Industry Trends 2024: Innovation Needs Competence

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What are the major industry challenges? A global industry survey gives answers. Competitiveness is increasingly jeopardized by lack of competences. The effects of working in office versus remote work get tangible. The article provides insights and resolutions.

A t year-end 2023, we contacted industry experts on their challenges and resolutions. Lack of competence is the biggest challenge identified in our annual industry survey. The growing lack of competence is perceived across industries as both the major short-term as well as a mid-term challenge.

Technology companies increasingly suffer from inadequate competences, both in terms of quantity and quality.

COMPETENCE DRIVES COMPETITIVENESS

To get reliable industry insights, we have contacted 3,700 persons across different industries and regions worldwide. The survey was in online format and addressed to software and IT professionals, both managers and engineers. With a response rate of 6% covering different indust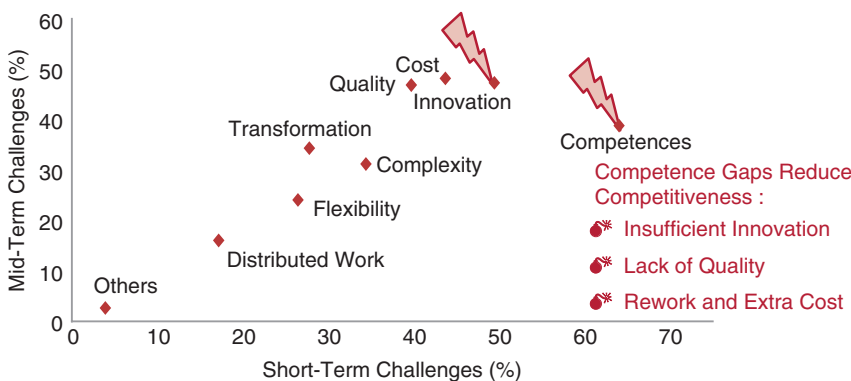ry domains, the survey well represents different business models and regions in the world. From our parallel interviews with technology leaders, we dive deeper and investigate resolutions.

Figure 1 shows the perception on upcoming challenges results across industries and regions. The horizontal axis shows short-term challenges, while the vertical axis shows mid-term obstacles. Each respondent was allowed to mention up to five challenges in both dimensions. The sum thus is more than 100%.

One pattern is obvious from looking at the chart, namely that competence, or the lack of competence, is perceived as most critical in the short term. Lack of adequate competences is a short-term as well as a long-term challenge because competence needs are fast changing. For instance, fact-based learning is replaced in the time of generative artificial intelligence (AI) by understanding which "facts" to trust. Traditional engineering will increasingly be enhanced or even replaced by generative AI (GenAI). For instance, software verification and validation will use AI competences to identify critical feature correlations and corner cases. Automatic pattern matching will be used to detect defects and deviations from requirements, rather than traditional coverage criteria.

Competitiveness needs the right competences, both in companies but also for entire countries. Note in this context that when speaking about competence we mean many dimensions, from technical know-how to business know-why and social know-them.[1,2,3,4]

Engineers with the right competence mix, hard and (!) soft, are in demand across domains, from IT to Internet of Things, from app development to big systems, and from IT to automotive, medical, and robotics. There is even a legal obligation to grow professional competences because each major standard demands learning and proof of learning.[3] With clients, we observe notable gaps especially in systems engineering, architecture, configuration management, test, and development processes. In today's distributed teams, soft competences are highly demanded, such as communication skills, culture empathy, and awareness on social and ethical implications of work.[2]

WHICH MEDIA CHANNELS MATTER MOST?

Tools and techniques to grow your own competences are shifting. Classic classroom formats are not relevant anymore in times of distributed teams. Increasingly, engineers use online formats for trainings. Figure 2 provides insights into media usage to grow your own competences. Each respondent could name a maximum of three channels which explains why we see a sum of more than 100%. Search tools, podcasts, and online videos dominate the access to new information. It looks as if individual engineers prefer free formats, even at the cost of not knowing about the reliability of contents of such formats. One reason is the decreasing investment of their employees into formats with higher quality such as trainings. Many companies consider training and competence growth a cost factor, rather than an investment. In the project heat, trainings are canceled first.

BUSINESS RISKS AND INDIVIDUAL RISKS

We asked about the major business risks in the respective companies. Figure 3 provides the results. Each respondent could name a maximum of three impacts which explains why we see a sum of more than 100%. Perceived business risks are dominated by four factors, as follows:

› getting products faster to market with right quality
› growing competition
› lack of people and competences
› coping with volatility, uncertainty, complexity, ambiguity (VUCA).

Competitiveness with growing market pressure relates to the economic decline anticipated by many markets toward year-end 2023. Coping with an increasingly VUCA world needs resilience, which not everybody is yet prepared for.[4,5,6] Uncertainties are of growing relevance, not just for

Source: Vector Industry Trends Survey 2024.
Details: www.vector.com/trends. Horizontal axis shows short-term challenges; vertical axis shows mid-term challenges.
Sum > 300% due to max. 5 answers per question.
Good validity with 6% response rate of 3700 recipients from different industries worldwide.

FIGURE 1. Challenges in the industry survey 2024.

business but also for individuals. Figure 4 contrasts the business risks to a more personal and individual level. Among the individual projects risks we see challenges in requirements and insufficient management competences, as in the years before. Yet, the effects of distributed work and decreasing commitment and quality are increasing.

With most companies having changed their presence work toward some two to three days per week in office and an equal amount working remotely, we also face this pattern in the individual risk perception. The middle part of Figure 4 shows this shift. Commitment and task management are necessary because not everybody working from home and without direct supervision will deliver as planned. Some of the companies we are working with observed that a big part of their engineering teams degraded in terms of commitment and quality. Some have started to release workforce. A seasoned software manager remarked that "distributed work can impede seamless communication and collaboration, crucial in complex, global projects. I advise placing a greater emphasis on strategies for managing distributed teams and international collaborations."

Engineers are people, and people need social interaction. Working
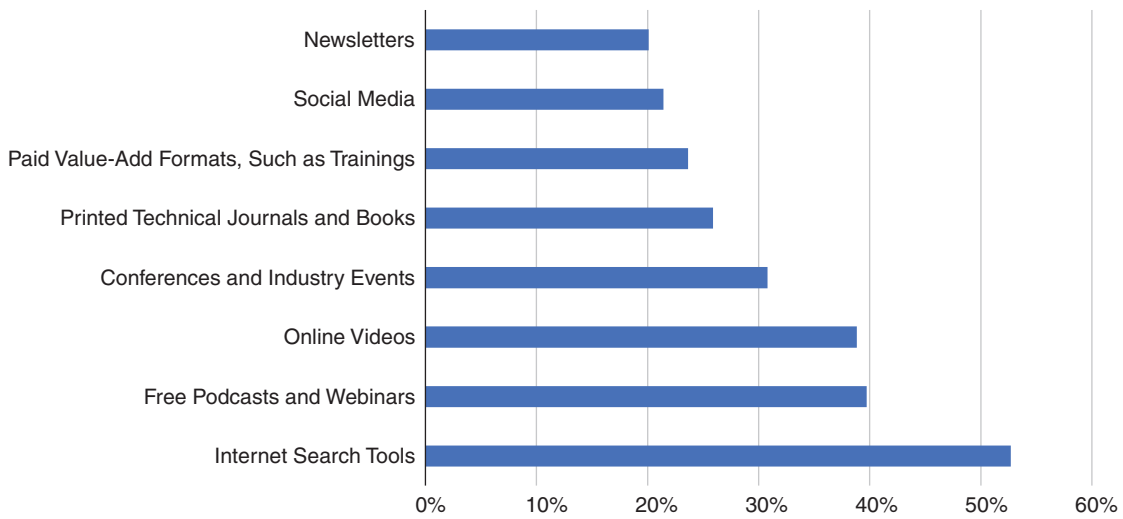
FIGURE 2. Media usage to grow own competences.

FIGURE 3. Perceived business threats.

entirely remote reduces creativity and thus software productivity. Leading tech players are moving back to defined workdays in office. Apple's chief AI manager has called back employees. The inflexible remote working policy of Apple has been reducing creativity and in turn innovation capabilities. With working from home, collaboration across groups is heavily reduced and thus impacts the ability to process new and complex information. People work in their known teams, but do not grow new networks.

While ad hoc task productivity may go up with the perceived freedom of working from home, long-term productivity is decreasing. Studies show that attribute substantial disadvantages to creative exchange due to remote work.[5,6] Software though digital in purpose is driven by human features if we see it as a creative work.[4] Remote work has stimulated a commitment divide which is hard to recuperate from. One part of the team is highly committed and is working in task forces and on weekends. Others are less visible and might contribute less because they are not part of the creative coffee room chats, as several engineers and managers pointed out in our interviews. The situation cannot be repaired by collaborative technology alone but needs leadership, such as mandatory office hours.

> Working entirely remote reduces creativity and thus software productivity.

Our recommendation is clear: Enforce rules for mandatory office time to bring people back to their colleagues and stimulate interaction. Encourage more traditional connects within the team such as periodic meetings within the team, hands-on mentoring, and solving problems in groups. Facilitate building new networks within the organization with informal meetings, such as a "happy hour" in presence. This stimulates team spirit and strengthens the corporate culture toward more networking and thus improves innovation and productivity. Having two to three days in the office seems to balance the need for creativity and innovation with the demand for flexible work formats. Tech companies, such as Apple and Microsoft, are already promoting a hybrid model with a mix of work from home and office work and demand staff to work from the office between two and three days a week.

REGIONAL PERSPECTIVES

To better understand regional perceptions, we filtered answers to our industry survey on regions. Figure 5 shows from our industry survey 2024 how productivity is impacted by complexity, compliance, legacy, and technical debt. The data are filtered for Western origins (top) versus China (bottom). There is a significant difference in how impacts on productivity are perceived in China versus Western countries.

While China sees some impact but can deal with it, engineers and managers in the West perceive constraints as more difficult. Chinese experts working in both regions related in our interviews this perception to different cultures. Chinese culture stimulates group thinking and hard work. Even factors such as work time are different. At the time of our survey, several Chinese companies have started a six-day week to further accelerate their competitive lead.
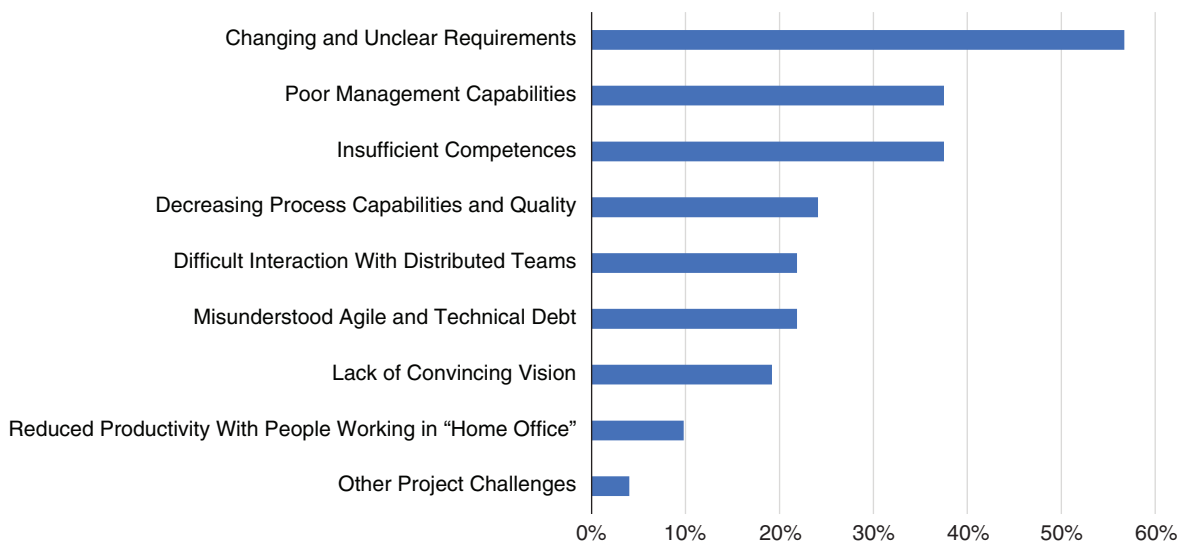

FIGURE 4. Perceived project threats.

WHERE DO WE GO FROM HERE?

The business environment remains uncertain and rapidly evolving. To thrive in this time of continuous change, companies and each single engineer need resilience to accept sudden changes and agility to immediately exploit the emerging opportunities. This demands a continuous learning to adapt to change and to adopt new practices. With practically all industries being in heavy digital transformations, competent software and computer engineers are the limiting factor.[4]

In our projects worldwide, we found that companies are aware of growing competence challenges, yet often lack systematic methodology to implement. Here, some hands-on guidance on competence grow from our consulting projects. Use them for transfer to your own environments:

› Agree on individual and team learning targets at least on an annual basis in the performance reviews. There is no evolution without measurable targets and actual feedback. Check the learning and commit to measurable learning objectives.

› Establish systematic competence evolution by competence grids for each basic role. To motivate growth, a competency matrix should show an advancement path from junior to expert and how to grow with self-learning, mentoring, classes, hands-on projects, and so on.

› Go beyond technology competence. Engineers love the technology stack and certainly know what is relevant for their work. Yet they often miss to look beyond today into evolving business needs. A case in point is the growing impact of GenAI, both as a productivity driver, for example, code generation and test support, but also as a risk, for example, intellectual
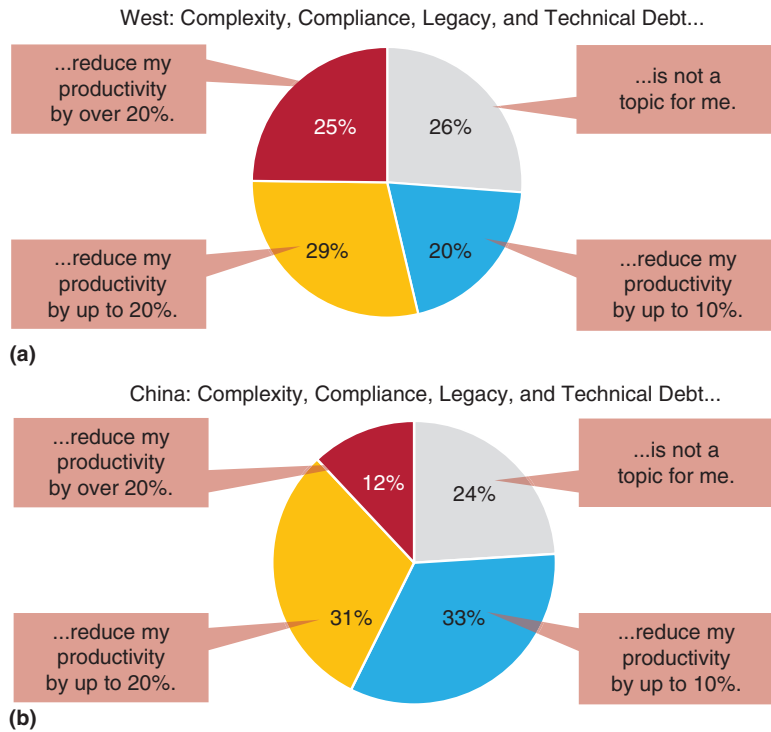

West: Complexity, Compliance, Legacy, and Technical Debt...

- ...reduce my productivity by over 20%. — 25%
- ...is not a topic for me. — 26%
- ...reduce my productivity by up to 20%. — 29%
- ...reduce my productivity by up to 10%. — 20%

(a)

China: Complexity, Compliance, Legacy, and Technical Debt...

- ...reduce my productivity by over 20%. — 12%
- ...is not a topic for me. — 24%
- ...reduce my productivity by up to 20%. — 31%
- ...reduce my productivity by up to 10%. — 33%

(b)

FIGURE 5. Perceptions of productivity impacts in (a) Western countries versus (b) China.

property rights and degrading own competences.

› Encourage informal interactions across the team and open sharing of thoughts, ideas, and concerns. This means to get back into the office and physically interact with colleagues. Remote work is ok for mechanical tasks and project management, but not for thinking out of the box and generating new ideas.

› Establish periodic meetings to grow hard and soft competences. Take one topic that matters and have one person to explain and then discuss for 15 minutes. Soft skills are highly relevant for all distributed teams, which today is pretty much each single engineer.

› Use innovative technologies for knowledge management. GenAI is today often considered as a major knowledge source, yet needs not only intelligent

prompts, but also careful filtering to highlight what matters and withdraw hallucinations. While it is relevant to deploy standard tools, such as SharePoint and collaboration tools, personal and organizational processes to share and grow competencies are more relevant.

› Ensure that formal meetings and communication are timely, transparent, and widespread. Many meetings have long topic lists but no take-aways and no sustainable learning. Start with what one or more persons have learned in the past week. Use open issue lists to systematically follow up and close items.

"There is no growth in the comfort zone," observed Jocko Willink, an American officer of the Navy Seals. To keep pace in global competition, we must leave our comfort

zone. To continuously grow our own competence is challenging, especially in times where relevant information is hard to find amid search engine gossip, opinions, and fake news. Ask yourself each evening what you have learned that day, and what sustains your personal competitive advantage. Leaving your own comfort zone, though difficult, is the way forward to staying at the innovation front end. 🄲

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