A2.2: Methodology for collection of the best practices and successful models for knowledge transfer between business and universities and between universities from different countries

(WP2)

Disclaimer

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Date

15.09.2024

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Introduction

In recent years, we've witnessed a rapid transformation in the IT landscape, accompanied by evolving expectations for vendors, service providers, and IT professionals at every level. What was once a highly technical field, where IT leaders were viewed primarily as hardware experts or system administrators, has now evolved into a critical, strategic role within businesses. Today, IT leaders are integral to business processes, often seen as key drivers of innovation and operational efficiency. Many IT leaders are even offered equity or incentives as recognition for their contribution to business success—highlighting the market's maturity and the new phase of corporate evolution.

Executives now demand real-time access to accurate financial and operational data, supply chain transparency, and streamlined production workflows. This has spurred significant investments in automation and digital transformation. Consequently, the expectations placed on IT leaders have grown as well. They are no longer seen as just technical experts but as strategic business partners with a deep understanding of how technology impacts industries and business models.

Increasingly, business consultants or professionals from non-technical backgrounds are stepping into IT leadership roles, even if they lack hands-on experience with server architecture, RAID arrays, or networking. Today, the technical nuances are secondary to delivering clear, scalable business management solutions through automation and innovation.

The job market reflects this with multiple titles: IT Leader, CIO, CTO, Director of Technology, among others. While many people assume these roles are interchangeable, they often carry distinct responsibilities and varying degrees of strategic influence within organizations.

It is no longer possible to divide the expectations for IT leaders into simply 'technical' or 'managerial' categories. To build effective teams, deliver project results, and meet financial objectives, IT leaders must master a unique blend of technical knowledge and leadership skills. However, finding this balance remains a challenge. Weak organizational skills or a lack of technical insight can derail even the most ambitious initiatives.

As IT leaders, we must stay adaptable, continuously evolving our skill sets and perspectives. Our role is not just about overseeing technology infrastructure but about shaping the business strategy and driving transformation through digital innovation and operational excellence.

Depending on the industry and business niche, the priority skills required of an IT leader can vary. However, it is generally expected that IT leaders possess a solid technical background. Key **desired features** include:

- Experience in independently developing and implementing solutions, as well as software architecture design.

- Proficiency in working with version control systems and integrating applications.

- The ability to craft and execute IT strategies.

- Expertise in ensuring information security.

- Knowledge of web technologies and digital marketing strategies.

- Keeping up with the latest trends and technological innovations in the IT market.

- Familiarity with Enterprise resource planning (ERP) systems.

Let's pause on the last point. ERP systems are a cornerstone for nearly all companies, making this expertise critical for IT leaders. Globally, SAP tops the market, followed by Oracle and Microsoft. There are, of course, many other vendors, including domestic providers. The IT leader's task is to select the right system that reflects the company's unique needs and characteristics.

IT leaders should also be mindful of emerging technologies that are already in demand, such as blockchain, business intelligence, IoT, and big data. However, not all of these technologies have seen widespread adoption. According to a Gartner survey, IT departments at large enterprises are slow to adopt blockchain, citing the complexity of integration. Only 1% of 3,138 IT leaders surveyed are actively using blockchain, with another 8% planning to implement it soon. The primary reasons for the reluctance are a lack of required skills, the scarcity of highly specialized professionals, and the significant changes blockchain could impose on IT departments—changes that many corporations are not yet ready for.

Beyond technical expertise, IT leaders must also have strong **communication and business skills**, such as:

- Experience managing development teams.

- Advanced leadership abilities in general and project management.

- Crisis management expertise.

- Business analytics skills.

- Business intuition, forecasting abilities, and the capacity to identify growth opportunities.

In addition to these core competencies, IT leaders are also expected to have:

- Knowledge of budgeting, accounting, logistics, payroll systems, management accounting, and CRM.

- The ability to automate business processes.

- Sales skills, including negotiations, contract management, and execution.

- The capability to analyze a project's profitability and costs effectively.

IT leadership today requires a well-rounded blend of technical, strategic, and business skills to navigate the complexities of modern organizations. Success in this role depends on the ability to balance technology innovation with business acumen, ensuring that IT initiatives align with and drive broader organizational goals.

Methodology

1. Background

The rapid evolution of the IT landscape requires higher education institutions to effectively collaborate with industries and other academic institutions globally to train IT business leaders. This methodology outlines a structured approach to collect best practices and successful models of **knowledge transfer** with a focus on developing **hard skills**, **soft skills**, and **competences** for IT leadership, as described in **ACM/IEEE Computer Science Curricula 2023**.

The objective is to enable students to develop the necessary **hard skills** (technical proficiency), **soft skills** (social and leadership capabilities), and **competences** (ability to apply skills to real-world tasks and scenarios). The focus is on training in emerging fields such as **Artificial Intelligence (AI)**, **Internet of Things (IoT)**, and related technologies.

2. Scope and Objectives

The scope of this methodology involves collecting data on **knowledge transfer** practices, identifying successful models, and analyzing them in the context of training future IT leaders. It focuses on:

- University-to-business collaboration for transferring **hard skills** and developing real-world **competences**.

- University-to-university partnerships to share best practices globally.

- Equipping students with the necessary **soft skills** to lead effectively in the IT sector.

Objectives include:

1. Identifying effective models of knowledge transfer between universities and businesses, focusing on the development of **competences** for real-world problem-solving.

2. Analyzing how universities collaborate internationally to develop the **hard skills** and **competences** required for IT business leadership.

3. Documenting good practices for nurturing **soft skills**, crucial for managing teams, projects, and crisis situations.

4. Providing recommendations on how universities and businesses can optimize collaboration to create a pipeline of competent IT leaders.

3. Key Concepts

Before diving into the methodology, it's crucial to define the three main categories:

- **Hard Skills**: Technical abilities that enable an individual to perform tasks in a controlled or experimental environment (e.g., writing code, designing databases, optimizing networks).

- **Soft Skills**: Interpersonal or leadership abilities such as communication, teamwork, stress management, and negotiation, which are crucial for effectively managing social and organizational contexts.

- **Competences**: The ability to manage and complete tasks in a real-world environment, integrating both hard and soft skills to deliver results. This involves applying theoretical knowledge to real use cases, solving problems with real data, and managing practical business or technical challenges.

4. Methodological Framework

The methodological framework is built around **phases** to collect and analyze data on knowledge transfer practices and leadership development.

Figure 1 *Methodological Framework*

4.1. Phase 1: Defining Knowledge Transfer Models

In this phase, we will identify and define the types of knowledge transfer models that foster the development of **hard skills**, **soft skills**, and **competences**. These models are divided into two primary categories:

University-to-Business Knowledge Transfer:

- **Internships and Capstone Projects**: These offer students the opportunity to apply **hard skills** like programming, data management, and AI in real-world business settings, thus developing **competences**.

- **Industry Workshops and Hackathons**: Collaboration with industry experts through workshops and hackathons can help students sharpen their technical skills and gain practical experience.

- **Joint R&D Projects**: Collaborative research projects between universities and businesses can provide students with exposure to real-world challenges, further developing their **competences**.

University-to-University Knowledge Transfer:

- **International Exchange Programs**: Faculty and student exchange programs between universities allow for the transfer of teaching methods, research findings, and leadership practices.

- **Virtual Collaborative Projects**: Global projects involving students from different universities can help foster the development of **competences** in managing cross-cultural teams and solving global business challenges.

4.2. Phase 2: Identifying Key Skills and Competences for IT Leadership

This phase focuses on identifying and categorizing the essential **hard skills**, **soft skills**, and **competences** required by future IT business leaders. The skills are based on the **ACM/IEEE Computer Science Curricula 2023** as well as insights from industry and academia.

Hard Skills (Technical Proficiency):

These include but are not limited to:

- **Software Engineering**: Writing code, developing test cases, and designing system architectures.

- **Artificial Intelligence**: Creating machine learning pipelines, detecting biases in algorithms, and applying AI in practical use cases.

- **Data Management**: Designing databases, managing real-time data, and ensuring data security.

- **IoT Systems**: Developing and optimizing IoT networks, understanding sensor integration, and applying these systems to real-world problems.

- **Cybersecurity**: Identifying and mitigating security threats.

- **Systems and Network Design**: Optimizing system performance, network throughput, and ensuring secure communications.

Soft Skills (Social and Leadership Skills):

These skills are critical in managing teams and projects in real-world IT business environments:

- **Communication**: The ability to clearly articulate ideas, give feedback, and manage cross-disciplinary teams.

- **Team Management**: Leading teams, managing conflict, and delegating responsibilities effectively.

- **Stress Management**: Managing high-pressure situations, particularly during project deadlines and crisis events.

- **Project Management**: The ability to lead projects from inception to completion, balancing resources, timelines, and stakeholder expectations.

Competences (Applying Skills to Real-World Scenarios):

Competences refer to the ability to combine **hard skills** and **soft skills** to achieve outcomes in real-world contexts:

- **Problem-Solving in AI and IoT**: Applying AI algorithms and IoT systems to solve complex problems such as optimizing industrial processes or designing smart cities.

- **Project Leadership**: Leading cross-functional teams in designing, implementing, and managing large-scale IT systems.

- **Ethical Decision-Making**: Navigating the ethical challenges of data use, security, and privacy in IT projects.

- **Business Strategy Development**: Applying IT knowledge to develop business strategies that align with organizational goals.

4.3. Phase 3: Data Collection Techniques

This phase focuses on gathering data through various research methods to understand the current state of **hard skills**, **soft skills**, and **competence** development in IT leadership programs.
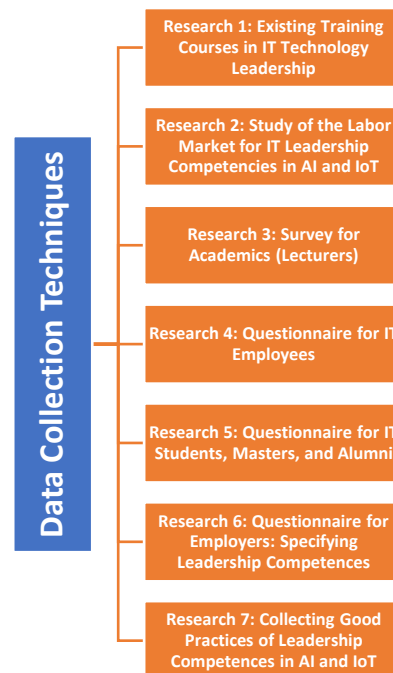

*Figure 2 **Data Collection Techniques***

Research 1: Existing Training Courses in IT Technology Leadership

- **Objective**: Review and analyze current university and professional training programs that focus on IT leadership in AI, IoT, and related fields.

- **Method**: Conduct a comprehensive literature review of curricula, syllabi, course descriptions, and learning outcomes. Analyze how programs develop **hard skills**, **soft skills**, and **competences** in students.

Research 2: Study of the Labor Market for IT Leadership Competencies in AI and IoT

- **Objective**: Understand the labor market demand for specific **competences** in AI, IoT, and leadership.

- **Method**: Perform a labor market analysis by reviewing job postings and employer surveys. This will include interviews with HR professionals to assess the **hard skills** and **soft skills** employers expect, and how these skills translate into workplace **competences**.

Research 3: Survey for Academics (Lecturers)

- **Objective**: Capture lecturers' perspectives on how leadership skills are taught and how effective the knowledge transfer processes are in preparing students for industry challenges.

- **Method**: A structured survey will be distributed to faculty members, asking about how they develop **hard skills** and **competences** in students and their views on collaborating with industry to enhance real-world readiness.

Research 4: Questionnaire for IT Employees

- **Objective**: Understand the leadership **competences** required in real-world IT settings, and how education has prepared professionals to face these challenges.

- **Method**: A survey targeting IT professionals will be used to gather insights into the **hard skills**, **soft skills**, and **competences** that are most valuable in their current roles.

Research 5: Questionnaire for IT Students, Masters, and Alumni

- **Objective**: Gather feedback from students and alumni about how well their education equipped them with the necessary skills and **competences** to succeed in leadership roles.

- **Method**: A survey focused on recent graduates and students in IT fields to evaluate the efficacy of their training programs in developing leadership abilities.

Research 6: Questionnaire for Employers: Specifying Leadership Competences

- **Objective**: Identify the most important **competences** that employers seek in IT leaders, particularly in the areas of AI and IoT.

- **Method**: A detailed questionnaire sent to employers, gathering insights into what they expect from graduates and how universities can better prepare students for leadership roles in technical and business domains.

Research 7: Collecting Good Practices of Leadership Competences in AI and IoT

- **Objective**: Document successful cases of leadership training in AI and IoT, focusing on the transfer of **hard skills**, **soft skills**, and **competences**.

- **Method**: Conduct case studies of universities and companies that have successfully implemented leadership programs, with interviews of key stakeholders to extract best practices.

4.4. Phase 4: Data Analysis

The data collected from the above studies will be analyzed through both qualitative and quantitative methods to identify trends, gaps, and opportunities in the development of **hard skills**, **soft skills**, and **competences**.

Qualitative Analysis:

- Review responses to open-ended survey questions to identify recurring themes and successful practices in knowledge transfer.

- Compare best practices across different regions and sectors to identify universal strategies for developing **competences** in IT leadership.

Quantitative Analysis:

- Analyze survey data to identify which **hard skills** and **soft skills** are most frequently taught and demanded by the labor market.

- Assess the alignment between the training programs and the labor market demands, focusing on how well students are prepared for leadership roles.

4.5. Phase 5: Documentation and Dissemination of Best Practices

Digital Repository:

- Develop a repository for sharing case studies, best practice guidelines, and other resources to aid in the development of leadership training programs focused on AI, IoT, and IT business leadership.

Guidelines:

- Create a whitepaper or guideline document detailing the findings and recommendations, offering actionable steps for universities and businesses to optimize knowledge transfer for leadership development.

Stakeholder Recommendations:

- Provide tailored recommendations for university administrators, faculty, and employers, focusing on how to foster the development of **competences** that combine **hard skills** and **soft skills**.

5. Conclusion

This methodology outlines a detailed approach for collecting and analyzing best practices in knowledge transfer between universities, businesses, and academic institutions globally. It emphasizes the need to distinguish between **hard skills**, **soft skills**, and **competences** while fostering collaboration to develop effective IT business leaders.