

Diagnosis in Management. A Comparative Analysis of Approaches to Management Integration

Integrated Management: The State of the Art

Another Dilemma in Management Innovation

Innovation in management is very often achieved by the addition of new management functions to the bulk of existing management jobs. In some cases progress comes from putting the focus on specific management functions which have thus far been neglected. By this procedure compensation, motivation, goals (results, objectives), corporate culture, budgeting, organisational design, and strategic thinking have been introduced into the management system. This "additive" behavior resulted in lists of management jobs becoming much longer than Fayol's system of managerial functions or the POSDCORB-scheme from the early days of management research. Current debates on, for example, "controlling *or* culture" as pivotal conditions for management success prove that the strategy of management growth by focus relocation is still alive and well.

Unfortunately, as we have learned from Schumpeter's "creative destruction" or from Wilson's organizational dilemma, processes of innovation are likely to be charged with built-in conflicts¹. This also holds true for the pattern of management growth performed by "isolated" innovations outlined above: without a doubt, they increase the efficiency of a specific management sector by filling a gap or replacing an obsolete item, but at the same time, they possibly reduce the efficiency of other dependent sectors and probably of the management system as a whole. They share the same fate as highly functional products released from R & D labs or assembly lines (like some "communication"- or "C²"-technologies, biotechnology, soft energies, the "Concorde" etc.), which remain "foreign bodies" because either links to complementary products or the favorable institutional (e.g. legislative) climate, or the required infrastructure is missing.

To avoid this negative overall effect, systemic patterns of innovation have been adopted, according to which adequate *structure* is the keyword to management progress. One important structural approach is development by differentiation, which has (among others) been applied to *control*², providing us with feed forward in addition to feed back control, on-line control, strategic and operative control, scrutiny of assumptions, etc. According to the differentiation-integration-paradigm, adequate structures are necessarily integrated structures. The idea of *integrated* management is reflected in the plethora of famous acronyms such as MIS, 7-S, OD, MbO, DSS/KS, PPBS, ZBB, CIM, 3D, together with contingency approaches (fit, congruency), equity

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models, equilibria of contributions and inducements, grids, modern controlling, co-alignment, planned evolution, life-cycle-models of organizations and leadership, etc. The advantages or even the necessity of integration seemed evident for quite a time. They appeared to be based on fundamental "truths" about interdependencies like "control without planning is impossible!" and "planning without control is useless!". But even these "truths" have been questioned. Some recent investigations disclosed that the pattern of integration based on complementary relations (harmony) is not the long expected panacea. The notorious interface of corporate structure and strategy³ serves an impressive testimony that simply stating the advantages of integration does not tell us *how* to integrate. Moreover, as demonstrated by the "paralysis by analysis-pitfall" and by two familiar ways of coping with the future, i.e. prediction and preparation⁴, complementary integration according to "the more of the two, the better" is not an universally valid approach to management integration. There are two simple but nevertheless important lessons to be learned from these deficiencies in existing patterns of integration:

1) *Integration must not be too loose.* For personnel management the relation between performance appraisal and career (developmental) planning serves as a good illustration of such "integration gaps". Promotional decisions based upon performance appraisal are doomed to failure ("Peter-Principle") unless appraisal data have prospective capacity, i.e. emphasize lasting "traits" or trends instead of transitory past "states".

2) *Integration must not be too tight.* If planning and control are tightly integrated in a controlling system, management will become biased towards incremental interventions. In this case firms will be run by conservative "registrators" utilizing a piecemeal controlling system which yields small-step-interventions, incapable of conceding heuristics the importance it deserves. Furthermore, over-integration is detrimental to the "integrity" of control as an impartial arbiter within the management system. Loose (instead of tight) coupling of management jobs, on the other hand, enhances the creative potential of management. A certain level of disintegration, e.g. of incongruity and cognitive or normative conflict (as opposed to harmony), improves the explorative capacity of management, the evaluative handling of plans and of assumptions.

Obviously, integrated approaches to management innovation also have to cope with nasty difficulties reminiscent of the classical paradoxes and dilemmas of management such as the bureaucratic paradox, the control dilemma, or the administrative paradox. Compared with patterns of isolated innovations, the conflict appears just slightly modified: tight partial integration is an enrichment which enhances sectoral efficiency, but impairs overall efficiency because integration with other management sectors is getting too loose. The simultaneous occurrence of fit (increase of integration) and misfit (increase of disintegration) gives a static formulation of this *dilemma of management integration*. From a dynamic point of view it says that integrating the management system step by step, i.e. integrating two jobs at a time, does not automatically facilitate overall integration, but more likely complicates it. Successful "interlocking" ("blocking") of complementary or homogeneous management functions often prompts phenomena of alienation, segregation, and isolation with respect to the rest of the system.

Redefining the Task of Management Integration in Terms of Optimal Integration

A prerequisite for avoiding these defects and the only chance to solve the dilemma is to refrain from approaches guided by naive “yes-or-no”, radical maximum, or short-sighted sectoral ideas about integrated management. Adequate integration is basically a matter of “*optimal*” integration. Optimality itself is a matter of putting the right things together with the appropriate intensity.

The objective of this paper is to awaken awareness of the dilemma of management integration by investigating its nature and impact. It will also try to outline ways of handling it in order to obtain optimal integration. For further elucidation of the concept, first, the necessities of management integration, i.e. the interfaces in the management system, must be identified. Subsequently, the idea of optimal management integration will be applied to a major innovation in management: diagnosis.

Optimal integration, i.e. the overall (“holistic”) optimum of integration, remains a vague idea, as long as it has not been tested against the interfaces in the management system. From a formal point of view, i.e. disregarding the specific interfaces within business management like production/marketing or investment/finance, five *core interfaces* of integration can be identified⁵:

1. Integration of planning and control as the core issue of traditional approaches to integration⁶.
2. Integration of prospective problem recognition and retrospective control or feed-forward and feedback-control, a crucial interface for early warning systems, proactive management etc.⁷.
3. Integration of management activities and information systems, a linkage emphasized by MIS and DSS.
4. Integration of strategic and operative activities within a hierarchical management system.
5. Integration of rationalistic attempts to find optimal solutions for problems and realistic attempts to find feasible solutions for systems (employees, customers, plants, equipment etc.). The business of integrating “problem”-oriented and “system”-oriented management activities is usually labelled implementation.

Diagnosis seems most suitable for a *paradigmatic illustration* of the dilemma and its handling:

First, from a denotative point of view, it is an innovation proper: contrary to traditional management jobs such as planning and organizing, which tell us what to do and how to do it, it describes the job of merely stating that there is something to do. The acceptance of such grievance contributions (as opposed to constructive suggestions) requires an extended notion of management efficiency, which must also reinforce activities of raising dust, and bother or even shock people without having something like a plan at hand. In times when overheads are the target of ZBB or overhead value analysts, the promotion of such an expansion of overheads appears to be quite a heroic venture.

Secondly, from a connotative point of view, the ambiguity in the evaluation of this activity presents a challenge: on the one hand, any manager is afraid of Cassandra diagnostics of impending perils. On the other hand, managers are fond of look-out-diagnostics that spot new product-market-bonanzas.

Thirdly, from a “positioning” point of view, diagnostic thinking has connections to any of the integration problems listed above: The idea of diagnostic thinking originates in

the integration of feed-forward and feedback control. Likewise, it takes account of the integration of planning and control as well as the management-information systems-interface. Last but not least, there is concern about its connection with the question of implementability, in other words, the borderline between science and science fiction of management.

A Brief Job Description of Diagnosis

While all of the intervention-oriented management jobs yield problem solutions, the ultimate output of diagnostic thinking in management is *problems*. Problems are expressions of need for action. The formulation of such action-initiating information is triggered by the recognition of *discrepancies* (gaps) between the way things are (more correctly: will be) and the way they ought to be. Forecasting such gaps is the realm of status-quo-prognostics, as opposed to forecasting action-depending effects in planning. Status-quo-forecasts tell us what will happen if no new therapy is applied. Within diagnostics, these forecasts are published to initiate action. They therefore become “reflexive” prognoses of the self-fulfilling type (in case of opportunities) or of the self-destroying type (in case of threats). Familiar categories of the gaps in question are daily difficulties, strategic surprises, exceptional disturbances, pathologies, upsets of organizational equilibria, crises, deviant behavior, disorders, vulnerability, risks, threats, conflicts, inability to show requisite variety, but also opportunities, unanticipated attractiveness, etc.⁸. A first qualitative attempt to evaluate the contributions of this new management job reveals the following salient advantages (or avoidable disadvantages):

- Diagnosis helps fight the error of the third kind⁹.
- Diagnosis avoids troubling planners with unsolvable problems.
- Diagnosis dissolves pseudo-problems and discloses pseudo-harmonies.
- Diagnosis discriminates between major and minor problems.
- Diagnosis prepares for intervention.

In order to meet these expectations, diagnosis must be composed of manifold ways of information processing like exploration, classification, description, prediction, validation, explanation, and evaluation. Compared with existing concepts of (clinical) diagnosis, which operate on the diagnosis-prognosis-distinction, the “prospective” version outlined above is broader and sort of pre-integrated. Semantics in this case takes account of the fact that for managerial interventions the knowledge about *present* states is merely of instrumental importance, compared with information about certain *future* states, a lesson primarily learned from life-cycle analysis¹⁰. Accordingly, familiar operations like *testing, analyzing, scrutinizing, auditing, scanning*, etc. are only integrated steps in diagnosis and do not provide diagnostic output information themselves.

The Scope of Integrated Diagnosis

A first step on the way to the optimal integration of diagnosis is to survey the scope of integration patterns by identifying the different kinds of *informational bases* for diagnostic reasoning.

Fact

The tight version of integrated diagnosis attaches the recognition of problems exclusively to feedback control. Consequently, need for action is exclusively derived from *monitoring*, i.e. retrospective information (facts) and their extrapolation. Failures or strengths registered in the past are considered to be identical with the threats or opportunities expected in the future. Another feature is the tight complementary linkage to planning: in planning and control systems, feedback control has the monopoly on inducing and reviewing planning activities. In addition, diagnosis is in charge of the entire reactive management, i.e. it also conceives adaptive interventions. Its unconditional reliance on hard facts makes this variety of diagnosis look sort of sombre, but at the same time realistic. It keeps management "with both feet" in the actual world. It obviously corresponds to the theoretical construct of a no-change or at least a mechanical ("Newtonian") universe. Unfortunately, however, the practitioner is often hardly able to tell which kind of environment his organization is or will be coping with. Thus fact-based management is "doomed" to miss the requirements of the actual situation from time to time. Moreover, the reactions of these "adapters" are likely to show considerable and dangerous *time lags*, since only strong signals induce action. There is no need to add that *proactive* behavior is prohibited or appears only haphazardly. Apparently, this tight pattern of integration of management suffocates heuristics, which is existential for survival, not only in turbulent or "Einsteinian", but also in unstable environments.

Fantasy

Within the loose version of integration, diagnosis is considered a managerial function of its own, deliberately staying apart from the rest of the clan. It closes a functional gap left by the existing management functions. A first hint at its peculiarity is that it works on a kind of prospective information quite different from facts, that might be (exaggeratedly) called "fantasy". The business of problem recognition is not concerned with the actual world, but deals with possible future worlds captured in scenarios. Thus the job of diagnosis is detecting possible (novel) threats and opportunities by "undirected" viewing¹¹ and forecasting activities as well as what-if-reasoning. By relying on fantasy, diagnosis *compensates* the built-in inclination of planning and feedback control to think in terms of stationary or mechanistic systems. It plays the role of an antidote or countervailing power against the selective management forces addicted to the past.

Unfortunately, a price has to be paid for such deliberate alienation procedures. The results of planning/control, on the one hand, and diagnosis on the other are no longer comparable. It makes little sense to accept an intuitively ("inexactly") derived diagnosis as a (counterinductive) test of an empirically ("exactly") tested plan or control statement. Incomparability comes to incompatibility, separating the management system into two different, but nevertheless interdependent domains where communication is difficult because of the lack of a common language¹².

In fact, most protagonists of "compensatory" diagnosis are less radical. They usually restrict the range of its applicability to "surveillance" within *strategic management*¹³. In this management sector they locate a special need for fantasy: it is not so much the specific dealing with weak signals or "soft (fuzzy)" facts per se that requires fantasy

instead of hard facts. It is rather the handling of *discontinuities*¹⁴. Empiristic management cannot possibly cope with this phenomenon, since for an empiricist there is no way to claim that the future is completely different from the past without questioning his own methodological standpoint.

Both the logical consistency and the plausibility of this argument seem overwhelming. Still, the proposed solution of the integration problem is anything but satisfactory. Even if the integration of strategic fantasy-based diagnosis and strategic planning can be achieved, it will be accomplished at the price of another management *disintegration*. This time, the gap is between *fantasy-based strategic* management, on the one hand, and *data-based operative* management on the other. The disparity causes not only trouble but also communication problems, especially since the latter is hierarchically dependent on the first.

Our meta-diagnostic reasoning brings us to the following conclusion: barriers to optimal integration arise from the existence of two different informational bases of management. Why not replace the two adversaries by a third, less troublesome, and more integrative basis?

Experience

Experience – as opposed to factual knowledge – is basically a system or, more often, merely a set of hypotheses, which have undergone some tests. These propositions can be part of individual-subjective or of collective-intersubjective knowledge. In both cases they are concerned with comparatively invariant structures, contingencies, causal relationships, etc.

Obviously, this methodological notion of experience corresponds to a “theoretical” version of empiricism. It stands out against the atheoretical, so called *dataistic* version of empiricism analyzed above, where empirical knowledge is the same as factual knowledge¹⁵. However, the implicit premise of a purely factual, unprejudiced, phenomenological, immediate approach to reality is a fallacy. Observational approaches to the real world are (theory-) loaded with several varieties of hypothetical knowledge, covering observational theories, background and auxiliary theories, etc.

The production of experiential information is primarily accomplished by utilizing logical operations to combine two kinds of input information: first, fantasy which enters the production process as conjectures, speculations, explorations (or sometimes as already pre-tested hypotheses). Second, facts which enter as observations, sample data etc.

Obviously, the use of experience is not “revolutionary” in that it radically eliminates either facts or fantasy from the process of diagnostics. It rather redefines the respective contributions of different kinds of information. Informational support now comes from three sources with experience playing the major role: This re-arrangement was inevitable, since “*facts without theory*” do not really exist and “*fantasy without theory*” goes along with arbitrary action. The cooperation of the three informational inputs works like this:

– Whereas theory is the immediate informational support for diagnostic statements, facts and fantasy are the inspirational “cues” that initialize the application of theories. As for existing products of fantasy (e.g. scenarios), theory provides the *filter* (touchstone) needed to select (corroborate) conjectures about future threats and

opportunities. As for existing facts, theory serves as a *vehicle*: it decides which data are relevant (irrelevant), i.e. which ones should be incorporated (excluded) into (from) the diagnostic process.

– In cases where neither factual nor intuitive information is at hand, theory itself is the (deductive) inspirational *guide* (searchlight, lookout, *radar*) to discover the relevant information needed. Thus theory keeps environmental analysis and internal scrutinizing from getting lost due to the lack of a criterion of relevance (e.g. for relevant markets)¹⁶. Managers must be aware of the fact that possibilistic creative scanning (viewing) “beyond theory” cannot claim to provide morphological totality because neither possible states nor relationships are completely enumerable.

– Last but not least, theory plays the role of a “*third party*” when cognitive conflicts between factual and conjectural items in diagnostic knowledge arise. By virtue of its *hybrid* character, theory has the integrity to fulfill this job of a neutral arbiter. First, theory is impartial. It has the capacity to be both counter-intuitive, i.e. to question beliefs (as demonstrated by the theory of cognitive dissonance), and counter-inductive, i.e. to question facts. Secondly, theory is openminded with respect to arguments stemming from analytical reasoning or from observation. In other words, factual and conjectural information can be applied to improve the quality of hypothetical knowledge.

In order to manage conflicts between the worlds of facts and fantasy within diagnosis, experience must not be conceived as a dogmatic or rigid “Procrustes’ bed”. An orthodox elimination- or paradigm shift-approach would furnish the required *flexibility* of theoretical knowledge by substituting falsified items with new items. It denies the built-in flexibility of theories, which enables them to incorporate data and conjectures without strict elimination. For one thing, this built-in flexibility is due to the low degree of specification of most theories. In addition, flexibility is enhanced by a hierarchical structure of theoretical systems according to the Lakatosian model of research programs¹⁷.

Unfortunately, the radical absence of elimination rules may render theoretical knowledge a collection of contradictory propositions. Such a *pluralistic coexistence* may be beneficial for exploration, but is unacceptable for final evaluation. Consensus either as a cognitive constituent of corporate culture or as the result of consensus, devil’s advocacy or dialectical techniques must be used to conserve experience like a Chinese wall against possibilism.

All together, built-in flexibility opens theories towards inspirations from the worlds of facts and fantasy such as (for diagnostics) new states of relevant variables, new kinds of contingencies, modified demarcation between constraints on the one hand and instruments on the other, etc.

Optimal Internal Integration of Diagnostic Systems

Some problems of the integration of feedback and feed-forward control have been implicitly solved above. The affinity of the two varieties of control lies in their common concern for discrepancies. They differ in time reference of discrepancies. Feedback control usually deals with past weaknesses, failures, and strengths. Within first generation early-warning systems, they represent factual inspirational input for

diagnosis. In second generation systems, additional input are observations of leading indicators. In both cases, the two control processes refer to a common theoretical basis, thereby warranting comparability of results. Feedback control uses theoretical knowledge primarily for explanation, diagnosis for both explanation and forecasting. In first generation early-warning systems, theory is applied for monitoring purposes. In second generation systems, theory has already been utilized to discover useful indicators.

Optimal internal integration of experience-based diagnosis is primarily dependent upon appropriate *timing*. Fortunately, both jobs care for quick provision of information: feed back control primarily for motivation (equity), feed forward control primarily for intervention purposes. Problems of comparability may arise from time lags between the two activities whenever timing is not perfect. In these cases, the two activities are likely to be run on different informational bases (data, models, and methods)¹⁸.

A more essential difference between the two control processes comes from the fact that diagnosis, unlike feedback control, can also be triggered by non-factual information, which is typical of *third generation early warning systems*. Strictly speaking, the optimum of integration of the two processes is to determine which proportion of inspirational input should come from facts and which from creative pondering about possible developments. This explication of "*optimally mixed scanning*" is equivalent with the well-known methodological problem – unsolved to date – of how to influence explorative processes by an optimal mix of inductive and deductive techniques and devices (morphology, review, search, expertise, creativity, observation, alertness, etc.). Similarly, the integration of operative and strategic diagnosis within a diagnostic system can be accomplished by relying on experience. Although strategic and operative problem recognition differ with respect to their immediate impulses (*weak* and *strong signals*¹⁹), they utilize common hypothetical knowledge as a bridging device. Quite analogous to the strategy-operation-distinction, differences between the two kinds of signals are, first of all, *formal* in nature: strategic diagnosis is concerned with global ("macro"), long-term factors (legislation, technologies, changes in values and attitudes, socio-political risks, etc.), whereas operative diagnosis deals with specific ("micro"), short-term factors derived from (cost) accounting data, revision of budgets, project management, and the like.

A special characteristic of hierarchically integrated diagnosis is the fact that strong signals not only provoke operative diagnostics to detect immediate need for action. They are also the starting points of *bottom-up-diagnostics*. This goes from operative to strategic needs for action by persuing the long-term impact of operative discrepancies. Vice versa, weak signals may also initiate *top-down-diagnostics*, leading from weak to strong signals by decomposing global factors with respect to content and time.

Optimal integration of operative and strategic diagnosis is not primarily a question of how many processes should be initiated from the top or from the bottom. Optimality rather implies that impulses do not get lost unless their irrelevance for the other levels has been proved. Thus integrated ("synoptic") diagnostic systems cure both managerial *myopia* and managerial *hyperopia*.

Optimal Integration of Planning and Diagnosis

From the scanning-planning-paradigm we know that integrating diagnosis and intervention deals with the dependency of processes of problem solution on initializing processes of problem recognition. From our consideration about integrative informational bases for management, we know that both jobs utilize experience: diagnosis uses it primarily for status-quo-prognostics, planning primarily for "efficiency"-prognostics. Since not merely integration, but optimal integration is aspired to, this interface needs more profound investigation: first, relevant interrelations consist of more than just a one-sided initiating connection. Diagnosis already performs *preparational activities to facilitate intervention*, either direct response or the construction of (flexible) action potentials. Accordingly, the quality of problem recognition predetermines, to some extent, the quality of problem solution. Secondly, models of optimal integration are expected to fix optimal allocation of management activities on diagnosis, on the one hand, and intervention on the other hand, in other words, optimal management budgets.

Some "neoclassical" reasoning can be used to outline the coordination of diagnostic and planning efforts (cp. figure 1). Considerations refer to a given interval between a horizon of planning, t_2 , and an earliest starting point for planning and diagnostic activities, t_1 . Time represents time "ahead" for prognosis or time "left" for intervention, not time (i.e. resources) "spent": the amounts of resources used for either management activity are assumed to be already "optimal" according to the standards of information economics.

In the t_1-t_2 interval, costs of problem solution (PS-curve) based upon perfect diagnoses are supposed to increase the less time there is left for intervention. Opportunity costs of problem recognition (PR-line), on the other hand, decrease, because recognition becomes more reliable the closer the events to predict or register are.

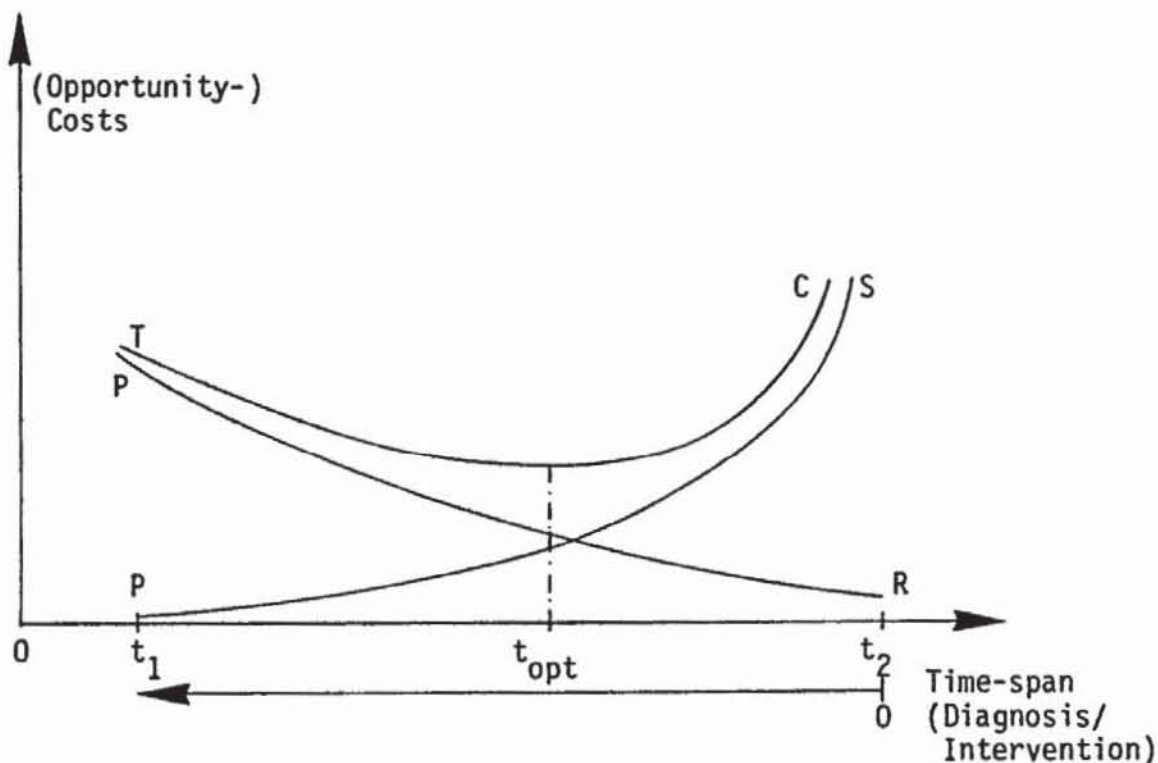


Figure 1: Optimal integration of diagnosis and planning

Diagnostic activities exert a twofold influence on the shape of total costs (TC-line): on the one hand, facilitation of intervention by typology of problems, indication systems, etc. reduces planning costs, as the result of substituting planning activities by diagnostic activities. On the other hand, diagnosis increases total costs whenever the error of the third kind has not been eliminated successfully or pseudo-problems have not been unmasked. In these cases costs of *over-sensitivity* arise, i.e. planning departments are employed to solve problems that do not really exist (e.g. for the European automobile industries preparing to meet changing announcements of legislation concerning speed limits, catalysator technologies, over time).

The shape of the TC-curve analytically defines a point t_{opt} of optimal integration in terms of opportunity-costs depending on timing (assuming that planning activities are triggered without delay). As a matter of fact, budgeting and the determination of (cost saving rate based) transfer prices for diagnostic information requires knowledge of the exact amounts of the respective costs. Since the model only contains ordinal data, considerations merely serve as a "regulative idea", not as an operational guideline.

The Implementation of Diagnosis

The last interface for optimal integration of diagnosis into the management system deals with the integration of rationalistic and realistic views of problem recognition in management. It may be that experience-based diagnosis is willingly accepted by a rationalistic scientific community. But from the realistic standpoint taken by practitioners, it may be viewed as overly rationalized, another contribution to what may be more properly termed "science fiction of management".

Certainly, statistical evidence on the incidence of early warning systems, environmental scanning and analysis, as well as case studies in successful proactive management makes clear that diagnostical reasoning is an empirical fact. There is also ample evidence that a high percentage of firms (big and small business) have elaborate feedback control (reporting) systems which serve as a sound basis for factually based problem recognition²⁰. Of course theoretical models on natural and artificial intelligence in problem solving and decision-making contain diagnostic elements. Still, acceptance barriers may come from an aversion against the use of theoretical experience for diagnostic purposes.

Fortunately, there is support from theory that theoretical reasoning is no foreign body, but rather an *indispensable constituent within practical reasoning*. This is first true for the individual level, where *implicit* theories of personality and leadership, patterns of attribution, expectations in motivation, superstition etc. have been discovered. It also applies to the collective level, where we find theoretical items not only in formal information systems, but also in specific corporate cultures (sometimes labeled "beliefs", "myths", "basic assumptions" etc.) or in global culture, such as common sense, which can be conceived as a set of (sometimes contradictory and poorly confirmed) hypotheses.

Conditions apparently favor the successful implementation of diagnosis: the step from factual and implicit theoretical reasoning to explicit application in diagnosis seems rather small. Implanting for the scientist is not primarily a task of selling some strange academic products. It is rather the job of making homemade theories explicit and of teaching their critical handling, e.g. by confronting them with some scientific theories.

Future Management Research in Diagnosis

Our considerations about the adequate handling of the five relevant interfaces in the management system gave shape to the concept of optimally integrated diagnosis. A corresponding job description "from an integration point of view" covers five integration requirements (exhibit 1):

- Formal clarification of information content, i.e. specification and extension of problem formulations with respect to quality, amount, time reference, etc.
- Positive validation (verification, confirmation) and normative validation (impact, relevance, significance) of factual and conjectural discrepancies against experiential knowledge.

Exhibit 1: Diagnostic activities

Integration Requirement	Diagnostic Activity	Explication	Diagnostic Method (selected)
Information Content	Specification, Completion, Operationalisation etc.	Determining adequate semantic/pragmatic information content of problem formulations	(Multidimensional) scaling
Filter	Validation	Finding and testing (as well as eliminating pseudo-) discrepancies	Time series analysis, gap-projection, scenario-writing, survey-feed-back, check-lists, grievance-systems, early warning-systems
	Evaluation	Assessing relevance of discrepancies	Sensitivity-analysis, rating
Format	Decomposition	Splitting complex problems into smaller problems	Relevance-tree-analysis
	Composition	Fusing interrelated partial problems to aggregate problem(s)	Cross-impact-analysis
Focus	Transposition	Tracing symptomatic discrepancies (global factors) to causal discrepancies (specific factors) (incl. radical substitution of problems)	Progressive abstraction, path analysis
	Identification	Categorizing individual problems as elements of (intervention-oriented) classification(s)	Discriminant-analysis, expert-systems
Structure	Coordination	Coupling "within" multiple diagnostic processes based upon (hierarchical) classification and/or interrelations	Cluster-analysis, factor analysis, facet analysis
	Cooperation	Coupling "between" diagnostic processes and other management processes	Online information and communication systems, liaison devices

- Determination of adequate complexity (size) of problems (as for objectives, constraints, and activities) to match available resources for intervention vis-a-vis the (sequential, pooled, reciprocal) interrelatedness of problems.
- Indication of possible areas of intervention by analysis of causal factors and application of intervention-oriented clustering.
- Integrative coupling of interrelated diagnostic processes and of diagnosis and other management jobs.

The conceptual framework of activities in exhibit 1 describes the state of the art of how to overcome the dilemma of integrated management when introducing diagnosis into the management system. At the same time, it serves as a meta-diagnostic device to reveal what still has to be done in future management research on diagnosis.

A major field of future refinement of the framework outlined above is the *organizational design* of diagnostic management systems. A first concern of organizational research is to find out who is best charged with the respective diagnostic jobs. The answer to this question positively lies beyond the crude staff-line-distinction, the selective reference to certain positions or levels of management (CEO, head of SBU, controller, freestanding fulltime "look-out"-specialists etc.). It must also comprise external partners like consultants or various, possibly cooperatively run information services. Motivational and informational conditions for successful initiation and diffusion of information about action needs will have to be analysed in terms of *combined* bases of influence (such as informational-, reward-, expert-power etc.). The integration of familiar contingency factors like divisional or departmental structures, size, type of culture, and environment with special emphasis on organization of planning (department, task-force etc.) is obligatory. Taking account of these contextual variables will help one to fathom the respective ranges of applicability for turn-key versus tailored diagnostic systems.

Another major concern of organizational design is *process coupling* within diagnostic activities and between diagnostic and non-diagnostic management jobs. A mix of continuous and periodical review has to warrant on-line updating of relevant information to avoid both loss and obsolescence of information.

In the course of time, appropriate organizational design helps establish not only learning intervention systems, but also *learning diagnostic systems*. Dynamic variations of costs of problem recognition can then be incorporated into learning curve models. In addition to the integrative bridging of past and future as well as problems and solutions, the design of diagnostic systems can be used to study developmental processes, in other words, the dynamic aspects of optimal integration of the management system.

Footnotes

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