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Exploring Human Performance Technology (HPT) Models for Knowledge Workers

Hwan Young JANG*
The Presidential Commission on National Competitiveness
Korea

The purpose of this paper is to review a variety of challenges facing the Human Performance Technology (HPT) in supporting knowledge workers' performance, and to explore possible HPT models for knowledge workers. The first section of this paper investigates the core attributes and major models of HPT as a foundation. While HPT has a lot of strengths in terms of systemic, systematic, methodologically eclectic, evidence based, and results oriented approaches, some pitfalls – which could be detected if these principles were mindlessly applied to problem areas – are explored. The second section presents some considerations such as analysis, intervention design, and leadership that HP technologists need to take in order to make HPT a better field of practice for knowledge workers. The author also suggests a tentative diagnostic model and a process model for knowledge workers, core principles of which are based on systems thinking, in particular Senge's the fifth discipline and Checkland's soft systems methodology. The importance of formative evaluations to improve these models is noted as a conclusion.

Keywords : human performance technology, HTP model, knowledge workers

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* Public Innovation Team, the Presidential Commission on National Competitiveness
welcome9@naver.com

Introduction

Human Performance Technology (HPT) focuses on the improvement of performer's skills, knowledge, and attitudes. The goal of HPT is to ensure that employees have the skills, knowledge, motivations and support mechanisms needed to effectively and efficiently perform their jobs. So, we may assume that HPT has made great contributions to knowledge workers' performance improvement. However, this hypothesis has not been proved by rigorous empirical research, and few particular HPT models for knowledge workers have been provided. According to Stolovitch and Keeps (1999), "HPT's roots lie in behaviorism and this heritage helps explain why current HP technologists focus so strongly on the identification and analysis of stimuli within a system that may trigger certain responses and the consequences they engender" (p. 654). Behavioral orientation of HPT makes PT practitioners see a worker as a performer rather than as a learner. A performer is task oriented and a learner is knowledge oriented. In the author's perspective, however, a knowledge worker is the sum total of a performer, a learner, and a value creator. He/she needs to solve ill-structured problems, create future values, and face on-going changes or breakthroughs. So if we create HPT models that focus not only on performers but also on learners and value-creators, it would be valuable in that HPT can provide workers with better tools to tackle a variety of performance problems facing many knowledge intensive organizations.

The purpose of this paper is to explore adequate HPT models for knowledge workers' performance improvement. The first section will investigate the core attributes and major models of HPT as a foundation, and the second section will address the challenges that face the HPT field in terms of the development of performance improvement tools for knowledge workers. In the third section, the author will present tentative HPT models for knowledge workers, and will note the requirements for these models' improvement in the conclusion.

A Foundation of Human Performance Technology

Before the investigation on what HPT models are appropriate for knowledge workers, the first step should be to explain what HPT is. Critical attributes of HPT and major HPT models are described in this section.

Critical attributes of HPT

Though there is no single definition with universal agreement, "a consensus on its critical attributes appears to have formed" (Stolovitch & Keeps, 1999, p. 9). International Society for Performance Improvement (ISPI, 2002) set the performance technology standards as follows;

- HPT focuses on outcomes.
- HPT takes a systems view.
- HPT adds value.
- HPT establishes partnerships.
- Be systematic in the assessment of the need or opportunity.
- Be systematic in the analysis of the work and workplace to identify the cause or factors that limit performance.
- Be systematic in the design of the solution or specification of the requirements of the solution.
- Be systematic in the development of all or some of the solution and its elements.
- Be systematic in the implementation of the solution.
- Be systematic in the evaluation of the process and the results.

The critical attributes of HPT have been derived from the wisdom of experienced HP technologists who have been engaged in diverse performance improvement projects for many years, and those attributes have formed the identity of the field of HPT. However, the principles of HPT could become negative features depending on what perspectives we have and how we apply those principles to performance problems. Major principles of HPT and their parallel weaknesses are summarized in Table 1. Those weaknesses are regarded as the challenges that the field of HPT faces today, which will be discussed with the emergence of knowledge workers in the next section.

Table 1. HPT's Strengths and Weaknesses

Strengths	Weaknesses
• Systematic process (Analysis, intervention design, development, implementation, evaluation)	• Blindly employing step-by-step engineering procedure • Losing sight of social and political aspects in organization
• Systems thinking	• Only applying the hard systems thinking (system engineering, system analysis) • Little considerations of soft systems methodology or critical systems thinking (world view or mind-set change, consensus building, etc)
• Open to all means and methods	• Lack of clarity for HPT (Pershing, 2006)
• Focus on human performance	• Little attention to organizational performance or business performance
• Evidence based and results oriented practices	• Weak linkages between theories and practices • Possibility of resulting in few HPT's theories or frameworks on its own

Major HPT models

A variety of models have appeared over the last fifty years in the HPT field, which indicates that the field is still evolving. These models provide performance technologists with unique perspectives that enable them to analyze and manage performance problems effectively. These perspectives have been utilized and practiced for performance projects of diverse settings by many performance technologists. As a result, the HPT models have included coherent HPT perspectives and approaches that are distinguished from ones in other disciplines and that performance technologists can easily utilize in their research and practices.

Rosenberg, Coscarelli, and Hutchinson (1992) categorized HPT models as diagnostic and process models. According to Rosenberg, Coscarelli, and Hutchinson (1992), "Diagnostic models help classify areas where HPT can be applied; process models attempt to describe how HPT could be applied" (p. 27). Evolution and development of HPT models were started more or less from the efforts to find the root causes of the performance problems. While Gilbert contributed many powerful ideas in improving human performance, his most important contribution would be his emphasis on the accomplishments or the products of behavior rather than on behavior itself. According to Gilbert (1978), "in performance, behavior is a means, and its consequence is the end" (p. 16). His focus on "worthy performance in which the value of the accomplishment exceeds the cost of the behavior" (p. 17) paved the way for proliferating HPT models with the efforts to systemically diagnose the cause of the performance problem and to systematically process the performance projects.

A representative example of diagnostic models is David Wile's (1996) synthesized HPT model. This model is unique in that "it offers concrete solutions to varying performance problems and discriminates between interventions that are training solutions and those that are not" (Wilmoth, Prigmore, & Bray, 2002, p. 17).

Process models have many similar characteristics; they have phased or grouped activities, seek out performance gaps, consider multiple intervention possibilities, and evaluate results with an appropriate feedback loop (Wilmoth, Prigmore, & Bray, 2002).

The International Society for Performance Improvement (ISPI) model (Van Tiem, Moseley, and Dessinger, 2004) includes all these characteristics and is an appropriate example of a process model. Van Tiem, Moseley, and Dessinger (2004) demonstrate major features of each phase in the HPT process. The description of HPT process in Table 2 is based on ISPI standards (2002) and other related literature.

Stolovitch & Keeps (1999) point out that, "The orderliness of the HPT, the objectivity and care with which analysis, design, and evaluation procedures are conducted, and the linking of training, environmental redesign, feedback systems, and incentive systems to measurable performance – all these elements build credibility and buy-in for the interventions that are applied" (p. 11).

In addition to diagnostic models and process models, some HPT researchers and practitioners have developed more rigorous systemic models in consideration of non-linear and complex aspects of performance problems although these were not made explicitly for knowledge workers (see Table 3). These models are different from conventional process models, in that they look at problem areas as performance systems, and explore the comprehensive solutions for long-term results. The author classified them as performance system models differentiating from traditional diagnostic and process models. One of core features in performance system models is the scalability (Amarant & Tosti, 2006) of systemic approach, so performance system can be an individual worker, a work group, or an organization. In each performance system level, system elements – input, process, output, consequence, and feedback – are analyzed, and comprehensive interventions are selected on the basis of the analysis.

Table 2. HPT Process

HPT Process	Definition	Special features
Performance analysis	• Process of identifying the organization's performance requirements and comparing them to its objectives and capabilities. • In 1986, Joe Harless described this as "front-end analysis". • Rossett (1987) described the goal of performance analysis is to measure the gap between desired and actual performance.	• Organization Analysis (Vision, Mission, Values, Goals & Strategies) • Environmental Analysis (Organizational Environment, Work Environment, Work, Worker) • Gap Analysis
Cause analysis	• Process of determining the root cause(s) of past, present and future performance gaps	• The bridge between performance analysis and the selection of the appropriate interventions • Gilbert's Behavior Engineering Model * Lack of Environmental Support * Lack of Repertory of Behavior
Intervention selection	• The process of choosing the appropriate action that will reduce/close the gap between desired and actual performance. • Interventions may include: training, career development, individual feedback, incentives, rewards, team building, culture change, coaching, recruiting, succession planning, job aids, electronic resources, and facilities design.	• The practitioner's repertoire should include basic instructional and non-instructional interventions • Spitzer's 11 criteria for successful interventions • Rosenberg's 4 major areas of interventions (Human resource development, Organizational development, Human resource management, Environmental engineering)
Implementation	• The process of implementing and managing the intervention so that their effects are fully realized, long-lived, and present the least degree of discomfort to employees.	• Change Management • Process Consulting • Employee Development • Communication, Networking, & Alliance Building
Evaluation	• Providing information about worth or value or meaning (Reynolds, 1993) • The process collecting information and feeding it back to those who need the information so that the system can succeed (Shrock & Geis, 1999, p. 185)	• Van Tiem, Moseley, & Dessinger (2004) - Formative Evaluation - Summative Evaluation - Confirmative Evaluation - Meta Evaluation

Source: Van Tiem, Moseley, & Dessinger (2004), Fundamentals of Performance technology

Table 3. HPT Models

Diagnostic Models	• Behavior Engineering Model (Gilbert, 1978) • Performance Analysis Flow Chart (Mager & Pipe, 1984) • Performance Diagnosis Matrix (Swanson, 1994) • Organizational Elements Model (Kaufman, 1997) • Performer–Centered HPT Model (Deterline, 1993) • Wile's Synthesized HPT Model (Wile, 1996) • Performance Architecture Map (Addison & Haig, 1999) • · "Big Three" causes of performance gap (Clark & Estes, 2002)
Process Models	• Systematic Design of Instruction (Dick & Carey, 1996) • Strategic Impact Model (Molenda & Pershing, 2004, including Wile's diagnostic model) • ISPI Model (Van Tiem, Moseley, & Dessinger, 2004) • Performance Improvement Process (Pershing, 2006)
Performance System Models	• Total Performance System (Brethower, 1972) • The Open System Model (Harrison, 1994) • The Super-System Model, Nine Performance Variables (Rummler & Brache, 1995) • The Language of Work (Langdon, 1999) • The Organizational Alignment (Tosti & Jackson, 1994)

Challenges Facing HPT in Supporting Knowledge Workers' Performance

In the first section of this paper, the author addressed the foundation of HPT, and described some weaknesses of HPT's core principles. In this section, the author will discuss those weaknesses in detail in relation to knowledge workers' performance, which will illuminate the development of HPT models for knowledge workers. Main characteristics of knowledge workers are presented first, followed by major challenges facing HPT.

Main characteristics of knowledge workers

Though knowledge workers such as professors, doctors, lawyers, and priests have existed from ancient times (Cortada, 1998), significant attention to them is a recent phenomenon. It corresponds to the emergence of the new economy that originated from technological advances and globalization. Clark and Estes (2002) summarize well the relationship between knowledge workers and the changing economy.

> Increasing knowledge, skills, and motivation are the keys to success in the new world economy. During the next few decades, business will continue to focus on global competition, E-business, supply chain management, and strategic partnerships. Organizations will continue to face profound, complex, and persistent change. Nearly every sage and scientific study warns us that to achieve a sustainable competitive advantage in this permanent white-water environment, businesses must invest more and more resources in our knowledge workers. Knowledge workers are defined, in part, by the ability to solve new problems and adapt to changing conditions. In a constantly shifting economic marketplace, the most valuable workers are those who can change with it (p. 2).

Davenport (2005) gives us a prosaic description of knowledge workers: "They enjoy more autonomy than other workers. Much of their work is invisible and hard to measure, because it goes on inside their heads or outside the office. They are a growing part of the U.S. work-force, and their skills are hard to replace" (p. 33). Drucker (1999) also illustrates knowledge workers as follows:

- "Knowledge worker productivity demands that we ask the question: "what is the task?"

- They have to have autonomy
- Continuing innovation has to be part of the work
- Continuous learning and continuous teaching are required on the part of the knowledge worker
- Productivity of the knowledge worker is not a matter of the quantity of output but the quality
- Knowledge worker is both seen and treated as an asset rather than a cost." (p. 142).

However, Scarborough (1999) indicates that, "The increasing use of the term 'knowledge worker' can be easily criticized for lack of methodological and theoretical rigor" (p. 6). He continues to argue that, "Knowledge workers are not a discrete occupational group, and lacking the controls of conventional professional groups, knowledge workers are defined primarily by the work that they do – work which is relatively unstructured and organizationally contingent, and which thus reflects the changing demands of organizations more than occupationally-defined norms and practices" (p. 7). In synthesizing a variety of definitions that many scholars suggest, despite lacking theoretical rigors as Scarborough points out, major common characteristics can be found that distinguish knowledge workers from other workers, such as requiring autonomy, producing quality product, learning continuously, and focusing on innovation.

The main interest of this paper is how knowledge workers' performance can be improved. Is it best to leave them alone? Davenport (2005) states that, "What most organizations do is to hire smart people and leave them alone, but once they're hired we don't do a lot to improve their performance" (p. 34). Educational leaders and business managers should pay attention to knowledge workers' performance and provide them with appropriate performance supports in order to maintain the organizations' competitive edge. Can traditional HPT frameworks such as the ISPI model provide critical solutions to complex problems that knowledge workers face day to day? To answer this question, we need to address major challenges to reconsider existing HPT models.

Major challenges facing a field of HPT

Analysis challenges

The HPT models such as the ISPI model, regard performance gap analysis as the foundation for the HPT process. The most important job for HP technologists is to precisely concretize the gap between the desired performance and the current performance. Stolovitch and Keeps (1999) emphasize that, "HPT is an engineering approach to attaining desired accomplishments from human performers. HP Technologists are those who adopt a systems view of performance gaps, systematically analyze both gaps and systems, and design cost-effective interventions in order to close these gaps in the most desirable manner" (p. 10). For knowledge workers, however, we cannot clearly define the gap between the actual performance state and the desired performance state. As Wittkuhn (2004) states, "Nobody knows what the desired performance looks like" (p. 37). Most of the problems, if not all, addressed by knowledge workers are wicked problems. Rittel (cited by Churchman, 1967) defines wicked problems as "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (p. 141). To respond these wicked problems, knowledge workers need complex and high-order thinking skills and they should be heavily involved in collaborative working environment and social learning process. Though one performance intervention can fill in the gap at the moment, another difficult competency already waits for a knowledge worker in this fast changing economy. Knowledge workers must always pursue "the Excellence" which is the truly desired state, so there are performance gaps for them at all times. Solutions of well-designed knowledge management system or communities of practice might be preferable for them rather than one-time performance interventions based on gap analysis. HP technologists need to reconsider linear HPT process models focusing on gap and cause analysis.

Intervention design challenges

The ISPI model is a linear and step by step process. Sometimes the harsh reality that business companies face these days does not allow the time for HPT process. Though one-time performance intervention could cure the performance problems at the moment, the organization might be already situated in totally different new performance problems. The linear and time-consuming HPT process might be inadequate to the situations that knowledge workers face day to day. So business CEOs could determine that an investment for marketing or advanced technology is more profitable for their companies than an investment for performance improvement. Sometimes they are right. The point is how HPT reflects these business realities. The HPT researchers and practitioners need to be more adapted to the business environment and business languages. The main concern is how to support the organization for the business results on an on-going basis. There is no end for knowledge workers' performance improvement. A one-time performance solution is not the answer.

Leadership challenges

One of the missing agendas in HPT literature is a leadership issue. Carr (1997) indicates that, "In spite of the variety of roles HP technologists play in organizations and the goal of the field as a whole, it appears that emphasis on leadership is notably absent from the foundations of HPT" (p.125). According to Covey (2006), "The new Knowledge Worker Age is based on a new paradigm, one entirely different from the thing paradigm of the Industrial Age" (p.220). He calls it "the Whole-Person Paradigm" that represents the four basic need and motivations of all people: "to live (survival), to love (relationships), to learn (growth and development), and to leave a legacy (meaning and contribution)" (p.221), which implies that "only an individual who is respected as a whole person in a whole job makes desirable choices–cheerful cooperation, heart-felt commitment, or creative excitement" (p.222). In order to provide appropriate performance tools for a knowledge worker as a whole person, HP technologists need to pay attention to leadership issues such as how management leaderships affect knowledge workers' performance and what leadership skills are required for knowledge workers. Covey also argues that, "Leading in the knowledge worker age requires us to reach beyond effectiveness, and the call for a new era is for greatness" (p.223). In a practical viewpoint, HP technologists' partnership with leaders in the clients' organizations are also a crucial factor for the success of HPT practices. It is odd why HP technologists do not pay much attention to this issue. My assumption is that leadership is an abstract term and difficult to define as measurable competencies. However, avoiding leadership issues because of the difficulty to tackle leadership competencies would be the same as abandoning a computer due to the difficulty to know how to use it.

Tentative HPT Frameworks for Knowledge Workers

Most business people today would understand that knowledge workers' performance is the key to long-term organizational sustainability and growth. If traditional HPT models have many challenges in responding to the requirements of knowledge workers' performance improvements, the next question is how we can improve existing models or create new models adequate for knowledge workers. In this section, a diagnostic model and a process model for knowledge workers developed by the author are briefly presented. A performance system model is not additionally presented in this paper, because various ideas of system thinkers, such as Senge, Checkland, and Ackoff, are implicitly included in the diagnostic model and the process model for knowledge workers.

Diagnostic model for knowledge workers

The diagnostic model that is introduced in this section is not complete, rather a tentative one, a kind of provocative suggestion of the author. It should be tested by future empirical evidences. However, the model provides a basic framework that HP technologists can refer to when engaging in performance projects for knowledge workers. It includes three technologies that performance consultants may utilize and it also shows where those technologies can be applied for improving performance of knowledge workers. The model is comprised of three principles about knowledge workers, which are described below.

Knowledge workers are always pursuing "excellence"

The organizations that can survive in the future constantly strive for finding performance opportunities, which means making continuous efforts to achieve peak performances – "the excellence." Only a standard of excellence can give knowledge workers the purpose and direction they strive for, in other words, *innovation.*

One intervention for one problem is fragmented

To improve the organization, every possible intervention should be provided at all system levels; people level, work level, and organization level. According to Dean (1997), performance has two parts: "an activity and the outcome of that activity" (p. 72). Performance occurs within a context of performance system requirements (Lynham & Chermack, 2006). Therefore, the performance system defines performance to achieve its unique goals. The merit of a systems view towards performance is that we can see an activity and the outcome of that activity as an emerging property of all system elements working together. Generally, system elements comprise input, process, output, consequences, and feedback. Performance is the result of the interaction between system elements and "the degree to which the system uses its capacity" (Wittkuhn, 2004, p. 35).

The application of a systems view to performance leads us to see that the performance can be analyzed on multi-dimensional levels. Tosti and Jackson (1999) indicated that the following three kinds of factors could influence performance:

- *People factors,* which operate primarily for individuals or groups. These factors are related to such things as the climate in which the individuals or groups work, the nature of the demands on them, their skills and knowledge, and the feedback and rewards they receive.
- *Work factors,* which primarily influence a particular job category or set of job categories. These factors are related to such things as the typical work environment, the resources and information available, the work process, and the nature of the products and services produced.
- O*rganizational factors*, which tend to influence the performance of the whole organization and/or most of the people in it. These factors are related to such things as organizational structure, centrally controlled systems, corporate strategies, key policies, and organizational values and culture. (p. 260).

Tosti & Jackson (1997), in their "Organizational SCAN" model (see Figure 1), provided a way to organize the huge number of variables that affect organizational results, which helps not only to find areas where our organizational performance efforts can have the greatest impact on desired results but also to identify other elements that may facilitate or inhibit an organizational performance effort.

Level	*Conditions*	*Input*	*Process*	*Outcomes*	*Receivers*
Organization	Organizational Environment	Strategy	Administration	Business Results	Owners
Work	Physical Environment	Demands, Schedule	Methods, Capacity	Products, Services	Customers
People	Social Environment	Direction	Performers	Consequences	Employees

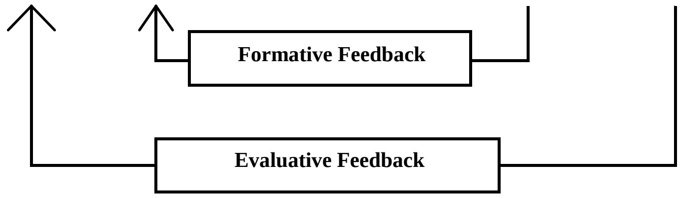


Figure 1. The Organizational SCAN Model

The Organizational SCAN model has strength in terms of mixing the performance levels and system elements (input, process, outcomes, and feedback), so that it provides an overall framework so people can see where a particular organizational performance initiative fits in the larger picture of things. Tosti emphasized that the major advantages of using a systems model are two:

> "First, they do not just identify variables but they also provide insight into the interdependent relationships among the variables.
>
> Second, systems models are scalable. That is, 'systems logic' can be applied to individuals, to operations, to the administration of the whole organization and to the organization's interactions with its marketplace and community" (in personal email conversation, 2008).

Innovation and change is an on-going process: Change should be institutionalized in an organization

Although the organizational SCAN model provides us with a snap shot we can easily detect performance problems in an organization, it was made for general performers and organizations, not especially for knowledge workers and learning organizations. Continuous learning and change should be institutionalized in learning organizations. For an adequate HPT model for knowledge workers and learning organizations, two considerations were taken in addition to the organizational SCAN model;

- Devising change technologies
- Making Senge's (1990) five disciplines integrated into the model in order to inter-connect each change technology for a synergic impact to knowledge workers' performance

Technology can be defined as an application of scientific knowledge and it is usually utilized as a process, methods, and tools for some predefined objects. Change technology indicates "tools for change," so to speak, "a variety of interventions for individual and organizational change" in the context of performance systems. Table 4 shows the examples of change interventions at each technology.

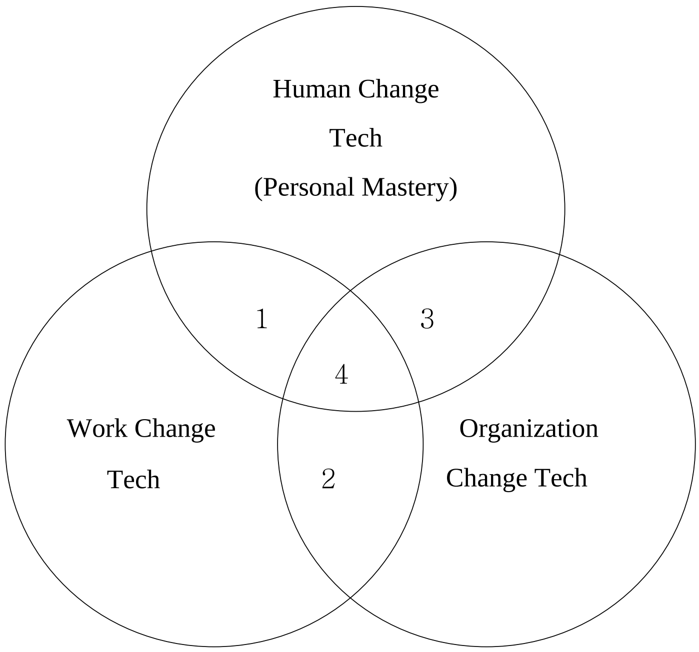
Table 4. Change Technologies

Change Tech	Examples
Organization Change Technology	Strategic visioning, Future search, Participative design workshop, The whole systems approach, Restructuring, Process mapping, Human systems dynamics, Information & communication system redesign, The Six Sigma approach, Appreciative inquiry, Balanced score card, WorkOut, etc.
Work Change Technology	Collaborative work system design, Ergonomics, Communities of practice, Open space technology, Consensus decision making, Action learning, Electronic performance support system, Dynamic facilitation, Rapid results, etc.
Human Change Technology	Personal mastery programs, Training, Leadership development, Career consulting, Mentoring, The practice of empowerment, etc.

Senge's book "titled the Fifth Discipline(1990)" is one of the best-selling texts on learning organizations. His five disciplines, which are systems thinking, mental models, personal mastery, shared vision, and team learning, can be employed to combine three technologies, which lead to a synergic impact of performance interventions for knowledge workers. Senge's five disciplines can play a role as the enablers which connect each level of change technologies together, as well as the multipliers which maximize the power of each change technology. Because technologies can be productively utilized when consistent principles like five disciplines for learning organization are provided, on the other hand, disciplines are effective only when adequate technologies are available to support them. Amalgamation of change technologies and five disciplines is presented as the following:

- Human change technology + Work change technology: together can be supported by "Team learning."
- Work change technology + Organization change technology: together can be supported by "Systems thinking."
- Human change technology + Organization change technology: together can be supported by "Mental models."
- Human change technology + Work change technology + Organization change technology: together should be aligned with "Shared Vision."

'The tentative framework presented here is the only ideal level description that requires sophisticated development in the future. People, work, and organization are three areas that HP technologists need to investigate in order to find appropriate interventions for knowledge workers' performance problems, but these areas are highly interrelated; therefore one piecemeal intervention is not effective to improve knowledge workers' performance. Senge's five disciplines are the linking solutions to make comprehensive and systemic interventions possible. While a diagnostic model is a snap shot view, a process model provides us with a flow of actions that HP technologists need to take, which is described next.



1: Team learning, 2: Systems Thinking, 3: Mental Model, 4: Shared Vision

Figure 2. Linking change technologies and five disciplines

Process model for knowledge workers

The author intends to propose "Soft Performance Technology (SPT)" (Jang, 2008) as a process model for knowledge workers. SPT was developed from three core concepts; soft systems methodology, appreciative inquiry, and idealized design, which is also the reason the author suggests it as a more suitable model for knowledge workers' performance improvement than other HPT models.

Soft systems methodology

Checkland (1981), devising his “soft systems methodology (SSM)”, called various systems approaches that existed before his methodology “hard systems thinking (HST)”. Examples of HST are Operational Research, Systems Analysis, and Systems Engineering. What makes SSM distinctive is that it includes the comparison stage, namely, the stage of the political negotiation of change in which "systems thinking provides a structure for a debate about change which hopefully will be of good quality as a result of the insight captured in root definitions" (p. 191). The author believes that Checkland's SSM is more appropriate for a change of knowledge intensive organizations than hard systems approaches because knowledge workers' performance cannot be engineered but only influenced. In this regard, SPT is differentiated from traditional HPT (such as ISPI HPT model) based on hard systems thinking (an expert-oriented engineering approach).

Appreciative inquiry

HP technologists start their work from detecting performance problems, in other words, finding the gap between actual performance and standard performance. Their main job is to fix the problem and to recover the normal state of operation and standard performance. It is rare to have breakthrough changes - which are essential to knowledge based organizations - to go beyond standards. One of the drawbacks in gap analysis and cause analysis in traditional HPT approaches is that it is too problem-centered, rather than opportunity-centered. Gerson (2004) points out that the problem-centered approach is fatally flawed:

> People don't want to hear what's wrong with them, why they are failing, and how someone else who knows nothing about them or their job can help them improve. Rather, people tend to want to have their egos massaged, their self-esteem validated, and their accomplishments reinforced. … Maybe we need to abandon the deficiency approach and look for the abundance approach (p. 16).

HP technologists keep telling our clients what they never want to hear, "problems and faults, or the blame game in the worst case." HP technologists, as Van Tiem & Lewis (2006) suggest, need to use appreciative inquiry (Cooperrider & Whitney, 2002) and ask themselves "where is *an opportunity* for you?" rather than "what is *the problem* with you?" The basic assumption of Appreciative Inquiry (AI) is that every organization has some strengths which can be the starting point for creating positive change. AI is "the cooperative co-evolutionary search for 'the positive core' which is the best in people, their organizations, and the world around them" (Cooperrider, Whitney, & Stavros, 2008, p. 3). By inquiring into its positive core, an knowledge based organization enhances its collective wisdom of knowledge workers, builds resiliency for continuous innovation of knowledge work, and extends its knowledge capacity to bring about extraordinary results.

Idealized design

Idealized design is an effective method for generating "discontinuous improvement" and "continuous innovation." It was invented to generate maximum creativity among those involved, which is possible from "the idea that the system of concern was destroyed 'last night', no longer exists and can be designed afresh today" (Jackson, 2003, p. 163). In idealized design, everything is open if the design is under the following three conditions;

- It must be technologically feasible
- It must be operationally viable
- It must be capable of being continuously improved.

One of the strengths of idealized design is that "it begins at the end - the state desired today - and enables people to work backward, thus removing many apparent constraints, mostly self-imposed" (Magidson, 2007, p. 521). Idealized design is a powerful tool to bring out creativity of knowledge workers and to enable them to build a system they truly desire.

Based on the above three sources, soft performance technology (SPT) is established and it stands in stark contrast to traditional performance technology models such as ISPI model which I call "hard performance technology (HPT)" because they focus on expertise oriented engineering approaches that employ hard system thinking for problem solving. Figure 2 and Table 8 show the distinctive features of SPT in contrast to HPT.

SPT is directed toward "problem dissolving" (Ackoff et al., 2006, p. 117) rather than toward "problem solving." Fritz (1991) makes clear the difference between problem solving and creating (problem dissolving) such as idealized design: "When people attempt to solve problems, they are taking actions to have something go away – the problem. When they are creating, they should be taking actions to have something come into being – the creation"(p.22). SPT provides an adequate process through which knowledge workers autonomously create their performance systems that allow their highest commitment.

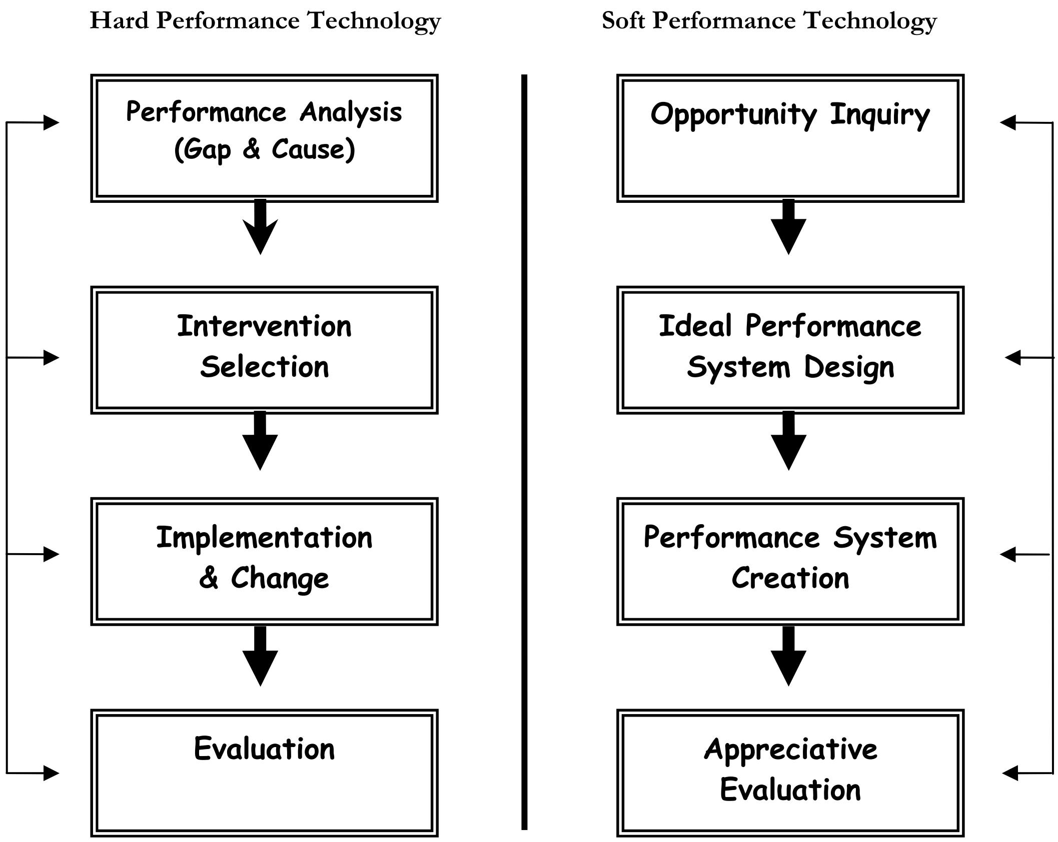


Figure 2. Hard Performance Technology & Soft Performance Technology (Jang, 2008)

Table 8. The differences between HPT & SPT (Jang, 2008)

Hard Performance Technology	**Soft Performance Technology**
Problem-centered	Opportunity-centered
Hard systems thinking	Soft systems thinking
Gap & cause analysis	Opportunity analysis
Problem solving	System design (Problem dissolving)
Expert engineering approach	User-designer approach
Top-down	Participatory
One-on-one intervention based on cause analysis	Idealized system creation
Result-oriented	Long-term result oriented
Pursuing standard performance	Pursuing peak performance
Formative and summative evaluation	Appreciative Evaluation

Conclusion

This paper investigated the core attributes and major models of HPT as a foundation, and addressed what challenges the HPT field faces in terms of the development of performance improvement tools for knowledge workers. The author presented a tentative diagnostic model and a process HPT model for knowledge workers in the third section. The frameworks presented in the present study need to improve and elaborated by means of formative evaluations for further improvement. Experts review and interviews can be considered as the methods for formative evaluations. The purpose of the experts review is to find ways of improving the HPT models for knowledge workers. Thus, the focus is to examine what works, what should be improved, and how the models can be improved. The models' completeness and effectiveness for ensuring knowledge workers' performance improvement should be considered. Interviews may be used to supplement the experts review. The interviewer may seek information to ascertain if these models are applicable to knowledge workers' work settings and to reveal what needs to be done to increase practical usefulness of the models.

Considering the growing importance of knowledge workers these days, we need more advanced HPT models for knowledge workers' performance. While the strengths of HPT such as systemic, systematic, methodologically eclectic, evidence-based, and results-oriented approaches should be emphasized, these principles need to be intertwined with "new ones that are growing from HPT's awareness of business realities, the nature of today's organizations, and the increasingly global nature of work" (Rosenberg et al., 1999, p. 41) to increase the feasibility of HPT to our clients who employ knowledge workers.

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Hwan Young JANG
Director, Public Innovation Team, the Presidential Commission on National Competitiveness. Interests: Performance technology, Positive HRD, Competitive advantages by human capital
E-mail: welcome9@naver.com