Soft Skills – An Important Key for Employability in the "Shift to a Service Driven Economy" Era

Ilana Lavy and Aharon Yadin

***Abstract*—The shift from production to a service driven economy in recent years has increased the importance of soft skills among graduates in general and IT (Information Technology) in particular. While a decade ago the market requirements focused mainly on the candidate's technical expertise, currently there is an increased attention to the soft skills as well. This study that maps the real market soft-skills' requirements, was initiated due to employers' complains about the lack of soft skills among IT graduates. As part of the study 2000 IT classified advertisements that relate to IT professionals were analyzed. The study revealed that human interaction skills were high on the demand list (41.2% of the soft skills ads), common (or general skills) were in second place (22.8% of the ads), task interaction were third (20.2% of the ads) and organization skills were the least requested (15.8%).**

***Index Terms*—IT soft skills, human interaction skills for IT.**

I. Introduction

The shift from production to a service driven economy in the last decade has an impact on the importance of soft skills for the employability of graduates in general and IT (Information Technology) graduates in particular. In this paper, we use the term IT to refer to the entire computing industry, or the use of computers and software applications to manage information. In the past, applicants for various IT jobs were required to possess mainly excellent technical skills. This however has changed and currently, due to the rapid advancement in computing technologies, flexibility and the ability to learn become important. In addition, Due to the elevated complexity of the newly developed applications most of the development work is performed by teams of developers. As a result, interpersonal and social interaction skills as well as being able to work in a team-based environment are of paramount importance. Many new developments address various business and organizational issues, so IT graduates; especially the ones who will be involved in designing, defining and developing such systems have to exhibit knowledge regarding business processes and functionality. These new developments in the IT discipline lead to a different understanding that graduates should possess not only technical skills, but soft (or non-technical) skills as well. The main purpose of this study was to map the various soft skills to the real market requirements. For this purpose, 2000 classified advertisements related only to IT jobs were examined and analyzed

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II. Literature Review

In what follows a brief literature review on soft skills and the roles and meanings of soft skills is presented.

A. Soft Skills

Many synonyms are used in the industry for non-technical skills, such as "soft skills", "people skills", "emotional skills", "employability skills", etc. These non-technical skills refer to the collection of personality traits and attitudes that drives one's behavior [1]. The IS 2002 (IS 2002 Model Curriculum) [2] as well as the IS 2010 (IS 2010 Curriculum Guidelines for Undergraduate Degree Programs in Information Systems) [3] defined some categories of non-technical capabilities that are required. Among these non-technical capabilities, one may find "Strong analytical and critical thinking skills to thrive in a competitive global environment", or the graduates have to "exhibit strong ethical principles and have good interpersonal communication and team skills" [3]. Other researchers and scholars relate to listening skills as one of the "most neglected aspect of communication" [4]. For better preparing the graduates for the real life tasks, various surveys were conducted. Some employers find that new graduates "lack key inter-personal skills" [5]. Reference [6] suggested that the most important soft skills that apply to all IT jobs are oral and written communication, problem solving, and the ability to learn. Reference [7] reviewed 250 job descriptions for software developers and concluded there were nine soft skills that were required: 1) communication; 2) interpersonal; 3) analytical and problems solving; 4) organizational; 5) fast learning; 6) team playing; 7) ability to work independently; 8) innovative and creative; and 9) open and adaptive to changes. This survey was conducted in several countries and although there were substantial differences between North America and the rest of the world regarding interpersonal, analytical, organizational and open to changes skills, the most important set of skills was communication. This may be explained by the open and global nature of software and the fact that many software development projects are performed offshore or partially outsourced. These globalized forms of work concerning products' development, collaboration and service provision, are typical for the 21th century and require special attention on communication skills.

B. Roles and Meanings of Soft Skills for IT Graduates

For a successful career, IT graduates have to possess and exhibit both technical and non-technical or soft skills [8]. For project managers for example it was observed already that they are required to demonstrate mastery of both technical and soft skills [8]. As part of their studies, IT graduates, especially with IS (Information Systems) emphasis have

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acquired a profound knowledge of applied computing and business, and are able to identify and analyze problems, design solutions, and implement these designs into a working application [9]. In addition, due to the rapid new development in the computing discipline they are expected to be able to learn and apply new technologies. Furthermore, they have to be able to work in teams, since computer applications have become too complex for one programmer to deal with [10] and most applications are developed by teams. Since Information Systems are considered Technology-Enabled Business Development [2] the IT person that augments the computing/technical discipline with the business world has to possess oral and writing skills in order to better communicate with peers, explain and document the work done and to facilitate communication with other stakeholders [11]. Software based systems are usually complex due to their intangibility that requires several levels of abstraction. Although abstraction is not an easy topic to learn [10], it is fundamental for better understanding the systems' requirements. In spite the rapid advancements in tools, technologies and methodologies the success of project managers that orchestrate their teams' work into a coherent effort to get things done, cannot be achieved using only technical skills. The ability to influence, assign, oversee, delegate, supervise, negotiate and manage is a central pillar for success. Good interpersonal or soft skills are essential prerequisites for a successful manager. [12] wrote, “The skills required for project management are now often divided 50/50 into traditional ‘hard’ skills, such as risk management and scheduling, and ‘soft’, people oriented skills, such as interpersonal communication.” (p. 41)

Soft skills as mandatory modern competencies are not limited only to project managers or to IT professionals who aim to become future managers. Many of the software attributes, such as complexity, intangibility and abstraction apply to the professional people and not only to their managers. Nurturing these attributes increases the importance of non-technical skills such as communication among IT professionals. In an article dated back to 1981, [13] analysed the long term changes in organizations in relation to IT and IS and defined "new" skills that should be developed among the systems staff, the "Hybrid" skills. He stated that for successful implementation of Information Systems, the professional people cannot dismiss organizational and political issues as irrelevant. In 1996 Earl, [14] defined the Hybrid employee as "a person with strong technical skills and adequate business knowledge, or vice versa". The importance of soft skills for IT graduates' future employment was addresses by numerous surveys. Although many of these surveys were aimed at analysing future technological trends for preparing the students for the new market demands, these surveys also revealed the need for soft skills as well. In an early study [15] regarding the gap between the skills taught by academia and the skills required by businesses, it was revealed that during the academic studies the emphasis is mainly on the technical aspects, while the profession requirements are more towards business and human orientation. Reference [16] also supported these conclusions after they found that there was a misalignment between the IS curricula in academia and the business needs. Additional studies [17]-[19] were consistent in finding that employers emphasize the importance of the non-technical skills more than the technical ones. The suggested explanation was that the non-technical skills apply to all the IT positions, while the technical skills are, in many cases relevant only to a specific role. Reference [20] wrote, "If you had asked project-management gurus five years ago to name the most important competencies project managers should have, most would have said technical skills. Today they'd be more inclined to place communications or negotiations acumen at the top of their lists" (p. 22). This understanding regarding the relative importance of soft skills currently exists not only for project managers, but also for the whole IT professional community [21], [22].

The IT competencies required by business and industry include both technical and non-technical skills. Technical skills refer to capabilities related to professional methodologies for requirements elicitation and analysis, system design, human computer interface design, software validation and verification, software quality and software development and implementation. Non-technical skills or the soft skills refer to human related activities such as communication, teamwork, collaboration, planning, subject leading, presentation delivery, writing skills, and work assessment.

Many employers consider both technical and non-technical skills to be equally important, and search for professional employees possessing both types of skills [23], [24]. In addition, graduate students with better soft skills are often quickly placed on mission critical project teams [25]. Moreover, industry leaders point out that when they have to choose between a candidate with highly developed technical qualities and a candidate with highly developed interpersonal traits, the latter wins out most of the time [26]. This supports previous findings [17]-[19] that employers regard the not technical (or soft) skills more than the technical ones when promoting employees to more important roles with a higher level of responsibility. This of course applies to managers as well as to professional non-manager employees.

These changes regarding the relative importance of soft skills in the computing discipline were addressed in details specifically by the IS curriculum. The IS 2010 [3] as well as the previous IS 2002 [2] refer to both technical and non-technical skills, considering them as essential capabilities. The IS 2002 defined four high level capabilities graduate should possess: 1) 'Business Fundamentals'; 2) 'Technology'; 3) 'Analytical and Critical Thinking'; and 4) 'Interpersonal, Communication and Team Skills'. Only by combining all four capabilities, the graduate will be able to produce successful IS, which were defined by this model curriculum as 'Technology-Enabled Business Development".

The IS 2010 used a different high-level approach and defined three knowledge and skills categories IS graduates should possess: 1) 'Information Systems Knowledge and Skills' that include all relevant capabilities related to the IS discipline; 2) 'Fundamental Knowledge and Skills' that are not specific only to the IS discipline, referring mainly to soft skills such as 'leadership and collaboration, communication and analytical and critical thinking'; and 3) 'Domain fundamentals' that refer to knowledge related "to the domain

to which a specific Information System program applies computing". The Guidelines presented in the IS 2010 specifically addresses the 'Fundamental Knowledge and Skills' and states that although these capabilities are not unique to the IS profession, more emphasis should be placed on enhancing these skills among the graduates.

III. The Study

As part of this study, we assessed the market's needs for IT professionals' soft skills by reviewing and analyzing 2000 IT classified advertisements. The advertisements were collected and analyzed during the first half of August 2012. From the soft skills found in these advertisements, we produced a list of required skills. In the next stage, a content analysis [27] was performed in order to classify the collected skills into categories on which we elaborate in the results and discussion section. In addition, we classified these skills according the type of hiring organization in order to check whether and how this hiring organization's type affects the required skills.

IV. Results and Discussion

In what follows results and a discussion relating to the research questions are presented

A. The Real Soft Skills Requirements as Represented in the Media Advertisements

Among these 2000 advertisements, there were twenty different soft skill attributes, with a minor level of overlapping (Table I):

TABLE I: Original Advertisements Classifications

Attribute	Description
Human relations (33.0%)	The applicant has to possess and be able to demonstrate excellent human relations (or interpersonal relations) within the team, the department, the organization and with external entities
Team player (28.6%)	The applicant has to be a team player, being able to work with others to accomplish the job. Demonstrates reliability, cooperates with others, does his or her share of the work, and meets his /her assigned commitments. Willingly shares knowledge and expertise with other team members and treats others with respect.
Self-learner (20.9%)	The applicant has to be able to learn new material by him or herself. Continuous and periodic learning while searching new sources of knowledge. High competencies for self-development.
Expressive (18.3%)	The applicant has to be able to speak up and express his/her ideas clearly to a large heterogeneous audience. He/she knows how to make a point, however it is done in a positive and respectful manner.
Independent (17.9%)	The applicant has to be independent, being able to work with minimal supervision, make decisions, go forward and overcome various problems with minimal management interventions.
Service oriented (17.7%)	The applicant has to be service oriented being able to provide support to all kinds of customers representing various levels of understanding. Good listening attitude and willingness to serve and build customer goodwill.
Work under pressure (16.8%)	The applicant has to be able to perform well even at periods of extreme pressure and volunteer for assignments to offload extra pressure from other team members and to get the job done.
Can-do attitude (14.7%)	The applicant should have a positive attitude and be able to perform beyond the call of duty. A proactive attitude that takes the initiative to make things happen. Cares about the overall work and expresses a commitment to succeed or to contribute to the team/organization success.
Analytical (12.2%)	The applicant has to possess analytical skills being able to analyze situations, data and information and provide creative solutions. Being able to assess the situation by reducing its complexity
Business oriented (11.9%)	The applicant should have a very good business understanding, including business processes and organizational behavior
Creative (10.9%)	Being creative providing solution even to complex events and situations, being able to deal with and solve all kinds of problems in a solution oriented way.
Initiator /promoter (10.7%)	The applicant should be able to initiate new tasks and activities, as well as promote existing ones. Entrepreneur mindset.
Highly motivated (9.8%)	The applicant has to be highly motivated willing to spend additional time and effort when needed. Cares about the team and the organizations and contribute to its success without being asked or pushed. Responds to requests for help and take the initiative to offer help to others
Systemic /holistic (7.7%)	The applicant should be able to see the whole picture without losing any details. Being able to consider multiple and different points of view and assess each one.
Instructor (6.6%)	The applicant should be able to teach and instruct other on how to use the system as well as assimilate it among the end users
Focused (6.0%)	The applicant should be focused on achieving the goal and not being distracted by other, non-relevant "surrounding noise"
Organized (5.8%)	The applicant has to be very organized and paying attention to details, absorb and understand. Sets goals, manages time and priorities and concentrates on the important issues.
Multi-tasking (5.5%)	The applicant should be able to work on several tasks in parallel
Flexible (5.1%)	The applicant has to be flexible in addressing the job requirements. This flexibility may relate to the working environment, customer, peers, etc. He/she should be able to adapt to the ever-changing situations without complaining.
Presentations (4.9%)	The applicant should be able to prepare and deliver effective presentations expressing ideas in a clear and convincing way, possess good public speaking skills and conveying the information.

Those were classified into the following four main categories: 1) human interaction which includes the skills referring to the interaction with other people (i.e. employees, customers, peers, etc.); 2) task interaction which includes the skills that are necessary for working in a computerized environments and performing the required tasks; 3) organization interaction which includes the skills that are needed for proper functioning in the organization and 4) common or general skills which include the general skills needed for proper functioning in all the above three categories. The four categories and their attributes are described in Table II.

TABLE II: CATEGORIZED CLASSIFICATIONS

Human interaction skills	Task interaction skills	Organization interaction skills	Common (or general) skills
Team player	Can-do attitude	Work under pressure	Independent
Human relations	Analytical	Multi - tasking	Flexible
Presentations	Organized	Business oriented	Focused
Service oriented	Self-learner	Systemic /holistic	Highly motivated
Expressive			Creative
Instructor			Initiator/promoter

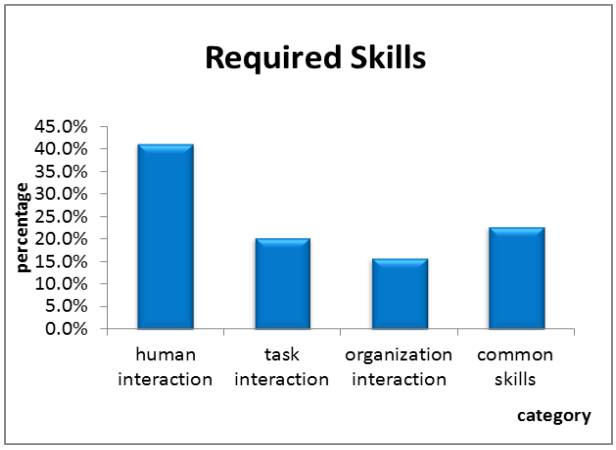

Fig. 1. Distribution of skills according to the emerged categories.

Interpretation of Fig. 1 reveals that when compared to task and machine interaction skills, human interactions are the most required. Possible explanation to this result stems from the enormous change the software industry has gone through in the last three decades. Originally, the IT peoples' most important qualifications were related to their technical capabilities. However, with the rapid technological developments and the pivotal role computers play in the organizational success and development, these qualifications have changed. Currently the IT department's employees are involved in many of the organizations' activities, communicating with users across all functional units. This type of collaboration required excellent communication and presentation skills.

Due to the elevated complexity of modern software based projects, developers have to work in teams. This represents an additional set of soft skills such as being able to perform well as part of a team, listen, provide and accept constructive feedback and exhibit excellent inter-personal relations. Furthermore, new agile development methodologies such as Scrum stress fast functionality delivery over heavy documentation. This is achieved following a rapid iterative process that quickly delivers a working version of the software being developed [28] and required excellent interpersonal traits. This may explain the large difference of almost double, between the human interaction soft skills (required for about 40% of the jobs advertised) to the other soft skills (task interaction – 20.2%, organizational skills – 15.8%, and common skills – 22.8%).

The most important result of the study is the unbiased understanding of the market requirements regarding soft skill. The fact that 41.2% of the soft skills advertisements required human interaction skills is very significant although understandable. This supports previous findings [10], [19], [8], [11] to name just a few), however the importance of this study is in the concrete figures it produce by relating to a real market situation. The growing autonomy of the modern employee [29], can be used to explain why the task interaction skills appeared in 20.2% of the soft skill ads. This growing autonomy is due to economic pressure and the need to be more efficient which leads employers to hire employees that can deliver with minimal supervision. Organizational skills (15.8% of all soft skills ads) are important mainly for the jobs that relate to business type systems. This supports the IS 2010 [3] which defined a requirement for 'Business Fundamental'.

B. Implications for Instruction

Although a wide understanding regarding the importance of soft skills for the future vocation of the graduates, already exists, the academic curriculum was very slow in responding to these requirements. Some of the lecturers implement tactics to nurture these required skills, for example in our college the Software Analysis and Design workshop (a 3rd year course) employs team based projects in which the students are required to study a real customer's problem and design a solution for it. The workshop includes a requirement gathering simulation intended to enhance the students' communications skills and a customer presentation intended to strengthen the presentation capabilities. The workshop's grade is based on all team members' activities with the intention to reinforce the team-based qualifications. The students are also engaged in assessing their peers' work, which enhances their critical thinking and feedback provision capabilities. However, although some courses that address the soft skills issue already exist, based on the results obtained by this study much more has to be done.

In order to nurture these capabilities some additional attention should be given during the learning years. For example using team-based assignments early in the learning process (even during the first year), spending more time on various alternatives to solutions while asking the students to assess their level of creativity. Alternatively, implementing a presentation mechanism in which students will have to defend their solution while elaborating on its uniqueness. In addition, for teaching students the importance of soft skills the grade calculation should take into account other aspects such as simplicity, creativity, originality, and not only concentration the technical capability measurements.

V. CONCLUDING REMARKS

The results received from this study revealed that the IT graduates' soft skills profile as represented by the industry requirements has gone through a big change. Initially, during the hiring process, only technological skills were important and currently the soft skills are equally important in assessing the future employee success.

These results demonstrate the conceptual shift that occurred in the last decade regarding the relative importance of the soft skills for IT professionals. This shift was initiated

by the important, sometimes critical role of IT for the organizations' wellbeing and the fact that the IT employees have to communicate with other business functions and all managerial levels. Furthermore, as the IT based solutions become more complex, larger teams are required for development. This implies that the IT professional should possess good interpersonal and team based qualifications. Even the modern agile development methodologies stress the importance of human interaction. The bottom line is that the academic institutes should embrace this change and modify the learning outcomes to include developing and enhancing the soft skills addressed in this study.

Future research activities will repeat the survey, analyzing an additional set of requirements. This new survey will be conducted long enough time after the first one, to make sure all the previous jobs were filled. Another direction to be applied relates to checking the soft skills on a broader and international scale.

REFERENCES

[1] A. Roan and A. G. Whitehouse. "Women, information technology and waves of optimism: Australian evidence on mixed-skill jobs," *Work and Employment*, vol. 22, no. 1, pp. 21–33, 2007

[2] J. Gorgone, G. B. Davis, J. S. Valacich, H. Topi, D. L. Feinstein, and H. E. Longenecker, "IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems," *The Communications of the Association for Information Systems, 11*, article 1, 2003.

[3] H. Topi, J. S. Valacich, R. T. Wright, K. Kaiser,J. F. Nunamaker, J. C, Sipior, and G. de Vreede, "IS 2010: Curriculum Guidelines for Undergraduate Degree Programs in Information Systems," *Communications of the AIS*, vol. 26, no. 18, 2010

[4] J. Flynn, T. R. Valikoski, and J. Grau, "Listening in the Business Context: Reviewing the State of Research," *The International Journal of Listening*, vol. 22, pp. 141–151, 2008

[5] A. Fisher, "The Trouble with MBAs," *Fortune International*, vol. 155, no. 7, pp. 33–34, April 2007

[6] J. Cappel, "Entry-level IS job skills: A survey of employers," *Journal of Computer Information Systems*, vol. 42, no. 2, pp. 76–82, 2002.

[7] A. Faheem, "Software Requirements Engineer: An Empirical Study about Non-Technical Skills," *Journal of Software*, vol. 7, no. 2, pp. 389–397, 2012.

[8] S. Gillard. (2009). Soft Skills and Technical Expertise of Effective Project Managers. *Issues in Informing Science and Information Technology*. [Online]. *(6)*. pp. 725. Available: http://iisit.org/Vol6/IISITv6p723-729Gillard599.pdf

[9] C. Bishop_Clark. "Cognitive style, personality, and computer programming," *Computers in Human Behaviour*, vol. 11, pp. 241-260, 1995.

[10] O. Hazzan and J. Kramer, "Abstraction in Computer Science & Software Engineering: A pedagogical perspective," *System Design Frontier Exclusive Frontier Coverage on System Designs*, vol. 4, no. 1, pp. 6–14, 2007.

[11] L. F. Capretz and F. Ahmed, "Making sense of software development and personality types," *IEEE IT Professional*, vol. 12, no. 1, pp. 6-13, 2010.

[12] B. Sampson, "Get with the project," *Professional Engineering*, vol. 20, no. 12, pp. 41–42, 2007.

[13] P. G. W. Keen, "Information systems and organizational change," *Communications of the ACM*, vol. 24, no. 1, pp. 24–33, 1981.

[14] M. J. Earl, B. Edwards, and D. F. Feeny, "Configuring the IS Function in Complex Organizations," *Information Management: The Organizational Dimension*, pp. 201–230, 1996.

[15] E. Trauth, D. Farwell, and D. Lee, "The IS Expectation Gap: Industry Expectations Versus Academic Preparation," *MIS Quarterly*, vol. 17, no. 3, pp. 293–303, 1993.

[16] D. Lee, E. Trauth, and D. Farwell, "Critical Skills and Knowledge Requirements of IS Professionals: A Joint Academic/Industry Investigation," *MIS Quarterly*, vol. 19, no. 3, pp. 313–340, 1995.

[17] T. Richards, R. Yellen, L. Kappelman, and S. Guynes, "Information Systems Manager's Perceptions of IS Job Skills," *Journal of Computer Information Systems*, vol. 38, no. 3, pp. 53–57, 1998.

[18] D. Young, "The Relative Importance of Technical and Interpersonal Skills for New Information Systems Personnel," *Journal of Computer Information Systems*, vol. 36, no. 4, pp. 66–71, 1996.

[19] C. R. Woratschek and T. L. Lenox, "Information Systems Entry-level Job Skills: A Survey of Employers," in *Proc. the Information Systems Education Conference*, 2002.

[20] D. Zielinski, "Soft skills, hard truths," *Training*, vol. 42, no. 7, pp. 18-22, 2005

[21] A. Sukhoo, A. Barnard, M. M. Eloff, J. A. van der Poll, and M. Motah, "Skills in Software Project Management," *Issues in Informing Science and Information Technology*, vol. 2, pp. 691–704, 2005.

[22] R. Bancino and C. Zevalkink, "Soft Skills," *Association for Career & Technical Education*, 2007.

[23] L. Bailey and G. Stefanizk, "Preparing the information technology workforce for the new millennium," *ACM SIGCPR Computer Personnel*, vol. 20, no. 4, pp. 4–15, 2002

[24] C. L. Noll and M. Wilkins, "Critical skills of IS professionals: A model for curriculum development," *Journal of Information Technology Education*, vol. 1, no. 3, pp. 143–154, 2002.

[25] T, Stader, "State Farm Insurance Information Systems," *Student Recruiter, Interview*, Northwestern State University, September 24, 2004.

[26] J. Russell, B. Russell, and W. Tastle, "Teaching Soft Skills in a System Development Capstone Course," *Information Systems Education Journal*, vol. 3, no. 19, 2005.

[27] K. A. Neuendorf, *Content analysis guidebook*, Sage Publications Ltd, 2002.

[28] K. Schwaber, *Agile project management with Scrum*, Redmond, Wash: Microsoft Press, 2004.

[29] K. Martin and R. E. Freeman, "Some problems with employee monitoring," *Journal of Business Ethics*, vol. 43, no. 4, pp. 353-361, 2003.

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