



## Steering HR growth

With professionals in technical fields developing strategies for innovation, new business development and globalisation opportunities for their employers, they must also focus on tectonic shift taking place in the nature of their jobs and requirements expected in the 21<sup>st</sup> century economy. This article provides tools and techniques to make these professionals more relevant and valuable in the workplace.



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## **Introduction:**

Technical professional, i.e., scientists, engineers, or managers with an interest in physical sciences and their use constitute the back bone of any industrial society. They are generally described as STEM (science, technology, engineering, and mathematics) professionals, where the word technology is often thought to imply IT. While these professionals are engaged in developing strategies for innovation, new business development and globalization opportunities for their employers, they rarely focus on the changing landscape, the tectonic shift taking place in the nature of their jobs and requirements expected in the 21<sup>st</sup> century economy. It is imperative to draw the attention of STEM professionals to the challenges posed by this evolving landscape. These professionals can make themselves relevant and valuable in a way that is also rewarding to them, at a time when the work of every kind is also being replaced from a human centered activity to a system driven standards and operating procedures.

## **Work as a source of income: How is it changing?**

Let us begin with a broad overview or description of the landscape in the work place. The traditional organization is generally a pyramid, with fewer people at the top while there are many workers at the lower layers of the pyramid. This is schematically illustrated in Figure 1. The workers are generally classified as blue collar, white collar, middle management and senior

managers as illustrated on the left side of the figure. Historically, there were opportunities for mobility across these layers as the workers learned new skills. Such mobility within organizations has been also

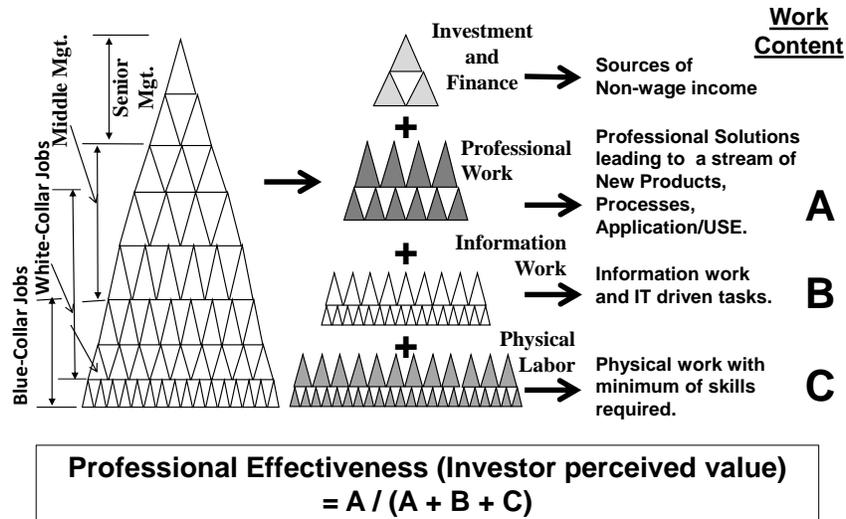


Figure 1. Work and its stratification

a source of economic and social upward mobility enjoyed by these workers. Today, the workplace has become stratified into four, new, well identifiable layers as illustrated on the right side in Figure 1. Advancements in Information Technology (IT) and Global Capitalism (under the broad umbrella of globalization) are the forces driving such stratification. The investors, professional workers, information workers and the physical labor constitute these four strata of work force.

The separation of the investors as an isolated layer is now widely recognized and this separation is also pointed out as a possible source of increasing income inequality. Many economists would suggest that there are two sources of income: non-wage income and the income through wages and salaries. The investor class consists of non-wage income earners while the other three strata of workers fall into the category where salaries and wages are their primary source of income. Many economists also point out that the income inequality seen today in the US is the result of the rise in non-wage income over the years, while the wage earner's income has been nearly constant and without much increase. To address this income inequality, the wage earning professionals have to re-think the nature of their work and the education required in this new scenario.

**Professional Effectiveness (PE – Score):**

The work of most professionals falls into one of the three categories identified as professional work, information work and physical labor (A, B and C respectively) in Figure 1. Much of the migration of work from the developed countries in the early stages of globalization have targeted low skilled physical labor work and their de-localization to lower cost countries. Jobs with high

content of information work can be seen in call centers, on-line tech. support workers, those who write codes or implement and administer software support solutions for a variety of applications. This was the second wave of work category that was outsourced, off shored or brought on-shore under temporary visa from lower cost and readily available work force from abroad. The third and final category of wage earning work is described as the work that results in identifiable new products (leading to new sources of revenue), new processes required to conceive and realize such new products, as well as applications/use of these products (which in turn leads to additional revenue for the product supplier). Every company or investor is judged by their ability to develop and develop new streams of solutions in terms of Product, Process and their application/USE. Every wage earner contributes to these outcomes, but obtains the wage as a reward for their effort resulting from the three streams of stratified work (Professional Solutions (A), Information Work (B) and Physical Labor (C)). Ultimately every wage earner is judged by an efficiency factor or Professional Effectiveness or PE – Score.

$$\text{PE Score} = A / (A + B + C)$$

### **Binary Economy:**

One can readily note that there are two approaches for increasing the PE Score: (1) increase the numerator or the “professional” output per worker (higher levels of A) or (2) decrease the denominator, by decreasing the role or effort of the worker in B and C categories of work. Indeed these two modes of increasing worker productivity have been at play for the past four decades. This effect can be described as Binary Economy and is illustrated in Figure 2. In this Binary Economy we see two approaches through which professionals can contribute to the economy and thus earn their wages:

- **Economy 1:** Professionals create and implement New Solutions better than anyone else across the globe. They are also richly rewarded (and hence can afford the highest standard of living anywhere in the world). These top professionals improve sector productivity by using advanced technology based on physical sciences as well as digital tools/applications. Sometimes they also establish new sectors that may provide jobs for a relatively small number of top professionals (locally) or create a larger number of low-skilled jobs elsewhere (globally).
- **Economy 2:** Professionals contribute to the execution of solutions that are already well established. Such effort is required to replicate the known solutions in ever increasing larger quantities. In this mode, there is a constant and unending effort to de-skill and de-localize all jobs, leading to tasks that can be automated or accomplished through larger numbers of low-skill, low-wage workers from low-cost regions across the globe. Professionals engaged in these jobs find a constant downward slide in their wages and rewards (tending toward the lowest sustainable wages across the globe).

Both these modes of economic activities increase the PE Score, but clearly only one of these two (Economy 1) is favorable for high wages and rewards for the professionals and their academic and industry/sector specific know-how.

Rapid developments in IT enable both these modes of economic activities as noted in Figure 2. Integration of knowledge available from across the globe is an essential element of Economy 1.

The power of internet and search engines and social networking for such knowledge integration is well known. Standardization, de-skilling of tasks and de-localization (key elements of economy 2), are also enabled by Digital Technology (DT). The success of companies like Walmart, FedEx, Amazon, etc. and their prowess in the application of IT tools are the examples here. Worldwide most of the so-called manufacturing sector has been focused on the Replication Solutions pertaining to Economy 2. However in the recent years there is a shift with many new small or startup companies and also entrepreneurial ventures inside large companies to garner the power of economy 1 for new solutions in every professional area.

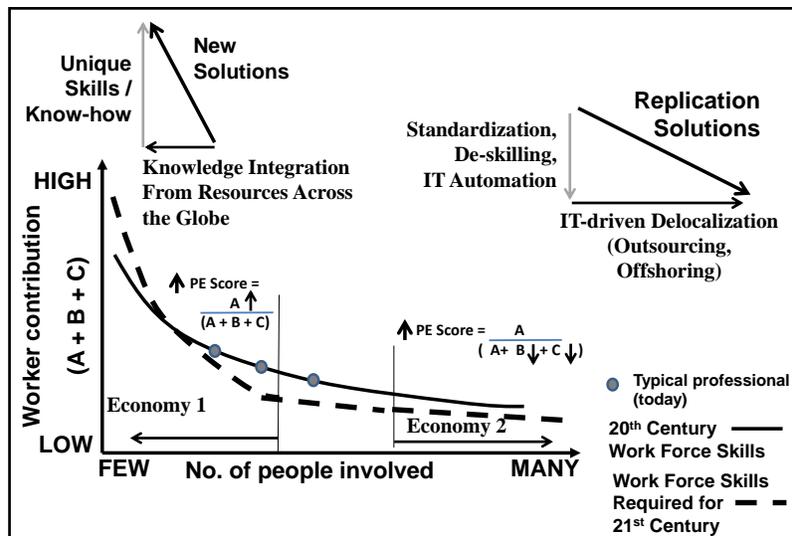


Figure 2. Binary Economy

### Transformational Skills:

The above discussion leads us to the conclusion that the future of professionals in any field can lead to jobs with large content of professional's skills and their reward is not a broad array of job opportunities but a narrow sub-set. The work force in this sub-set is characterized by their ability to identify (discover/invent) new opportunities, develop them into useful end results and also deploy/exploit them in an effective manner. These are the professionals endowed with Transformational Skills (TS) to identify, create, implement, and validate the impact of New Solutions based on physical sciences. These Transformational Skills also enable the professionals to develop alliances within the company and the industry, and then aggregate resources available across the globe. The ability to integrate knowledge from all available resources will transform technical professionals into the Global Intellect, enabling them to deploy their intellectual capital, just as investors benefit from global resources through Global Capitalism. The Transformational Skills can be listed as noted Figure 3, with a brief description of these skills as noted below:

### Transformational Skills to identify and foster New Solutions

- **Ability to develop a common language:** Understanding of the common terms used by technical professionals such as Product, Process, Use/Application, manufacturing,

technology, supply chain, value chain, etc. Use such understanding to promote dialogue across a larger pool of resources to identify and formalize the unmet needs or opportunities.

- **3-D view of the core capabilities:** Core capabilities are the transformation engines for any solution. They come from the technical professional as an individual, through a collection of such core capabilities across many professionals who work in the team, and finally they are exploited as the core capabilities of the company, enterprise, or industry.

### **Knowledge Integration: Transformational Skills to develop New Solutions by integrating knowledge from all Available Resources**

- **The System Approach:** The framework necessary to integrate the science, engineering, and management skills in a simultaneous and comprehensive manner; exploit the skills from all available resources; achieve the solution, of benefit to all stake holders. Ability to shift away from task execution to systems and solutions (also known as system thinking). Here the emphasis is on the principle: The whole is larger than the mere sum of its parts.
- **Emphasis on the science and use of mobile diagnostic tools and methods:** Relentless focus on the “transformation” at the core of the solution and the scientific understanding of the same; emphasis on portable diagnostic tools and methods. Here the emphasis is on development and use of problem-solving skills using in-process data; logic and scientific reasoning; management of the forces that tend to de-skill the work content.
- **Ability to build ecosystem based on identified Core Technology platforms:** Ability to build technology molecules based on physical processes and their integration leading to Core Technology platforms; constantly connecting the dots in the domain specific space (through physical processes) and domain neutral space (through service processes) to see the big picture instead of the pixel. Here the stress is on ecosystem development that leverages resources and opportunities across the globe; ability to constantly focus on the solution (as a whole). The ecosystem belongs to everyone. No one can claim ownership of it. Yet, it nurtures and rewards everyone who contributes and participates in it.

### **Transformational Skills to Exploit New Solutions and Achieve Maximum Impact Across Long Reaches (and Thus Attract Users From Across the Globe)**

- **End-to-End Innovation: E-to-E Innovation = Idea X Use X Impact.** Here the focus is on constantly expanding the role from discovery to development to launch, leading to maximum of identifiable impact.
- **Emotional Intelligence for New Solutions:** Fostering solutions that benefit others, which in turn benefit the self. While close collaboration with customers are often encouraged for co-creation of value, build the company from outside, etc. these outcomes require emotional intelligence as the starting point for the technical professionals.

• Develop a Common Language	Discover / Define	
• 3-D View of Core Capabilities		
<hr/>		X
• System Approach for Knowledge Integration		
• Emphasis on Science and Mobile Diagnostics	Develop	
• Build Ecosystem for Core Technology Platforms		
<hr/>		X
• End-to-End Innovation		
• Emotional Intelligence for New Solutions	Deploy	

Figure 3. Transformational Skills

**Conclusion:**

Education, training and effective use of professionals with Transformational Skills is also the role of the investors/employers, management, academia, and national policy makers. Their collaboration and engagement are necessary for a number of reasons. There is an urgent need for society as a whole to drive the growth in Economy 1 in order to mitigate the adverse effects of the growth limited to low-wage jobs in Economy 2—and the resultant downward slide of the middle class. It is also needed as the growth engine for the Economy 2 of tomorrow, essential for the long-term economic vitality and for full employment in the nation as a whole! To expand the opportunities in Economy 1 (create and implement technically advanced New Solutions), society must shift gears. Today, executives in Economy 2 (intent on replicating known solutions and constantly driven to reduce cost, de-skill, outsource, and automate) are likely to sideline anyone with “big ideas” for physical technology intensive New Solutions. None of the big ideas—technical, engineering, and scientific solutions—that enabled the industrialized nations would have progressed if market-driven economics were the sole criteria at the starting gate. The 21<sup>st</sup> century Binary Economy does not give the same degree of freedom and latitude for unlimited funding for new initiatives. What is necessary is a better balancing of the two modes of the economy between society’s desire to be on the cutting edge (and thus create Economy 1 jobs for a larger number of skilled technical professionals) and the need to relentlessly leverage growth opportunities in Economy 2 (presented by replicating more of the same worldwide). On the education front, in addition to teaching technical disciplines and training students on today’s industry sectors/systems, there should be emphasis on education for Transformational Skills. Finally, in order for technical professionals to gain the most from their jobs and to align with the limited few Economy 1 opportunities, they need to seek out and acquire structured education and knowledge on the Transformational Skills, as it is in their own best interest.

**Editor’s Note:**

This article is based on a recent book, **published by the ASME Press: *Thriving in the 21<sup>st</sup> Century Economy: Transformational Skills for Technical Professionals***,  
**Authors:** Dr. K. (Subbu) Subramanian, Prof. Srinivasa U. Rangan. ISBN-13: 978-0791860168  
<http://www.asme.org/products/books/thriving-in-the-21st-century-economy--transformati>

After describing the problem faced by the professionals in the global economy, unlike many other books of this category, the authors in this book also offer a set of tools for the re-alignment of professionals’ skills. These tools – the transformational skills - are the requisites for success in this 21<sup>st</sup> century economy. This combined aspect of problem description with a clear set of solutions prescribed makes this a must read book. [Efficient Manufacturing](#)