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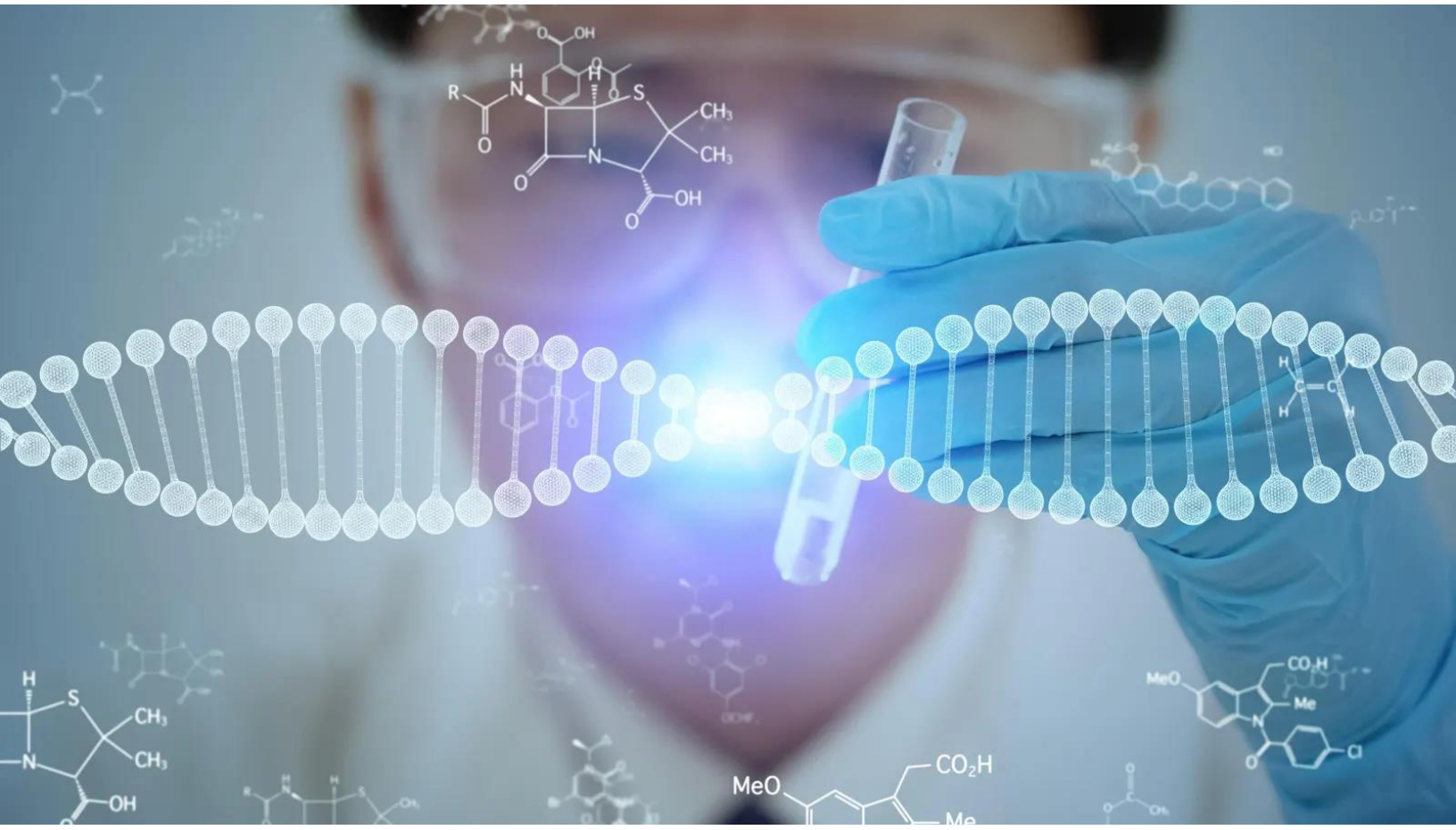
Life Science Practice

Making the Most of your Engineering Talent



Today, many companies are facing a shortage of engineers. The historically low unemployment rate further exacerbates the problem. One way companies contend with this shortage is to raise engineer wages. But employers can avoid this wage spiral by first looking at how the engineers they are already paying are deployed. By developing a clear understanding of current engineering skill sets and capabilities across disciplines and aligning it more effectively with actual needs, organizations may be able to avoid hiring new engineers or raising wages.

Why there's an engineering talent shortage

We expect the market for engineers to remain tight. The root causes of this talent shortage can be attributed to several factors:

1 **Shrinking immigration:** The engineering workforce in the U.S. has long been home to a significant portion of talented foreign-born workers–about 20 percent to 25 percent according to the American Immigration Council.[1] However, the number of international students has declined by 17 percent in recent years due to changes in visa regulations. Furthermore, while large organizations in the engineering fields have historically been the biggest sponsors of H-1B visas for foreign workers, the cost of sponsorship has increased and use of H-1B visas has declined. U.S. companies rely increasingly on the limited domestic pool of engineering professionals.

2 **Declining interest in engineering studies:** Last year, the number of teenage boys interested in an engineering career dropped from 36 percent to 24 percent, while the number of teenage girls interested remained stagnant at just 11 percent.[2] Some believe that an unfavorable perception of the industry is the root cause of this disinterest.

3 **Lack of women in engineering:** While only 11 percent of teenage girls are interested in engineering careers, the number of female engineering graduates is 24 percent. That is despite the fact that women outnumber men in overall graduate school enrollment.

4 **Aging workforce:** Every retirement of a senior engineer requires a concerted effort of knowledge transfer to junior engineers. The U.S. Bureau of Labor Statistics forecasts[3] a large need for engineering and computer-related talent over the next 10 years due rising needs for technical skills and retirements.

[1] Source: American Immigration Council, American Community Survey Fact Sheet, June 2022
[2] Source: Government Technology, New Research Shows Declining Interest on STEM, June 2018
[3] Source: U.S. Bureau of Labor Statistics, Engineers: Employment, Pay, and Outlook, February 2018

Ease the shortage by properly allocating existing talent

We find that engineering talent is frequently deployed ineffectively. Often, too many engineers are assigned to a project or engineers are misassigned: they are too senior or too junior for their projects. To address these issues, companies should begin thinking about engineering talent not as a human resources problem, but as a supply chain issue to tackle continuously.

Just as car companies think in terms of years when planning their supply of car parts, so too, can engineering organizations think in terms of decades when considering its supply of engineers. For an American motorcycle manufacturer, KPMG determined the strategic importance of each engineering area and assessed internal and external engineering capabilities. We developed a core capability strategy to define engineering needs for a new product development operating model and recommended ways to fill resource requirement gaps, which the company then implemented.

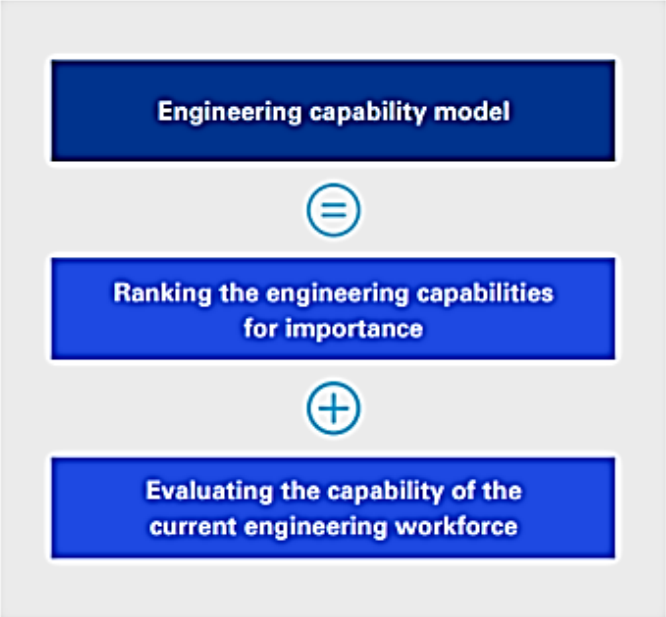
Start with an engineering capability model

The most effective way to create visibility into the existing skill sets of the engineering talent is to develop an engineering capability model that aligns skill sets with engineering program/product requirements. A capability model helps companies understand the unique skills and proficiencies that make up their workforce.

The model can be an effective part of a talent management program for a given organization and can be particularly useful when organizations are combined. However, when two companies merge, their engineering organizations are sometimes left out of the integration. Without a focused resource allocation schema, there could be engineering programs that are left understaffed or overstaffed because of misalignment of engineering resources.

The capability model is important because it assesses engineers' proficiency levels and contextualizes the importance of those skills to a specific organization. Whether it is combining two engineering organizations or improving a standalone engineering organization, a well-designed capability model can address the issues within an engineering organization, or, in cases of M&A, support the integration of two engineering organizations. Either way, it creates a level of transparency into the existing engineering talent that may reduce the previously thought need for hiring more engineers. It effectively allows you to do more with the same talent base.

The capability model is comprised of two main elements (ranking and evaluating) that together can identify skill and capacity issues.



By identifying skill gaps and capacity issues, this model can help guide resource realignment decisions across multiple sites and business entities.

1 Engineering capability ranking

The engineering capability ranking should include a scoring mechanism for each technical skill in relation to a product platform, for example: 1 for core skill set; 2 for critical skill set, and 3 for necessary but not critical skill set. The intersection of a product and technical skill defines a capability. Exhibit 1 shows a sample rubric for capability rankings.

Given their experience with successful (and unsuccessful) programs, senior leadership teams should be tasked with ranking the relative importance of each technical skill.

A completed matrix provides the engineering organization with a granular assessment of each capability to aid resource allocation decisions. To complete this exercise, you must first determine how to rank the various capabilities (Exhibit 1). Core capabilities are scarce skills that align with the business strategy. Critical capabilities are important skills that cannot be easily acquired. Finally, necessary capabilities are common skills that are necessary to the overall program.

Exhibit 1. Completed sample capability ranking of an engineering organization

The ranking indicates the importance of skills and their alignment with the company's strategy and core business at a granular level

			Product				
			Skill Group A				
			Air inlet	Compressor	Combustion chamber	Turbine	Exhaust nozzle
Technical	Leadership	Technical leadership	1-Core	3-Necessary	2-Critical	3-Necessary	1-Core
		Project leadership	2-Critical	3-Necessary	3-Necessary	3-Necessary	1-Core
	Configuration management	Configuration management	3-Necessary	3-Necessary	3-Necessary	3-Necessary	2-Critical
		Release and change control	3-Necessary	3-Necessary	1-Core	3-Necessary	1-Core
		Software configuration management	1-Core	2-Critical	1-Core	2-Critical	3-Necessary
		Data management	1-Core	2-Critical	1-Core	2-Critical	3-Necessary
		Specifications writing	3-Necessary	3-Necessary	1-Core	2-Critical	3-Necessary
		Knowledge retention	3-Necessary	3-Necessary	3-Necessary	3-Necessary	3-Necessary
	Systems analysis	Modeling	3-Necessary	3-Necessary	3-Necessary	1-Core	3-Necessary
		System design	3-Necessary	1-Core	3-Necessary	1-Core	3-Necessary
		Architecture definition	2-Critical	1-Core	2-Critical	1-Core	1-Core
		System simulation	2-Critical	1-Core	2-Critical	3-Necessary	3-Necessary
		System algorithm/controls	3-Necessary	3-Necessary	3-Necessary	3-Necessary	3-Necessary

2 Engineer proficiency assessment

To complete the capability model, an engineering organization needs to assess the skills of their current workforce to determine which proficiencies are over or underrepresented. Because engineering managers and directors typically evaluate their direct reports across multiple skills (e.g., product, technical, software), their responses can be mapped to a matrix. By mapping across proficiency level and skill, engineering organizations can identify capacity issues and adjust their resource allocation strategy accordingly.

Similarly, there must be a rubric in place to rank proficiency levels. An effective scoring system classifies and scores proficiency levels across four levels: basic, skilled, advanced, and expert. Exhibit 2 shows a sample proficiency ranking scale and Exhibit 3 depicts a completed engineer proficiency assessment.

Exhibit 2. Sample proficiency ranking scale

Proficiency scale

Scale	Name	Description
0	None	No knowledge relevant to skill
2	Basic	Knowledgeable and requires supervision
3	Skilled	Knowledgeable and requires minimal supervision
4	Advanced	Proficient; guides and leads others
5	Expert	Proficient with recognized expertise; guides and leads others

Benefits of methodology

Clear definition of proficiency
- Straightforward assessment
- Enables quicker evaluation

Scoring is independent of capability
- Proficiency and assessment not based on skill specific details
- Avoids the time consuming activity of developing skill specific activities and tasks

Four levels prevents "riding the fence"
- Must make a distinction between "skilled" and "advanced"
- Can't use middle or average score as default

Exhibit 3. Completed sample engineer proficiency assessment

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			Product				
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Technical	Leadership	Technical leadership	15	12	17	16	12
		Project leadership	10	7	12	11	7
	Configuration management	Configuration management	3	0	9	4	0
		Release and change control	2	0	7	3	0
		Software configuration management	1	0	4	2	0
		Data management	0	0	7	1	0
		Specifications writing	0	1	6	1	1
		Knowledge retention	0	2	9	1	2
	Systems analysis	Modeling	1	3	10	2	3
		System design	2	1	4	3	1
		Architecture definition	3	1	3	4	1
		System simulation	3	0	8	4	0
		System algorithm/controls	0	0	2	1	0

Strong proficiency

Weak proficiency

This proficiency assessment for engineers differs from a traditional performance or skill assessment because it 1) Clearly defines the proficiency levels, 2) Contextualizes skills, and 3) Forces the evaluator to distinguish between average performers.

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Conclusion

While many engineering organizations view the labor shortage as a roadblock in their five-year plans, the current environment can also provide the opportunity to assess how they use their existing engineering resources more effectively. The consequences of a poor allocation strategy will only be intensified by labor market constraints, which are not likely to ease in the near term. Therefore, we believe that all engineering organizations need to re-engineer their internal labor pool to determine overcapacity and skill gaps.

In our experience, clients have found success in realigning their existing workforce. The result is that seasoned and skilled engineers upskill their junior counterparts to mitigate the impact of a tight labor market. However, regardless of market conditions, the onus remains on the leaders of engineering organizations to continue providing the right engineers with the right skills and staffing them on the right programs to effectively develop new products that align with the business strategy.