

Introduction

The new phenomena, called “multidisciplinary”, enters to the universities life only a few years ago. The demand of the alumnus, experienced in more than one branch, increased very rapidly and it is the most seen in information technologies. Where else you can find the extreme requests of the experts, well educated in technical skills, but also able to understand the real problems of the customers. Through this pressure many of IT guys had to “metamorphose” from IT stuff to real multidisciplinary experts – the T-shape professionals.

The most important leader in this is definitely the company IBM. Its new discipline, called Service Science, is the most developed discipline in applied IT. Also they support very intensively the creating of the Service Science study programs at the universities around whole world.

Mostly in United States, but also in other countries, was created a lot of multidisciplinary study programs and some of the developing teams have published their experiences.

Also in Czech republic at the Faculty of informatics of Masaryk University in Brno was found a master study program “Service Science, Management and Engineering” (SSME). It was the first master program focused not primary to the scientific research, but to the business reality – the concept, uncommon in Czech universities, with the very different attitude to the students, in 90% taught in English.

The main focus was to “create” a new design of the graduates, the T-shape professionals, who have deep knowledge of the one scientific field (information technologies), but also a lot of other soft skills. The role of the internship was also different than in the others programs – it is one of the most important courses. Also the number and the role of the courses, taught by the experts from the companies, were more important than in any other study program.

The main reason of creating such an unusual program was also the demand on the labour market, presented mostly by IBM, but also by a lot of IT companies, settled in Brno in a lot of scientific or industrial parks. But it was necessary to make them to interact more with the faculty they were used to – to involve them into the teaching process – in the university and create more job offers for the internship of the students.

The expectations were quite high – in both ways. The opponents of the programmes expected big crush, mostly connected with non-research focus of the program. The founders expected a big interest of the students of the bachelor programs not only of the Faculty of informatics. In any event, the untypical structure of the program promised a big challenge for everyone in the founding team.

But the most important questions were – Will it be working? Is it possible to teach multidisciplinary program at one faculty without using the courses from the other faculties? Or should we choose some courses from the other faculties – and which? Will the cooperation with external experts work? Will students accept this new structure?

All those questions needed to be answered. Some answers were surprise for all participants.

The first study program

Before we will present the study program, it is necessary to name the founders of the program – especially one of them – RNDr. Zdenko Staniček, who alone, with help of his post gradual students Pavel Minařík and Marek Winkler created the first study plat of SSME. With support of dean prof. Jiří Zlatuška they started completely new approach to the university degree.

The very first structure was created upon following assumptions:

- The most of the IT knowledge students already got during their bachelor studies
- They need to study the process and project management, soft skills, marketing and other management courses
- The key role of internship and the connection with partner companies and entrepreneurs
- We need a new type of the courses, taught by the experts from the partner companies
- We need to open the program for as many students as we can

The big role in the study program was played by the interaction with the partners. University and faculty have a long tradition with cooperation of the business partners, but never in direct influence to the teaching process. The external partners played two roles:

- Platform for student internship (will be described in the next chapter)
- The experts from the companies played an important teaching role in key lessons of the program

The second role was not very unusual for the faculty or for the partner – many experts from the companies were used to take one or a few presentations on the university. But never faculty created programs, where the mandatory courses would be taught by the external teachers.

The structure of the mandatory courses fully represented the ideas above:

Table 1 – The first structure of mandatory courses of SSME program (study program, Information system of Masaryk University – www.is.muni.cz)

Code of course	Name	Teacher – external/internal
PV203	IT Services Management	External – IBM
PA181	Services – Systems, Modelling and Execution	External – MycroftMind ¹
PA116	Domain Understanding and Modeling	Internal
PV207	Business process management	External – IBM
PA104	Leading of the team project	External - IBM
PA179	Project Management and Service Lifecycle	Internal
PV206	Communication and Soft Skills	Internal

¹ MycroftMind is a spin-off of the Masaryk University, focused on intelligent data-mining and real time analyzing of the huge data streams. Its name comes from the Arthur Common Doyle series about Sherlock Holmes. Mycroft is the name of Sherlock's brother, who worked for British government. His biggest ability was to collect ostensibly invaluable information, analyze them and turn them into a valuable one.

The structure of the mandatory elective courses was divided into three groups:

- Information technology
- Management and economics
- Human oriented

The courses of each group had a quite big variation – in each group you was able to find very theoretical courses (Petri’s nets, Parallel and distributed calculations) together with very practically oriented courses, like Service oriented architecture, Computer networks etc. There were more than seven different courses in each group with no other key to choose – only minimum credits for each group was given to students.

In the very first reaction was very positive. The number of the students increased very rapidly – as seen in the following table:

Table 2 – No. of students in SSME (source: Information system of Masaryk University)

Year – the indicator is from the end of presented year	No. of students in SSME (in whole program)
2008	12
2009	57
2010	128
2011	216
2012	175

The very first year (2008) it seemed to be all right. But in next two years, when the number of the students increased very rapidly, the first problems come:

- The number of the students brought a big pressure to the faculty administration (mostly connected with the internship, but there were also a problem to find a lot of a good thesis leaders)
- The external teachers were not able to exam a such big amount of the students
- Some of them were not able to guarantee their presence on the lessons or seminars during the school year (mostly on selective courses)

The result of those effects was the courses became too easy to pass for many students or they have a problem with the credits when they enrolled the course that was cancelled later. Also the first feedbacks, coming from the partners, insinuated students did not have a such a good IT knowledge as we supposed.

Internship – Interim project

As it was many in times mentioned, the internship played and plays the key role in whole program. It is also the biggest difference between this and the other programs, based on the following idea: When you want to create a real Service Science manager, you need to give him a real experience before he or she finishes the whole program. Only in this case you are able to guarantee you really create T-shape professional, because you have the best control mechanism – the labour market itself. That is also reason for making this course mandatory.

From the very beginning there were two versions of internships:

- Business (Interim Project Business) – used for the business partners. Length 5 months, 4 days per a week (one last day for the study), 8 hours per a day
- Research (Interim Project Research) – used for faculties or other research departments. Length 10 months, 2 days per a week (3 days for the study), 8 hours per a day

The length of the internship was more than 2 times longer than in every other study programs. The reasons for such a long period of the internship are very clear:

- The confrontation of the students school learned knowledge with the reality – but the very first month or more you need to learn company structure and processes
- To learn a new information and new procedures on their fields of study – but to be a real part of some project takes more time than a few weeks
- To accomplish the effect for the partner – to return his cost, spend on the beginning of the internship – but to be a valuable “employee” takes more than 3 months

For a such long internship you need some process to do. Because we are facing the business reality, the process must be very similar to the usual business processes than to academic ones.

The process of the internship was following:

1. Finding a partner

- a. Students were able to find a partner by themselves. Than all negotiation process was done between the student and partner and faculty administration helped only if it was necessary.
- b. Faculty found the partner through its contacts, using a lot of meetings, organized by the faculty staff.

2. Contract with the partner (only voluntary step) There is a recommended possibility to sign a contract between faculty and the partner about the principles of the internship (see point 3). Usually it is done in case of the continuous cooperation between partner and faculty. There are no other limitations or restrictions and the cooperation is always free of charge.

3. Defining the position

The partner must define the position for the internship. The position must correspond with the principle of T-shape professional:

- a. A student must interact with non-IT people (colleagues, customers etc.)
- b. A problem, the student will work on, must be connected with a real business case (or real case in Research option)
- c. A problem must be solved by IT tools

Than there must be defined a responsible person at the side of the partner and the faculty as well.

4. Position after confirming of the SSME program coordinator is presented on faculty website (only in case it is NOT a concrete position for concrete student). Students can enrol the position. If there is more than one student, partner can organize the selection process or some other kind of competition.

5. After finding the student for the position, a protocol of the acceptance is done and signed by the student, partner and SSME coordinator. There is clearly said the content of the internship, the dates of it and the name of a supervisor of the student.
6. Meetings with the students are organized at the beginning of every semester to inform them about news, related to internships and accentuate the basic principles of the internship.
7. Controlings during internships randomly chosen internships are controlled directly in the partner's companies. The target is not only to control students, but also to learn the feedback about student's knowledge.
8. After finishing the internship:
 - a. Student must work up a protocol about his experiences. This protocol must correspond with standard protocol for IPMA project manager, level B.
 - b. This protocol must be approved by the partner. It declares it was truly done and the information written by the student can be used for academics purposes.
9. Finally students must present their experiences at the final meeting, opened for every student of SSME program and the partners.

Except that process, faculty organizes a workshops for the partners and the organization of the partners – to enable to all sided to meet, find the right persons or to discuss about possible enhancements.

The new structure

After 3 years run of the program, when the problems, described in previous chapters clearly appeared, it was necessary to react. The main problem on the side of the university was underestimation of the administration, coming with a large number of the students. Till 2011 the program administration, guarantee and the most of organizing process was done by one person, RNDr. Zdenko Staníček, with help of his post gradual students and some students of SSME. But this situation could not continue anymore. One person could not cope with a lot of organizing problems.

The person of the guarantor changed - prof. Jiří Zlatuška became a new guarantor of the SSME program. Also there comes a new coordinator – Ing. Leonard Wallezský, Ph.D. and a new administrator of SSME, Mgr. Jitka Kitner. To solve problems with coordination with IBM teacher, the last member of the team was Ing. Jaroslav Zelený, CSc., IBM university relation coordinator and the member of the scientific board of Faculty of informatics.

The problem with external teachers was necessary to solve very quickly. To part of the mandatory courses we found internal teachers or some other externals, who better understand the faculty needs. It was also possible because of better communication with the partners after the first good experiences with the internships students. A lot of partners found the cooperation with the faculty as the competitive advance and possibility of teaching was for them a new way how to find good students as possible employees.

Very quickly was also recognized the sources of the other problem – there were messages, coming from the partners saying the students have no proper IT knowledge. Program was open too much and there were a lot of students coming from non-IT bachelor programs.

The team came with double solution of this problem:

1. Entrance test (it was used for all master programs at FI generally)
2. Changing a structure of the courses and adding some mandatory “core” IT courses

To the structure of the mandatory courses was added following courses:

Table 3 – Added mandatory courses, students must choose at least one from each group

Programming	
PA165	Enterprise Applications in Java
PV247	Agile Web Project in .NET
Databases	
PA152	Efficient Use of Database Systems
PV055	Data Processing - Trends and Practice

If students have not enough knowledge to pass the courses, they can enrol some basic courses to learn them. But those courses are not counted into total amount of their credits.

To define the knowledge of T-shape professional more properly, the structure of mandatory elective courses was changed too:

- Information technology
 - Computer networks and security
 - Other IT
- Economics and Finance
- Management and Marketing
- Soft and other skills

The courses, included into those 4 groups are not only the courses, taught basically on the Faculty of informatics. Especially in the group of Economics and Finance or Management and Marketing you can find a lot of courses, coming from other faculties or external teachers, coming from the Czech or foreign universities. The main question was – When we can take such a course from the other university or faculty and when we need to try to build it by ourselves (or under our control)?

The solution is quite simple: If students need some special knowledge before they enrol the course, you need to build a special one. For example, we needed to take a course about Corporate finance, because our partners complained students could not understand basic vocabulary used for ERP systems. But, when we try to find some available course at the Faculty of economics and administration, in every course about corporate finance we found following prerequisites: Accounting and Microeconomics. But there was no space in study program to enable the students to study both of the economics courses. So we found easier to build our own course, using external expert.

But on the other hand, we could take a course about IT law or Public Economy without any limitations. Also courses about management and marketing, taught by the foreign experts, could be included very easily into program curriculum.

The new structure, deeply discussed with our business partners and presented at many internal workshops, corresponds more to the rules of T-shape professional and the requests of our partners. Also it is more dynamic and easy to change or add a new courses. The knowledge of the students is corresponding more to the Service Economy.

Conclusion

The main question, also used as the title of this article, was “Is it possible to teach Service Science?” As was showed in it, it is possible, if you follow these conditions:

1. Describe your “customers”. It is obvious they are not only student, but also the companies. They are here to help with defining of the student’s profile, knowledge they need and test them during student’s internships.
2. Define very carefully the structure of the program. If you are assuming some knowledge, coming from previous studies, do not forget to test or better to improve them.
3. Service Science is strictly connected with the business praxis. Involve your business partners to the process of founding the program and annually ask them for feedbacks.
4. There is not Service Science program without good and long internship. Primarily it is not for creation academics, but business professionals
5. Define long term targets for developing the relations with your partner. If you want to use a partner as the teacher, choose first those, who understand advantages of this relationship. It is probable they will be more responsible.

If you will follow those rules, you will be able not only to build Service Science study program, but also to ensure its developing to the future.

Literature

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