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The Emerging Practice of Global Scientific Work
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The Emerging Practice of Global Scientific Work

A study of international scientific expert work in doping control in sport

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ABSTRACT

The abuse of drugs in sport is one example of a social issue where expert scientists work in a complex global context that presents many challenges, both scientific and non-scientific. This paper reports on the progress of an investigation into the work of the scientific directors of accredited anti-doping laboratories. Analysis of data collected from surveys and interviews sheds light on the views of the scientific directors about their work, the complex nature of the context within which this work is performed, and the process by which scientists become international experts in this field. It also identifies tensions within this work relating to knowledge management, its situation in a politicised context, and participation in decision-making. This research provides scientists working in doping control in sport with an opportunity to discuss and address the tensions associated with their work through the expansion of the community's capabilities in the use of advanced practices of knowledge management in complex settings and the exploration of the use of information and communication technologies to cultivate network-centric approaches to community development.

THE RESEARCH

In order to develop a rich understanding of the work of scientific experts working in anti-doping science, a developmental case study approach was chosen and data collected using surveys and semi-structured interviews from willing scientific directors of accredited laboratories and representatives of other groups of stakeholders (see Table 1) with whom the directors come in contact. At the time of the presentation in Cologne in March 2004, more than forty people had agreed to participate in the study. Some participants belonged to more than one expert group. Participants were interviewed either in person or by telephone. Data

was analysed using a phenomenographic approach to develop categories built on frameworks relating to Activity Theory and Communities of Practice. From this analysis, various features of the work of the scientific experts in anti-doping including both positive and negative aspects, general concerns about this field and the growth of knowledge and expertise, have been identified.

Table 1: Study Participation

Expert Groups	Number of participants
Directors of anti-doping laboratories	16
Anti-doping laboratory staff	2
Other scientists	2
NADOs (operations & management)	9
Other organisations concerned with anti-doping (IOC, ISFs, WADA)	6
Medical experts	5
Legal experts	2
Journalists & 'interested' others	2
Coaches	2
Athletes	0

Positive and Negative aspects of the work

When asked about those aspects of their work that they liked, the scientific directors gave a variety of responses. The scientific directors liked their work because:

- it was interesting and varied: *"It is usual that unusual things happen."*
- it had practical significance: *"you produce results and you immediately have an effect"*
- there were research opportunities
- they experienced collegiality: *"Good experiences with colleagues"*

The directors did not like those aspects of their work which involved:

- Administrative paperwork: doing *"work for nonsense written requests."*
- Legal & political aspects: *"Some decisions are politically motivated."*
- Dealing with a constant stream of *"new sport administrators ... (who are) still learning the basics... takes time."*

Directors' Concerns

The directors had a number of concerns including the need for financial and collegial support. Over the years, both routine and research work in anti-doping has been carried out internationally in a small number of accredited laboratories hosted by a variety of institutions. Laboratories are situated in universities, hospitals, government departments, and private

companies which do not necessarily understand the nature and demands of the work of their accredited doping control laboratory. It was not surprising then that the director's major concern was lack of financial support necessary to provide resources needed to maintain the high standards required of accredited laboratories. As one director put it, it was hard to:

> "(find) *support, money...because as time moves on...you have to improve the lab ... so that the lab can maintain (its) reputation all the time".*

Such support extended beyond equipment to providing staff, including specialist staff:

> *"Having enough positions to run the lab."*

Another concern related to both the local context and the geographical isolation which results from the fact that there are only thirty or so accredited laboratories doing this work around the world. Some of the directors expressed feelings of isolation of themselves and their laboratories:

> *"people are so far apart"*

Maintaining expertise

Scientific advances relevant to the work of the accredited laboratories place continuing demands on scientists working in the area but particularly on the scientific directors of the laboratories. They used various means to maintain their own expertise as well as the expertise of their staff.

As well as reading the literature and attending conferences, the scientific directors maintained their knowledge by conversations with their colleagues and information from the internet. Doing *"case work"* was also a powerful means of maintaining expertise as were in-house and shared research projects. Contact with instrument manufacturers and the pharmaceutical industry also enabled the directors to keep in touch with the latest technical and pharmaceutical developments.

Factors which hampered the directors in their efforts to maintain their expertise included a lack of time resulting from their involvement in issues relating to the day-to-day running of the laboratory, dealing with positive cases, duties related to the work context beyond the laboratory:

> *"Difficulties will arise when you have little time based on extensive and less effective administrative work"*

Other directors suggested that it was difficult to maintain current knowledge of a rapidly changing field when there weren't many scientists actually working in that field. Another saw a problem resulting from that fact that there was:

"Nobody that we can exchange specific information with (in our own language)"

When asked about the manner in which new knowledge should be shared by the members of this relatively small scientific community, again a variety of views were expressed:

"In the peer-reviewed literature ... nobody has found a better way."

"To publish ... and to inform your colleagues in dope control"

"Communication between laboratories."

There was also apprehension expressed about the fact that:

"If you're doing really good anti-doping work ... no one except the scientific community wants to hear it."

When asked whether or not the laboratories should do both research and routine work, the directors were unanimous in their support of the anti-doping laboratories carrying out both routine and research functions. Reasons given included the following:

"leads to better understanding of what the scientist is actually doing"

"You have to include some form of research so that people doing the routine work are thinking about their work and don't become just robots just doing things automatically without thinking about it very much."

From these comments it seems that the maintenance of expertise takes place through both the traditional avenues of the literature and academic gatherings as well as through participation in an expert community and learning from doing the work itself.

THE ACTIVITY OF DOING THE WORK OF A SCIENTIFIC DIRECTOR: A COMPLEX ACTIVITY

The complex nature of the work of the scientific directors of accredited anti-doping laboratories can be made clearer through the use of Activity Theory, which provides a "global multidisciplinary research approach … which is increasingly oriented toward the study of work and technologies" [1]. When applied to the work of the scientific directors of accredited anti-doping laboratories, a better understanding of the complex nature of their work emerges. (Figure 1).

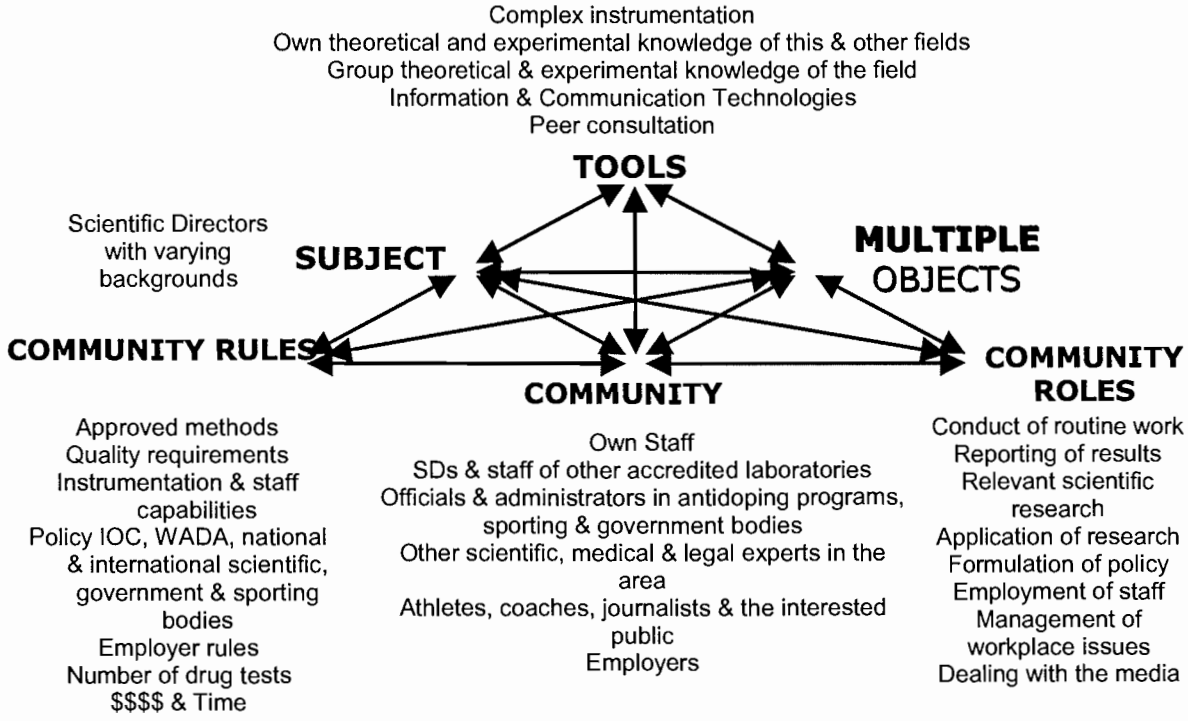

Figure 1: The activity of the work of the scientific directors of accredited anti-doping laboratories

From this study it seems that the scientific directors come from various backgrounds but are all passionately committed to their work. Their community is made up of many different groups: ranging from their own staff whom they see on a daily basis, colleagues in other anti-doping laboratories with whom they come in contact less frequently, experts in related scientific and medical fields, as well as non-scientific workers in anti-doping, representatives of government bodies and sporting federations, and legal experts. In the course of their work in anti-doping they may also come into contact with journalists, coaches, athletes and the interested public. They also interact with their organizational superiors about organizational and business matters.

The work of the scientific directors is affected by various aspects of their context that impinge upon what they do and how they do it. For example, the number of analyses affects the amount of income, the number of staff, the amount of instrumentation that a laboratory has. Conversely, the amount and quality of instrumentation and number of staff affect the number of analyses that can be done. National laws and anti-doping policy as well as the presence or absence of a national antidoping organization also affect the work of the scientific director. The organizational context within which the laboratory is situated is also influential. For example a fee-for-service laboratory situated in a university may be regarded negatively by academics beyond the laboratory walls.

The members of the broader antidoping community carry out various roles in anti-doping work. Whilst the routine work and much of the scientific research and the application of that research has been left to the laboratories, over time others have joined the broader antidoping community and taken on other non-scientific roles such as sample collection, antidoping education programs, formulation of policy and so on.

The tools used by scientific directors in their work are both physical and intellectual. The methodology of experimental and theoretical chemistry together with highly sophisticated analytical instrumentation facilitate the accomplishment of routine work whereas the non-routine work related to instances of doing as well as research call for access to an extended knowledge base provided by the literature and the scientific antidoping community.

There is no single goal, or object, for the directors. According to the scientific director's perspective, and the situation in which he or she works, there are often multiple goals and purposes. In fact it seems that there is a transition from a local to a global perspective depending upon the experience of the director.

When a scientist first takes on the position of the director of an accredited anti-doping laboratory, they have just spent a number of years on establishing a laboratory of the required international standard. In doing so, they have worked towards becoming the local expert in antidoping science. With time and further experience, they are able to maintain this standard more as a matter or routine and work out ways in which they are able to develop and expand their and their laboratory's own expertise to the point where they are able to make contributions to the evolving knowledge base and scientific practice of anti-doping science. At times, a scientific director might become involved with local anti-doping policy development and decision-making. In some instances, the directors have also committed to maintaining one of the few, if not the only, internationally, accredited laboratory with such strict requirements in their country. After considerable experience in the field, a scientific director may develop recognition as an international expert in anti-doping science who may become involved with international anti-doping decision making and policy development, including informing decisions about athlete testing programmes and scientific research directions. Beyond anti-doping work, experienced scientific directors are frequently involved in the professional development of a new generation of anti-doping scientists. These varied goals suggest that becoming an international expert in anti-doping science is an extended professional and personal development journey. Thus the saying "experience is a great teacher" seems to hold true in this as in most, if not all, areas of human endeavour. Our

awareness, identity, capabilities and goals evolve through interaction in social contexts. From the data gathered in this research, it appears that to become an international expert in anti-doping science, a scientist passes through a number of phases which correspond to the components of social learning described by Wenger [2].

SCIENTIFIC ANTIDOPING PRACTITIONERS: A PRACTISING EXPERT COMMUNITY

It is clear then that community plays an important role in the professional formation of new scientific experts in anti-doping. However, it is not the only role that community plays in this field.

Wenger, McDermott, and Snyder [3] believe that professionals in a community of practice help each other solve everyday work problems in their discipline, develop and disseminate a set of best practices, develop and steward the tools, insights, and approaches needed to work in that profession, develop highly innovative solutions and ideas, and have different levels of participation in the community. Analysis of data from this study suggests that, as in other communities of practice [2], the community of antidoping scientists

- are mutually engaged and so they do things together, develop working relationships and put effort into maintaining their community;
- have a joint enterprise built upon a practice that has been worked out together over time engendering mutual accountability, common interpretations but local responses and regular events, and
- have developed and continue to develop a shared repertoire based on discussions of cases and events, methods and instrumentation, ongoing issues, and common ways of thinking and acting in relation to their practice and its place in the wider community.

As with other communities of practice, the level of this community's energy and visibility has changed and will continue to change over time as it deals with internal and external challenges.

TENSIONS WITHIN THE WORK OF THE SCIENTIFIC DIRECTORS

Not surprisingly, the work of being a scientific director is not without its problems. Three major tensions that have emerged so far in this study relate to

- the sustainability of their laboratory's high-level of performance;
- the generation and management of new knowledge in antidoping science, and
- the involvement of scientific directors in national & international anti-doping decision making & policy development.

Laboratory Sustainability

The scientific directors are responsible for their laboratory's ability to function at an extremely high level. Such a level of performance is associated with considerable resource demands, including sufficient analyses to maintain skills. An ongoing need for quality instrumentation, specialist staff and other resources means that at times the scientific directors find it hard to maintain the financial viability of their laboratory. A number of laboratories have taken on work in other areas in order to support their laboratories.

Knowledge Management

Over the years, antidoping research has not been well resourced [4] and has not attracted many scientists as a field of research. The majority of scientists researching this area have worked in dope testing laboratories and conducted research as part of their work. The application of research outcomes to routine testing has been part of the research activity. Antidoping research results were published in peer reviewed scientific literature and/or communicated informally to other scientists working in the area and from a private to the public space. The outcomes of such research resulted in the development of expertise as well as the attainment of respect and influence. The process led to the research being regarded as accurate, of high quality, of low risk with respect to legal attack and public failure. The research was able to be integrated into the body of established defensible practice and deployed effectively as new tests in all laboratories. There was a feeling that real knowledge about antidoping science was within the community of scientists working within antidoping laboratories. Without such relevant knowledge and expertise, other scientists did not have full understanding of the antidoping context and could not make a complete contribution.

An influx of funding from the World Anti-Doping Agency, the United States Antidoping Agency and national government funding programs has gone some way to support research as anti-doping science responds to new developments in biotechnology and pharmaceutics and their use for athletic performance enhancement. At times, there has been a need for an immediate response to doping situations (e.g. the use of the designer steroid THG). Thus the pressure to move from knowledge management to knowledge mobilization is apparent in many fields including anti-doping science. Anti-doping scientists are facing a need to improve and extend the channels by which they currently enhance and extend their knowledge and practice. Knowledge mobilization measures will ensure the rapid integration into laboratory practice of the new contribution to this field whether they originate from

within or outside an accredited laboratory. However, both scientific and non-scientific antidoping workers will need to tackle the intellectual property issues that will arise when contributions to this non-profit, socially oriented context are made by scientists working in other disciplines or in industry.

Involvement in decision-making and policy development

The fight against doping in sport by national and international sporting and government bodies has for many years relied upon the expert knowledge and goodwill of the scientific directors of the accredited laboratory system. Yet, a further source of tension for the scientific directors is their lack of involvement in antidoping decision making and policy development in the increasingly complex context of international sport. As "the main focus on controlling the use of banned substances has been on testing athletes and the development of tests to detect usage" [5], antidoping decisions and policy necessarily impact upon the work of the antidoping laboratories. The involvement of governments, antidoping organisations, scientists from other areas, lawyers has resulted in lower participation of the antidoping laboratory directors: The sense of frustration is apparent in the following comments:

> *"A laboratory expert has valuable experience to all aspects of the fight against doping: control, legislation, education."*
>
> *"We're here and we've got something to say"*
>
> *"They won't listen to us."*

CONCLUSION

This "progress report" report aims to clarify various aspects of the challenges, relationships and opportunities associated with scientific expert work in this changing global context and encourage further discussion within the community. In particular, it is important that the global community work together in order to resolve the tensions associated with the scientific anti-doping work so that some working solutions can be co-invented, reviewed regularly, understood, and accepted as global practice. This research also identifies a need for the scientific antidoping community to explore the use of information and communication technologies to foster more network-centric approaches to community development, knowledge sharing and decision making. Such a strategy has the potential to expand the community's capabilities in the use of advanced practices of knowledge management and mobilization in the complex setting within which it is situated.

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