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Research Application Summary

My Life amidst Computer Scientists and Software Engineers: the Union of two Disciplines

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Abstract

This article gives an account of my personal experiences as a foreign student studying outside my home country in Europe. The article covers the period immediately after my arrival in Europe. I give this account because having come from a developing country, sometimes, it takes a lot of effort to fit into new cultures (including new languages, new foods etc.), adapt to new ways of life, and at the same time pursue scholarship work. I believe students studying outside their home country have different experiences; be it students from Africa studying in Europe, Asia, Oceania, and the Americas or students from those regions studying in Africa. Documenting these experiences can serve different purposes such as motivating future students that wish to study outside their home countries either by desire or by virtue of getting academic scholarships and sponsorship opportunities. The world is diverse, cultures are different, and experiences are enriching. The melting pot that brings all these together is documenting stories that the rest of the world can use as a source of information. In fact, we are living in an era where the oral tradition and folklores from the past may not apply anymore; virtually everyone is getting glued to the screen. As such, documented stories can be accessed via those screens from all over the globe. After all information shared is much better than information securely kept in the royal vaults of our minds; royal because of being unique and individualistic.

Keywords: Academic mobility, cultural diversity, graduate education, information sharing

Résumé

Cet article fait le compte de mes expériences personnelles en tant qu'étudiant étranger qui étudient en dehors de mon pays d'origine en Europe. L'article couvre la période immédiatement après mon arrivée en Europe. Je donne ce compte parce que provenant d'un pays en développement, parfois, il faut beaucoup d'efforts pour s'adapter à de nouvelles cultures (y compris les nouvelles langues, les nouveaux aliments, etc.), s'adapter à de nouveaux styles de la vie, et en même temps poursuivre ses études. Je crois que les étudiants qui étudient en dehors de leur pays d'origine ont des expériences différentes ; Qu'il s'agisse d'étudiants d'Afrique étudiant en Europe, en Asie, en Océanie et aux Amériques ou des étudiants de ces régions qui étudient en Afrique. Documenter ces expériences peut servir à différentes fins telles que motiver les futurs étudiants qui souhaitent étudier à l'extérieur de leurs pays d'origine, par désir ou grâce à bourse académique et d'opportunités de parrainage.

Le monde est diversifié, les cultures sont différentes et les expériences sont enrichissantes. Pour rassembler toutes ces expériences, il est nécessaire de documenter des histoires que le reste du monde peut utiliser comme source d'informations. En fait, nous vivons à une époque où la tradition orale et les folklores du passé s'appliquent plus entièrement. Pratiquement tout le monde devient collé à l'écran. De cette manière, les histoires documentées sont accessibles via ces écrans du monde entier. Par ailleurs, les informations partagées sont bien meilleures que celles sécurisées dans les voûtes royales de notre esprit ; royal parce qu'unique et individualiste.

Mots-clés: mobilité académique, diversité culturelle, études supérieures, partage d'informations

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Prologue

My arrival in Europe and Brussels was quite unique starting from being received at the airport by my supervisor (promotor), Prof. Dr. Elisa Gonzalez Boix, to the experiences I have had so far. I already have the first set in a series of these experiences that I am building on. I must say it is a humbling endeavour that opens your eyes and constantly keeps you on toes; of course, in a positive way! Now, I am fully settled in Brussels, and I have had a number of positive encounters which to some extent I can call revelations that are worth sharing before they start overflowing the cup. Brussels is fairly multicultural; there are many people with different nationalities given that it is the headquarters of the European Union. The way to know your way around a new city is to take random walks to have the map of the new place somehow permanently glued into your brain; I have done it a couple of times now! Brussels is well planned and using the online maps with GPS features on the mobile phones gets you to the exact point that you want to go. I now have a very good companion in my phone to consult when I want to go somewhere, and I am guaranteed to get to the exact destination.

Going back to the ages

I suppose the policy on cultural heritage is well grounded in Europe because there are numerous museums for different things in Brussels; the history of trains from the times of the steam engines that were fueled using firewood to what we now have – trans-continental trains that can reach up to top speeds of about 300 kmh. The museum on evolution depicting dinosaurs (the early descendants of the family of birds since they both have the same bone structure) and the musical instruments museum among others. There is even one museum on African culture; it is under renovation though and I will surely visit it once it is reopened to the public later in the year. Interestingly enough, Brussels has some of the historic times preserved in buildings as well; the old buildings are renovated with caution to have them have grandeur for human habitation and still retain their original look. For example, the walls of the grand place are decorated with artefacts from the ancient history. You notice this when you are close enough and the little statues joined together start making intricate patterns that you can follow with awe!

Grand-Place

When I arrived in Brussels, Esther Toili was already in her third week, and she already knew some

places of interest. And given that with my small experience this far, I never ever want to re-invent the wheel, she offered to take and show me the Grand-Place. Now if you ever get a chance to visit Brussels, make sure to visit the Grand Place on a good sunny afternoon. It is the only place in my life that made me change my outlook towards photography, especially if I am part of the story to be captured in the photo. The selfie I took was one of a kind! We didn't know the exact directions to the place, and we set out on a self-discovery mode, but somehow, we found ourselves at the place. A few days earlier there was an event that Esther together with Gakuo and Teddy had attended at the same place. Teddy is a Kenyan student pursuing his MA in educational sciences at the VUB. And so, when we were in the vicinity, at least she could remember some places which looked familiar to her. We went to the same restaurant where they had had dinner during the event day for our lunch; it is a small restaurant called "Plaka". This is the place where I ate my first olive! Salty as it tasted, I never liked it then, but now I enjoy eating them time and again. I saw the small fruit in my plate, and from the look it was appealing to eat; and Esther was quick to entice me how nice it is. I believed what she was telling me and regretted why I didn't follow my animal instincts. The very same way you tricked me; Esther be sure I have your turn reserved in store. It is not a revenge though! For those that might be wondering, "Plaka" is one of the Greek restaurants that's located along a small street right behind the main square at the Grand-Place. If you enter the square from the entry that comes directly from the "Centraal Station", follow the exit that is directly on the opposite side and the street is right at the end of that exit. There you will find a "conglomerate" of Greek restaurants.

The Grand-Place is a top tourist destination in Brussels. It is almost always full of people from different parts of the world. The building takes the structure of an ancient royal palace. And indeed, the architectural design is ancient and there is someone who has already found a business opportunity with a horse pulled royal carriage; you pay to enjoy the service! The buildings are decorated with hundreds of statues and the graphic patterns they display makes it look real grand. The center takes the form of a square and right from the center of the place, if you look up on a clear blue-sky day, the buildings appear moving due the relative motion of the clouds far high. Go there on a dry weather day and you will surely have fun. Among other things that you can see at the Grand-Place include the "Manneken Pis" and the Delerium that has the highest concentration of different brands of beer in one location. The "Manneken Pis" is a statue of a small boy doing something that people do several times in a day with a rich history that you can find online. At the corner in front of the Delerium is a statue of a girl doing the same thing the "Manneken Pis" does. We did visit the royal museum of the fine art and experienced art from the 14th century. The museum is not so far from the Grand-Place. There is much to see in the museum; if you ever plan to visit the museum, spare at least 6-8 hours of your day and you will surely enjoy the experience. I came to Belgium for academic scholarship, but at times you need a break from the routine, even though those breaks can happen right inside the lab.

Newbie's drink

The Software Languages Lab is a free and open thinking space for computer scientists doing their science research in the design and development of software languages; the umbrella theme is design, implementation, and application of better languages to support the software engineering life cycle. The space is full of an army of amazing minds; minds that hack problems just "like that!" Hacking a problem just "like that" translates to getting around an issue to understand the

existing loopholes that can be exploited within the shortest time possible. The older ones have to write their thesis, defend it and either proceed with postdoc or just go out to the universe and release their knowledge and skills for the advancement of humanity. And to keep a vibrant continuity of the activities in the lab, new minds have to be recruited to join the lab. That is what happened to me when I met Prof. Dr. Wolfgang De Meuter sometime in March 2017 back in Nairobi. He was already on transit to the airport when we met and because of the urgency of time, our meeting lasted for only five minutes. I am estimating, I will be telling a lie if I say that I counted. Sometimes, but not always, you need seconds to make long lasting decisions which are truly correct. And of course, I hope that you do remember that choices have consequences. So, when I joined the lab on the second day of the tenth month the year 2017, I was not the only new one. There were three other newbies and together we became four: Yunior Pacheco from Cuba, Noah van Es from Belgium (my host country now) and Matteo Marra from Italy. We share the same promotor with Matteo. It took me a couple of days to get used to the culture in the lab; I presume the same thing happened to the other newbies though I do not want to guess and speak for them. In science independence in thinking is very important; science is not a democracy! Anyway, as part of the culture in the lab, as newbies we were expected to organize for a "newbies drink". For your information, a newbies drink is an academic party. And by that I do not mean getting books and other academic materials to read or share with one another. No! It is a real party with drinks and food and some nice music. We planned for it, set the date, invited the members of the lab for the drink and bought all that was needed to make it truly a newbies drink.

For that year (2017) the newbie drink was held on the 10th day of the 11th month. I remember very well it was on a Friday and the party was to start at 18h00. We bought the needed stuff at Colruyt right opposite VUB's Building K, across the road on your way to Petillon metro station, and Mathijs Saey offered to transport them to the lab. Once in the lab we re-arranged the kitchen to transform it into a good layout (form) for the party and at 18h00 or there about the drink commenced. As the hosts, we were the last to leave after everyone else had left; as part of playing a good host, I found myself leaving the lab at 01h30 the next day. At that time of the day, public transport is hardly a guarantee. That is how I ended up walking with Matteo Marra as the guide, in a V-shape route and found myself at my place of residence; thank you Matteo for being a good guide. Well, from the feedback we received from those who attended the drink, the party was well organized and a memorable one. Maybe one day they will also give an account!

Christmas lunch

The 2017 Christmas lunch for the lab was held on 21st December. For me it was remarkable to share the same table with the professors in the lab. Prof. Dr. Coen De Roover sat to my right-hand side while Prof. Dr. Theo D'Hondt and Prof. Dr. Wolfgang De Meuter sat on the opposite side of the table. Later Prof. Dr. Viviane Jonckers joined and sat on the opposite side of the table as well; my promotor was on leave and so she was not present for the lunch. So, to make it a bit clearer, Prof. Dr. Theo was the academic promotor for Prof. Dr. Wolfgang and Prof. Dr. Elisa, while Wolfgang was the promotor of Prof. Dr. Coen, Prof. Dr. Engineer Bainomugisha, and Prof. Dr. Elisa (who guided Engineer in his MA thesis). Prof. Dr. Viviane sat in the jury for all of them except for Theo. So, in short Theo is my academic great grandfather. When I was being introduced to him by Wolfgang, I told him that and his immediate reaction was, "You make me look so old!". I enjoyed the lunch sitting with professors and from time and again I

would seek to know their advice to a new PhD student like myself. My carry home message from that table was "always say your say". That was Theo! For those of you who don't know him, Theo designed the Pico programming language from which the AmbientTalk language was orchestrated. Pico is a small research language with a Smalltalk-like structure to teach functional programming to non-computer scientists, while AmbientTalk is a language for distributed mobile computing; it is designed for developing software applications that are resilient to network outages which is common especially in cellular networks as mobiles transition from one network footprint to another. Wolfgang got the revelation of AmbientTalk in a metro station while watching someone struggle to seek proper signal coverage to sustain an active call. The first version of the language was designed by Jessie Dedecker. The design was later improved by Tom Van Cutsem to AmbientTalk/2 and Elisa Gonzalez Boix who introduced leasing to the language. The leasing concept is used to manage resources in a distributed setting and handle transient failures in Mobile Ad Hoc Networks (MANETs). The whole design and implementation process is credited to Tom Van Cutsem, Stijn Mostinckx, Jessie Dedecker, and Wolfgang De Meuter; there are other players like, my promotor, who are not directly credited for the design and development of the language, though their additions improved the language further. By the way, some core functionalities of the AmbientTalk like "reflection and far references" are now being used in the APIs for some of the mainstream programming languages.

Prior to the Christmas lunch, DINF had organized a reception to end the year and welcome new members. DINF is the department of computer science at VUB. During the reception I was officially initiated into the group as an honorary member. Honorary members support and participate in the activities of the group in kind. Members from the other research groups were also present and it was a nice opportunity to meet the professors from the AI and WISE research groups; AI and WISE are the other research labs in the department of computer science. It was good meeting the larger computer science group then because during the new year lunch everyone was familiar. The new year lunch was organized by DINF on the eighth of that very first month of 2018 to welcome the new year and wish each other best wishes for the year. In Belgium, it is part of culture to wish each other best wishes at the beginning of the year. This is normally in the middle of winter and so it provides a good opportunity for people to warmly come together.

White Christmas

Being my first ever Christmas outside my home country and in Europe, it was full of surprises. My landlord and landlady invited me to their Christmas party on the eve of the Christmas day and my now good friends (Joseph and Lucy Bakari) whom I had met the same month invited me for Christmas lunch at their residence. It is during the Christmas lunch at the Bakaris that I met two other students from Africa (one from Tanzania and the other from Togo) studying in KU Leuven; and Benjamin from Uganda. I don't want to forget my little friends Joel and Julie (together with their mum, Olivier and grandma, Edith – "bibi" as they called her in Swahili language) who after interacting for a while brought to my full realization that I have a look-alike in Poland, though I am yet to meet him in person. Joel is nine and Julie is seven and half. My look-alike apparently is the father to one of their best friends. Hopefully, one day when I get free time off the schedule, we shall meet with my look-alike and try to see or even trace where the story started from; the world, and of course the universe, can be full of surprises. I received a nice and warm welcome and felt so much at home. Thank you for inviting me and I hope that this served to forge a long-lasting

collaborative and fruitful working relationship in all facets of life. There is more to life than just meeting and talking! The African continent where we come from has unique sets of problems that for example, we can collaboratively share and try to solve. I am convinced that two heads wrapped with the spirit of teamwork are better than one! And maybe one day the future generations will read some of these experiences and feel inspired to become better agents of change; better than the preceding – we are sojourners on this planet that we call home! We should aspire to do our part now and when the time comes, we shall exit and hand it over to the younger generation to continue from where we shall have reached. Positive change begins with good positive orientation followed by actions to make the thoughts and spent efforts become a reality. The end of that Christmas week I again joined my landlord in their party to welcome the new year. The attendance of the party was fairly balanced in terms of diversity; I met people from France, Mexico, Cuba, Madagascar, and Belgium itself; and of course, I represented the entire East African region in the event.

Experiencing the white Christmas is just one of a kind! Though, in Brussels, it didn't snow during the Christmas week, it did in other parts of the country. It happens that it snows a lot during the Christmas week that everywhere is virtually white because of piles of frozen snow, and hence, the "white Christmas". It is during this period that I had my train experience in Brussels; I may not wish to see your ribs broken with laughter, so let me reserve that experience for another day. You can remind me in case I forget! I went to visit a family (Gemma Demandt and her husband Fernand Jennen) in Hasselt which is about an hour and half away from Brussels via the inter-city (IC) train. My host, Fernand Jennen, picked me up from the train station at Hasselt and took me to their house. We had coffee and spent the entire day traveling around parts of Flanders. He stays in Diepenbeek on the outskirts of Hasselt city. Hasselt is the capital of the Limburg province in Belgium. The city itself is in Flanders – the northern part of Belgium. We visited the now extinct coal mines in Genk and public library in the same town. After, we had lunch and went to Tongeren city. The city of Tongeren was built in 53 BC and now it is part of the UNESCO heritage centers. It is the oldest city in Belgium with a city wall built all around it. The statue of the Ambiorix is erected right at the center of the city in the market square. The Ambiorix is the only man who was brave enough to resist the advance of the then emperor Caesar to Northern Europe, and for that reason he is honored with a fairly sizable statue of stature erected at the market square in Tongeren. Story has it that together with his soldiers they disappeared without trace up to date, even though he was never seen moving towards the direction of the Bermuda triangle! He is among the list of people in the world who mysteriously disappeared without trace. The city also has one of the oldest basilicas in Belgium which is right at the market square in the direction to which the statue of the Ambiorix is facing. For your information that statue is facing the geographical north; the direction to which it is believed that the Ambiorix and his soldiers moved towards after which they were never seen again. Construction of the basilica was completed in 1240 AD having taken 300 years to build and a quick calculation reveals that the construction actually began in the year 900 AD; it is a fine piece of art built from hand-cut stones! After Tongeren, we went to Hasselt University and visited the Christmas market in Hasselt city. Just to let know that there is a region in the western part of Kenya called Tongaren, a name that is almost similar to Tongeren.

LCEFoNS Project Workshop

The Christmas and new year festivities were concluded with the presentations that followed on the scholarship progress so far achieved. The project workshop was organized by the LCEFoNs

project team and took place in the Faculty of Bioengineering, Katholieke University Leuven (KUL). KUL is an old university having commenced and opened doors to student admission way back in 1425 AD; it has lived long enough to see people from different parts of the world go through its education system. VUB commenced in 1834 AD, and it is fairly young in comparison to KUL, though very old compared to many universities in Africa for example. The workshop was attended by the lead professors in the LCEFoNs programme; Prof. Dr. Mark Hendrickx, Prof. Dr. Christophe Matthys, Prof. Dr. Daniel Sila, Prof. Dr. Githiri, Prof. Dr. Wolfgang De Meuter, Prof. Dr. Stephen Kimani, Dr. Florence Kyallo, Prof. Dr. Geert Angenon and the project management stronghold (Dr. Peter Kahenya Kinyanjui, Tupac Calfat, and Ann Hasendonckx). Geert is the professor from the molecular biology lab guiding Esther Toili together with Githiri in her work. It is in this very same lab that Nano bodies were discovered. Nano bodies are a class of proprietary therapeutic proteins that are based on single-domain antibody fragments that contain the unique structural and functional properties of naturally occurring heavy chain-only antibodies. Wolf heads the Software Languages Lab (SOFT). SOFT boasts of a number of research artefacts already in use in the industry including the foundational research on reflection APIs used in a number of mainstream programming languages. Linet is guided by Christophe and Florence, while Elizabeth is guided by Mark, Daniel and Kahenya. For your information LCEFoNS is a North – South collaboration project to foster food security majorly in the South. The collaborating university in the South is the Jomo Kenyatta University of Agriculture and Technology, while those from the North are the Vrije Universiteit Brussel (VUB) and KUL.

The workshop was officially opened by KUL's vice rector in charge of university development cooperation, Prof. Dr. Christel Van Geet; a very warm professor – thank you for the warm welcome to KU Leuven. We had a scientific day on the second day of the workshop where the young scholars (pre-doctoral candidates) showcased the various research activities they were doing already and those they planned to do for their scholarship endeavors. I call the young scholar pre-doctoral candidates because they are the youngest in the hierarchy of science; it is during this period that one develops a strong scientific foundation before diving deep into extending the existing body of knowledge (doctoral phase). After the doctoral phase, one becomes a junior scientist and after making remarkable contributions to science, then progression allows one to proceed to be a scientist; though whether at the pre-doctoral phase or the refined end of science, all are equal in the thought space – independent thinkers.

The project workshop was the first project workshop in a series of many for the scholarship period. Additional students were invited to participate during the scientific day. Raphael and Ramon, both from the molecular biology laboratory at the VUB, and Kennedy Kambona Kondo (from SOFT), were present together with a team from the host university's food technology laboratory. Kennedy is almost done writing his thesis and should defend it any time soon. His jury is already approved. The ladies Esther, Elizabeth, and Linet were not physically present during the workshop, and they had to follow through the workshop and make their presentations and contributions remotely. Well, the organizers of the workshop deserve a "bravo" for considering and dedicating an entire day to listen to the progress of the students. It is a polite way of passing the button to the young generation of scientists.

Mingling with computer scientists and software engineers

The lab has created a platform for the scientists and software engineers to mingle and constructively

exchange ideas. It provides the melting and fusion point for two disciplines that are forever inseparable. On the one hand you have the theory while on the other end you have the application part. Theory has all to do with formal mathematical proofs which to me are important in the design of programming languages. Going beyond the theory, calls for converting the theory and giving it a new name that is more meaningful to the end user. Without the science, the meaningful end cannot just happen spontaneously; the big bang theory does not apply here. The design aspect for software borrows a lot from engineering and allows for mass production procedures to be realized. It is an open debate though for us it requires effort to realize a software product which can then be installed for use in multiple points (computers). All these efforts begin with abstract things that exist in the mind of a computer scientist, which eventually when contextually expressed using a certain programming language, make the physical environment to react and conform to the abstract thinking in the mind. It is kind of magic, but with no magic spells from sorcerers.

There are several research groups within the lab that dynamically evolve over time to the changing research spectrum. I belong to two of such groups; one headed by my very good promotor, Prof. Dr. Elisa and the other headed by Prof. Dr. Wolfgang. The group headed by Elisa touches on rich internet applications and extends to include distributed systems. Within the group is Carmen Torres Lopez, Matteo Marra, Angel Luis Scull Pupo, and yours truly (myself). Though I hear soon the group is rebranding to take care of the interest of all the individual researchers in the group. The group headed by Wolfgang touches on reactive event-based programming languages. The trick of increasing the size of the group lies in funding; more funding means more academic and research scholarships for new entrants. The main role of the group head is to keep dreaming and defining new dimensions; and if you assume the group to take the shape of a ring, then the new dimensions keep on increasing the diameter of the group. It is interesting to note that though united in group membership, each scientist aims to be the lead expert in one unique area within the bigger pool of knowledge. After all, what constitutes a PhD is that unique contribution to science. The other group is headed by Prof. Dr. Coen De Roover and they dwell mostly on code manipulation and analysis. Just know that for your software to be tested, it has to go through the process of debugging which helps to reveal any anomaly that might cause the software to function abnormally. This is done either statically or dynamically e.g., through the dynamic symbolic execution process. It is in software testing that you realize how your code “smells” (after all rotten code can be smelly, I tell you!), and you can slice it up to fix the bugs (problems). So, all these groups united form the SOFT lab and act as a check point to constantly motivate the army of scientists and software engineers in the lab to keep matching forward in the continuum of science. I guess there is no end for science; the more problems get solved, the more problems that arise that require investigation. It is just a beautiful cycle and puzzle that permits continuous discovery of new knowledge.

Group check-pointing

Normally, the groups meet at least twice in a month. And for your information, the meetings are physical with a secretary to record minutes and report back to the group. At first, I was amazed when I was requested to set the targets of what I wanted to do for the next two weeks. It was nice for me, because it was an easy way to keep making baby steps towards my grand goal of attaining the PhD. However, I did not expect the professor who is the head of the group to also be asked to set his/her targets, scientific targets and not administrative targets. To me this was a humbling

experience to see professors trying their level best to work with the same zeal and zest to discover new knowledge just like their students; they are free and open for corrections on what they do by the same students they supervise. Well, I suppose, hopefully one day it will become clearer than now, that in science, all scientists are the same and should be treated equal. There is nothing like gender or age or whatsoever imaginable to bring a divide. Maybe the civil society groups and the political groups have one or two things to learn from this, especially in developing and middle-income countries. Fix problems without dividing people and stop taking politics to institutions of higher learning; instead take your problems to the same institutions and seek for solutions! Anyway, back to the research groups, each member is expected to present his/her progress to the entire lab at least twice in a calendar year. This serves to give you feedback and keep you refined to your line of thinking. Any discussions not concluded well are extended over to the coffee table; the table where theories are brewed and made!

At this point, I want to mention two people in the lab that I consider meta-brains. One is Lara Mennes and the other is Dirk van Deun. The two are in charge of the execution of the administrative issues for the lab. If you want your contract to be ready or money spent reimbursed, then Lara will fix it. There is a joke in the lab that Lara is the super brain of SOFT. If you want to know why you are not executing your code in the server computers, then Dirk will always fix the issue. The many PhDs that have graduated from the lab, somehow have benefitted from the experiences of the two and others that sit at the faculty secretariat. I guess everyone can remember the everyday 11h40 sermons by Dirk for "Boeftime". You will be busy on your desk and then you hear a soft knock on your office door and when you look up, Dirk would be smilingly standing there to let you know that it is time to take a lunch break. Boeftime is lunch time in the Flemish language. For members in the lab, you either are in the league of those who like hot lunches or in the other group that likes burgers, sandwiches and the like. Dirk, just like Joerie De Koster, speaks like his name. One day when you meet either of them, you will understand what speaking like your name means.

Sacrificial table where theories are developed

Science is not a democracy; we do not vote to see which side is right. Everything has to be based on sound arguments and judgment. In simple terms, everything has to be reproducible by someone else if the same conditions and procedures are applied and followed. To reason out ideas, then it follows that those scientific debates are inevitable. Such is the beautiful life in the lab where we subject our brains to good use, and we do not want interference whatsoever. Sometimes the debating time is not adequate enough and we naturally carry the debates to the coffee table or coffee bar if you want to call it that way. You see, in science, the art of independent thinking is key; and for those of you who have successfully completed your PhDs, then this is rather obvious to you. There is no manual to make one think in a certain way. Everything has to be based on sound facts. Doctoral promotors (supervisors) will attest to the fact that new PhD students are like newborn babies – they never come with manuals. Each one is unique in his/her own way! I too did not come along with my own manual and my promotor has to see me through this entire process. Then, to develop a new scientist, freedom to independent thinking is important. At one point the new PhD is expected to know more than you as the supervisor/promotor, unless otherwise! I am developing my own theories and validating them on the sacrificial table with the very good professors as I slowly grow my thinking space to maturity. Some of these theories have actually made me question my conscience and ask myself so many questions as to why, say, some countries

are developed while others are still lagging so behind. Interestingly enough, most of the so called underdeveloped or developing countries are so poor and yet they have hundreds of thousands of acres of rich mineral deposits. Could it be that priorities in such countries are misplaced? Or is it maybe that there is no knowledge on the existence of such mineral deposits? These are the very same countries where most, if not all, governance processes are de-linked fairly to a larger extent from the academy; the academy in this context refers to institutions of higher learning. On the contrary all the developed countries have their governance processes anchored and backed up by the academy in the form of scientific advisory boards and, wait for it…, research labs!

Mingling of cultures

Africa is endowed with a rich cultural diversity. The ethnic languages are just a beautiful rich gift from the universe to the continent. Unlike other parts of the world, I guess it is only in Africa where you find more than 50 languages being spoken within the jurisprudence of a sizable geographical area in the name of a country. Interestingly enough, outside the continent we are all seen as one; no one is able to differentiate a Congolese from a Nigerian, an Ethiopian from an Eritrean, a Kenyan from a Ugandan or Tanzanian - we are all known as Africans. I guess individuals with a strong divisive political agenda have always taken advantage of this to gain political mileage. The more people are made to feel not being the same, the easier it is to convince them for votes. Majority of the people vote not because someone has values but to preserve tribal affiliations.

So, when I arrived, Wolfgang introduced me to Kennedy. “Hey, Kennedy! Have you met your fellow Kenyan?”, he shouted. And of course, being my first time, we had not formally met with Kennedy though we had exchanged numerous communications on email. I was glad to meet him finally in person. Days later, Kennedy would be the point man to meet the other Kenyan students in Brussels. We organized for an impromptu meetup in Newlaan; Christine Njiru agreed to be our host. That Saturday, I remember meeting a good number of Kenyan students in Brussels; the ladies Winnie, Jane, Aby, and Christine herself who was the host. Esther Toili my colleague PhD student in the LCEFoNS project was also present. The others were the gentlemen Kennedy Kambona himself, Patrick Gakuo (the M.Sc. student in the project), Mohammed, Josphat Nguu, Teddy Otieno, Kiprono, and Nicholas Odhiambo. We cooked and enjoyed Kenyan food that evening as we debated on issues bedeviling Kenya and ways in which we could make small contributions to at least bring a small positive change. Two months later I met Jackline Mwihaki Kariuki; she is doing her PhD at Hasselt University, though her research station is in the Belgium Nuclear Centre in Mol. I also met with Nixon Ronoh and Edna Milgo, both from Moi University – Eldoret. The two were actually writing their PhD theses under the guidance of Prof. Bernard Manderick, a Belgian who knows Nairobi more than I do and I am Kenyan. He can tell you the region where you come from just by a mere look on your facial structure. And of course, his guess for where I come from was spot on the very first time I met him, and I uttered that I am a Kenyan. I guess he has a super algorithm wired in his brain to aid the classification. After all he is in the field of artificial intelligence; one of the many arms of computer science. His lab (AI Lab) used to be just right in the next building to the one where SOFT is located, but they moved to a new building (Plainlaan 9) and left the space for the chemistry scientists. The relocation also saw the other lab in the department of computer science headed by Prof. Dr. Olga De Troyer, Prof. Dr. Beat Signer and Prof. Dr. Jan Hidders, move to the same new building at Plainlaan 9. At least the meeting served to introduce me to my fellow country men and women with whom we could organize meetings

time and again to catch up and discuss issues outside the academic environment. Though, now I think I am more of a global citizen! As a PhD research student, sometimes you need to go off the normal routine and engage the brain in other agendas to give it a break to relax and regenerate the cells necessary to improve the quality of thinking. Without good thinking, I can assure you, the PhD experience can fall short of your expectations. As we often met, we never stopped to imagine that we are from different tribes; maybe our good politicians can learn one or two things from this. The unity of Kenyans is one; differences come when separation is vehemently fueled by political mileage. The same applies to other countries all over the world.

I talk and keep quiet in equal measure, but I do not think that qualifies to be double personality. When I have to say my say I do it willingly without apology. Thanks to retired Prof. Dr. Theo D'Hondt for re-affirming my thinking. If then I tell you that I talk to people including those I have met for the very first time, then you will understand. Of course, I do it cautiously! Some people may have ill motives and find easy prey. So, when I met Lucy (I will later call her Lucy Bakari and I will tell you why), in one of the social gatherings and since she was black like me, I decided to introduce myself to her. She responded with a very wide and welcoming smile. I learnt that she is from Tanzania and to keep her engaged I asked to know what she was studying. To my surprise she told me that she was not studying, and I was quick to ask where she worked, to which she said she did not work either. Then she went straight to the point, "I am a housewife!". I was quick to reply, "Being a housewife is even interesting and a hard job". Later that day I learnt that her husband, Joseph Bakari, was a man in the military working with the international sports military organization in Brussels. The organization uses sports as a tool for pacifying war-torn countries and uniting nations. This he told me himself when I met him several weeks later and watched him humbly introduce himself to me. Maybe Lucy, her wife, had informed him about me because when I met him for the very first time, he proceeded to invite me for Christmas lunch at their place of residence. It was my first Christmas outside Kenya, my first Christmas in Europe (white Christmas) and this was the second invite for a Christmas lunch cum dinner; I think I was, and I still consider myself as a very lucky person. And should I be summoned to explain why I consider myself a lucky person, then I surely will tag along Wolfgang to testify on my side! Just to mention, but not exactly in his words, I am lucky to be at the right place and at the right time. During the Christmas dinner I met other Tanzanians, now my good friends, and one Ugandan, Mr. Benjamin, who works at the Tanzania Mission in Brussels. I also met Joel and Julie, my young friends, who after interacting for a while made me realize that I have a look alike in Poland and I am looking forward to meeting him in person someday. They mistook me for someone they already knew, and I am convinced they cannot lie, and he must be really my look alike. I know your mind is already wondering and thinking otherwise, but you are free to think; I cannot limit your thinking space!

The first Christmas party invite I had was from my landlord and landlady (Patrick and Olga); the invite was combined together with the one for welcoming the new year at the very last day of the twelfth month of the year 2017. The pleasure was mine getting such an honor from the same people who offered a place for me to stay on my arrival in Brussels. The party was attended by their friends from Cuba, France, Brazil, Flanders (Northern Belgium) and Madagascar. And of course, with truly yours in the mix, the global representation was almost set except for the east which was glaringly missing. In the end, the experience was very exciting. Everyone was eager to come talk to me, and I felt so uniquely special; like a prince who has to patiently talk to his subjects. Peter and Isabelle from France who attended the party, extended their hospitality by

inviting me for a holiday in France and hopefully when my head starts getting saturated with scientific knowledge in replication and consistency and their respective programming language abstractions for distributed systems, then I will consider taking a holiday and France is already on my list of the countries to visit in Europe. I have to climb the Eiffel Tower and watch the world from above, you know. I already picture viewing like five countries in a row from atop the Eiffel tower.

Skating rails on the rink

New year begins with new things. It is almost a tradition all over the world. Computer scientists too are not left behind in commencing the new year with new things. Only that what they consider new, you may look at it keenly and wonder what exactly might have happened for them to consider it new. Sometimes even an hour of refreshments and a good lunch is good enough; either way they will still continue discussing and developing their theories. That's how a lunch was organized for the info group (DINF) members to meet, share lunch and welcome the new year in style. The lunch dubbed "New Year's lunch" was held in Etterbeek at the beginning of the second week of the first month, the year 2018; the eighth day of that month to be precise. The restaurant which served as the venue for the lunch is just a walking distance. The professors in the lab as usual, passed round offices marshaling people for the event. Now I know that the professors always try their best to lead by example; show people the way so that tomorrow they can also show others. I enjoyed eating Tuna fish, specially selected for me by Simon van de Water and Jesse Zaman, for the appetizer and the main dish. It is a salty sea fish. Although the recipe for preparing the fish was different from what I was used to, the outcome was a delicious piece of meal; I do not mind doing a repeat. What started as a lunch ended up being a party (lunch and drinks) for the entire afternoon. No sooner had we finished enjoying the lunch, than Wolfgang passed round the tables extending his invite to everyone to join the professors' drink courtesy of the Rector of the University.

Experiences are shared in the least expected places and since I had already made a reserve and my mind was open to gain more and new experiences, I did not see any valid reason to turn down the offer. Some offers come once in a lifetime! All in all, meeting and seeing professors in one place, talking and sharing to researchers and PhD students goes a long way in creating an imprint of long-lasting memories. For your information, wherever Wolfgang is out hanging with PhD students, Coen is always around. I am told that the three (Wolfgang, Elisa, and Coen) used to always be together when sharing their experiences to their students outside the lab environment, but then Elisa gave birth to a newborn, and it will probably take a couple of months or even a few years before she resumes and joins the normal routine. Sometimes the sessions for sharing the experiences turn out to be avenues for proposing theories and justifiably trying to argue and defend or disapprove them. Learning is a continuous process and to me every single second is a good opportunity to learn something new; having an open clean mind is all I need. I remember someday Wolfgang asking me what my experience by that time was; it was barely a month after coming to Europe and my initial thought process was still taking shape. And just thinking for a second, I told him that, "My experience was to have a clean open mind". And he was like, "What do you mean?". And I said, "I am ready to learn". Maybe one day I will get a clearer revelation on what a clean open mind means, but for now my mind is just open to learn.

Towards the last week of that very same month, Wolfgang passed by my working space (office).

My office faces the Northern part of the university with a very nice clear view of the city of Brussels. Standing on the window and momentarily staring outside, he turned to me, and he was like, "It is cold outside. Maybe it is perfect time for 'SOFTies' to go ice skating". The temperature outside was 3 degrees on the Celsius scale and clearly it was cold. A couple of days later I saw a message on 'slack', "How many people are interested in going for ice skating?". Slack is a communication and group collaboration tool that is widely used in all over the world; it is in slack where you actually get to know that some verbally silent people are actually very noisy! The message was from Wolfgang, and it was a mini poll asking people to vote for the days when they were available. And of course, based on the outcome of the poll the day was fixed on the calendar and communicated to everyone. The second semester of the 2017/2018 academic year for the university was scheduled to commence in the second week of February 2018. Normally, some of the researchers in the lab double up as professors who teach courses to the undergraduate and masters students. That meant it was not possible to schedule for a day to go for ice skating after the second semester had commenced. So, when, Monday, the 5th of February 2018 was settled on and communicated, none of those interested had an objection. One rule in the lab, though not written, is to never impose things on someone; always respect other people's opinions. They too have an entitlement to freedom of speech, and I want to add also freedom to express themselves. And so, at 17h00 we converged at the lobby right outside the elevators on the 10th floor between building E and F, and made our way to Poseidon rink, in Tomberg area. If you have been to the place, it is not so far from the VUB by public transport. We purchased the entry tickets and hired skating shoes and we were right inside the rink at 17h30. It never ceases to amaze me how so many things I found myself doing were actually a first for me. I guess even when I will grow so old that I will not be remembering anything, it will still be a first for me; now I am young!

It was a whole learning experience tying the skating shoes well enough to avoid leaving them loose and create room for accidents. Immediately I was on the actual ice, it hit me that everyone has a trade (skill) and talent. I was struggling to learn basics when there were seven-year-olds who were skating as professionals. Can you imagine being more than eight times the age of someone and yet you cannot do what he/she can do? Humility comes knocking when you least expect and somehow you have to give in and chew your humble pie; I call it accepting that you don't know some things and proudly living with the reality. Maybe you are loudly laughing while reading this sentence, but I was not alone. Maybe when Kennedy Kambona and Janwillem share their skating experiences, then you will understand that I was not alone. I must say Wolfgang is not only just a professor, but also an excellent professional in skating; Coen will follow suit. The other young professors in the lab (Postdocs) were not left behind. Tim and Jens with exactly opposite outlook. Both are very intelligent young professors, but Jens is more talkative while Tim is very silent. You can easily fail to notice his presence on a round table talk. Of course, in the league of scientist you must say your say or else if you don't, then, silence is an alternative. After all, silence can sometimes speak louder than words and either way, you will not go wrong!

Those who were good in skating did the sport (Wolfgang, Coen, Tim, Jens, Thierry, Quentin, Jonas, Simon, Jesse) and those like me, Janwillem, and Kennedy, we also did our thing and we learnt. At least I left knowing how to balance on the skating shoes. Nathalie was supposed to join the skating team bonanza but due to unavoidable circumstances she could not. Though I hear she really knows how to skate. Hopefully there will be another round of skating activities and those who missed will have chance to join. After an hour and half of skating, we had a warm drink

to rejuvenate the body temperature and we called it a day! I left the skating rink with a good experience and stories to narrate to the future generations someday. And I am sure you are reading it somewhere and quietly smiling and laughing at me; but it is alright, if you have smiled then I know distantly I have made you happy.

Computer science and software engineering

By definition that you can find in dictionaries online, computer science refers to the study of computers and how they can be used. Expanding this definition includes computing to the field, theoretical and algorithmic foundations of computing, hardware and software, and how they can be used to process information. In a nutshell, those that pursue computer science study among others, algorithms and data structures, network design, data modeling, modeling information processes, and artificial intelligence (e.g., computer vision that relies on image processing). The discipline draws its foundations on mathematics and engineering incorporating techniques from both fields such as queueing theory, probability, statistics, calculus, algebra etc. Queueing theory is important to computer science, for example in modeling information processes and scheduling tasks in the main processing unit of the computer. Probability, statistics, and calculus are important in data science and artificial intelligence; the robots of the future will be intelligent courtesy of probability to reason ahead of time, statistics to draw conclusions from facts, and calculus to make optimal choices from a list of possibilities. Algebra is important to computer science in many different ways including software language design. Software languages provide the means to instruct the computer hardware on what to do, how to do it, and what results to provide to the computer user. There are thousands of software languages, both industrial scale languages and small (research) languages like Pico that I mentioned before. Industrial scale software languages include Scala, Scheme, Java, JavaScript, Python etc. Part of the core activities in software engineering is improving (optimizing) existing software languages and designing new ones to address different software development needs. It also includes using these languages to design software that can be used to automate different tasks such as word processing, sending emails and text messages, making phones calls, collaborative working etc. In a nutshell, computer science is the science that brings live to mathematics. Mathematics defines the mechanical relations between objects in the universe at an abstract level, while computer science makes these abstract definitions real. Software engineering is one large arm of computer science just like artificial intelligence is. If you have ever wondered where the mathematics, that we learn in school can be applied in real life, then at least now you know a few application areas and possibly how they are important to our everyday activities. Almost every person in the world today enjoys the services of cellular communication that rely on among others queueing theory (mathematics) and software engineering that brough life to the queueing theory.

Summing it up

Science is making all efforts to advance humanity; improve discovery of new drugs to combat diseases, develop new techniques to improve food productivity and food security, and develop new technologies to make human life better; and we at SOFT are busy building new abstractions for software languages for technologies of the future. The things we do are not physically tangible, but somehow, they find themselves, for example, into the mobile devices (phones and computers) at your disposal. All these things are possible if a number of things are kept separate especially

in the developing and middle-income countries. First, there should be a clear separation between politics and religion from the state. The raging political and religious divides are not worth anything at all. Instead, efforts should be made to improve the infrastructure and social security; access to good healthcare and quality education should be a reserve for all. The way it is now, especially in the developing countries, if you want better healthcare, then you have to be ready to pay; and the same thing applies to quality education and improved quality life. More resources should be channeled towards research; instead of establishing many new universities, strengthen the already existing ones to realize quality research output. Interestingly, the universe resonates with the thought process to make things become real. Science existed long before politics and as such politics should draw a lot from the experiences of science. My promotor (Elisa Gonzalez Boix) has returned from leave, and I now have a new office mate from Italy (Dario Di Nucci). I already shared my early experiences upon which these ones are based (Oteyo, 2018; Oteyo, 2016). I will be right back again with a whole set of new experiences.

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