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Journey from the student to the full-time programmer
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ABSTRACT

Suppose you want to work in the pharmaceutical industry, but you are studying in the field of applied mathematics. One natural question that may arise: what are the chances of me getting into such an industry? For me the answer turned out to be: 'pretty high!'

In hindsight, I understand that pursuing a degree in applied mathematics is a bit of a risk; particularly, for those of us who enrolled in the Clinical SAS University Program 2013 -2014. Our class was the first experiment with this kind of program, so we were not sure about its success rate. Furthermore, we entered the program without fully understanding the benefits of pursuing such a field. Additionally, there will come a time, where we as students will question if the substantial effort we put to our education and the knowledge that we have accumulated so far will result in a better opportunity to secure a career in the field we want.

In this talk, by deriving from some of my experiences, I will discuss how recent graduates without any solid work experience in IT may start their professional careers in the Clinical Research Industry. In particular, I will put an emphasis on the path of a student in the Clinical SAS University program: his/her journey through the internship period, the company's hiring process, and eventually a professional career as a statistical programmer.

INTRODUCTION

The last year of your studying is the exact time when you should choose what you want to do in the future. At that point, you already have some variants: connect your life with mathematics/standard programming or try something new. Take a stab at the Pharmaceutical industry is one of them. This paper will answer the question what to expect if he/she choose the last possibility.

UNIVERSITY PROGRAM

In my university (Karazin Kharkiv National University), when I first saw the advertisement about the Clinical SAS and Biostatistics course, I thought I was on the wrong floor, and was walking in the corridor of the Biological Sciences Department, which was just one floor below the Mathematical Sciences Department. The idea that maybe I should try to take this unusual course in addition to my department courses stuck in my mind. Finally, after going through the interview and a couple of tests, I was enrolled in the Clinical SAS and Biostatistics course.

This program has 4 subjects: SAS Programming, Clinical Research, Statistics, and English. I was pleasantly surprised that every subject was very interesting. In fact, each of them was taught very well. However, frankly speaking, the relationship amongst the 4 subjects was still unclear to me even after the first week. More specifically, I had no clue how SAS Programming was related to Clinical Research!

I found that SAS Programming was a very challenging subject, just because SAS was a completely different animal from the languages and the software that I was comfortable with. During the first semester, Clinical Research was not even touched upon in this programming course! I mostly learned the syntax of SAS. After a while, I became more comfortable with the course, and the amount of time I spent doing each assignment decreased over time. I did not waste as much as time as I did in the beginning of the course, and we were able to complete every task within several hours rather than days or weeks.

While the first semester of this course was more on building a strong background, the second semester was more about applying the tools that had been taught in class. I was involved first hand in an actual anonymized clinical research study and it felt like I work as a researcher. This was the first time I saw how the study documentation worked and how we would use it in the future. All students were divided into 3 teams. These 3 teams had to compete amongst themselves, and each team had a mentor. During this semester, we were heavily involved with a lot of datasets and databases. We were annotating CRF, working with Protocol, creating basic SDTM datasets: DM, DS, AE, MH, VS, LB, basic tables and listings.

After the end of the course, all students successfully passed SAS Base certification.

This course was totally different from others, since it was very interesting and practical. Compared to other courses, this course was definitely not monotonous in any way. The year 2014, was after all the first time this SAS programming course was offered. As a result, going into the course, I did not know what to expect. Nevertheless, I could tell that the quality of this course was closely maintained by the course organizers, who were part of the Ukrainian team, and the students' feedbacks were highly valued. Overall, it was quite a rough year as the students in applied mathematics also had other courses to take. Therefore, the course load was not trivial. To add to the challenge, all of the information was carried out and communicated in English. Most importantly, as a student, I was highly uncertain if I would be hired in the end after the tremendous effort that I put in, and was not sure how many people would be hired.

INTERNSHIP

Woohoo! I was chosen for an internship. Of course, on the first day, I was walking around the office with a sense of amazement. All of the interns were divided into 2 teams: Team Ukraine and Team USA. I was asked to be part of the USA team. It was very daunting for me. I was not very confident of my English skills and I was afraid that the language barrier would become a huge problem. My initial thoughts were: 'I will not survive after 3 months of this internship!'

We were having 2 meetings per week. One meeting was common for all of the students and mentors. We discussed what was done during the week, what questions we have and what new tasks we have for the next week. The second meeting was one-to-one with mentors. At the beginning of every meeting we discussed task and then we usually talked about topics from different sides of life.

The first meeting felt chaotic, at least for me. It seemed that I did not understand anything. Just like anything else, once I got used to the meetings, I felt more comfortable. I started to understand that my mentor was not an examiner, she was there to guide me. In fact, my mentor became my friend and having a good relationship with my mentor actually empowered me to work harder.

All interns were divided into pairs. We were working with documentation: CRF, protocol and SAP, creating SDTM, ADAM datasets, creating standard tables, nonstandard tables, and graphs. We used our knowledge in advanced statistics: worked with t-test, ANOVA test, calculated confidence intervals for population means.

FULL-TIME PROGRAMMING

FIRST REAL PROTOCOL

After the internship, I was hired as a full-time employee supporting client project work. Simply said, this experience was awesome! I was introduced to all of these medical terms. It was actually an interesting process to google their descriptions and find relevant biological books that were able to provide further information. I like to think of it as a mini research project that would help me to do my job as a programmer.

FIRST DATASET

Second line programmer

This position requires a very high level of accuracy and attention to detail. I had to pay attention to every single line of the code, analyze the datasets multiple times in hopes that I would find a suitable way to handle them. However, because it was my first project as a second-line programmer, my main responsibility was programming. Of course, in the process of performing the QC, I found a lot of discrepancies, the 1st line programmer had to correct his/her program/specifications, needed to consult a statistician, etc. In the end, I learned more than just to program information.

First line programmer

The next step in my development was to become a first-line programmer. I started questioning every variable and more questions were asked to the study lead and statistician. So, this role provided more interaction with the rest of the study team. After finishing my first dataset, and more importantly, after having filled the shoes of both second-line and first-line programmers, I realized one important thing: one should not completely rely on the first line

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programmers. After the first experience as a 1st line programmer . I began to work more carefully with documentation, recheck logic in specification, try to predict the most suitable way to improve a program in the future if it would be expanded.

When I began my professional career, I was totally ready for it in the sense that I was mentally invested in it, had all the required programming skills, and had the necessary knowledge about clinical research. I did not feel that I weighed the team down. Challenges are certainly unavoidable; that is a given. One important thing is to always learn. Just because you have graduated, it does not give you a valid excuse to stop learning. In the workplace setting, you will have to complete multiple diverse tasks. As time progresses, people from different departments may come and ask you for some clarifications. Now, the item that they ask may be from a task that you have completed a while ago. As a result, you may forget some of the details. It may be overwhelming the first few times, but do not let this discourage you; you should still give your utmost best.

Now I take an active part in weekly meetings, I can advise some solutions, dispute a decision. I am not afraid to ask question if it seems to me that I do not have full understanding of the situation.

I feel like I belong to a team after going through this full set of experiences.

CONCLUSION

Thus far, I have described 3 stages: university, internship, and the start of your professional career. I would like to reinforce the point that asking for support or guidance does not imply that you are weak or incapable. It just means that you are growing at the right pace and you want to learn. Having this support actually is one important element that assists you to progress through the next level of your professional career. Different types of support exist in different stages of your career.

At the university stage, it is crucial to find the support and resources that are able to highlight your strengths, preserve and even magnify your interests in a given subject, and develop your lifetime learning abilities.

At the internship stage, it is important to keep in mind that you are not alone and you can always get help if you need it. The support of my mentor gave me the confidence to communicate my ideas more, regardless of the existence of a language barrier. It is important to have a hands-on mentor.

Lastly, it is also essential to have the support of the study lead of your project. Once you are hired, you again embark on a new journey, but the learning process never stops. It is important to have a study lead, who is respectable, who can appreciate you as a member of the team, and who can always encourage your growth. Acknowledgments

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