

White Paper

The Missing Link: the Tactical Level in the Management of Technology

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THE MISSING LINK: THE TACTICAL LEVEL IN THE MANAGEMENT OF TECHNOLOGY

Tapani Talonen, KONE Corporation, Global R&D, Finland

Kari Hakkarainen, KONE Corporation, Global R&D, Finland

ABSTRACT

The practitioners and authorities of the Management of Technology (MoT) usually consider the **operational** and **strategic** interests of an organization. The operational aspect deals with day-to-day activities, while the strategic dimension focuses on long-term issues. Both of these must be taken into account in MoT.

However, as the shift between these two dimensions is rather large, we need the **tactical** level to link the operational and strategic levels.

The tactical level is not 'additional' to the other levels; on the contrary, it is both strategic and operational. It is essential for linking short-term, project-level operations and product development activities with long-term strategic objectives, and vice versa.

There are no explicit ranges, substances or process steps between the levels; on the contrary, the identities of the levels and the interfaces between them should be fuzzy. The idea is not to have three separate control mechanisms, but rather to understand and master the context and extent of the different levels in a consistent MoT framework.

This paper discusses the three levels of MoT, their characteristics and essential processes. It shows why the tactical level is so important in a holistic approach to the management of technology. The paper is based on the literature and on the authors' own experience of MoT initiatives in a global technology company.

CURRENT DEFINITION OF STRATEGIC AND OPERATIONAL LEVELS IN MANAGEMENT OF TECHNOLOGY

The practitioners and authorities of Management of Technology usually consider the operational and strategic interest of an organization. According to Khalil (2000), the operational aspect deals with the day-to-day activities of the organization, while the strategic dimension focuses on the long-term issues.

Steele (1989) proposes that the basic difference between these two levels is the basic attitude to change. Where strategic management addresses fundamental questions of strategic change in future markets, growth, competition, technologies, and basic business concepts and cultures, operational management prizes stability, imposes structure and discipline, and resists change.

The focus of strategic management is on the long-range survival of the company, and that may demand significant changes in the business portfolio, modes of competition, or corporate culture. Change of this magnitude is antithetical to operations management, which recognizes the need for incremental change, while regarding strategic change as something to avoid.

Steele (1989) has laid out three roles for technology in strategic planning: 1) keeping existing products healthy, 2) developing new products, and 3) providing significant advances in operating effectiveness. The strategic management of technology necessitates applying two attributes – vision and perspective – to all three of these roles. In Steele's (1989) thinking, strategic technology planning is an iterative process of thinking about the nature of an enterprise and about the role of technology in that enterprise.

Another level of Steele's (1989) technology management framework, operational management, consists of four elements: 1) programme selection by using a funnel type programme filter process, 2) risk management, 3) project management, and 4) technology transfer to operations.

EXISTING STUDIES ON THE TACTICAL LEVEL COMPARED TO STRATEGIC AND OPERATIONAL LEVELS

Strategic vs. tactical

Some authors have identified the need for a tactical level between strategic and operational management (e.g. Rummler & Brache 1995, Dodgson 2000). Dodgson (2000) argues that in determining what is strategic, an analogue should be drawn to military tactics and strategy: "In military parlance, 'tactical' refers to the means by which battles are won. 'Strategic' refers to how wars are won."

One of the most respected authorities in the military context is Carl von Clausewitz. According to Clausewitz (1999), "*tactics*" refers to how individual battles are arranged, organized and managed. "*Strategy*" refers to how battles are combined together to serve and support the objective and purpose of war.

According to Dodgson (2000), the tactical issues in technology include how firms innovate new products and production processes. Strategic matters include choosing and developing competencies that shape firms' opportunities for innovation and continuing competitiveness. Dodgson argues that in this schema, many of the issues of managing research and development (R&D) and the new product development (NPD) process are tactical. He concludes that decisions become strategic when their intent is to extend technological competencies, or when major organizational issues are addressed.

Strategic, tactical & operational

Rummler & Brache (1995) have identified three different levels of generic performance from an organizational point of view: organization, process, and job/performer. In other words, these are also the levels of strategy implementation. In their approach, generic management processes comprise one part of the process level. Strategic and tactical planning and goal setting are at the top of the list of these generic management processes (Rummler & Brache 1995). The rest of their processes are on the operational management level if we use, for example, Ansoff's (1972) categorization.

Andersen and Hein (1987) argue that product development and innovation cannot be confined to a part of a company, but must be an integrated part of the company's efforts to fulfil its objectives. In a company with a complex structure, these activities give rise to several sequences of management activities at *a strategic*, *a tactical* and *an operational* level. According to them, these levels include strategy setting, leading product development projects, and performing the practical tasks, respectively. These activities become part of the cement that must bind the various layers within the company into a coherent whole.

In his concept of the strategic management of technological learning, Carayannis (2000) has proposed three levels of technological learning in the context and scale of the learning organization. The following levels are more levels of organizational learning dynamics or capability than real technology management levels in the decision-making and implementation context.

1. *Operational technological learning level*: The short- to medium-term perspective that focuses on managing core organizational capabilities, resource allocation, and competitive strategy (single-loop learning of new things).
2. *Tactical technological learning level*: Double-loop, self-organizing or second-order technological learning. The medium- to long-term perspective that focuses on a strategy of reinventing and reengineering the corporation (learning to learn, or metalearning).
3. *Strategic technological learning level*: Triple-loop, self-organizing metalearning, or third-order technological learning. The very long-term perspective that focuses on reshaping or reinventing and reengineering organizational methods and processes (learn how to learn).

TACTICAL LEVEL – A NEW EMPHASIS FOR MOT

Both the strategic and operational levels must be taken into account in MoT. However, since the shift between these two dimensions is rather large, in the context of MoT there is clearly a need to place more emphasis on the **tactical** level to link the operational and strategic levels.

The crucial role of this ‘new’ level is to link operational work with strategies in practice. This tactical level is not ‘additional’ to the strategic and operational levels; on the contrary, it is both strategic and operational. It links short-term, project-level operations and technology or product development activities with long-term strategic objectives, and vice versa. The essence of the tactical level is to provide conditional strategic agility in a shorter response time.

There are several arguments for clarifying the needs for focusing on tactical level technology management.

1. We should continuously reflect our business environment, and nimbly adapt our strategies to take account of fast change signals and increased or more accurate knowledge about business challenges.
2. We cannot base our project selection on the evaluation and analysis of individual projects. Rather we need to manage the balance of the entire portfolio in line with strategy, and to compare project candidates with each other. Project selection should be *tactical level action*, which is *based on strategic choices that have already been made*.
3. It is very difficult to turn strategies directly into objectives for individual projects. It is much easier to determine what kind of roadmap steps and project portfolio are needed to achieve strategic objectives.

We propose the following aspects for the different levels of technology management:

1. Strategic Level – Strategy positioning and generation

- *Essence*: strategic positioning, renewal
- *Driver*: changing business challenges
- *Analysis*: business opportunities – strategic options – technological competencies
- *Tools*: competitive, product and technology strategies, business roadmaps

2. Tactical Level – Continuous planning and adaptation

- *Essence*: continuous planning and strategy adaptation
- *Driver*: mid-range strategic agility
- *Analysis*: customer segments – product offering and platform evolutions – technological alternatives
- *Tools*: product and technology roadmaps and portfolios

3. Operational Level – Implementation

- *Essence*: strategy implementation, technology and product development
- *Driver*: time-to-market, effectiveness, productivity, quality
- *Analysis*: customer needs – product specifications and platform definitions – project scopes
- *Tools*: projects, technology and product development process

The levels differ with regard to the nature of decision-making (*Figure 1*). The ‘strategic’ space for decisions narrows when moving from the strategic to the operational level.

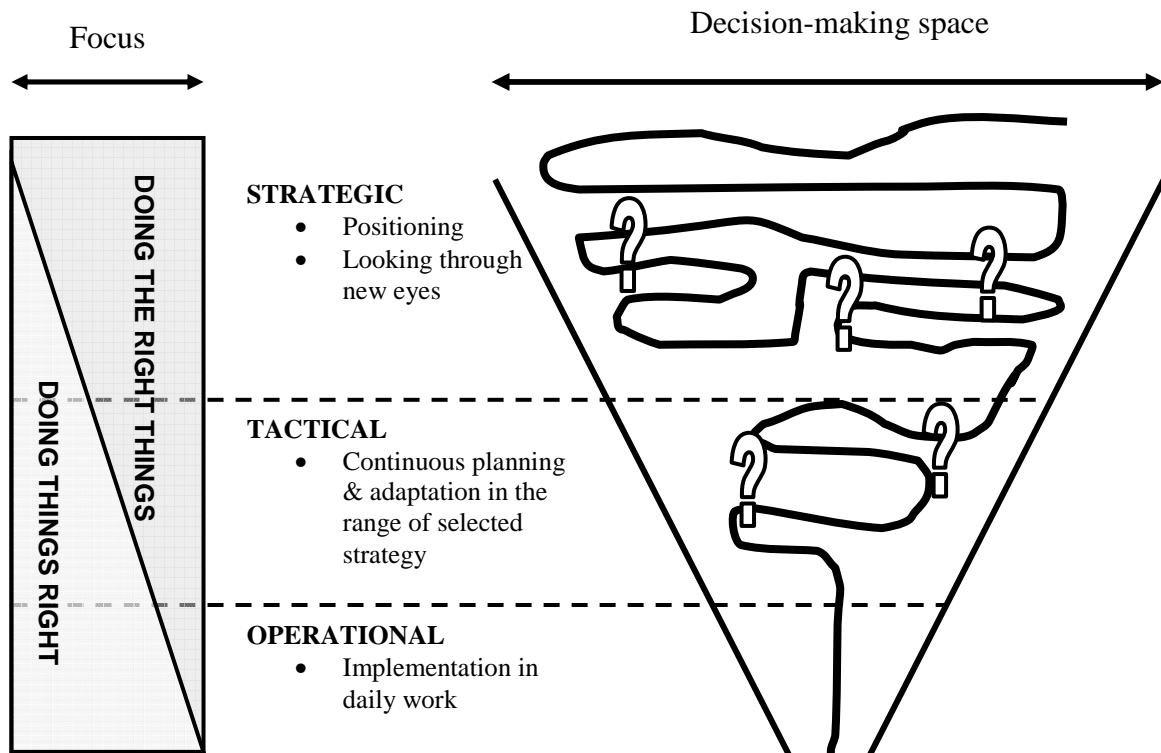


Figure 1. Decision-making space at the different levels.

Strategic level decisions address searching for compatibility between business opportunities and the company’s long-term competencies. The essence is to set a vision of the company’s future position, and then to decide the directions and strategic options on the road to that vision. The basic question at the strategic level is: “What are the right things to do in the future?”

The essential content at the tactical level is to provide agility with fast decision-making, according to the conditional business situation. What options are selected? When are the conditions in the business environment favourable for investing or reinvesting in options? Tactical level decisions also define the contents and appropriate parts or elements, and the steps to implement the options.

The key question at the operational level is: “What is the right way to implement options to ensure productivity and efficiency, the right time-to-market, high quality, etc.?”

There are no explicit ranges, substances or process steps between the levels; on the contrary, the identities of the levels and the interfaces between them should be fuzzy and even messy. The idea is not to have three separate control mechanisms, but rather to understand and master the contexts and extent of the different levels in a consistent MoT process (*Figure 2*).

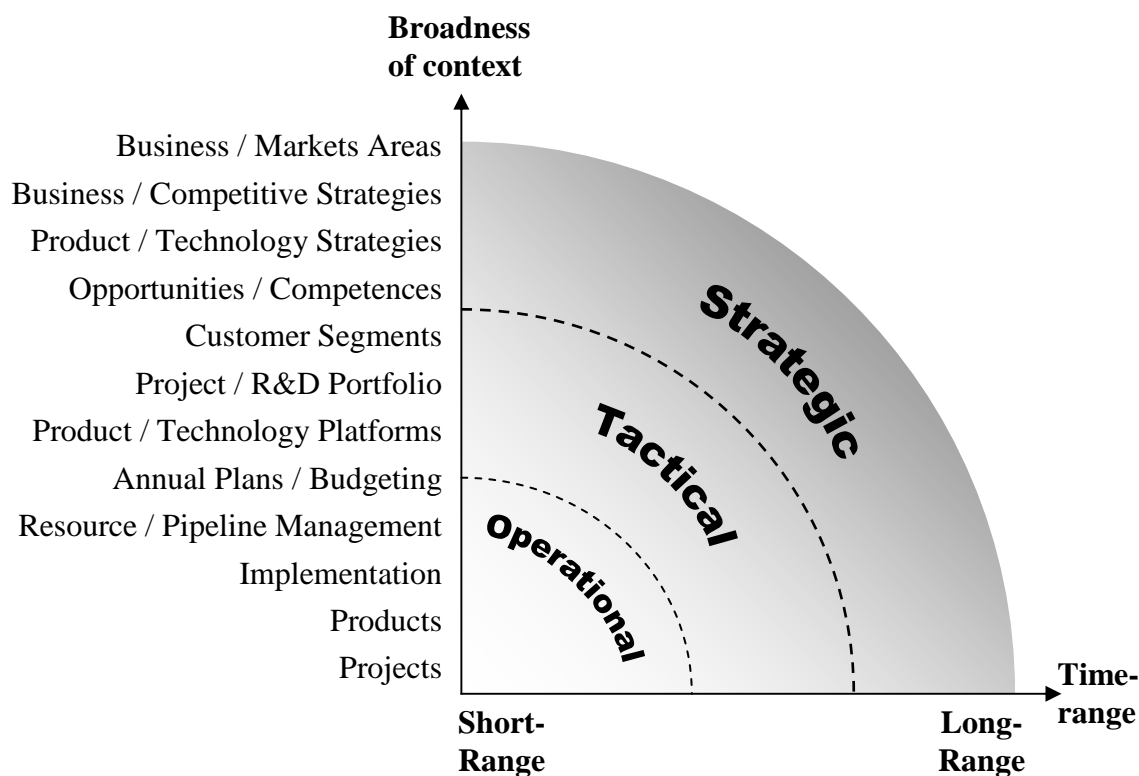


Figure 2. The sphere of technology management.

The time range at the strategic level is typically longer than at the tactical and operational levels, but this is still not a 'law of nature'. In some cases, a strategic level focus would also be on quite short-term topics, especially when there are rapid changes in significant and discontinuous points of the business environment. However, at the tactical level the time context is almost always in the mid-range, and sometimes even in the short-range, because an essential aspect of the tactical level is flexibility and reflective decision-making with a short response time.

From another perspective there are also differences between the broadness of general management contexts at the different technology management levels.

At the strategic level the focus is typically on the entire business, or the business or market areas. At this level one works with business/competitive and product/technology strategies.

At the tactical level the management's interest centres on the dynamic driving of product and project portfolios, on roadmaps, and on release plans focusing typically on certain customer segments. The essential issues to manage are changes in offerings and product families, and the definitions of next-generation platforms.

The main context of the operational level is the management and implementation of projects focusing on the definition and development of individual platforms, products, processes and services. The essential tools at the operational level are typically product creation projects and processes.

CONCLUSIONS

Based on these selected basic approaches, we came to the conclusion that technology management cannot be completely formulated as a single and continuous process in the sense of the traditional process definition. It is not like a product creation or a production process generating outputs from inputs by sequential steps. It is rather a management structure consisting of different activities, forums, workshops, meetings, information flows, tools, documents, and also more formulated sub-processes. The most important issue is that the management structure, and different roles, authorities and responsibilities, are understood throughout the company's management.

Different levels are essential in mastering technology management. Especially important is the often-overlooked tactical level, which serves as the "glue" between the strategic and operational levels. Its role is crucial in linking operational work to strategies in practice.

As a senior vice president, technology, in our company stated at a review meeting:

*"This model reveals a central problem in our management.
After a short contribution on long-range strategic planning our discussion shifts quickly into acute and short-term operational issues completely isolated from strategic intents.
We have had a lack of a tactical level that links operational activities with strategy".*

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