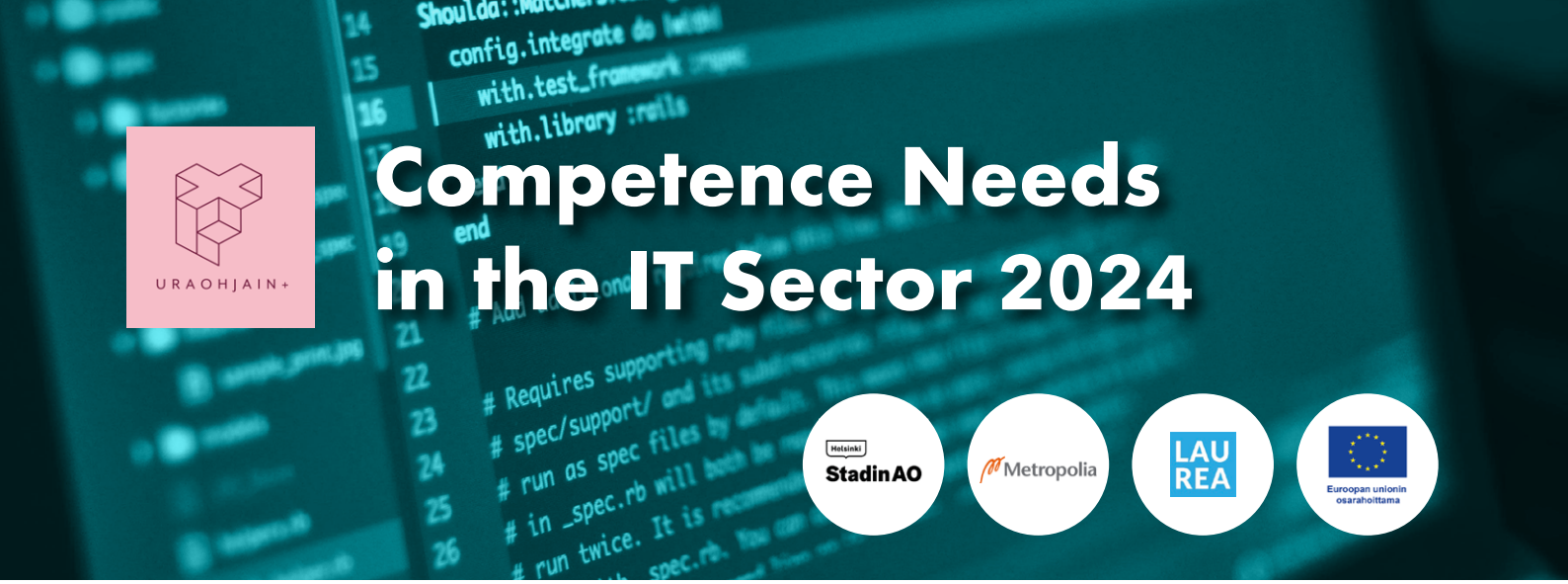

Competence Needs in the IT Sector 2024

Introduction

The Uraohjain service, developed through the Uraohjain+ project, was launched on November 1, 2023. It aims to enhance the skills of job seekers in the ICT, software development, and media sectors to better align with the needs of the job market. This comprehensive service addresses labor market demands by providing career and educational guidance, support for well-being, and opportunities for independent professional growth.

As part of the service development, we conducted a study on the competence needs of companies in the ICT and software industries[1] . This research utilized qualitative data from public sources and included insights gathered through virtual meetings with representatives from approximately 70 companies in the sector. The participating companies represented a diverse sample of organizations in the Helsinki metropolitan area, ranging from small consulting firms to subsidiaries of large international corporations.

We specifically aimed to engage small and medium-sized enterprises (SMEs) in our meetings, as they represent nearly 90% of companies in the sector but are not as widely recognized by job seekers compared to larger corporations.

The labor market in this field is highly fragmented and can be challenging to navigate, particularly for career changers and job seekers who have relocated to Finland. Even defining the "IT sector" can easily become complicated. In everyday language, IT and ICT are often used interchangeably, distinctions blurring as the field evolves. Official statistical analyses, however, rely on stricter industry classifications, which may not fully capture the breadth of industries where IT expertise is needed.

In this report, we explore in greater detail the factors influencing IT sector roles and the competences required for them, such as technological advancements. These impacts extend not only to the IT sector but also to all organizations that utilize information technology.

1 In our analysis, we do not rely strictly on the official ICT sector industry classification (TOL 2008), but rather discuss IT sector skills more flexibly. For instance, official industry and sector classifications are commonly used in publications by Statistics Finland. At the same time, IT skills are increasingly required in other sectors as well.

Background, Labor Market Situation[2]

In recent years, the ICT sector has emerged as a significant employer and growth area in Finland. According to Statistics Finland's Labor Force Survey, around 137,000 people were employed in the ICT sector in 2023. The number of study places and student numbers in the sector have also been steadily increasing in recent years, with ICT studies often perceived as almost guaranteeing employment.

However, since 2023, the ICT sector's labor market has been experiencing rapid changes. Compared to the previous years of rapid growth, recent years have been exceptional. According to Statistics Finland, at the end of 2023, there were 8,692 unemployed job seekers in the ICT sector, which is 19.4% more than the previous year. The number of unemployed increased by 1,414 people while the number of job vacancies halved. The labor market situation in the ICT sector in Finland in 2024 remains challenging, but there are also signs of recovery. However, forecasting the situation has proven difficult.

The ICT sector in Finland is strongly concentrated in the largest cities, particularly in the capital region. The sector's importance to employment is notably significant in the Greater Helsinki area, where companies practically define the sector's development in Finland. Around 76% of ICT sector staff are based in either Espoo or Helsinki. Several factors explain why companies are in these cities: 1) The area hosts multiple universities and higher education institutions that provide a well-educated workforce. 2) The Greater Helsinki and Espoo areas feature well-established business clusters, which have particularly attracted startup companies. 3) The region's infrastructure, including transportation and services, is highly developed, making it an attractive place for businesses. 4) The economic significance of Helsinki and Espoo is substantial, creating a favorable environment for business activities.

In previous years, the sector was accustomed to relatively high wages even at entry-level positions. However, the poor market situation last year appears to have raised the general experience and competence requirements a notch or two higher. In other words, the demand for expert work is increasing, and more jobs now require a high level of education and specialized skills. On the other hand, the diversification of the sector creates new employment opportunities for professionals from various backgrounds.

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2 In this section, we use Statistics Finland's definition of the "ICT sector," although it does not fully capture where ICT professionals and expertise are needed. However, official statistics serve as a reliable indicator of the sector's growth.

Technology Trends

This chapter covers broad technology trends in the IT sector. Their impact on skill needs will be discussed in more detail in a later chapter.

Artificial Intelligence (Large Language Models)

Large language models have become widely recognized under the term AI. A couple of years ago, AI primarily referred to machine learning, but this meaning has quickly evolved. Several alternative AI services have emerged in a short period, available to the public at low or reasonable costs. These services can generate text, images, and music, with competing products indicating the market's attractiveness. These services are rapidly evolving, with new ones continually entering the market. US companies have invested substantial amounts in developing these services, and the technology used in the services available in Finland is largely derived from the United States.

Cybersecurity

The continuous development and increased utilization of digitalization in almost all aspects of human activity means that maintaining the availability, confidentiality, and integrity of information is becoming increasingly important.

Cybersecurity and data privacy breaches have evolved into an illegal industry, with even commercial services widely available. As technology evolves and usage expands, defending against cyber threats is a constant race.

Cybersecurity and data privacy are somewhat contradictory: Security requires reliable, continuous user identification, but strong authentication also challenges privacy protection.

Artificial intelligence is a constantly evolving tool for experts, used not only for legal but also for illicit activities.

Low-code and No-code

Computer software is a classic example of intangible assets. They can be replicated and reused indefinitely at practically no cost. In Europe, computer programs cannot even be patented. This essentially means that once a computer program or a functional module is developed, it doesn't need to be re-developed anymore - existing code can be used. The amount of written code continues to grow, but the limiting factor has been finding and utilizing existing code. Evolving artificial intelligence has recently been of significant help in this regard.

Software has also been developed specifically for easy reuse and adaptation to various situations. More and more programs and services are available that leverage existing assets and enable the use of information technology either completely or almost entirely without coding.

Quantum Computers

Technology that leverages quantum physics phenomena is being rapidly developed worldwide. The driving force behind this development is likely the anticipated impact on data encryption, cybersecurity, and ultimately military applications. The dominant entity with control over this technology could easily break current encryption methods and access commercial, political, and military secrets.

However, quantum technology is still in the early stages of hardware development, and it requires the development of new software solutions. There is no certainty regarding its practical applications yet.

Cloud Computing

Computing hardware continues to evolve into more powerful systems, while network speeds are increasing. The alternative to single organizations managing their own data centers has emerged with cloud computing, where user organizations leverage large hardware clusters via networks. Centralization can provide cost benefits, as cloud service providers handle centralized maintenance of hardware and base software. The utilization rate of hardware can also be increased by adapting capacity needs according to daily rhythm in different regions. The growing production of AI services significantly increases the demand for cloud services.

Skill Needs of Companies in the Helsinki Metropolitan Area 2024

As part of the project work, we conducted a survey on the competence, skill and recruitment needs of IT companies in Helsinki, Espoo, and Vantaa. This section of our study is based on discussions with representatives from these companies. The findings are derived from notes taken during 70 recorded conversations. Most of the participating companies were small software firms located in Helsinki. Many of these businesses also operated in other regions and/or internationally.

The discussions were analyzed from three perspectives: 1) What kind of technical expertise are companies looking for? 2) What other workplace skills are valued in these companies? 3) What makes a good employee?

Technical Expertise

> *"There will be less demand for bulk coding in the future. Consulting and architectural roles will be more sought after, so having the right mindset for those would be beneficial."* – Representative of an IT consultancy company

Most of the technologies and related competences mentioned in the discussions represent mainstream software development. Therefore, providing a detailed list of technical skills here is not particularly meaningful, as the business models and service offerings of the companies involved varied significantly. For instance, participants included small software firms specializing in proprietary products, large consulting firms, and companies focused on data center services and cloud computing. The required

skills were not described in a standardized way, and the interviewees' backgrounds likely influenced their responses. While most companies preferred top-tier professionals in their respective fields, there were exceptions. For example, basic maintenance skills are still needed in data center operations.

To illustrate the diversity of competence and skill requirements, we created a concept cloud using artificial intelligence (Figure 1). This cloud provides a weighted view, based on the number of mentions, of the types of technical expertise highlighted in the discussions.

Several representatives from IT consulting and staffing firms emphasized that the technologies used are largely determined by client needs. While deep expertise in specific technologies is still sought after, overall, experience and versatility appear to be more critical factors. This aligns with the earlier reference to "bulk coders." In particular, smaller companies highlighted the importance of versatility, flexibility, and the ability to adapt to various tasks and technologies. The identified competence needs largely followed broad industry trends, which are discussed in other sections of this report.

Figure 1 Concept cloud created using ChatGPT

Work-life Skills

> *"Work-life skills should be in order, along with some work experience, so we don't have to start coaching those."* – CEO of a small software company

Technical competencies and skills, such as proficiency in various programming languages and environments, are essential in the IT sector. However, so-called soft skills,

including communication, customer service, and teamwork, are equally important. In smaller companies, teamwork, independence, and proactivity are especially emphasized. As one CEO put it: "There's no one constantly holding your hand." Comments like these partly explain why many recent graduates may find it particularly challenging to enter the industry. Collaboration between educational institutions and the workplace is crucial to lowering the barriers for employment after graduation. On the other hand, small companies may be more flexible with their requirements as long as the candidate appears motivated and committed.

The bar set by consulting companies for technical expertise, work experience, and work-life skills is often unattainably high for many job seekers. This situation is influenced by both the general labor market conditions, with a large pool of competent workers available, and the stringent requirements imposed by clients.

In general, the work-life skills described by company representatives are highly universal. It is likely that companies in any industry would value the following work-life skills:

- Communication: Strong communication skills, ability to convey ideas effectively, customer service expertise.
- Teamwork: Team-player mindset, ability to collaborate within teams.
- Independence: Self-direction, proactivity, ability to work independently.
- Problem-Solving: Problem-solving ability, creative problem-solving skills.
- Leadership and Coordination: Leadership, coordination capabilities.

What Makes a Good Employee?

We asked company representatives to define a good employee from their perspective. Many responses emphasized broad technical knowledge: "Full-stack skills, leadership, and a deeper understanding of various technologies and their applications"; however, personal qualities were mentioned even more frequently: "Independent, experienced, persistent, and able to take care of themselves."

In contrast, for maintenance and upkeep roles in data centers, the requirements were less stringent: "Sufficient motivation and adequate industry training" were deemed enough.

A willingness to learn and develop is critical. The field evolves rapidly, making it essential for employees to stay up to date and adapt to changing circumstances. Flexibility and the ability to take on new tasks are particularly valued in smaller companies.

Independent work and accountability are highly regarded traits. Many roles require initiative, as constant guidance may not always be available. At the same time, strong teamwork skills are essential, as most tasks are carried out collaboratively.

Customer focus and solution orientation complement expertise. A good employee can listen to the customer's needs and find effective solutions for them.

In summary

"IT or ICT skills" have replaced the term "computer skills" in many résumés over the years. However, IT or ICT expertise is a different matter, both quantitatively and qualitatively, and it is not easily defined. The possible combinations of competences and skills are virtually endless, especially as technology and work methods continue to evolve at a rapid pace.

As of writing this (December 2024), the Service Centre for Continuous Learning and Employment's (SECLE) Skills Needs Compass combines a staggering **313** different skills with the job title "ICT Specialist" (see https://www.osaamistarvekompassi.fi/fi/briefly-english)

IT Industry Competence Trends

IT-related roles exist across all industries, with the largest concentration naturally found in companies developing IT systems and services. Below, we examine selected roles and application areas.

Use of AI Services

AI services based on large language models significantly enhance the productivity of programming work and, in fact, impact specialist tasks across all industries. Advanced AI services streamline expert work, thereby reducing the overall need for labor.

Development of Systems Based on Large Language Models

The use of large language models in system development has become feasible thanks to both openly available and commercial models. The rapid evolution of these models and their offerings is notable. AI can be integrated into various information systems and services. Developing such software requires expertise in both large language models and the target systems. This competence set is in demand now and will continue to be in the future.

Machine Learning Systems

Previously, machine learning, a sub-area of AI that received significant attention, is finding its place, and becoming established in various industries such as healthcare technology, industrial systems, and the banking sector. Machine learning can be utilized to analyze data, measurement results, and datasets as well as adjust processes. Designing IT solutions for systems that leverage machine learning requires expertise not only in machine learning technology but also in the principles of the target applications.

Data Security Expertise in User Organizations

Regulation related to data security and privacy is increasing, especially within the European Union. This applies to all organizations utilizing IT. The level of requirements grows with the size of the organization. All organizations using IT need to understand the basics of data security and privacy, which calls for well-versed experts in these areas for user training, guidance, and problem-solving. Incorporating these requirements into organizational-level solutions may require expertise either from internal staff or obtained externally.

The demand for data security and privacy experts is increasing. Expertise is needed for training, onboarding, problem-solving, and evaluating organizational-level solutions. Smaller organizations may find it challenging to justify hiring their own expert, so the market for service providers is expected to develop further from its current state.

Robotic Process Automation (RPA)

Robotic Process Automation (RPA) aims to automate repetitive, similar tasks performed by users, such as manual data transfer and copying from one system to another. Although RPA has been on the radar for about a decade, it has not gained much attention despite becoming more common. The benefits are that manageable, and necessary investments can be easily phased and scheduled. There will continue to be a need for RPA, and the required expertise can be relatively easily acquired by building on previous IT programming skills.

IT Installation, Maintenance, and Support

The use of information technology is evolving, and personal computers have become a standard tool for professionals. Some in-house data centers are being phased out and replaced by centralized cloud service provider data centers. Previously, hardware and software installation, maintenance, and support were the responsibility of user organizations, but these tasks are increasingly moving to specialized service providers.

Centralizing services reduces workforce demand but on the one hand, producing AI services requires significant hardware capacity and data centers where necessary installation, maintenance, and support tasks increase.

Basic technical training is required for these job roles. Customer service skills, the right attitude, and attention to detail are crucial.

Gaming Industry

The gaming industry has received a lot of attention and has an attractive employer brand in Finland. The sector employs a group of competent professionals. However, the number of job roles does not show a significant growth trend. Competence demands are high, and there are many eager candidates for the available positions.

Utilization of IT in Expert Roles Across Industries

The use of IT in various forms is an essential part of an expert's work across nearly all industries. The skill requirement starts with word processing and communication software and extends to social media usage. Basic knowledge of data security and protection has become as fundamental a requirement as a hygiene certificate in the food industry.

AI based on large language models is becoming mainstream, and expertise in its use is likely to become a competitive advantage. There are already many options for processing data on a large scale.

The development of no/low code technologies is lowering the barriers to software adoption across industries. Professionals need to acquire skills to use these technolo-

gies. After the development effort by product vendors, all that is needed is guidance and advice. This development reduces the need for customized in-house programming to some extent.

The advancement of IT tools also means that some tasks performed by humans will decrease. Developing IT continues to replace tasks, and there is no end in sight.

Conclusions

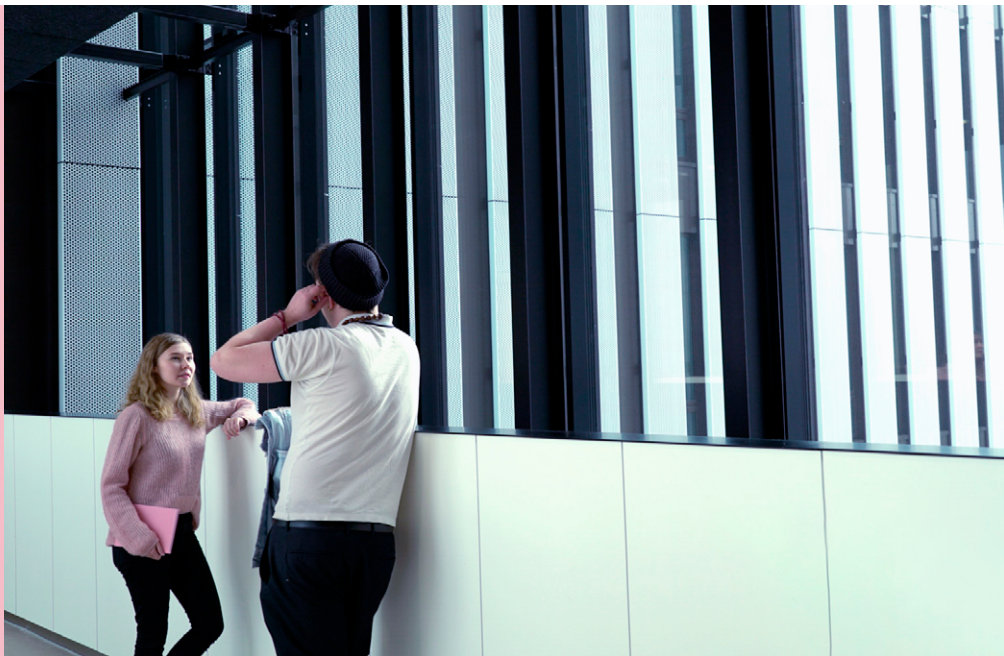
The competence and skill level required from IT experts is increasing, with a demand for diverse knowledge of various technologies and tools becoming a key competitive factor in the job market. Understanding the specific application areas is essential. While there is demand, the supply of adequately skilled labor in these demanding roles is limiting development and growth.

The number of entry-level junior positions that enable growth is decreasing as AI, low-code/no-code tools, and data analysis and visualization tools continue to improve.

Installation, maintenance, upkeep, and monitoring tasks still require human involvement, although there is a push towards automation to reduce costs and standardize quality. Standardization aims to increase productivity and lower the skill level required. The growth of AI services increases demand for workforce.

The pace of development is rapid and unlikely to slow down.

Use of AI: *In the writing of this report, AI was utilized in processing anonymized interview notes in the section on business skill requirements in the Helsinki metropolitan area in 2024. The AI applications used included ChatGPT (OpenAI) and Copilot (Microsoft). The translation from Finnish to English has been assisted by Copilot, DeepL and ChatGPT. The authors are responsible for the content.*



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