

People are not machines, that's why applying engineered work design to knowledge jobs can be a mistake

**BY JAMES S. PEPITONE**

# A case for humaneering

For as much as the productivity of manufacturing and logistics work has increased in modern times, little has been accomplished to raise the productivity of knowledge and service work. With 80 percent of the U.S. workforce now engaged in white-collar professions as specialists, technicians, analysts, designers, managers, and so forth, there is tremendous potential for real financial gain to companies that can tap into productivity improvements in this type of work.

There are several barriers to tapping productivity improvement in these areas, however. Perhaps the most critical is the persistent use of traditional control-based methods — mechanization, standardization, measurement, and training — for improving performance. Although highly effective for production and logistics workers, these tools have not proven successful with knowledge and service workers.

Another factor is the inherent complexity of knowledge and service work and its dependence on human perfor-

mance. The principles that have proven successful in improving the productivity of knowledge work are virtual opposites of the principles that are traditionally effective in increasing the efficiency of production work.

An additional barrier standing in the way of productivity improvements to knowledge and service work is the suboptimizing influence of HR and other staff functions that attach great importance to administrative control. Harvard Business School professor Rosabeth Moss Kanter summed up the situation well: “Remember that the total-quality revolution was led by industrial engineers, not by human resource professionals — even though the treatment of people, the nature of work systems, and education for problem-solving loomed large in the prescriptions of every quality guru. Training and development had the tools, but the engineers had the vision.”

## Beyond engineering

The social sciences can provide insights to enhance the

industrial engineer's understanding of principles for improving the performance of knowledge and service workers. To these insights, industrial engineers can add their specialized learning and take a step toward optimizing the productivity of work.

Knowledge disciplines tend to be self-referring and insulated from one another, so IEs will need to bridge many different disciplines if they are to broaden the dialogue about improving work performance and productivity. In the end, this knowledge will direct us not merely to engineer work designs, but to *humaneer* them when work performance depends substantially on human qualities.

It is common practice for managers of production and logistics operations to engineer work — to apply scientific principles to the work's design, operation, and maintenance — for greater precision, consistency, and efficiency. The principles for engineering work are drawn primarily from the sciences of physics, chemistry, and mathematics, as well as from practical experience.

The engineered design of work has been so successful as a universal method for improving productivity and is so well accepted for this purpose that this approach is unwittingly applied to all work as the best way to optimize results. In many organizations, engineering-based methods (such as training, procedures, quan-

to improve work that is performed by workers who must adapt to circumstances that cannot be predetermined? What about the predominant work in knowledge and service industries for which performance is dependent largely on people's discretion and self-directed behavior?

Engineering the organic elements of this work only reduces the capacity of people to do their work and thereby reduces their performance and productivity. The potential for knowledge and service workers to create value is based on their ability to act at their discretion for the ultimate purpose of increasing customer satisfaction and value to the enterprise.

#### When variation is the objective

Frederick Taylor's engineering-based methods for improving work performance represented a tremendous leap forward for both management and employees. The widespread success of these methods established an approach for improving work performance that persists today in the minds of many as the right way to design and improve all work. As the nature of human work has shifted away from production and logistics, however, persistent efforts to apply Taylor's principles to manage and improve the performance and productivity of a growing workforce of knowledge and service workers have met with poor results.

In fact, the effect of Taylor's methods on knowledge and service work is virtually opposite of the desired effect. Rather than improving performance, these methods often prevent it. This undesired result can be explained by the fact that the mechanistic principles that underlie Taylor's engineering-based methods strive to achieve higher levels of performance by eliminating process variation through the reduction of worker discretion. Yet worker discretion is precisely the way knowledge and service workers achieve effectiveness.

Knowledge and service work are very different from production and logistics work. The distinguishing feature of knowledge and service work is worker discretion (Figure 1). Knowledge and service workers are expected to have and apply appropriate knowledge to a situation by attending and responding to it adaptively, thereby creating value by meeting the specific needs of each customer. Workers decide what work to do and determine the appropriate methods for completing it, usually with a minimum of restrictions.

These differences, which stem from the amount of discretion required for workers to perform the work, have a tremendous impact on what's effective and what's not with regard to performance improvement. To appreciate the substantial differences between production and knowledge work in terms of their fundamental characteristics and the methods they employ for effective performance improvement, a broad comparison is provided in Figure 2. Reflect on this information and consider how well it describes companies with which you are familiar. But recognize that no enterprise, function, role, or task is 100 percent characteristic of its category.

For production and logistics work, the common goal of improvement initiatives is essentially to get workers to use prescribed methods to perform standardized tasks. The desired level of performance is engineered into the task and supported by methods, tools, instructions, training, and policies. If managers can get workers to follow the work design — to do what they are told — then

## Humaneering

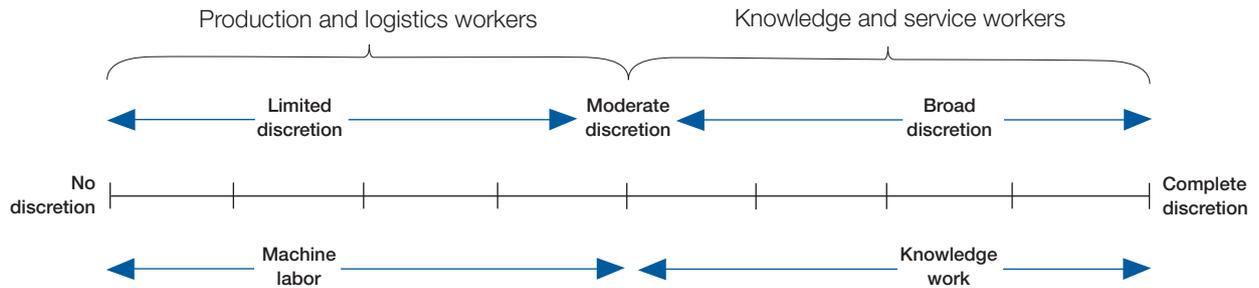
**Humaneering** (hyoo'me-nîr'ing) n. 1. The application of scientific principles concerning human beings, in particular their motivations, capacities, and achievements, to practical ends, such as the design, formation, and operation of effective and efficient processes, systems, and organizations. — vt. 1. To plan, construct, manage, and accomplish practical results by way of skillful acts or ingenious plan to apply the scientifically validated capabilities of people.

Source: *Humaneering: Human Performance Technology at Work* (1989)

tative measures, and time-management systems) are not only the standard tools of practitioners, they are the only tools. What goes unrecognized is the negative effect these methods have on work with organic characteristics — work that is nonlinear, requires discretion, and is self-paced. This is the kind of work that depends mostly on people, not machines.

There is a limit to how and where engineering principles can be properly applied. Work systems that are isolated and controlled (i.e., not subject to human nature) and have a machine-like nature can be improved to greater levels of precision, consistency, and efficiency. But what about the elements of work that are not mechanistic — the ones that cannot be isolated and controlled, that are very much subject to human nature? What can organizations do

# WORK CLASSIFICATION



Work classification	Production	Logistics	Service	Knowledge
<b>Basic process</b>	Making products	Moving products	Applying knowledge	Creating knowledge
<b>Industries</b>	Manufacturing Acquisition Construction Refining	Transportation Distribution Retail marts Finance	Leisure Health care Retail shops Police	Education Consulting Design Legal
<b>Roles</b>	Laborer Assembler Equipment operator Fabricator Packager	Delivery driver Stocker Order picker Data-entry clerk Shipping clerk	Call-center rep Sales person Trainer Supervisor Engineer	Entrepreneur Consultant Analyst Researcher Professor

Figure 1. The distinguishing feature of knowledge and service work is worker discretion.

the work will be completed effectively.

For knowledge and service work, the goal of performance improvement initiatives is to get workers to use their discretion to provide customers with the most satisfaction. In this way, these workers create the greatest value for the customer and the company. The desired level of performance is achieved when workers do their best with every problem or opportunity, using whatever knowledge and expertise they have or can access.

Knowledge and service workers do their best when they perform with high levels of differentiation — when the service rendered most closely fits what the customer values. The role of these workers is to perceive and assess consumer desires and then vary their work behavior to maximize the value to customers. This requires high levels of discretion exercised by capable workers.

## Blends of work and management

For knowledge and service work, variation in behavior initiated by worker discretion — not standardization — is the goal of work and organization design. In turn, any strategy for improving knowledge and service work performance should focus on enhancing effective worker discretion, not reducing it.

Knowledge and service workers are employed even in companies whose principal business consists of production and logistics operations. We naturally expect to find executives, engineers, managers, analysts, product managers, salespeople, and technicians in such companies, all of whom have knowledge and service responsibilities.

Likewise, production and logistics workers are found in com-

panies whose principal business consists of knowledge and service operations. These workers may include equipment operators, data-entry clerks, processors, bookkeepers, delivery personnel, and custodial workers, all of whom perform work activities that involve production and logistics.

In fact, to some degree, all work combines the characteristics of each classification of work. Still, specific jobs and industries are most often dominated by one type. Thus, we talk about knowledge and service workers as though their roles consist entirely of knowledge and service work. This is not true. I have never encountered a knowledge or service role that did not also contain elements of production and logistics work — filling out forms, following procedures, applying professional methods, maintaining required records, and the like.

All work is a blend of these two types. This is particularly important for practitioners to keep foremost in their minds since it has become commonplace to use these classifications informally by referring to one or the other without clarifying the true nature of the entire role.

Another concern regarding performance is the practice of operating an entire enterprise with a management system designed for the principal operations — for example, using a production and logistics management system for all functions within a trucking operation. This means people working in areas such as planning, engineering, finance, and information systems are forced to achieve their objectives within a management system that does not best suit their work.

Consistent management systems throughout an enterprise may

## WORK CHARACTERISTICS

	PRODUCTION AND LOGISTICS	KNOWLEDGE AND SERVICE
<b>FUNDAMENTALS</b>		
Function	Making and moving products	Interpreting and providing experiences
Value proposition	Maximize financial value by increasing cost efficiencies	Maximize financial value by creating more value for every customer
Value creation	Created in advance of consumption (stored opportunity)	Created at the point of consumption (perishable opportunity)
Means of production	Machines	People
Output	Tangible	Intangible
Performance measures	Mostly objective	Mostly subjective
<b>STRATEGIES</b>		
Operations strategy	Mass production through standardization, scale, size, and automation	Mass customization through differentiation, flexibility, and a unit of one
Marketing strategy	Group consumers to meet common needs	Differentiate consumers to meet individual desires
<b>ORGANIZATION</b>		
Organization design	Highly structured machine bureaucracy	Dynamic performance-focused work systems
Work design	Low-discretion work	High-discretion work
Workers	Mostly dependent	Mostly independent
<b>PERFORMANCE IMPROVEMENT</b>		
Improvement strategy	Engineer: Optimize machine performance by bringing people into alignment with the machine's work	Humaneer: Optimize human performance by bringing the system into alignment with people's work
Improvement focus	People	System
Driving force	Mandate	Improvement expectation
Source of assessment	Supervisor	Self-assessment
Target	Root cause	Contributing causes
Process	Orientation, standardization, and control	Facilitation, support, and development
Techniques	Process redesign, policy change, training, and controls	Shared experience, new information, interpretation, system realignment, practice, adaptation, and integration

Figure 2. A broad categorization of work characteristics.

simplify management of the enterprise, but it compromises the performance of people whose work is inconsistent with the predominant business operation. Such tradeoffs are common in every enterprise, and negative impacts are readily apparent to those who are affected. These arrangements can be made less costly for the enterprise and more tolerable for workers if managers are skilled at using the appropriate management system for their function and can buffer the dominant management system to reduce negative results.

### Distinguishing types of work

Just as companies can accommodate characteristics basic to both work classifications, they can also accommodate individual work roles within organizations. Most work involves some combination of production work and knowledge work, so it would be impractical to be too specific in dividing all jobs into these categories.

What is practical and enlightening is to consider the work elements of specific jobs and determine the extent to which they require either standardization of behavior (low discretion) or variation of behavior (high discretion) from workers. Some jobs —

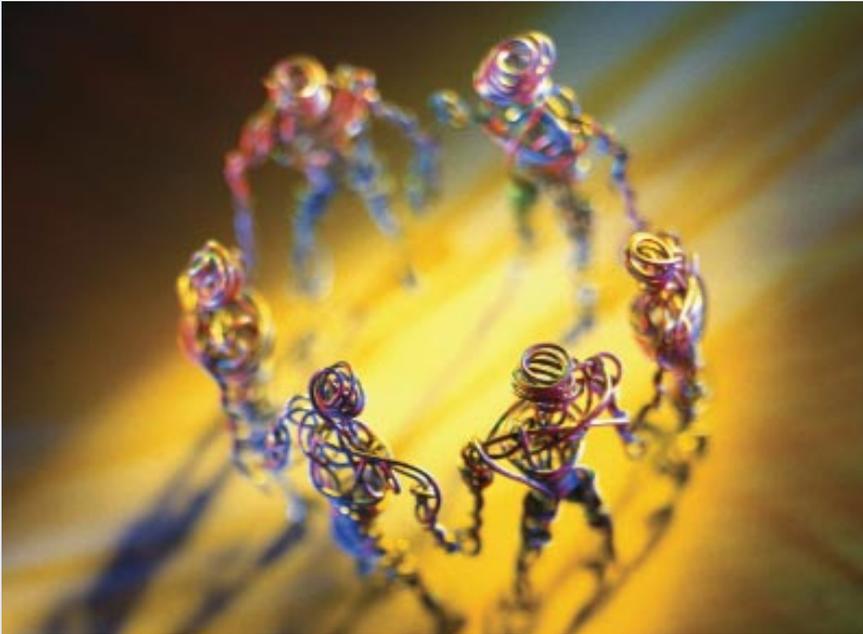
assembly-line operator, fast-food server, retail clerk — require workers to make very few adapting decisions. Others — sales representative, product designer, counselor — are highly dependent on worker decisions to achieve their performance objectives.

The requirement for decision-making in any job is related to the need for workers to determine their own behavior in order to perform satisfactorily. This need is prompted by work situations that are not predictable or by situations in which fully standardized behavior is not acceptable. In unpredictable situations, workers are required to perceive and interpret the variables, consider their options, decide on the most appropriate responses, and then act accordingly.

If a substantial part of a worker's behavior is essentially predefined, then the work is defined as low-discretion. If you answer yes to the following questions concerning worker behavior, then the work can be categorized as such.

- Is the place where the work occurs defined?
- Is the work something that almost any able-bodied person could do if provided some basic training?
- Is the work dominated by the operation of machinery, the performance of routine procedures, or predetermined activities?

# Key principles of HUMANEERED WORK



The concept of humaneered work is drawn from many disciplines of science to deal with the complexities of human nature as they impact work performance and productivity. Four principles serve as the cornerstones of humaneered work:

- **Align work design to enterprise objectives.** Organization and work design are the means by which managers translate enterprise goals into work behaviors. This design takes shape through a continuous flow of management processes and decisions that seek to align three things: the strategic objectives of an enterprise, the management processes used to coordinate operations, and the work that is performed to satisfy customers.

The design process begins with the enterprise strategy because of its powerful influence on both organizational and operational design. Enterprise strategy and the processes for its implementation generally determine the functions required to produce and deliver products and services. The design of these functions includes initial decisions concerning whether workers must or will be included in the function, and the choice of methods that combine machines and workers.

This approach entails consideration of the trade-off between the use of workers and machines to implement a function. Any function in which conditions change unpredictably or the qualities of perception

and discretion are necessary requires human problem-solving. Conversely, if specified rules, routines, and procedures are effective in guiding completion of the function, then machines can be substituted for human problem-solving.

Highly mechanistic work designs assume that all the essential behaviors needed to carry out the work have been identified. By contrast, highly organic work designs require adaptive human behavior.

To determine the optimal approach to function and work design, it is important to consider the specific situation and its variability, to take into account the availability of machine and human resources, and to test appropriate design alternatives to assess their individual trade-offs. The consequence of optimized work design is high levels of function and enterprise performance.

- **Design work at the role or job level.** Across most industries, there is substantial untapped potential to improve operational performance in knowledge and service work roles. What makes the potential for improvement so great is the fact that most companies have neglected work design at the role or job level.

Work designs at the job level usually consist of no more than a task-based job description and a loosely knit training program prepared by the personnel or HR function. Generally speaking, only work that

is highly mechanized receives design thinking, and generally the focus is at the task level of design. The popularity of re-engineering in the 1990s led many companies to redesign their core processes. However, these designs typically stopped with the identification of work roles and did not extend to even rudimentary work design.

Design at the job level is particularly vital to solving operational problems, including productivity, turnover, training, work quality, motivation, and many other management concerns. Design efforts at this level have consistently improved the performance and productivity of workers in every conceivable knowledge and service role, and many production and logistics roles.

- **Improve work designs through joint optimization.** In designing work at the role/job level, it is essential to consider the required functional roles and tasks to be performed as well as the inherent needs of the people performing them. Job designs that accomplish the requisite work in ways that are consistent with human nature will achieve the highest levels of performance and productivity. Therefore, the alignment of worker to work, and work to worker, needs to be natural in the sense that it capitalizes on human characteristics.

Enterprise is a human endeavor — from the development of strategy to the delivery of products and services. The extent to which it is designed to operate naturally for people is the degree to which people do not have to expend energy adjusting to behaviors they are not well suited to perform.

Designing work for the entire role (not just its standardized elements) is critical. In most organizations, work design occurs at a very superficial level. If design goes beyond this level, it generally extends only to those aspects of the work that are predefined by the operation's machine systems. Typically these elements of the work are engineered for precision, consistency, and efficient performance, all of which consider human factors only pertaining to workers' physical capacities. But this is where the design generally stops — very short of optimizing worker performance.

- **Align human resource practices to support work design.** In most organizations, HR systems, processes, and

practices are designed for administrative efficiency and low cost, not for high performance and added value. Quite often, substantial gains in performance and value can be realized through better alignment of this structure with work design. What is required is a systematic focus on the unique forms of support that are required for specific jobs — all for the purpose of maximizing the human resource contribution to an enterprise.

Human performance is determined largely by the alignment and quality of human resources recruited into the enterprise. Although obvious, this point is often lost on the employment manager who is pressured to recruit bodies to staff a growing function. Rather than solving the hiring dilemma in a way that optimizes enterprise performance, the quick solution that is more often chosen creates performance compromises that later ripple throughout the operation. As a result, some executive in the company feels innocently confident in a clever strategy to emphasize customer service, for instance, not realizing that this goal is being thwarted elsewhere by a well-intentioned staff member responding to operating pressures. The only acceptable solution to this dilemma is to find a way to achieve the operational strategy — a challenge that can be met only

if the consequences of actions in one aspect of the operation is linked with the impact it creates elsewhere.

The essential human component of an enterprise will not be fully optimized without coordination within the enterprise. The people who will show up for work cannot be any better than the fitness of the people hired and subsequently prepared for the challenge. The ability of business managers to achieve their objectives will be either enhanced or made more difficult by the appropriateness of the hires made. Compromises for the sake of administrative efficiency, consistency in policy, limited understanding of human performance, or simply poor judgment cannot be overcome later in the process. The die is set — adding to the difficulty in and unlikelihood of achieving operational objectives, lowering costs, and raising productivity.

Without understanding the linkage that aligns activity pertaining to human performance, few managers, organization specialists, and practitioners fully recognize the impact of their seemingly isolated handling of personnel issues. Isolated actions that are unknowingly unsupportive can easily become costly barriers to success further along in the process — when it is no longer possible to correct the mistake or to see who is responsible.

- Do workers determine where they will do their work?
- Does the work depend heavily on technical knowledge and prior experience?
- Do workers manage their own schedules and the processes they use to perform their work?
- Do workers determine what work methods, techniques, and materials to use?
- Do workers have to deal with different types of people to perform their work?
- Is performance measured primarily in qualitative terms?

Another way to distinguish knowledge and service work from production and logistics work is to look at what defines high performance. For production and logistics work, the goal is to reproduce products and services to exact specifications with a minimum of variation. The optimum behavior of workers can generally be spelled out in great detail, and their job is to do exactly as specified.

For knowledge and service work, the goal is to respond in the best way to situations that carry a lot of variation. In this case, the optimal behavior of workers cannot be specified in great detail because their job is to vary their responses to adapt to the needs of different situations. Variation is the objective.

### Summary

Distinguished from production and logistics work, which involves people supporting machine systems that make and move products, knowledge and service work is performed by people and only supported by machines. For knowledge and service work, people themselves are the principal “means of production” and therefore the main source of value within the enterprise.

The opportunities for performance and productivity improvements in knowledge and service work exceed what we have experienced in production and logistics work. Furthermore, the achievement of these improvements will occur very differently because human capabilities such as perception, empathy, understanding, caring, desire, life experience, creativity, and technical expertise are not easily replaced through automation or developed through training, procedures, or other methods of control. The opportunity for improving the performance and productivity of knowledge and service work will come only from employing capable workers and supporting these capabilities.

Humaneered work is analogous to engineered work in the sense that both result from the professional application of scientific principles to the design, development, and improvement of work systems. The difference is in the focal point — organic versus mechanistic aspects of work — and therefore the principles are also different — in many ways, opposite. When work is humaneered, the focus is on the human-dependent aspects of work and the optimization of this performance.

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- Are the work methods, techniques, and materials specified?
- Does the work require dealing with the same people every day?
- Is performance measured primarily in quantitative terms?

All these work characteristics tend to reduce discretion in the behavior of workers.

Alternatively, work that requires substantial variation in the behavior of workers is defined as high-discretion. If your answers to the following questions are mostly yes, then the work is essentially that.