

Are Requirements for Graduates of Master and PhD Programs in Business and Information Systems Engineering Changing?

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1 Introduction

For the past 40 years, one of the hallmarks of the German academic education in Wirtschaftsinformatik (Business and Information Systems Engineering, BISe) has been the strong intake of university graduates by industry, regardless

of reaching either diploma, master, or doctoral level. In the mid-1970s, the first BISe study programs were introduced at the Universities of Darmstadt, Linz, and Vienna as well as at the University of Applied Sciences Furtwangen, driven by a growing industry demand. Today more than 100 higher education institutions in Germany, Switzerland, and Austria offer BISe degrees – both on the bachelor and master level. Moreover, many PhD graduates from BISe doctoral programs pursue a professional career in industry instead of staying in academia. Consequently, balancing rigorous and relevant scientific education, a fruitful collaboration has been established in the last decades between industry and higher education institutions, both with study programs that fit the needs of the industry, and research collaborations that involve public-private partnership projects that enable an easier transition of PhD graduates into industry.

However, in light of increasingly rapid innovation cycles in industry on the one hand, requiring market-driven technological research, and changing qualification schemes for academia on the other hand, requiring top quality IS publications, this balance is jeopardized. For earlier BISe PhD graduates, the question of aiming for an industrial or an academic career did not need an answer until the concrete application for a post-doctoral position. Today, with academic career paths being driven significantly by single academic papers, this decision needs to be made much earlier.

Does this focus on publications weaken the historically strong collaboration between the industrial and the academic world in IS? Are there still concrete benefits of having a PhD degree when entering the industrial job market? Will it be possible to move between academia and industry (in both directions), even in later years, without giving up a career?

In this discussion, we convey experiences of BISe researchers in their capacity as individuals who are involved in man-

aging an international master program or being part of appointment committees, providing their views on the changing market environments and how they react to these. Furthermore, we invited experienced representatives from different industries to share their view on the ideal graduate of the future with us.

The objective of the discussion is to contrast the inside-out view (academia) with an outside-in view (industry) and provide illustrations of the challenges that both will have to address in the future.

We suggested the following guiding questions for creating the reflection statement:

1. For industry: What is currently the typical qualification profile of a master and/or PhD graduate that you are looking for? Moreover, if there is a gap between the profile looked for and the actual profile of the graduates, how do you cope with this situation? Furthermore, does the overall supply of graduates meet the demand for new hires?
2. For academia: What is currently the typical qualification profile of a master and/or PhD graduate that leaves your institution? How do you currently cope with the requirements for PhD graduates that want to stay in academia? What is your strategy of learning from industry to find out what they are looking for?
3. For industry: What are the expected changes – in terms of changing hard and soft skills – that you anticipate in the required profiles in the next five years? Do you expect that university graduates will have this profile? If not, how do you plan to react?
4. For academia: What are the expected changes – in terms of changing hard and soft skills – that you anticipate in the required profiles in the next five years? How do you plan to cope with the changing requirements for PhD graduates that want to stay in academia? In your opinion, how should higher education in-

stitutions respond to these changing requirements?

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2 Necessary Competencies from the Perspective of IT Consultants

2.1 Introduction

Do universities adequately educate BISE students for the professional job market? To answer the question if universities convey necessary competencies, I will formulate some working hypotheses regarding career-building requirements and their respective importance. As there are no stereotypical requirements for BISE professionals, and many potential job profiles, we consider the following characteristics as key competencies that build the fundament of a successful career.

1. **Conjunction of technological and domain expertise:** In nearly all industry sectors and application domains, network density and automation of business processes increases. This growing digitization leads to an impossibility to change IT applications or optimize processes in isolation or without side effects to other technical layers. I am thus convinced that conceptualizing effective IT solutions needs a high level of domain management expertise. We otherwise risk implementing solutions that turn out to be a dead end. Thus the conjunction of both technological and domain expertise is essential.
2. **Modeling competence:** Due to the inherent complexity of process and IT landscapes, an optimization is only possible if we succeed in mapping the real world in consistent process or data models on different levels of abstraction. Even the complexity of today's and thus, at large, well-structured IT landscapes, which we typically find in large companies, has meanwhile grown so much that models are compulsory, e.g., to analyze which changes in the IT yield which consequences. The performance and correctness of this analysis directly depends on the quality of the models in

use. Regrettably, many of the models that are stored in companies are useless (e.g., because of lacking maintenance). This is why the competence to create and maintain such models is important after all.

3. **Architectural competence:** While the first two requirements were sufficient for conducting optimizations within a "silo" (either for a department or for an isolated application), a company-wide or even company-spanning optimization of the IT or process layer needs a fundamental architectural competence to create efficient solutions that span across application or organizational boundaries. For many companies, the challenge for the 21st century will be to establish an integrated platform to combine process, product, and IT views. This will have fundamental consequences for IT governance, which will not continue to be an isolated management function. BISE students should understand this change and learn the fundamental tools accordingly. Towards this goal, the students should acquire fundamental visions of how fitting platforms should look like in selected industries, and what the drivers of platform design will be: e.g., how producing variants is modeled, and how flexibility in the design of products and processes will be supported.
4. **Structuring and solution competence:** The first three requirements form the toolbox of the classical BISE professional, which she or he needs for a solid analysis. These competencies are helpful both in the analysis phase as well as when designing a solution. The capability however to structure complex issues, so that structural problems can be instantaneously recognized on the one hand, and otherwise to derive solution patterns from this, is necessary to design innovative solutions. It is not only necessary that the chosen structure represents the problem in a complete and consistent way. On top of this, one needs to develop a good sense, as to which dimensions are helpful and important for the identification and solution shaping, and which dimensions one can abstract from. This structuring competence is a valuable tool in all project phases, e.g., estimation of efforts, resource and time planning. We thus consider structuring competence, in addition to the first three skills, to be a key competence.

Of course, in addition to these competencies there are more and equally important characteristics that distinguish a successful BISE graduate, these being among other things, soft skills, commitment or intelligence. I do not claim that the selection above is equally important for all possible BISE job profiles. However, I am convinced that those characteristics are not only important for IT consultants, but are a foundation for any career in management or in academia. In the next paragraph, I will highlight, based on subjective experiences from job interviews and talks, if and how German universities impart these competencies.

2.2 Qualification by Universities

In principle, we recruit nearly all our BISE graduates (that is, about a third of our employees) from German universities. Senacor Technologies AG is one of the fastest growing German IT consulting firms, and we can state that it is not true that University education does not match the requirements of the job market. Rather, we can select from a pool of well-educated BISE graduates.

However, considering an education with regard to the four fields of competence mentioned earlier, there are potentials for improvements – at least based on our experience and without claiming generalization. We know, that there are restrictions to the possible depth and broadness and that other employers might prefer a different profile.

Regarding combining technology and domain competence as well as modeling competence: From our experience, in Germany, Austria, and Switzerland many universities and BISE chairs offer profound knowledge through balanced curricula which address both technology competence as well as domain knowledge, even though the students are not aware how important that interface will be. However, when selecting job candidates, our impression was that a solid knowledge of modeling is not anymore the core of the BISE education. It is true that company-wide process or data models are not an end in itself, but modeling competence is necessary when designing department- or company-spanning solutions. We thus wish that these classical BISE contents become a stronger focus; in addition, modeling skills foster important thought patterns for BISE professionals.

Regarding architectural competence: While those two core elements of our

requirements profile (combining technology and domain, and modeling competence) are satisfyingly matched by German universities, what we describe as architectural competence is not (yet) a part of the fundamental curriculum. We need to realize that only some BISE alumni from selected universities are able to roughly sketch the IT landscape of a model company. Both students and alumni are lacking a basic understanding of the size and complexity of application landscapes in companies. The root cause for this often is a function-oriented curriculum, which insufficiently integrates the different views. Students who do not acquire this competence will seldom be able to analyze or even solve department- or application-spanning problems. Enterprise architecture management, which has gained importance in the last years, is a valuable addition for any curriculum. Alumni of universities that promote this skill possess a competitive advantage, which we appreciate.

Regarding structuring and solution competence: Whereas the three competencies mentioned above represent methodical knowledge, which in principle can be taught in classical lectures, relevant structuring and solution skills are taught by experience rather than in a university lecture. In this case, we think that supplementary (not substitutional) case studies (Harvard style) are reasonable. Students can thus develop the ability to quickly identify relevant dimensions to structure a priori unknown problems. In addition, students should learn, building on suitable structuring abilities, to derive and assess action alternatives for problem solving. Even though case studies are increasingly substituting traditional lectures, this is not a format which is widely accepted in BISE curricula and thus could help to complete BISE teaching accordingly.

Future development of the requirements profile: We assume that the requirements profile is relatively stable and the requirements motivated in this contribution are relevant in the future. Graduates with these competences are well prepared for IT transformations caused by global trends like digitization, social media, big data, or cloud computing. Already today we witness a shortcoming of graduates with exactly these competencies, which, given that the economic outlook does not drastically decrease, will endure for the next years to come.

In the case that the universities intend to fill this gap, we deem the following activities as prolific: First of all, the increase in BISE academic staff and resources that took place in the last ten years should be continued, if not intensified. Only in this way can the increasing demand for BISE graduates be matched. Secondly, the curricula should adapt to the requirements, by remembering the importance of core elements like modeling skills, and by adding supplementary case studies for conveying structuring and solution competencies.

In the area of PhD education, the actual trend towards publication-oriented research leads to increased structuring and solution skills, because the PhD students again and again get the opportunity to deal with new ways of looking at a certain problem and to develop a substantiated solution. We witness this particularly when researchers spend time on topics with high relevance, when drafting case studies, using design science or engaging in action research methods. We can put much more responsibility for a project on PhD graduates who have acquired these skills, and this reflects in the salary.

How does Senacor react to the excess demand on the BISE job market? In the end, there are only two options to satisfy our demand for qualified employees. On the one hand, by internal primary and continuing education, on the other hand, by addressing universities with our core interests and, supplementary, to give students and PhD candidates the opportunity to do internships in our industry projects.

Senacor emphasizes continuing education of their employees and thus offers through the Senacor Academy a broad spectrum of internal courses. As stated earlier, the contents are primarily conveyed through case studies to teach the structuring and solution skills, which are in our view necessary for innovative solutions. The broad spectrum also allows us, to hire graduates with a bachelor's degree. In the best case their education provides technological and domain knowledge and modeling skills. Gaps in the fields of architectural, and structuring and solution competencies can be filled by internal courses.

In addition, we involve ourselves to a great extent (measured by our company size) in cooperations with selected universities and chairs, and complement the

existing curriculum by lectures and information meetings. Within the scope of these partnerships, we offer normal lectures, but also Harvard-style case study seminars and project-based seminars. In the latter, our consultants involve and guide groups of students, who structure actual industry problems and develop sustainable solutions. We can illustrate this with the “Senacor Case Challenge”, which since 2013 annually allows student teams to compete for the best solution for a case out of our company's project history.

Usually, when getting involved with universities, we seek a long-term partnership, which allows students, but also PhD candidates, to work with us in consultancy projects with our customers. By this, they experience themselves that the skills and competencies mentioned throughout my article are of decisive importance, to plan, control, and implement large IT transformations.

2.3 Conclusion

To summarize, it can be said that the education of BISE students at German universities matches the fundamental requirements from industry. An increasing orientation towards publications is not a structural shortcoming. We assume that the trend for digitization will create a strong demand for the BISE profile in the future, and thus one can absolutely recommend prospective students to choose BISE programs. However, I think that architectural competence and structuring skills should be emphasized and thus potential industry requirements can be even better matched.

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3 The Impact of Increasing National and International Competition on BISE Master and PhD Programs

The strong ties between academic institutions and industry represent one of the competitive advantages of European universities, especially those in the DACH region (Germany, Austria, and Switzerland). However, these ties seem to be at risk, given that (young) academics face the pressure to concentrate on publishing in top-tier academic journals in order

to get tenured. On the other hand, industry research collaborations are time consuming and not particularly valued in an academic career. While the mid- to long-term implications for BISE Master and PhD programs are not yet foreseeable, these definitely deserve more discussion and reflection.

My perspective on this topic is driven by my personal experiences from working in research-oriented business schools, which strive for academic excellence and international reputation. In the past ten years, competition in the education market has increased considerably at national and international levels. As a result, faculties are constantly compared to others along criteria such as the quality of programs, employment opportunities for graduates, and the productivity, innovation, and influence of research. HEC Lausanne, the Faculty of Business and Economics at the University of Lausanne, is a good example of a faculty that seeks to be at the forefront of scientific research, while attracting the best students to its programs. Its mission is “using research to train our students to be capable and responsible leaders and entrepreneurs.” Accreditation by the European Quality Improvement System (EQUIS), which awards a quality label to the best institutions of higher learning in business, along with other accreditation processes, have led our faculty to reflect on the strategic positioning of its programs, document their learning outcomes and review how they are perceived by students and employers. Besides accreditations, we carefully monitor rankings, such as the prestigious Financial Times ranking and the Eduniversal Business School ranking, both of which value employability and career perspectives.

Although HEC Lausanne is a very research-oriented faculty, it is very clear that all Master’s programs include both a theoretical and a practical orientation. The vast majority of our Master students pursue a professional career in industry after their studies, and only a very small portion opts for staying in academia. From our experiences in the IS Master’s program, students mostly enroll owing to the excellent employment opportunities and their interest in innovations brought about by new technologies. Looking at the numbers, it would be impossible to establish a dedicated research-oriented Master’s program. It is only in the course of their Master’s studies, that some of our best students discover their interest for an

academic career. The Master’s thesis usually is a key factor in the decision making for or against an academic career.

For HEC Lausanne’s IS Master program, we have documented qualification profiles (Department of Information Systems, University of Lausanne 2012), which were further discussed with other Swiss universities. After Switzerland adopted the National Qualification Framework for Higher Education (nqf.ch-HS), in line with the Bologna process, the Rector Conference of the Swiss Universities initiated pilots for three disciplines – among them Computer Science/Information Systems (CRUS – Rector Conference of the Swiss Universities 2013). These pilots refined the so-called Dublin descriptors to describe typical expectations of achievements and abilities associated with the end of each (Bologna) cycle in the IS curriculum. Descriptors are phrased in terms of learning outcomes and competence levels, with the goal of distinguishing in a broad and general manner between the different cycles. A level descriptor includes the following five categories: (1) knowledge and understanding, (2) applying knowledge and understanding, (3) making judgments, (4) communication skills, (5) learning skills. The discipline-specific descriptors, defined by the pilots, have been published as *good practice* by the Rector Conference of the Swiss Universities and are depicted in **Table 1**.

At the Master’s level, IS students are expected to achieve “advanced knowledge and understanding of the *conceptual* and *applied aspects* of IS design and management.” Employability is addressed by the expected competence level in the category “applying knowledge and understanding”, but also by the associated learning and communication skills. According to the recommendations, students should be able to “apply their knowledge and understanding, and problem solving abilities

- in new or unfamiliar environments within broader (or multidisciplinary) contexts based on real case studies and practical exercises,
- develop and/or apply cutting-edge ideas/methods/principles/solutions,
- demonstrate the skills to discuss the major issues facing the IS managers’ profession and to analyze them using both academic and practitioner literature.”

HEC Lausanne implements these recommendations by integrating substantial project work in almost all courses, which require students to apply their conceptual knowledge in a real-world setting. Projects are complemented by a novel element that we integrated into our curriculum: a “block week” on a current topic that links technology innovations with managerial issues. During one week, the regular program is interrupted, and students work full time on a specific topic, such as *Cloud Computing* (in 2012) or *From Big Data to Smart Data* (in 2013). Based on practitioner inputs, they investigate technological and managerial challenges associated with this topic from a company’s perspective. They develop recommendations and discuss them with practitioners at the end of the week. Students thereby not only become familiar with latest technology innovations, they also integrate and apply their knowledge from different courses. In terms of curriculum design, this new component allows HEC Lausanne to integrate into the program relevant and interdisciplinary topics at the intersection of specialized courses or novel topics that are not (yet) fully integrated.

While applied aspects play an important role in IS programs, the Swiss pilot working group clearly emphasized expectations of academic practices in IS Master’s programs. Students are expected to develop an “understanding of contemporary research”, and “define their own master piece (thesis) using academic methods and literature”. In the case of HEC Lausanne, the Master thesis can be done in combination either with an internship or as an academic thesis, in order to prepare students for their subsequent – professional or academic – careers. Even though approximately 80% of our Master students opt for the internship thesis, HEC Lausanne maintains high academic requirements for both types of thesis and offers specific preparation courses to guide students in using academic literature and methods.

Compared to the Master’s program, the situation differs significantly for the PhD level. In Switzerland, a PhD degree is not particularly valued in the job market, given the lack of highly qualified labor especially in the IT industry. Hence, most (Swiss) PhD students start their degree as preparation for an academic career. According to the *good practice* defined by the Swiss pilot, PhD students “have

Table 1 Good Practice for IS Master and PhD programs (CRUS – Rector Conference of the Swiss Universities 2013)

Category	Second cycle degrees in Information Systems (MSc) On top of the capabilities mentioned for the BSc students, MSc students...	Third cycle degrees in Information Systems (PhD) On top of the capabilities mentioned for the BSc and MSc students...
Knowledge and understanding	<p>have demonstrated/acquired advanced knowledge and understanding of the conceptual and applied aspects of IS design and management as an academic discipline, including</p> <ul style="list-style-type: none"> • an understanding of contemporary research and developments • advanced methodological knowledge within IS design and management • increased depth of knowledge regarding the IS and business foundations 	<p>have demonstrated a systematic understanding of a field of study and mastery of the skills and methods of research associated with that field</p>
Applying knowledge and understanding	<p>can apply their knowledge and understanding, and problem solving abilities</p> <ul style="list-style-type: none"> • in new or unfamiliar environments within broader (or multidisciplinary) contexts based on real case studies and practical exercises • develop and/or apply cutting-edge ideas/methods/principles/solutions • demonstrate the skills to discuss the major issues facing the IS managers' profession and to analyze them using both academic and practitioner literature 	<p>have demonstrated the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity</p> <p>have made a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits national or international refereed publication</p>
Making judgments	<p>have the ability to</p> <ul style="list-style-type: none"> • assess business and technology innovations with regard to their implications for IS design and management • demonstrate skills to make judgments, in relation to relevant scientific, societal and ethical aspects, within the field of IS design and management • evaluate advantages and limitations of different theories, methodologies, and tools • understand the links between strategic and operational perspectives in problem-solving capabilities 	<p>are capable of critical analysis, evaluation and synthesis of new and complex ideas</p>
Communication skills	<p>have the ability to</p> <ul style="list-style-type: none"> • communicate effectively, orally and in writing, and justify the knowledge and rationale underpinning their conclusions, to varying stakeholders • lead and participate in teams, manage projects, respect deadlines and efficiently perform assigned tasks 	<p>can communicate with their peers, the larger scholarly community, and with society in general about their areas of expertise</p>
Learning skills	<p>have the ability to</p> <ul style="list-style-type: none"> • independently (self-directed or autonomous) acquire new knowledge, methods, and techniques from various sources (including the research literature) • define own masterpiece work (thesis) using academic methods and literature 	<p>can be expected to be able to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge based society</p>

made a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits national or international refereed publication.” This certainly raises the expectations in terms of research quality and may discourage some potential PhD students. However, we have also observed extremely successful PhD theses as a result of research collaborations with practitioners – such as Alexander Osterwalder’s PhD thesis (Osterwalder 2004), which has evolved into one of today’s most successful management books. From my perspective, the

key factor is that we further promote the “engaged scholarship” (Van de Ven 2007) in the IS discipline and in our PhD programs. This implies that (1) professors encourage PhD students to address relevant topics for industry and applied aspects of information systems in their research, and that (2) we further improve the setup of our research collaborations to produce relevant results that are developed in a rigorous research process.

To conclude, the global education market is undeniably having an impact on BISE programs in German-speaking

countries, especially for universities seeking to be among the national or international champions. Accreditations value the employability of students at the Master’s level, and relevant research results improve BISE program’s attractiveness. As a result, the strong ties between industry and academic institutions – potentially – represent a competitive factor for BISE Master’s programs in the German-speaking countries. Nevertheless, some work needs to be done to communicate these strengths in the global education market. In addition, we need to further develop participative forms of research

with industry to keep them attractive for young researchers as well as corporate partners.

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4 Requirements of the Service Industry – The Case of a Global Insurance Company

4.1 Introduction

The business environment has changed significantly over the past couple of years. Not only processes within the business environment but also expectations regarding the individual have shifted, leading to a different qualification profile of graduates currently being recruited by companies. The term VUCA (volatile, uncertain, complex, and ambiguous) which has been shaped by the US Army War College (Horney et al. 2010) tries to capture the outcome of those recent developments and builds a foundation for deciding on a qualification profile of graduates looked for in the near future.

4.2 What Is Currently the Typical Qualification Profile of Graduates that We Are Looking for?

Within the Allianz Group one of the most important aspects looked for in a graduate's profile is professional experience. If a company, as is the case for the Allianz Group, is in the beneficial position of being able to choose between around 90 applicants for only one position it will of course choose the one that has, at least to some extent, professional experience, since this facilitates the initiation process tremendously. Especially young graduates that have finished university without having done one or more internships will find it difficult to gain ground in this business environment. Students should use their time to do internships – if possible on an international basis – and work as working students or similar in order to gain first professional (and international) experience. Allianz as well as other companies are especially interested in people who have done an internship or worked as working students for one's own company as they already had the chance to gain company specific knowledge and expertise that will facilitate not only the onboarding process but

also further working procedures. Companies typically dedicate a lot of attention to those candidates during the selection process. One criteria that surprisingly is not considered as being highly important regarding the selection of applicants is the average grade of previous qualifications such as the high school degree. According to a recently published article in the "Wirtschaftswoche" (Stehle 2014) this criterion is even the least important of all hard and soft skills that were included in the survey. The average grade of the bachelor's or master's degree, however, is considered as being more influential. Due to country or even region specific differences regarding the degree of difficulty, it is in any case inevitable to calculate a weighted grade for each individual, taking differences into account, in order to guarantee a fair comparison among applicants. Applicants should definitely have a basic knowledge in economics at their disposal regardless of the position that they are applying for. Furthermore, graduate's profiles should ideally already contain a certain foundation of customer orientation and service understanding as well as consulting and advisory skills since this expertise is mandatory for most positions and processes within Allianz. Equally important are a good understanding of sales and distribution processes and a good sense of logical reasoning. The graduate's profile should most certainly also include strong language skills. Working for a multinational company such as Allianz definitely requires good English skills. It is also seen as a clear advantage if someone speaks even more languages since the company runs many international projects in various countries.

Regarding the personal characteristics of an individual currently looked for, passion for change can definitely be categorized as being key. Passion not only for change in general but also the sort of change that taps into the individual's personal life is inevitable in today's business context. People who are willing to accept any sort of change are fiercely being sought for and deeply needed in the VUCA environment. As one graduate can report from her own experience it is often not as easy to embrace change, as previously thought. Particularly in the beginning of her professional career, she had to overcome some difficulties accepting change: "It is, as you can imagine, quite exhausting to deal with change over and

over again, for instance when the current project is not even completed yet. It rarely happens that someone works on one project from beginning to end. This is the reason why people get less chance to settle down in this dynamic environment." The structure of today's business environment makes it clear how important it is for potential employees to be willing to accept and experience change.

Additionally, flexibility has become one of the major criteria looked for in the graduate's profiles. Allianz is selectively looking for highly flexible people. Where a couple of years ago people applied for a specific position with more or less invariable tasks, people in today's diverse business world have to offer a high degree of flexibility. It has become the norm that employees do not stay within fixed boundaries but rather move within their role or even between roles. Besides this, employees are confronted with a much wider array of technology than was the case only a couple of years ago. Adapting to this technological change is less a problem for the younger generation than it is for the older one. People entering business directly from university are already used to a huge variety of technology that they had to work with during their studies and thus have no problem adapting to this change.

Another profile criteria which is strongly connected to flexibility and patience for change and highly demanded by today's businesses is mobility. This criterion has more or less already become a natural characteristic for most graduates as they get increasingly used to changing locations and adapting to new environments. Many graduates decide to study in a different city than their home town and many also use the chance to study abroad at one point or another. The choice of country and hence language is of secondary importance. What is important is that the decision to live abroad indicates a person's willingness to accept and tolerate a different culture and gain experience in an international context.

Enthusiasm is another key characteristic looked for in the mindset of graduates applying for a position. An ideal graduate should be able to brim over with enthusiasm for specific topics rather than having a neutral attitude. Self-confidence and good presentation skills are also highly demanded in the profile of potential applicants and also mostly existent in the current graduate's profiles. A good

sense of responsibility, fast comprehension, and an extraordinarily strong willingness to learn are mandatory as well as some extracurricular activities.

It can be said that the overall requirements for graduates have risen due to the recent changes within the business environment and the possibility to outsource easy tasks in particular. The remaining tasks are quite complex and thus ask for specific expertise and competencies. Therefore, companies are not so much looking for people that are able to take over responsibility for repetitive and less complex tasks anymore but for people that are able to complete complex tasks.

4.3 How Do You Cope with a Situation Where There Is a Gap Between the Profiles Being Looked for and the Actual Profiles of the Graduates?

Even though most of the graduate's profiles match the overall expectations, one criterion often is the reason for rejection. It is typically the lack of professional experience that causes a misfit between the profiles looked for and actual profiles provided by graduates. Especially graduates that come directly from a university occasionally do not have the expected practical background. Internships and phases that include practical experience are not mandatory in most of the universities. Only a small number of graduates take time off during their studies in order to gain this kind of experience. But the trend is clear: applicants especially in the field of IT have a lot more practical experience than was the case a couple of years ago.

In case of a misfit the easiest and most likely solution from a company's perspective would be not to hire the candidate. However, some companies will find themselves in situations where they have to compromise about the selection of employees, either because there are no applicants available that offer the desired profile looked for, and/or the company simply does not have enough time to perform an elaborate search process. The most effective tool to bridge an existing gap between the profiles looked for and the actual profile of the newly hired person would most likely be on-the-job training in one way or another. However, the overall workload is often quite high which is why extensive on-the-job training can be hard to implement in the day-to-day business routine. In spite of the impediments, companies

should try to implement a buddy system in order to integrate new employees as fast and effectively as possible. As has proven to be true within Allianz, this way the individual gets the chance to adjust to the new environment in a highly effective and practice oriented approach. Due to the high workload and hence restricted time considering the initiation process of new staff, companies are generally fiercely in search of graduates that are able to work in an autonomous and proactive way.

4.4 Does the Overall Supply of Graduates Meet the Demand for New Hires?

The war for talents, as it has been titled in many articles, is ubiquitous in today's business environment. Over the past years, a clear shortfall of adequately qualified graduates could be reported. Positions in the field of IT security, IT architecture, business analysis, and even project management are especially affected. In general, the number of applications has not dropped significantly but the number of applications from people with an adequate profile of qualifications has shifted dramatically leading to this supply shortage. This supply shortage will lead to many companies having to accept applicants from different fields of study than initially planned. Besides that, applicants from other geographic areas will increasingly become key in reducing this shortage. Due to a very good reputation as an employer and thus an incredible high number of applicants, we foresee that the Allianz Group luckily does not have to deal with this issue, similar also to other strong employer brands.

4.5 Expected Changes – in Terms of Changing Hard and Soft Skills – Anticipated in the Required Profiles in the Next Five Years

Changes expected during the next five years regarding required hard and soft skills will most likely not differ from the changes described in the first section that are already ongoing. Requirements regarding those skills might become more intense but the overall expectations will stay the same; for IT employees with expert knowledge, they might become even more important than they are today. Generally, it can be said that in five years' time the Allianz Group will most likely be looking for people with the same

set of characteristics and qualifications as they do now.

4.6 Will University Graduates Have This Profile? If Not, How Do You Plan to React?

With the utmost probability, the tension on the job market will not ease within the next five years. There will be an even greater shortage of graduates with adequate qualifications and at the same time applicants themselves will start making greater demands on the employer. Companies will probably have to compromise employee selection even more than they do today due to the shortage of graduates available for hiring. This shortage leads to a situation in which some companies will have to hire graduates even though their profile does not exactly match the company's expectations.

One reason for a potential misfit between expected and actual profile of graduates in the future could be the current structure of universities. Nowadays it is sometimes the case that students cannot decide independently, on what specializations to take and when to do a semester abroad. Structures that are predefined and thus restricting the flexibility are counterproductive in a VUCA world.

To cope with this situation Allianz will continue to improve their strong employer brand. This way Allianz can prevent applicant numbers from declining, which will leave the company in the comfortable position of being able to choose between many highly qualified applicants.

Dr. Axel Schell
Allianz Managed Operations
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5 Hire Education: BISE as Science and Job Profile

5.1 Introduction

The guiding question is: Do we need to change the way we educate and develop our Bachelor/Master and our PhD students to cope with possibly changing job demands? To understand the underlying challenges, I will first discuss the job market for our graduates leaving university and then discuss particular challenges for an academic career path.

5.2 Our Graduates and the Labor Market

Overall, the job market could hardly be better for BISE graduates. Our annual survey of HR executives of Germany's largest 1,000 firms shows that, in 2014, almost all firms are hiring but over 40% of vacant positions are difficult or even impossible to fill (von Stetten et al. 2014). This trend has been consistent over the years and even through the recent crises. A major reason is the notorious demographic development, with only half as many young adults in absolute numbers now as there were in 1950 while at the same time job demands have become much more complex. Therefore, firms have long been facing a "war for talent" and struggled to find good candidates. Moreover, this battle for brainpower tends to be much fiercer in our disciplines. Our surveys consistently reveal that in IS and CS related fields (and also for R&D jobs), only 20% of the firms find enough qualified candidates on the market (in contrast, for instance, to 60% for HR or marketing) (von Stetten et al. 2011). Moreover, while in 2014 on average, 41.8% of firms have problems filling their vacancies; this figure goes up to 52.9% in the IT industry. On the candidate side, our annual candidate survey that has so far gathered over 100,000 web-based responses (Maier et al. 2014), consistently shows that, across industries, those individuals with IT/IS-related jobs are the most optimistic for their own career and find it easiest to move to new jobs or even "dream jobs". 93% said they found a good job instantly after graduating, in contrast to, for instance, only 28% of those who studied Germanic languages (Laumer et al. 2011). This is reflected in salaries as well, as those with IT-related jobs earn on average EUR 5,627 more than the rest. One of the main reasons is that there are much less low paying jobs in our field. Correspondingly, pay discrimination is lowest in the IT industry, and women in IT earn 22% more than in other industries. Other sources offer similar pictures. A survey by the worker's union IG Metall reveals that half of IT bachelor graduates from universities earn more than EUR 45,965.

Thus, one important insight is that our graduates are desperately sought for on the job market and that there is a serious scarcity of IS graduates. From many projects with HR executives, I am inclined to posit that while very particular skills are great to have, the true bot-

tleneck in most firms is to hire any decent IS graduate at all. My understanding of the firm's skill demands is mostly that short-term hiring needs – often looking for the most recent (and sometimes vendor driven) fads – are certainly most visible, but that long-term needs for good IS/BISE staff capable of a broad portfolio from modeling over IT management to critical thinking is even more virulent. This is also reflected in research on IS value creation, and also RBV studies show that superior programming skills can give a firm a temporary competitive advantage, but that business skills of the IT unit can even create a sustainable competitive edge. It also seems that the short-term skill demands change faster. Consequently, graduates leaving the university should be equipped with both short and long term skills. However, while the former might expire faster, be more firm specific and better to acquire on the job, the latter might be an even more important and longer-lasting aspect of the academic education. In the words of B.F. Skinner: "Education is what survives when what has been learned has been forgotten". Universities seem to be a good place for good education on top of good learning.

5.3 The Role of Soft Skills

While most job descriptions for academic graduates now include much more sophisticated skills than ever before, there seems to be a trend towards focusing on soft skills even more than on hard skills. When eliciting the skill demands for a modern recruiter, we learned that in addition to traditional skills modern recruiters only succeed in teams and should master, for example, HRIS KPIs, process management, SEO, and think and communicate like entrepreneurs (Eckhardt et al. 2014). When presenting these results to a group of about 450 HR executives and recruiters, I asked "These are substantially new skills. Would you hire yourself for your own job now?" and 3 out of 4 raised their hands for "No". Then I asked "Much of the recruiter 2.0 profile is about soft skills and communication capabilities. Can you develop your current staff towards these skills, or do you have to hire essentially new individuals?" Quite surprisingly, 2 out of 3 indicated they would have to lay off their current staff and hire different people. In a follow up study we found, consistent with the recent literature, that indeed, recruiters

in Germany's larger firms seem to select with a focus on soft facts. The top selection criteria are personality (#1) and soft skills (#2), followed by study majors (#4) and grades (#6). Overall, 66% consider soft skills to be more important than hard skills (60.7% in the IT industry). While I cannot evaluate the validity of these perceptions (that also somewhat contradict the findings on the dominance of GMA for on-the-job-performance (Rynes et al. 2007)), there are two possible explanations. First, while soft and hard skills are important, soft skill deficiencies are harder to remedy. The recruiters support this view as reported above, and it is also in line with our recent survey revealing that across industries, only 1 in 5 firms think you can teach or learn soft skills. Second, both are important but soft skills are the bottleneck factor. To resume the earlier argumentation, it might be tough enough to find IS staff with a particular hard skill set but even tougher to find (and harder to develop) candidates with sufficient soft skills. Looking at the job market demands, my general diagnosis is then, that the Universities still do a decent job in preparing the students we already have but mainly that we need more IS students. A major challenge then is to reach out to potential students that might so far have never come across the idea of taking up BISE, too. Moreover, while clearly more research is needed on the nature, relevance, and plasticity of soft skills, we need to do everything possible to also foster these skills.

5.4 The Industrial and Academic Job Market for PhD Graduates

Unfortunately, there seems to be much less data on supply and demand for our PhD students. My own view is that the labor market outside the universities is rather similar but that the academic job market is becoming more competitive. A major trend is certainly increased global competition. Overall, globalization has roughly doubled the supply of workers in the past decades. Harvard University's Richard Freeman (Freeman 2010) argues that the first world workforce in 1980 consisted of 980 Mio. individuals, this grew to 1.5 billion in 2000 (including parts of Africa and Latin America) and then absorbed another 1.5 billion from India, China, and the former USSR.

In academia, it is inspiring to see how fast many great young researchers from India and China have gained a foothold

in international top institutions and journals that were so far mostly populated by Anglo-American colleagues. Second, probably driven by political trends towards austerity and transparency, the public seems to be more interested to understand the return on investment of publicly funded science. The yardstick often used is the quality of research results, operationalized as quality ranked publications. This is not without problems, but it is reality. These two trends make a successful career in academia even in fields such as BISE more risky than before. A particular risk for academics is that in academia there are usually less potential employers than in industry (e.g., business analysts), and we have much less liquidity on the academic job market. How should we cope with this new situation?

Looking at the content side, I mostly think that in line with the Bachelor and Master programs we have, that diversity and long-term orientation is important, and we are quite well off with the existing mix of theory building and technology building skills. Interestingly, these two academic areas frequently mix and merge when it comes to short-term industry job market needs. Quite some PhD students have developed sophisticated analytical skills from empirically evaluating and improving theoretical knowledge and realized that the job market now looks for their Big Data and analytics skills.

For an academic career, doing and publishing research that other researchers appreciate seems more important than earlier, though. While the evaluation scales (journal rankings, impact etc.) might change like the short-term industry demands, it seems useful to accept global competition as a fact of academic life. Coping with changing requirements for PhD students includes discussing if they are looking at the national or possibly international academic job market, too. Senior faculty also has an increased responsibility not only to intellectually prepare the PhD students for the demands of a modern academic career but also to make sure they know what to expect. A colleague once said to a very good Master student contemplating an academic career that he so far was like the best tennis player in his town, but that he will have to play John McEnroe as a professor. The point is that “professional scientist” is still a top job if one is capable and looking for intellectual freedom and perpetual learning.

However, if the true goal is a supposedly secure job as tenured civil servant, this career path might not work well. In summary, the academic career seems to become more risky when following the rules of yesterday, and maybe as risky as “regular” jobs because there are fewer potential employers. The answer for the individual can only be to up the ante and lead in all the new categories of the academic decathlon while the BISE community could try to more convincingly propose (and politically implement) how our research quality should be measured. Maybe global initiatives led by global organizations such as AIS could make this even more convincing.

5.5 What Can We Do?

Looking ahead, the two major challenges are to make sure that we maintain teaching a sufficiently deep, broad, and modern skill base, and that we convince more individuals to major in BISE. These sophisticated topics might require their own discussion.

Regarding the skills, my assumption is that we need to keep a rather high diversity in the field that allows for specialization and mitigates the risk to follow myopic trends. The alternative of centralized planning of skill supply and demand has convincingly been outperformed almost all the time whilst it was tried. At the individual level, most BISE professors have close contact to and work together with many firms and industries, which is conducive to knowledge transfer anyway. Increasing efforts to keep in contact with alumni even strengthens this link. I have positively experienced asking students to write to me after one or two years in their jobs and indicate which topics and methods (a) they found particularly useful, (b) nice but unnecessary and (c) they missed and with hindsight would have liked. This helps shape existing courses and even develop new ones. For instance, I teach a course “IT controlling” that was essentially caused by these feedbacks. Concerning marketing for BISE programs, we need to better understand what prospective students might want and how they decide on what courses to take. Looking at the data above I am convinced many want to study IS but just do not know it yet, and we need to better understand their information sources, goals, and values in order to reach out to them. Trying to learn from

other successful universities and considering many efforts in the past, I assume that we will fail when trying to explain what BISE constitutes. Instead, we should make it easy for our target groups by adapting their imagery, and communicate career paths and job stereotypes. For example, most of those we try to convince to become BISE professionals will be more responsive to information on job satisfaction, salary and possible job descriptions such as outsourcing manager, consultant or process optimizer; rather than to discuss philosophical positions and definitions what BISE is, and what not. One insight from the many “girls’ days” and similar marketing events was that whenever parents attended (sometimes for the last 30 minutes when project results were presented), the salary figures mentioned earlier left a substantial impression. It also seems useful to explain that despite the reference to the computer science job market in the German translation of BISE, our graduates’ jobs are the least likely to be outsourced to India – a common fear – because it is exactly our graduates who decide and manage what to outsource. Trying to learn from other universities from all over the world, we might invest in being able to trace the career paths of our graduates better and thereby build a collective case database of compelling BISE careers. For those who seek an academic career, global competition and indebted public administration might have altered the job market for aspiring professors more poignantly. We can respond to these new challenges for the moment only by attempting to keep our top positions and be good at theory and systems development.

In summary, and trying to answer the guiding questions, it seems that BISE programs “produce” great graduates that are sought after on the job market – just not enough of them. Those pursuing academic careers need to be made aware of the changing job profile, and equip themselves with internationally acknowledgeable capabilities and a global mindset. From industry, we can learn to better accept and embrace competition and the will to get and stay ahead of others, and to communicate our value contribution in the language of the recipient. In all cases, we need to teach good BISE skills for immediate use in firms, but should emphasize lasting knowledge and the scientific virtue of critical thinking. In the words of

the great Aristotle: “It is the mark of an educated mind to be able to entertain a thought without accepting it.”

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