visible form. Regardless of the fact that the personnel play an important role, they convey their expertise-related knowledge face-to-face to the management, not through the IT systems. Furthermore, it is the supervisor who can decide how to apply the employees' knowledge to the process.

As information technology in kitchens is an almost unexamined area, our study opens several interesting study lines. For example, the focus on financial issues and management of information in professional kitchens requires further research. Besides focusing on hospitality and business issues, studying technology shaping by using professional kitchens as a empirical field, is also promising; for example, a deeper study of technology-in-use by using ethnography and the theory of ICT domestication (Silverstone, Hirsch, & Morley, 1992).

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