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RESEARCH PAPER

Development Phases of Forest Planning on Non-Industrial Private Lands in Finland: Perspective of Planners' Work

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Abstract This paper examines the historical phases of Finnish forest planning from the 1960s to the present day in support of the rational future development of forest planning for family-owned forest holdings. The 'historical types' of work—craft work, mass production, process enhancement, and mass customization have been recognized in the Finnish planning discourse to date. Indications of mass customization are typical in the present developmental discussion of forest planning. There are some signals in the current planning debate that are calling for the next activity principle, co-configuration. A forthcoming type of forestry extension activity, labelled adaptive planning, is described in this paper to explicate the demands imposed by a future planning system. The present analysis informs also other contexts outside of Finland, where public and private institutions that support family forest owners face post-industrial challenges.

Keywords Adaptive planning · Cultural-historical activity theory · Forest management planning · Forestry extension · Historical forms of work

Introduction

In forestry-reliant countries like Finland, where non-industrial private forestry dominates, state-supported forest management planning (hereafter: forest planning) has been considered to be an effective tool in the endeavour to induce family forest owners to manage their forests in the interests of the national economy (Hyttinen

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2001; Ollonqvist 2001). In some countries, e.g. Romania and France, the management plans for family-owned forest estates have an obligatory status (Bouriaud 2001). In most countries, as is the case in Finland, planning belongs to the category of *sermon policy tools* (Bemelmans-Videc et al. 1998) or *capacity tools* (Schneider and Ingram 1993), the underlying assumption then being that the aims of society and those of individual forest owners are sufficiently coherent: when the owners make rational decisions, supported by planning, the national economy also stands to benefit (Donner-Amnell 2004).

In order to enhance holding-specific planning and effective extension, the Finnish government has established a nation-wide organization (of regional Forestry Centres) and a controlled procedure to conduct regional forest inventories (RFIs) on non-industrial private forests. These inventories result in up-to-date forestry data, and they have been a key instrument in policy-driven information delivery to forest owners. Consequently they have always been funded from the state budget. The basic data have been collected per planning region covering 2000–5000 ha. Normally, the forests within a planning region are owned by a multitude of forest owners. The forestry data are collected for the whole area, not just for those forest holdings whose owners have placed orders for holding-specific forest management plans (FMPs).

The Finnish forestry legislation does not obligate family forest owners to have holding-specific FMPs, although their importance is emphasized in various laws and regulatory guidelines issued for Finnish forestry. The Ministry of Agriculture and Forestry has produced a directive on the contents of FMPs in order to standardize them. A FMP contains information on the amount of planned cuttings, predicted incomes and costs during the planning period, and a summary of the volume, growth, cuttings, silvicultural operations, and biotypes of special importance for nature conservation. A FMP can focus on timber production, nature conservation, or recreation, depending on the forest owner's wishes. The planning period is 10–15 years.

During the past decade, forest planning, like many other activities, has been under rather powerful pressures aimed at bring about changes in it. Among other things, technical innovations and increasing diversity among landowners are challenging the traditional forest planning perspective. Consequently, step-by-step, new objectives and tasks have been included in planning systems (e.g. protecting valuable habitats and landscape values, considering retention trees in the context of final cuttings). However, some reported signs of the difficulties faced by professional planners (Hokajärvi et al. 2009) indicate that the increasing demands of planners' work may soon result in information overload. This implies that the present way of framing and organizing forest planning should be replaced by a new working model. However, to make the change possible, acceptable and smooth, knowledge on the hitherto historical development of the activity is essential (Engeström 1987).

The theoretical rationale for the present study is provided by developmental work research (e.g. Engeström et al. 1999; Chaiklin et al. 1999; Engeström 1987, 1995, 2001, 2005, 2006). The basic unit to be analyzed in work development is the *activity system*. Any activity system, in this study a system of forest planning and advisory

work, possesses a kind of ability for learning. However, this learning ability is a limited one because the elements of the activity system are deeply institutionalized along the historical course of development. Therefore, the development of activity systems is not linear, but instead proceeds through cycles of transformation, whereby the whole system is redefined. Radical technological innovations, especially those that create new infrastructures for production and exchange, are important reasons for change. This expansive development follows a particular logic, which has been described by authors such as Victor and Boynton (1998) and Freeman and Louca (2001). In the present paper, the theory of historical types of work presented by Victor and Boynton serves as a tool for analyzing this logic. The theory has been successfully applied in developmental work research (e.g. Engeström 2005; Virkkunen 2007). The present study aim to inform policy-makers and service-developers of the features of forest planning through decades. While this study furthers the conceptual understanding of practical forest planning, it also serves by providing important groundwork for advising about future development. In addition, some of the inferences may be transferrable to other contexts outside of Finland, where family forestry institutions face post-industrial challenges.

The following section deals first with the theory of Victor and Boynton, and then goes onto provide a description of the data and the analysis. The Results section reports in condensed form on the empirical findings describing the chronological turning points of forest planning in Finnish family-owned forests. The Discussion section looks at the recognized phases of forest planning and compares them with the conceptual phases presented in the theory developed by Victor and Boynton. A brief Conclusions section thereafter winds up the paper.

Theoretical Orientation: Developmental Work Research and Historical Work Types

Observations selected from public policy analysis show that the theoretical promises of new "soft" policy instruments—e.g. a new environmental guideline—are rarely fully realized in practice, because any new policy development is always constrained by previous policy choices, which have become institutionalized (Howlett and Rayner 2007; Primmer and Karppinen 2010). Consistently, new features can be seen as cumulative layers in the present forest planning systems, while the foundations of planning systems have remained untouched. In the long term, contradictions may emerge between the layers, calling for more definite changes in the planning systems. Furthermore, the development of practical planning is distributed locally, within rural communities, and implemented through thousands of everyday contacts between professional planners and forest owners. Consequently, new policy input is, at best, only one element in the development of planning practice.

'The Right Path' by Victor and Boynton (1998) presents five types of work in the history of industrial production: craft work, mass production, process enhancement, mass customization, and co-configuration. Each work type generates particular types of knowledge in organizations. These knowledge types in turn enable specific

types of expansive transformations, learning and organizational development, in order to lead them to the next level. The transformations between the types are labelled as development, linking, modularization, and renewal. Thus, a central idea in the theory is that an activity must have attained the previous type before it is possible to move onto the next one. The following paragraphs present five types of work, and are based on the ideas of Victor and Boynton (1998).

Craft work applies personal know-how and tradition, i.e. tacit knowledge, which is in people's minds, not written explicitly in procedural documents. This work is decentralized among individuals and small groups, keeping the organization adaptable and informal. Quality control is focused directly on the end product, enabling a flexible and immediate response to customers' unique and changing needs. Craft work is typical when making products for personal use. In this type of work, the worker's talent, personal experience, and skills are the source of regeneration and development in all types of organizations. The main disadvantage of such organization is that it fails to guarantee continuity: the knowledge comes and goes, quality can vary from one individual to another, and tacit knowledge may be difficult to manage.

Shifting to the next work type requires that tacit knowledge is explicated, and thus organizational learning starts to focus on understanding the work procedure. This is done, for example, with the aid of time and motivation studies looking into the work process, which, in turn, is divided into digestible sub-processes. The outsourced knowledge is consistently distributed within the organization, and this requires written procedures and well-developed information technology.

The above development leads to transformation from craft work to *mass production,* which creates commodity value for customers and profits to firms around the world, although it has some negative connotations, too. It has been the answer to the inefficiency, slowness, and costliness of craft work. Using articulated and coded knowledge, workers and managers can share knowledge about production, quickly and easily. Work phases are separated to enable the replication and automation of the best working methods. This leads to the division of labour, where the work done does not require specialized skills. Organizations are hierarchical, separating sub-processes from each other and 'doers from thinkers'. Quality control focuses on the work process, and, in particular, on how exact and consistent it is with respect to work procedures. This control mechanism ensures a homogenous quality, which is required by the mass commodity markets. However, its ability to react is then slow when customers express demands for higher quality.

In mass production, 'practical knowledge' increases within an organization: people learn about the work process and how to manage the quality of the product. Besides inter-organizational learning, customers, when utilizing mass products, learn about what kinds of products they prefer and how much they are willing to pay for them. Cumulative practical knowledge enables transformation to the next work type through *linking*, i.e. consistent incorporation of feedback from both workers and customers, and the procedures on how the feedback shapes work and therefore evokes responses to increasing quality requirements.

Following mass production, *process enhancement* takes place where organizations can continuously improve the quality of their products and thus gain market advantages. Enhancement requires that practical knowledge is consistently applied to improve tasks and processes. 'Learning by doing' generates advanced practical knowledge, which leads to changes in the process. Such a learning organization is team-based, wherein information exchange is intensive and reciprocal, both horizontally and vertically. Quality control focuses on the continuous improvement of the working process with the aid of customer feedback.

Open information access promotes the overall understanding of the work processes at all levels of organizations. In addition, when information technology becomes more user-friendly, the previous separated tasks in production can be implemented by teams that confront the customers directly. Therefore, teams are better able to respond immediately to the demands of the market: architectural knowledge is created. Such knowledge reveals the structures of the work process so that new combinations or sequences can be constructed. Firms use this knowledge in modularization to manufacture value added for different customers by dividing products into modules, which can then be flexibly integrated according to customers' demands. Furthermore, work processes are re-configured to produce modules effectively and at low cost.

The basic idea of *mass customisation* is to produce precisely what the customer segments want. Personalization of products or services is the demand expressed by precision markets. The question is how to respond to every customer's unique needs, at a profitable price. In organizations, this requires that they focus on constantly changing behaviour, according to unpredictable product and service requirements. Hence, quality control indicates the organization's ability to react and innovate. A dynamic network, with many sub-contractors, forms a renewable organization, which is suitable for mass customization. Combining low cost with customisation, and staying more focused on customers, are among the advantages of mass customization. However, the basic logic of adaptation to customers' needs is a-priori: organizations interact with customers continuously in order to understand their hopes, and organizations produce a pallet of products to fulfil their predefined needs. Thus, mass-customized products are not adapted to the needs of any particular customer, but instead to the compounded needs of certain discerned customer segments.

The 'configuration knowledge' accumulated through mass customization processes enables the incremental development of smarter modules for smaller customer segments. Finally, the logic of adaptation can be turned a posteriori. Then the intelligence needed in the adaptation is constructed in the product or service itself. The product is not predefined, but instead *co-configured*, together with customers, along the production process. The products or services are 'customer-intelligent' when actively adapted to the changing needs of the users. Continuous information exchange between customers, producers, and service or product combinations is needed in co-configuration, and this results in mutual learning. The latter means that products and services dynamically and continuously respond to needs without forcing the customer or the organization to intervene (Victor and Boynton 1998; Engeström 2005).

Research Method

The present results were achieved by analyzing popular and professional texts related to forest planning, invited essays written by senior planning professionals (written in 2006), and complementary discussions held with forest professionals (in 2008 and in 2009). The development of planning activity was first outlined based on popular articles in *Tapion taskukirja*—a handbook series for forestry professionals, students and forest owners—published between 1958 and 2002. These data consisted of fifteen articles.

After the analysing this material, seven forestry experts were asked to write an essay about the development of forest planning from the 1970s until the present, or since they had been working in forest planning. The experts were asked to describe their own experience and points of view and to provide some background and reasoning (see Appendix). The aim in collecting these essays was to capture experiences from real-life actors, who had been involved in the development of planning. An additional aim was to specify and complete the information presented in the written documentary material. These essays, thus, deepened the analysis and outlined the changes that have taken place in forest planning since the 1970s.

Finally, a more extensive literature review was employed in the final formulation of the development path. A total of ten reports and memoranda by working groups (from 1973 to 2003) were used in gaining an understanding of the details and to inspect the background information. The data were collected between 2005 and 2009. The analysis was aligned and interpreted in relation to the broader lines of co-development of forest policy and economic policy (e.g. Ollonqvist 1998). A useful aspect of local history was taken from Pirttinen (2006). Altogether, 300 pages of textual data were collected. During the phase of condensing the empirical findings, several forestry professionals were asked to provide their responses to complementary questions. This was done until the present authors decided they had gained a sufficient concept of the practices. The data can never be comprehensive and there are distinct views of events. Hence, the written documents served as the core basis of analysis, whereas the complementary experiential data provided a better understanding of the events.

The primary analysis of the texts identified the development phases and pointed out the changes, turning points, and trends over the decades. All authors discussed the details and interpretations during the analysis and reporting. The first report was written, in Finnish, in 2007 (Hokajärvi et al. 2007). Thereafter, further research focused on the historical work types (Victor and Boynton 1998, see previous chapter) and on empirical evidence about the features during their practical development. To illustrate the evidence, some of the numerous sources of information are quoted below and the respective references are given in parentheses (data/…). Most data were in Finnish, and the referred quotations below are English translations that aim to preserve the original meaning. One of the authors was working at a regional forestry centre leading the process to introduce a quality-management system in the early years of the new millennium. All of the present authors possess over a decade of experience in forest planning education and research. These experiences and personal contacts between the authors and practical

planners and developers were useful in the analysis, but at the same time their partial role of participating observers gave rise to a need for critical reflection.

Results: The Chronology of Forest Planning in Finland

According to the analysis, six clear transition points can be recognized in the development of forest planning directed into Finnish family-owned forest holdings. The transition points are chronological, but the end points of the phases cannot be recognized, which means that the reforms are permanent. Consequently, there are no clear periods; instead, the phases provide a conceptual tool for enabling understanding the main driving forces, which have, in turn, modified current planning. Furthermore, the chronological phases are not, as such, comparable with historical types of work, while reasonable parallels are discovered in the Conclusions section.

Forest Management Plans for Individual Holdings (Pre-1970s)

Finnish forest planning has its roots in German forest mensuration tradition. Starting in the first half of the 20th century, detailed instructions for forest classifications and tables for forest mensuration became available and were used on large forest estates, but not on small-scale forest holdings. FMPs for family-owned forest holdings became more common in the 1950s.

At first, management plans were prepared directly for individual forest holdings, meaning that forestry data were collected from one holding at a time. Such a plan was constructed, based on an order, and immediately delivered to the owner by the one and the same forestry professional. There were particular forestry data to be provided in prescribed form, but descriptive explanations and instructions were proposed to be included. The inventory forms and the plan format were released by Tapio (formerly the Central Forestry Centre, now the Forestry Development Centre Tapio). A 'forest management plan' (ordinary plan) was developed for larger and more professionally-managed estates, and a 'forest holding plan' (a simple forest card) for smaller family-owned properties. Both included stand-wise information about site classes and recommendations for cuttings and silvicultural treatments. The ordinary plan was a booklet with dozens of pages, but the latter was a double-sided folded card with four pages (see Pirttinen p. 10). Most of the simple plans were made for post-war resettlement holdings to permit timber cutting.

There were some reference values relating to allowable cut (not to exceed growth or as a percentage of total volume) and sustainable annual forest regeneration area (percentage of productive forest land). The primary planning task was to reconcile stand-wise treatments to fit holding-level reference values, but consideration was also given to the special features of the holding. According to the planning guidebook, '*all formalism was undesirable in planning*' (except for the uniform presentation of data), because the particular features of the holding had to be taken into account (Lihtonen 1928). The first computer-aided planning applications became available at the end of the 1960s to help forest planning on larger estates,

and these applications soon after became the catalysts for the intensive development of the forest planning activity system.

Regional Planning (1970s to the Present)

Forest planning in its present form in Finland originated in the 1970s, when the concept and practice of 'regional forest planning' was launched. Regional planning scheme was included in the wording of the forestry legislation (Act 602/1967) obligating the relevant forestry organizations to implement regional centralization when constructing plans for forest improvement work. Co-operation would also enable a more profitable timber trade and cost savings in silvicultural work. Alongside striving towards regional co-operation, forest planning on non-industrial private forest holdings also began on a regional basis.

The continuity and efficiency of the planning work and the integration of various planning levels were mentioned as the objectives of regional planning. An additional aim was '*to concentrate planning on areas where landowners were passive as regards systematic silviculture'* (data/Memorandum of 'Regional Planning' working group, in 1973, p. 1). Regional planning was not obligatory for landowners, but it served both as a means of supervising compliance with forestry legislation and as a means of promoting the timber trade, forest improvement, and silviculture. Regional planning was conducted covering all estates in the region and holding-specific plans were then constructed based on regionally-collected data. The activity was financed by the state, and consequently landowners only paid half of the costs when buying their holding-level plan.

In the mid-1970s, a new information technology (IT) system called *MTS/Alue* (FMP/Region) made it possible to collect, save, and utilize regional data flexibly and to construct holding-specific FMPs from the database, whenever needed. Consequently, the separate phases of the planning work process became detached from each other. For the planner, early springtime was reserved for the preparation of data collection, while late spring, summer, and autumn were set aside for field work. Winter was then for extending and delivering holding-specific plans. Map drawing and plan construction were undertaken by office workers, who also printed out the plan documents. The use of computers enabled automated calculations and made the end products uniform. The IT system was the same throughout the country.

Extension work with landowners and other forest professionals was closely connected to regional planning. Regional group advisory meetings were organized between planners and other forestry professionals in the region. The original aim of the regional approach was to enhance co-operation between landowners as a means of cutting the costs of forestry operations using joint ventures in implementing plans, and this also meant local forestry co-operation areas. Co-operation proved unsuccessful in the timber trade, but forest improvement (ditching and forest road construction) works are still conducted jointly with several owners. Regional forest planning continues to be done, but the IT systems have changed, as have the forms of co-operation.

Forest owners at focal point of planning (1980s to the present)

Forest planning, extension work, and other service functions were given special attention after the creation of the national forestry strategy, which was given the name *Metsä 2000* (Metsä 2000 -ohjelman… 1985; The Forest 2000 Programme 1986). The change in strategy was due, at least in part, to intensive research focusing on non-industrial private forestry during the 1970s (Reunala and Tikkanen 1972; Hahtola 1973; Järveläinen 1974), based on the premise that forest owners' silvicultural, forest improvement, and timber felling works depended on how well owners knew their forests. '*The most important of the means available for increasing timber supply are forestry planning and an increase in advice and services directed at the forest owners.*' (The Forest 2000 Programme 1986, p. 43).

Individual extension services, as a part of forest planning, became the prevailing practice in the 1980s. Instead of organizing group advisory meetings, holding-based personal meetings were arranged. After the adopting of the new IT system, called TASO, in the late 1980s, '*the work performance of planning fell because of implementation of TASO and increasing holding-based advisory*' (data/An expert report for Tapio, 1990, p.2). Thanks to TASO, the plans became clearer and more understandable to forest owners. The TASO system also included the capability to construct alternative plan documents for holdings of different sizes. Also, the calculation features of the TASO system were thought to serve the extension function and interaction because of the improved methods for comparison calculations ('basic computation'). In practice, these features built into the TASO system were not fully utilized. As one of the experts writes: '*decentralization of the data processing was a big effort technically so there was not enough interest for new products and services*' (data/Essay, emailed on 13.3.2006). There were no clear procedures, for example, for computer-mediated interpersonal interaction or marketing of new products. The number of full-time planners in forest planning was at maximum level at that time.

Diversification of the Objectives (1990 to the Present)

The diversification of the objectives related to forest use also became evident in forest planning. The concept of sustainability was adopted into strategic programmes immediately after the Rio Declaration on Environment and Development in 1992 (see Johnson 1993). All programmes in Finland officially promoted the economically, ecologically, and socially sustainable use of forests. *Multiple-use* was adopted in the preparation of the *Metsä 2000* programme in the 1980s, but mostly as a marginal term, while the emphasis remained on securing favourable preconditions for practising forestry (Ollonqvist 1998). In the regional and national forest programs from 1998 up to present day, the purpose was clearly to safeguard forestry-based jobs, forest biodiversity, and the recreational function of forests. *The Finnish Forest Act* (Finnish Ministry of Agriculture and Forestry 1996) in turn introduced the preservation of biological diversity alongside sustainable yield. The operational environment widened and changed rapidly in the mid 1990s, putting pressure on the development of management planning as well.

The information content of the planning system diversified when the TASO planning system was introduced at end of the 1980s, and again at the end of the following decade. The present *Solmu*/*Luotsi* IT system was released at the end of the 1990s as a geographic information system (GIS) developed for personal computers (PCs). The number of parameters depicting the features of the forest stand doubled. Thus, the emphasis was more on discovering special values in the forests (e.g. valuable natural habitats and recreational values). It was also possible to have different types of plans (emphasizing gamekeeping, landscape, recreation, or nature management), but still the new products did not become well known. The *Solmu*/*Luotsi* IT system was user-friendly and later the planners were able to perform computations with the forest owners at the planners' PCs (Hokajärvi et al. 2009).

The official forest strategy included the vision that, aided by planning and advisory support, '*all forest owners make their decisions conscious of the different utilities and management needs of their forests*' (Finnish Ministry of Agriculture and Forestry 2008, p. 5). Clarification of the forest owners' objectives and taking also into account values other than economic, had always been stated in the planning documents; but starting from the 1990s the actual planning guidelines included more emphatic wording on the needs of the owner and the role of planning as a tool to aid owners in their decision making. (Hokajärvi et al. 2006).

Alongside the changing value structure among forest owners and in society in general, increasing focus was placed on the diversification of forest owners' objectives. The forest owners and the properties they owned underwent changes due to urbanization, retirement, and the fragmentation of the holdings. The increasing number of passive owners was seen as one of the challenges facing forest policy. Several reports and memoranda of working groups were released on the need to launch 'a new-generation forest planning system' (data/Reports dated 17.12.1997, 2.3.2001, 14.2.2003).

Quality-Management System (2000 to the Present)

Another much-debated development objective of forest planning, especially after the economic recession of the 1990s, was the need to improve the quality and cost-effectiveness of planning. The discussions took a concrete form at the beginning of the new millennium, when planning organizations began to construct consistent quality-management systems for their processes. One-by-one, regional forestry centres adopted ISO-quality standards. This process obligated these organizations to focus consistently on feedback procedures: how to collect feedback and how to take it into account. Numerous development teams were founded to explicate the practical work process. As a standard, representatives of practical planning personnel were nominated to these development groups. The organizations referred to themselves as team organizations. Due to the heightened closeness with customers and more user-friendly planning software, the delivery cycle of planning shortened. Now, the direction of development seems to have returned to the provision of a more holistic service rather than differentiation of work duties; with self-ruling teams producing the entire service to forest owners, more flexibly than before, but within recognized resource limitations and quality requirements.

The Beginning of Service Orientation (2005 to the Present)

During recent years, a consistent development process was established to develop entire planning service products. From 2005, a new phase was included in the planning process descriptions: customer segmentation. Accordingly, the planners were now to classify customers into two distinct segments; those knowing their forests well and those familiarizing themselves with their forest property. According to this simple classification, one of two service protocols was to be followed during interactions with the forest owners. The purpose of the segmentation was to improve the effectiveness of the planning service while still keeping the tailoring simple enough to involve large numbers of forest owners in a cost-effective planning process. '*The planner can use the segmentation model to find the appropriate way to respond to the customer's needs and to benefit action models and materials predefined to support extension work*' (data/Forestry Centres and Tapio, 12.2.2007).

Thus, the diversification of the service palette in forest planning has only just begun. The need for further customization is growing, along with the diversification of forest owners and their forestry objectives. This being so, service modularization and diversification have been stepped up quite a lot. More detailed foundations for customer segmentation are being sought and new service options are under development, with a particular focus on Internet-based services.

Discussion: Detecting Historical Work Types in the Chronology of Planning

The afore described evidence of transition points in practical forest planning in Finland can be further condensed and parallels can be found between them and the phases of work types presented by Victor and Boynton (1998) (Table 1). The first three work development phases can be paralleled now, and also signs of the fourth phase can be identified from practice. While forest planning before its regional orientation resembled craft work (with individual plans), mass production, as embodied in regional planning from the 1960s onwards, introduced standardized products and a division of labour. In the planning discourse, the emphasis on personal extension, from the 1980s onwards, and value diversification, from the 1990s onwards, were the first attempts at approaching mass customization, but the activity system was not able to react properly towards this change pressure, because the process enhancement phase had not yet taken place.

Process enhancement (since the early years of the last decade) incorporated feedback management and quality approach in development. Quality-management, including continuous quality improvement, became a tool in forest planning. This is opening the way to the mass-customization phase, which has only recently introduced customer segmentation and modularization of services, both in terms of process and the final product. In most respects, the practice of forest planning is now struggling to get the mass-customization type of work functioning.

It is recently that some speculative signs of the emergence of co-configuration has been observed in the discourse on tailoring and adaptability. Until now, co-configuration has seen evident among researchers, and not in practice.

Table 1 Features of forest planning development compared with corresponding historical work types as presented by Victor and Boynton (1998)

Type of work	Outlining of the type	Work features in data
Craft work	Informal and organic organization	Holding-level procedures and individual plan
	Collaborative professionals or craftsmen	Focus on verbal descriptions with tables and forms
	Novelty; unique products	Formulas, tables and models for calculation, but not for end product
	Tacit knowledge	One professional performing entire process (inventory, plan, and map)
Mass production	Increasing volume	Regional method of inventory (RFI) covering all holdings in region
	Functionally defined hierarchical organization	Standardized product (plan)
	Rationalized practices	Exact process flow of planning
	Division of labour	Planners make calculations (computing) and office staff make maps.
	Exact, constant work process	Focus on group-extension mechanisms and regional co-operation instead of individual owners
	Standardized products for 'average customer'	
	Articulated knowledge	
	Separating doers and knowers	
Process enhancement	Flexible mass production	More user-friendly IT
	Customer, product, process interaction	Customer feedback
	Reciprocity and feedback	Systematic continuous improvement of process
	Quality, value chain integration	ISO quality-management system
	Learning by doing	Improving product (plan) and process
	Practical knowledge	Workers' experiences applied in process development
	Doers as knowers	
	Team organization	
Mass customization	Modularization	Customer segmentation
	Precision markets; distinct service products	Product and process options
	Architectural knowledge	Internet plans
Co-configuration	Negotiations about service	Individual customization during service provision
	Products with long lifespans	Adaptability
	Dialogue-based configuration knowledge	
	Client-intelligence and learning products	

Conclusions

Historical analyses of forest policy and practice describe, for example, the large-scale shift from colonization to sustainable forest management in the case of Brazil (Banerjee et al. 2009), the actualization of collaborative forest management in the case of Nepal (Bampton et al. 2007), and the evolvement of forest fire policy in the

United States (Stephens and Ruth 2005). Some of the recent studies focusing on practical foresters' perspectives evaluate values and opinions related to sustainable forest management in the case of Austria (Pregernig 2001), to urbanization in the case of United States (Ricard and McDonough 2007), and to various forest functions in the case of Sweden (Kindstrand et al. 2008). The present study combines the above viewpoints and provides a forester-focused historical analysis of forest planning in the case of Finland. The acquired general view from Finland compares fairly well with that of Tipple and Wellman (1991), which acknowledged a shift towards complexity and diversity in North American foresters' working agenda. The added value of the present study two decades later is probably in the assessment of quality-management and service approaches in foresters' work.

The results of this study have been gained through long-term, collaborative interpretation efforts. Rather than being a critical policy analysis, this study may be considered to be a conceptual cultural-historical review emphasizing professional planners' perspectives on their everyday work. In this sense, the study encourages planners and service designers to engage in well-founded renewal rather than endeavour to evaluate any kind of 'goodness' of planning. The authors' experience of forest planning research, teaching, and development has served as a good basis for performing valid interpretations. The same experience, on the other hand, may have narrowed the perspective when looking at the data. As a consequence, the interpretations may be regarded as quasi-insiders' pragmatically conceptualized critique.

In the most developed work phase, which is labelled as co-configuration, the producer (service provider) and the user (customer) engage in a constant dialogue, and they modify both the content of the product and the service wholeness as a result of mutual learning (Victor and Boynton 1998; Engeström et al. 2003; Virkkunen 2007). In other words, there no longer is an *a priori* service protocol to be followed; instead, the owner and planner customize jointly the service during the process. The distinctive characteristics of joint development are a product or a service with a long lifespan, even one which will never be finished; a continuous adjustment to the user's action; 'client smartness' embedded in technological solutions; and the requirement of continuous re-configuration between the user, the producer, and the product itself (Victor and Boynton 1998; Engeström 2005).

In terms of forest planning, the move to this work type is even more challenging than the move between any previous work types. Implementing co-configuration may be impossible until the mass-customization process has gathered enough understanding on how to proceed in relation to interacting with forest owners throughout the service process. In other words, the point at which the co-configuration phase begins calls for increased dialogue-based configuration knowledge about forest planning. The main challenge in the development towards co-configuration is how to overturn the underlying assumptions that orientate the interactive acts in planning processes (cf. Virkkula et al. 2009). In this challenging endeavour, the forest owner's role should change from that of a customer to that of an initiator of a process that continuously adapts itself through sensitive feedback-response sequences. On the contrary, planners will be expected to play expert, as well as moderating, roles in order to produce some service elements, but more importantly, they will act as links between the dynamic network of service producers and forest owners.

Co-configuration has been discovered to be a challenge for the further development of forest planning, but it is not yet complete as a model for implementation. So far, in forest planning research, only the first steps towards describing this planning procedure have been taken. For example, the so-called adaptive decision analysis framework (ADA) aims to explicate what co-configuration may mean in relation to forest planning (Leskinen et al. 2009; Hujala et al. 2009). The ADA introduces several adaptation levels. First, a priori adaptation is based on the pre-planning information about the owner and about the planning environment. In practice, this adaptation relates to the planner's decisions about the service protocol for planning interaction. Second, a posteriori adaptation includes the adjustment of the process, based on the feedback information received throughout the process. Depending on the extent of the mismatch identified in the feedback analysis, adaptation occurs through learning at the computational level (planning calculation systems), the social level (interaction during the present service), and the organizational level (e.g. about the service product range or about the network of professionals offering planning services).

To conclude, the behavioural roles of the forest owner (as the target of the service or extension work), and the planner (as the expert) are deeply rooted in the common ground developed during the previous work phases, especially during the mass-production phase. Common ground defines how planning acts are responded to and how they are initiated. It is assumed that substantial repetition at the social interaction level (between forest owner and planner) is needed to enable organizational learning, outwards from the current dominating roles. Probably the most critical linkage is the development of a useful set of service options to be offered to forest owners. First of all, this will promote an owner-driven planning culture, empowering forest owners to make genuine decisions regarding planning procedures. Secondly, it will enable planners to learn about the needs of the owners and also about how to conduct owner-driven (rather than expert-led) interaction. In the course of time, the service range will diversify and become more flexible; and step-by-step, joint decision support about the service itself will be integrated into the service products. Whether the development will ever progress to genuine co-configuration is yet to be seen. In any case, this development calls for action-oriented forest planning research to accelerate the development.

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Appendix: An Essay-Writing Task Given to the Key Informants

Hopefully, you can spend a few hours thinking and producing a text of 2–3 pages, preferably during January [2006]. Do not concentrate too much on modifying the text: what is important are your thoughts. Please return your contribution, preferably by email.

The task: Write down your own experiences and opinions about 'The development of forest management planning from the 1970s to the present'.

Consider, for instance, the following aspects:

- What have been the essential aspects of this development?
- Include years or indicate otherwise the timing of the turning points.
- Present also background and reasons for the changes.

As an introduction, write down briefly your own history regarding forest planning.

Background: This essay is kindly requested from a couple of experts and practical workers who have been involved with the development of forest planning. After analysing the essays, complementary interviews will be conducted.

Based on the essays, interviews, and documentary material, the development phases of forest planning on non-industrial private lands will be described according to the theory of developmental work research. The material is confidential. Interpretations of the development phases will be made use of in the research project entitled 'Activity theoretical development of owner-oriented forest planning', which is funded by the Ministry of Agriculture and Forestry.

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