

**STATCOM @ UHASSELT: YET ANOTHER BENEFIT FOR ALL PARTIES**

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*Many statistical research centers have developed a strong activity with respect to scientific collaborations with external parties. Specifically within universities besides statistical research and education the interaction with either pharmaceutical or governmental third parties has generated an enormous network with industrial partners and other academic institutions. Within Hasselt University, the Center for Statistics organizes an international Master of Statistics. Several efforts have been made to incorporate collaborating with non-statisticians into our program. This manuscript therefore focuses on (1) how a statistical training program should also contain training in consultancy skills, as well as on (2) how consultants in a university framework can play a role in training researchers. Furthermore this paper will sketch a possible optimal combination of all above mentioned aspects together with the StatCom society in order to 'involve' students in consultancy projects and teach them how to participate in an interdisciplinary working environment.*

**INTRODUCTION**

Every statistician whether working in an academic field, as a (bio)-statistician within a (pharmaceutical) company and certainly while working as an independent statistician will be confronted with consultancy work possibly at different levels. For the latter group it might be a daily life business but certainly also other statisticians mentioned above will from time to time have to collaborate with non-statisticians and again this can happen in several circumstances. Consultancy can be considered as simply answering specific questions of a colleague statistician or researchers outside the field of statistics in need for some support but it can also consist of a long term collaboration with any third party in need for statistical expertise.

Barnett (1994) stated that statisticians are problem solvers within many fields which requires many skills besides of course statistical knowledge. Those skills can certainly be acquired while working as a consultant through experience (Ruberg, 1998) or through special courses devoted to statistical consulting (Khamis & Mann, 1994; Rangecroft & Wallace, 1998; van Belle, 1982). More recently however more educational programs in statistics are making efforts in order to train statisticians also with respect to consultancy skills. Some programs offer specific courses or topics intended to teach students those skills while other programs use practical exercises or student consulting services in college or university statistics labs (Calvin, 1982; Halavin & Mathiason, 1994; Meyers-Tate, 1999). It could be stated that in an optimal setting all statistical education programs should contain a substantial amount of 'courses' dealing with consultancy issues.

Furthermore in any consultancy setting it is experienced a strong advantage when both the statistical consultant and the possible non-statistical researcher or coworker both have at least some understanding of the other field. In other words, related to bio-statisticians it can be of interest to have some knowledge in life sciences.

In most universities there exist statistical consulting laboratories or centers which provide a useful service for faculty, staff, and students. Those centers can as well serve the purpose of training students mainly in consultancy. Meyers-Tate (1999) provides a model for such function while Boen and Zahn (1997) share mainly their own experiences. Barnett (1982) stressed the importance of statistical education by means of down-to-earth practical problems (see also Barnett, 1986a, 1986b)

Finally in the next section some of the particular skills with respect to consultancy work will be discussed while in the following section a case example of how things could be organized is provided incorporating the very useful international framework of StatCom.

## SKILLS

Statisticians working as consultant, regardless of the setting, will agree with the fact that besides a profound statistical training also other non-statistical skills are very important in order to be successful. It certainly is not the idea to ignore the importance of statistics education since without any doubt this always will be the most important part of the training. Furthermore, the specialists like the bio-statistician, the econometrician or a statistician working in sociology all have a specific background and operate in a particular field, but their basic roles are the same: to offer support in solving statistical problems or just solve them, communicate their solutions and findings often to non-statisticians, develop useful new methodologies and to teach others to do likewise. Since our main expertise concerns bio-statistics, statistical bioinformatics and epidemiology, those will be the fields under consideration but without any loss of generality since most of the conclusions can be carried forward towards other fields of application as well. In what follows the specific skills of a statistical consultant will be discussed in more detail.

A first rather important skill for the statistical consultant is the *knowledge about the field* he is working in. For a biostatistician this mainly has to do with medical knowledge or biology. Depending on the specific application information about drug development and pharmaceutical research or clinical trials might be of use. This knowledge can be obtained through introductory courses incorporated in the educational program or by experience while working in the field. Furthermore attending seminars or conferences related to life sciences are useful as well.

A second but certainly not less important skill concerns *communication* and can be considered at several different levels. First of all there is the need to be able to discuss the scientific question. Before a statistician can start working it needs to be very clear what exactly is to be investigated. Related to the background knowledge as discussed before the more expertise the easier this step will be moreover since often there is the need to guide the researchers in determining their scientific question. Once this step is finished the statistician needs to determine his approach and communicate this with the researchers and explain why a particular methodology should or should not be followed. Finally, when the results are ready they need to be explained and in many case this also requires some efforts from the statistician since the interpretation of statistical results is not always as straightforward as it seems. At last, and actually mostly to start with there is the communication about practical arrangements, often referred to as negotiation. In general it is stated that this is a skill one can only acquire through experience however some tricks and guidance might be of help as well.

As a conclusion it can be stated that there is an increasing need for training of non-statistical skills for the statistical consultant. Moreover, it is of importance to educate the statistical consultant about how to interact with researchers from diverse fields. There exist many recommendations about what should or could be done, what is being done by university research units dealing with statistical consulting and how students could be trained in consultancy skills. The last section of this manuscript will sketch another possibility of how such a statistical research unit could organize its research, education and consultancy services as interacting fields and even more how all those fields can strengthen the others.

## A CASE EXAMPLE

Note that several models could be proposed or compared and that in this process it will be very difficult to determine the best strategy. For this reason it should be mentioned that the organization as discussed below is just one example with to some extent a guarantee for success but it is certainly not the only option.

Figure 1 shows graphically how those three aspects all have its own position within an organization and which arrangements can facilitate interaction. The exact setting shown here will be discussed in more detail in this section.

The center for Statistics, a research institute of Hasselt University has achieved an international standard level of statistical research, education and consultancy services. In the last 2 decades the group of statisticians within Hasselt University has been growing from about 15 people to a research unit of about 50 people. Furthermore since 2008 there is a kind of joint venture with L-Biostat, which is the group of biostatisticians of Leuven University in the format of the Interuniversity Institute of Biostatistics and statistical Bioinformatics (I-Biostat). This group now

contains about 70 staff members at all levels (Faculty, Post doctoral and PhD-students) and working on several topics within biostatistics, bioinformatics and epidemiology. From an educational point of view there is the Master of Statistics program organized within Hasselt University. This program is an international Course Program (ICP) and therefore attracts students from all over the world with even a wide variety of backgrounds and previous education.

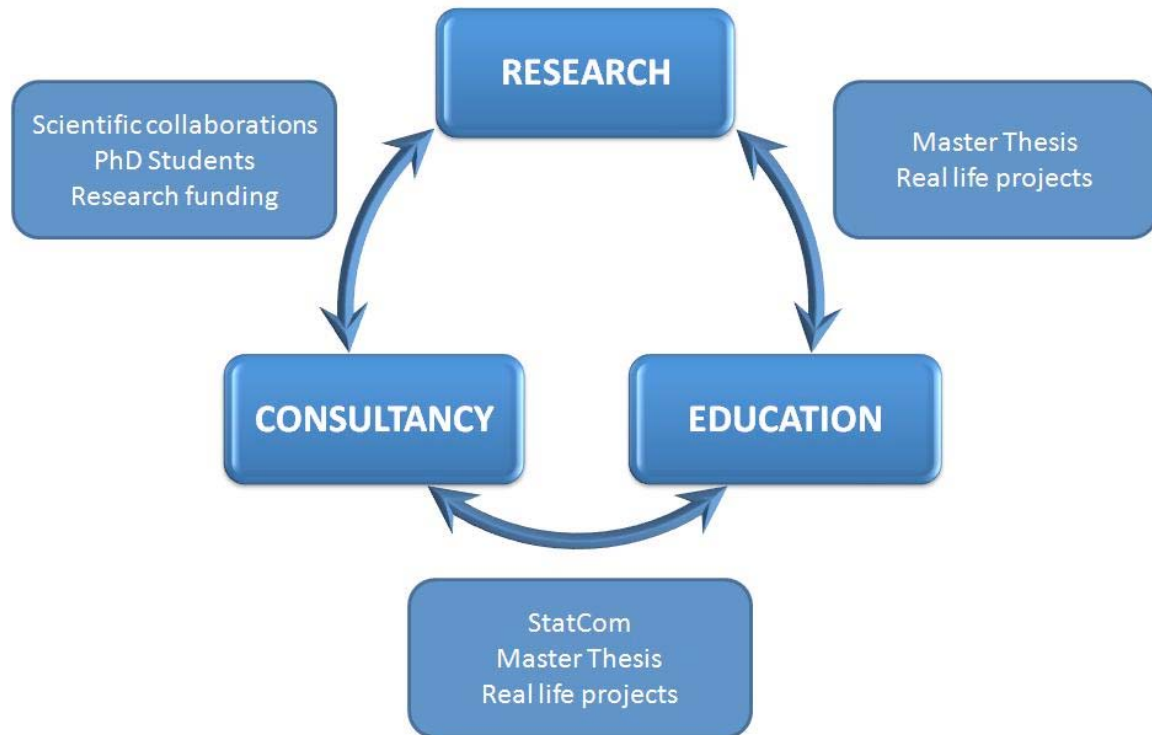


Figure 1. Graphical representation of the interactions within a statistical research unit

All of the 3 separate aspects are well established within the structures of the university and all in itself therefore well recognized. In more detail both the research activities and the consultancy services are internationally acknowledged and fit within a strong network of contacts with several other research units like the London school of public health and the Dana Farber institute in Boston. Also within the Master of Statistics program several courses are taught every year again by international visiting faculty.

In terms of interaction there is first of all a rather natural flow between research and statistical consultancy services. Since many research results are widely communicated it makes sense that companies, governments or other research institutions contact I-Biostat to support them in their research activity with respect to statistics. Once such collaboration has been set up it often happens that new research ideas are generated. Those ideas will then be explored and sometimes implemented as research topics. Without too much effort this establishes a logical link between research and consultancy and it is clear both activities benefit from the other.

As soon as education is involved little more effort might be needed however also the combination between teaching and research or teaching and consultancy is rather obvious. It is part of our mission statement that both faculty and postdoctoral staff members who certainly are active in research are teaching in the Master of Statistics. This means many research ideas can be communicated in a possibly somewhat lighter form towards the students. Furthermore all students need to finish a master thesis at the end of their 2-year education. This master thesis is an excellent opportunity to collaborate with one or two of the staff members on a real life research or consultancy project. For the students this is a perfect experience to learn more about statistical research and to get in touch with several if not all of the above mentioned skills for a statistical consultant. Of course as is clear by now, the master thesis is also an open door towards a real life experience with respect to consultancy services. While the master thesis is a fixed part of the

master of Statistics program there is another opportunity for the students to gain experience working as a statistical consultant through Statistics in the Community (StatCom). StatCom was founded at the in Purdue University's Department of Statistics in 2001 as a student run organization providing statistical support to governmental and non-profit organizations at a pro bono basis. Initially the driving thought was to increase engagement between Purdue University and the surrounding community. With some support from the American Statistical Association (ASA), an international StatCom Network has started its expansion with (under-)graduate students at many other universities in the US and since 2007 also at Hasselt University as the first and still only link outside US. Providing statistical consultancy through StatCom programs allow students to apply statistical methodologies in order to solve real life problems of any other non-profit third party.

Within Hasselt University Statcom is an organization which is fully run by students in the Master of Statistics program. One of the basic rules however is that by no means participation within StatCom can contribute in any way to achieving the degree of Master in Statistics. For this reason it is also rather important for the students to know that they can participate but (1) only when they have the capacity and are considered the better students in the Master of Statistics Program and (2) at a voluntary basis. The return in other words for the students is only in terms of extra experience with respect to providing statistical advice and consultancy services. Given the above mentioned arrangements and rules StatCom serves mainly researchers from other research groups within Hasselt University. Those students who had been allowed to participate in StatCom activities considered it an excellent experience.

Finally, in terms of teaching consultancy services, already from the academic year 2003-2004 there are several projects incorporated in the program in which students work either at an individual basis or in small groups of about 4 students in order to provide a statistically funded solution to any real life problem. Since 2008-1009 there has been an increased effort to expand one of those courses with a view inside pharmaceutical research to prepare students to this task as a statistical consultant contributing to drug development and pharmaceutical research and from this academic year 2009-2010 onwards there will be in that same course a kind of role play in which students have to negotiate with a clinical researcher from a pharmaceutical company in order to practice all of the above mentioned skills. In this way with rather little extra effort the circle is closed and all interactions between statistical research, statistical consultancy and statistical Education are strengthening each other. In other words this is a benefit to all aspects.

## CONCLUSION

In conclusion it was mentioned before that the framework outlined in this manuscript is certainly not the only one and there might exists even better strategies. On the other hand for a research institution already dealing with statistical research, statistical consultancy and statistical education the structure introduced above only takes little effort to be implemented and therefore might be worthwhile to consider.

From discussions with former students who are currently working within either a pharmaceutical company as biostatistician or active as an independent statistical consultant it was noted that those students really benefit from the fact that they had the opportunity to take part in the StatCom network. Furthermore, taking into account the fact that also the clients were very satisfied with the collaborations it must be concluded that many other universities should take the effort to organize a new unit within the StatCom network. As a result, the combination of StatCom with a proper statistical education program can deliver good statisticians who also have the capacities to interact with other possibly non-statistical researchers.

## REFERENCES

- Barnett, V. (1982). Why teach statistics? In D. G. Grey, P. Holmes, V. Barnett, & G. M. Constable (Eds.), *Proceedings of the First International Conference on Teaching Statistics* (pp. 3-15). U. K.: Teaching Statistics Trust.
- Barnett, V. (1986a). Straight consulting. In B. Everitt & D. J. Hand (Eds.), *The statistical consultant in action*. Cambridge: C. U. P.

- Barnett, V. (1986b). Statistical education. Presented at the *First International Seminar on Statistics in Euskadi. Cobierno Vasco, Spain*: Eusko Jaurlaritzza.
- Barnett, V. (1994). The role of consultancy in university education and professional training in statistics. In L. Brunelli & G. Cicchitelli (Eds.), *Proceedings of the First Scientific Meeting of the International Association for Statistical Education* (pp. 285-297). Perugia, Italy: International Association for Statistical Education.
- van Belle, G. (1982). Some aspects of teaching biostatistical consulting. In J. S. Rustagi & D. A. Wolfe (Eds.), *Teaching of Statistics and Statistical Consulting* (pp. 343-385). New York: Academic Press.
- Belli, G. (2000). The teaching of statistical consulting skills. Paper presented at the *Meetings of the American Educational Research Association*, New Orleans.
- Boen, J. R., & Zahn, D. A. (1982). *The human side of statistical consulting*. Belmont, CA: Lifetime Learning Publications, a division of Wadsworth, Inc. (Reprinted 1997 by the 338 *Gabriella Belli* Pharmaceutical Education & Research Institute (PERI) and PHRMA's Biostatistics Steering Committee).
- Calvin, L. D. (1982). Experience with a student consulting service. In J. S. Rustagi & D. A. Wolfe (Eds.), *Teaching of Statistics and Statistical Consulting* (pp. 311-326). New York: Academic Press.
- Halavin, J. J., & Mathiason, D. J. (1994). Designing and running undergraduate statistical consulting laboratories. *American Statistical Association 1994 Proceedings of the Section on Statistical Education* (pp. 132-136). Alexandria, VA: ASA.
- Khamis, H., & Mann, B. (1994). Outreach at a university statistical consulting center. *The American Statistician*, 48(3), 204-207.
- Meyers-Tate, C. (1999). A model for applied statistical consulting in a statistics lab environment. Paper presented at the *Annual Meetings of the American Educational Research Association*, Montreal, Canada, 19-23 April.
- Rangecroft, M., & Wallace, W. (1998). Group consultancy, as easy as falling off a bicycle! In L. Pereira-Mendoza, L. Seu Kea, T. Wee Kee & W. K. Wong (Eds.), *Proceedings of the Fifth International Conference on Teaching Statistics* (pp. 359-364). Voorburg: International Association for Statistical Education and International Statistics Institute.
- Ruberg, S. J. (1998). Consultancy: The two-way street. In L. Pereira-Mendoza, L. Seu Kea, T. Wee Kee & W. K. Wong (Ed.), *Proceedings of the Fifth International Conference on Teaching Statistics* (pp. 365-370). Voorburg: International Association for Statistical Education and International Statistics Institute.