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# The Statistical Profession and the Chartered Statistician (CStat)

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The Royal Statistical Society and the Institute of Statisticians have merged to form a new Royal Statistical Society which is both a learned society and a professional body. As a consequence of the merger, the RSS will be awarding the new professional qualification of Chartered Statistician (CStat). The details of the new award are given and the background to its creation are discussed.

*Key words:* Certification; professionalism; statistical associations.

## 1. Introduction

On January 1, 1993 the Institute of Statisticians (IoS) and the Royal Statistical Society (RSS) merged to form a new and enlarged Royal Statistical Society. The new RSS is both a learned society open to all with an interest in statistics and a professional body awarding the professional title of Chartered Statistician (CStat) to those who wish to hold such a title and meet the qualification criteria. The IoS has always been a professional body for statisticians and as a consequence of merger the RSS has embraced the issue of professionalism for statisticians.

The Statistical Society of London was formed in 1834 and became the Royal Statistical Society in 1887 on receipt of its charter from Queen Victoria. It is this charter which allows the RSS to award the title of Chartered Statistician. Charters are administered on behalf of the Monarch by the Privy Council. Victorian charters were far more liberal than those issued today, and the RSS charter allows the Society to change its bye-laws without reference to the Privy Council. This constitutional freedom reflects the trust placed in professions in the 19th century to administer their own affairs. This trust no longer exists and modern charters require Privy Council approval for changes in bye-laws.

The merger took place under the conditions of the old charter. After the second world war it was recognised that there was both a shortage of trained statisticians and a shortage of courses for training statisticians. To help alleviate this shortfall the RSS decided to introduce examinations in statistics. In 1947 the Royal Economic Society objected to the RSS conducting examinations in statistics on the grounds that it conflicted with their own charter, and this forced the RSS to withdraw from examining. As a direct consequence the Association of Incorporated Statisticians was

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formed in 1948 with the explicit professional responsibility for conducting examinations and for accrediting professional qualifications. This later became the Institute of Statisticians and awarded the qualifications of GradIS to those who had passed the Institute's examinations, or examinations of a similar standard, and MIS and FIS to those who had also acquired sufficient practical experience. From 1948 to the late 1960s the IoS prospered; it filled a gap in the production of qualified statisticians in the UK and the British Commonwealth and thousands benefitted. The IoS membership was mainly drawn from practising statisticians, official, industrial and commercial, but it was always strongly supported by academic statisticians who were RSS fellows including G.A. Barnard, M.G. Kendall, M.H. Quenouille and Sir John Kingman.

The expansion of universities in the UK and abroad and the widespread introduction of undergraduate courses in statistics meant that the demand for examinations in statistics fell during the 1970s. The IoS adapted to the changes and offered membership to those who passed examinations accredited by them. They thus demonstrated trust between academic statisticians in universities and the practising professional statisticians in the IoS. Despite this trust, proposals that the RSS and IoS should merge failed to attract widespread support. In 1980 a group chaired by Sir John Kingman agreed on terms for a merger that drew considerable support from both the RSS and IoS, but the attempt still foundered on issues such as the name of the merged society and professionalism. Stimulated by Sir John's presidential address to the RSS, Kingman (1989), another attempt was made to agree merger terms. This was successful and it was agreed to merge under the name of the Royal Statistical Society within the terms of the Society's charter which allows the new RSS to conduct examinations, to accredit qualifications and to award the title of Chartered Statistician. To date about 1250 ex-IoS members have adopted the new title of CStat and over 600 fellows of the RSS have applied to take up CStat status.

Merging under the conditions of the old charter gave the new RSS operational independence but eyebrows were raised in the Privy Council. Subsequent history is less satisfactory. The Society applied to the Department of Trade and Industry (DTI) for designation as the authority regulating the profession of statisticians within the UK. This designation would allow the Society to obtain recognition of CStat within the EU under Directive 89/48/EEC. Unfortunately the DTI rejected the proposal on the grounds that the Privy Council did not have the power of veto over changes to the bye-laws. The minute of the meeting reads as follows:

> "The award of professional qualifications in other bodies is regulated by bye-laws made under the charter, and these bye-laws are subject to Privy Council approval. The European Union requires a long-stop control by the Privy Council which it exercises through its veto. The charter of the Society was not altered at the time of merger and the nature of the Society and its purposes have not been changed. The change to a professional body needs to be effected through a change in the constitution. It would be possible for a supplemental charter to be awarded, although this would sweep away most of the present charter and start again. The Privy Council representative emphasised that the RSS is currently autonomous and could not be forced to change. However, if the Society wishes to benefit under the directive, it has to make professional status part of its objectives. This would require a change in the charter."

The RSS is currently considering its options. Should it retain its operational independence and forgo the right to be the designated body for the statistical profession in the UK, and hence to obtain recognition of CStat in the EU, or should it adopt a new more restrictive charter? The jury is still out. This brief history shows that the path to professional status is rarely smooth.

## 2. The Organisation of Professional Affairs

All fellows of the RSS are bound by the charter and the bye-laws of the Society. The new bye-laws that gave effect to the merger delegate the responsibility for running the professional activities of the new Society to a Professional Affairs Committee comprised mainly of professionally qualified fellows. The duties of the Professional Affairs Committee are to:

Maintain, review and update a register of Chartered Statisticians, FIS, MIS, GradIS and Graduate Statisticians;
Maintain and review the standards of, and assess applicants for, the grades of CStat and Grad Stat;
Recommend the granting of appropriate professional qualifications and awards; maintain and enforce a code of conduct;
Ensure the provision of appropriate professional training;
Arrange for the accreditation and validation of external courses leading to the Society's qualifications;
Arrange for appropriate Society examinations to be set;
Define general standards for statistical competence;
Institute disciplinary proceedings as required and in accordance with the bye-laws;
Arrange for the provision of continuing education for the benefit of professional development as and when needed and in association with the Education Committee of the Society.

## 3. The Code of Conduct

A condition for the approval of the new profession of Chartered Statistician was that there should be a code of conduct for professional members. The IoS code of conduct was not accepted by the Privy Council and so the RSS had to devise a new code. This is no easy task for any profession but is particularly difficult for one as diverse as statistics. In the event the RSS adopted a code based on that of the British Computer Society.

Roger Jowell, chairman of the International Statistical Institute (ISI) Ethics Committee, identified three models for a code of ethics (Jowell 1981):

a. an aspirational code, embodying lofty ideals;
b. a regulatory code, specifying enforceable rules of behaviour;
c. an educational code, encouraging ethical behaviour.

The RSS code is a combination of (a) and (c). A regulatory code was dismissed as being unenforceable for the same reasons as those advanced by Jowell. Many of the issues raised by Jowell (1986) are covered by the RSS code but on the whole it is too

aspirational for his liking and does not include the case studies that would form the basis of an educational code. The RSS is apparently more sympathetic to high aspirations than the ISI Ethics Committee, especially when there is so little case law on which to base a more pragmatic educational code. There were no cases known to the RSS of statisticians being sued for negligence, although I believe that there have been actions resulting from breaches of confidentiality.

The aim of the code proposed by the ISI Ethics Committee, ISI (1986), is "to document shared professional values and experience as a means of providing guidance rather than regulation". The RSS code recognises the obligations of its professional fellows to society, to funders and employers and to colleagues. It is weakest relative to the ISI code in its protection of the interests of subjects and in its recognition of the minefield of conflicting interests that exist in this area. In clause 2 the RSS code makes an aspirational statement about human rights and then states that

> "Enquiries involving human subjects should, as far as practicable, be based on the freely given informed consent of subjects. The identities of subjects should be kept confidential unless consent for disclosure is explicitly obtained."

The ISI Declaration on Professional Ethics (ISI 1986) starts with a similar general statement about informed consent and confidentiality but then devotes five pages to amplifying these problem areas in order to educate its members. But even the ISI code fails to make any statement about experiments with animals, an equally controversial area. In contrast The Code of Conduct, Ethical Principles and Guidelines issued by the British Psychological Society devotes four pages to guidelines for the use of animals in research as well as five pages on ethical principles for conducting research with human participants.

Most professions have evolved codes of conduct that are aspirational in their initial form and are subsequently amplified by detailed guidelines in areas which have caused ethical problems. The Hippocratic oath is an example of an aspirational code, but in practice the conduct of medical doctors is governed by detailed ethical guidelines based on the case law of professional negligence. Chartered accountants in the UK issue the following statement of fundamental principles.

1. A member should behave with integrity in all professional and business relationships. Integrity implies not merely honesty but fair dealing and truthfulness.
2. A member should strive for objectivity in all professional and business judgements. Objectivity is the state of mind which has regard to all considerations relevant to the task in hand but no other.
3. A member should not accept or perform work which he or she is not competent to undertake unless he obtains such advice and assistance as will enable him competently to carry out the work.
4. A member should carry out his or her professional work with due skill, care, diligence and expedition and with proper regard for the technical and professional standards expected of him as a member.
5. A member should conduct himself or herself with courtesy and consideration towards all with whom he comes into contact during the course of performing his work.

These general principles are amplified by detailed guidelines which have evolved over many years and now fill a small book.

Personally I favour this evolutionary approach starting with an aspirational code which is later amplified by detailed guidelines in areas where ethical dilemmas have been identified. One problem with a subject as ubiquitous as statistics is to define its limitations and it is here that guidelines for specific areas such as the conduct of clinical trials or the confidentiality of records would be useful. However, it would be a Herculean task to write guidelines for the ethical behaviour of statisticians in all possible areas of application.

The statistician as employee is an area of potential conflict for the profession. If there is a conflict between a chartered statistician and his or her employer on a matter of statistical principle, which cannot be resolved between the employer and employee, then the statistician is advised to refer the matter to the RSS. It is unclear, however, what action the Society could take beyond that of moral persuasion. Most official statisticians have their own code of conduct and it is essential that codes developed by the profession should not be incompatible with those used by official statisticians. Should official statisticians not be able to resolve an issue of professional integrity using their own procedures, perhaps due to political interference, then this is an area where a professional association would have to become involved. Hopefully moral persuasion and publicity would be effective, but if not this would be a real challenge to the profession.

Academic statisticians who restrict their activities to teaching and theoretical research may see little need for professional status. However, those who engage in applied research in cooperation with other scientists are acting as consultants and could benefit from adhering to a code of conduct. In fact one of the few professional grievances reported informally to the RSS has been by academics objecting to their names appearing in reports or papers without their permission. This is another area where the moral persuasion of the RSS could be effective. Although a code of conduct for ethical behaviour is an essential feature of any professional association, ethics remains in the domain of the unenforceable.

## 4. Becoming a Chartered Statistician

The Oxford English Dictionary defines a profession as "a vocation in which a professed knowledge of some department of learning or science is used in its application to the affairs of others or in the practise of an art founded upon it." Accordingly one of the main roles of a profession is to set standards for those who wish to practise the profession. These standards are usually governed by examinations at entry and by a period of practical experience. The RSS has adapted the IoS criteria for qualifications and experience and at least one of the following four criteria should be met:

1. A good UK honours degree (Class I or II) or an appropriate higher degree, or both, in Statistics or in a subject containing a substantial coverage of statistical method and theory. It will be necessary to know what modules or special subjects have been taken. Plus five years' practical experience in applying statistics. (NB Some post graduate courses may be eligible towards this practical experience.)

2. An appropriate overseas degree (in some cases an MSc will be the appropriate level) in Statistics or a subject with a substantial coverage of statistical method and theory. It will be necessary to know what modules and special subjects have been taken. Plus five years' practical experience in applying statistics at a substantial level.
3. The Institute of Statisticians' Graduate Diploma. Plus four years' practical experience in applying statistics.
4. At least ten years' practical experience in applying statistics at a substantial level together with acceptable evidence of knowledge, competence and contributions to the subject and its applications. Candidates who expect to be considered under this criterion should also provide details of their publications and other significant contributions to statistics.

During at least three years' experience, the candidates in all cases should have taken responsibility for the statistical content of their work. These guidelines for accreditation seek to achieve comparability with the range of coverage of the IoS Graduate Diploma.

The Professional Affairs Committee of the RSS is prepared to consider any relevant practical experience. The following list is indicative of the types of experience which would be considered but it is not necessarily comprehensive.

Managing a statistics section: leading projects with a substantial amount of statistical analysis or modelling; undertaking statistical analysis of data and reporting on the results; having responsibility for the interpretation and presentation of statistical information; teaching statistical theory and methods, and their applications, in a practically orientated way.

Unsupervised statistical consultancy: generally recognised as having made a substantial contribution to the subject of statistics.

It should be noted that the qualifications and experience explicitly allow academic statisticians to qualify for CStat status provided that they can demonstrate interest and experience in some area of practical statistics.

In summary CStat can be awarded to any statistician who is a fellow of the RSS, has passed the RSS (or IoS) examinations or their equivalent and has sufficient practical experience under supervision and working alone. In special cases practical experience alone will be accepted. This allows those who graduate in mathematics, or in some other non-statistical discipline, to qualify as statisticians once they have sufficient practical experience. It is the route that many senior academics have to follow if they wish to become chartered statisticians since they graduated before degrees in statistics became widely available.

## 5. Other Aspects of CStat

The CStat qualification is only awarded to fellows of the RSS. It is not granted for life and it has to be renewed annually. The RSS is considering whether some form of continuing education should be required by those awarded CStat in order to update their skills and to keep the qualification in line with other professions. The form that

this continuing education might take is open to debate, but it could include attendance at meetings and conferences as well as short courses on specific topics. There is room here for collaboration between the RSS and other statistical organisations such as the ISI, ASA and Eurostat.

All fellows of the RSS are governed by the bye-laws of the Society. So all chartered statisticians have to abide by the bye-laws which include procedures for disciplinary action, the most extreme form of which would be removal from the register of chartered statisticians and expulsion from the Society. Whether such a sanction would be effective in an open profession such as statistics, where there is no need for anybody to be professionally qualified before they practise as statisticians, is dubious. The only real sanctions will again be moral persuasion and adverse publicity. The RSS has not considered the alternative of trying to make CStat a compulsory qualification for those who wish to practise as statisticians. This alternative would have to be supported by law which in turn would require the practice of statistics to be defined formally. I, for one, have no wish to restrict the scope of statistics by subjecting it to an arbitrary legal definition.

One of the arguments of those who are against the idea of a statistics profession is that the subject cannot be defined and many would argue that statistical thinking has no boundaries. These arguments apply in a greater or lesser degree to all professions and it is more sensible to take a pragmatic approach and allow the profession to be defined not by words but by societies (such as the RSS) of people with a similar training and a similar set of ideas and problems. The profession is its members and their set of common interests and concerns.

## 6. Why Now?

Statisticians have been discussing professionalism and codes of conduct for over 40 years. Why should a formal professional qualification finally come about now? The answer is that the question is incorrect. There has been a professional qualification, the Membership and Fellowship of the Institute of Statisticians, in place since the 1950s. This qualification was recognised in many countries but has not received universal recognition. By merging with the RSS and creating a new professional qualification, the Chartered Statistician, it is hoped that the new qualification of CStat will gain much wider recognition. The RSS is in contact with Societies in America, Europe, Australia and New Zealand with a view to establish mutual recognition of qualifications.

The merger between the RSS and the IoS came about because of a minor crisis in the affairs of the Institute and a long held view that it was not very sensible to have two rival statistical societies in a small country such as the UK. The memberships of the societies were largely complementary, and the case for a merger was very strong. But the case was almost as strong in the 1970s and it failed then. So why now?

Modern professions are rooted in the associations of the 12th and 13th centuries which led to the formation of guilds and universities. Although the professions were initially limited to theology, law and medicine the growth of science and technology in the 18th and 19th centuries led to a rapid expansion into new areas such as engineering and architecture. This expansion has accelerated in the 20th century, not

only outwards, but also downwards into vocations such as nursing and teaching. Professionalisation is a social movement, a recognition by groups within society of a set of shared skills. Why should statisticians exclude themselves from this movement? In the 1970s there was still strong opposition among UK statisticians to the concept of a statistics profession. There remained a sympathy for the gifted amateur, and although that remains today in the open membership of the Society, the growth of professionalism elsewhere, the UK's entry into Europe and the hardening of many peoples views about economic and political issues during the 1980s, have affected UK statisticians and in 1990 there was virtually no opposition to the idea of a profession of statistics. The CStat qualification can be seen as part of the social movement towards professionalisation and will be but one of many such qualifications worldwide.

The fact that the IoS already had a professional qualification and the circumstances of the merger have spared the RSS from some of the agonising debates about professionalism and codes of conduct which are taking place elsewhere. We had to find solutions if the merger was to take place. One strong thing in favour of merger was the trust between academic statisticians and the professionals that had been built up over the years by the IoS. The IoS accredited university courses and trusted the skills of their academic colleagues in teaching and examining. Similarly universities accepted the IoS qualification as being of degree status. Both sides avoided excessively bureaucratic systems to their mutual benefit. The solution may not be perfect but we think that it will work, and that the CStat qualification will evolve as statistics evolves. The early response to CStat has been very positive and almost one-third of the Fellows of the RSS have taken up the professional qualification. The RSS looks forward to collaborating with colleagues outside the UK as they set up similar qualifications.

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# Planning the Methodology Work Program in a Statistical Agency

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## 1. Introduction

The methodology area of a statistical agency generally serves three main roles:

- helping to ensure the statistical integrity of the agency's products and services, and in particular to ensure a sound statistical basis to the collection, estimation, and analysis of data;
- helping to develop and evaluate cost effective methods, or methods that produce products and services that are of higher quality than current methods; and
- providing statistical skills, and in particular analytic skills, to develop products and services relevant to user needs (for example, seasonally adjusted and trended time series, as well as value added products such as socio-economic indexes, or model based estimates).

The boundaries of the methodology work program are not clear cut. The term methodology itself is poorly defined, and the skills of the methodology area, generally statistical and analytical skills, overlap to some extent the skills of a number of other areas of the organisation. An agency must decide which components of its statistical and analytic skills to bring together in the methodology group. In the ABS there has been considerable benefit from drawing together econometrics and time series analysts with the mathematical statistics specialists in the methodology area.

The responsibilities of the methodology area can also be unclear. Does it play an advisory role, responding to client requests for assistance, or does it take an auditing role with responsibility to advise senior management of concerns over the quality or cost effectiveness of projects? Does it solely respond to client demand from other areas of the agency, or is it expected to provide leadership in identifying and evaluating opportunities for improvement in agency products and services. In other words does the agency rely on a client pull approach or does it also encourage a specialist/innovation push?

In the case of the Australian Bureau of Statistics (ABS), the work program for the methodology area is developed by agreement with other parts of the bureau, working largely as a service to clients, responding to their expressed needs, but also with responsibility for playing an audit role where that is considered necessary. As well, the methodology area is expected to be proactive in identifying, evaluating, and helping to implement methods that will move the ABS towards its corporate objectives. Consequently, the ABS has made a conscious decision not to apply user pays princi-

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ples to determine the work program of the area, in recognition of the innovation and leadership role, as well as the auditing role, that it looks to the area to provide.

The starting point for planning the methodology work program is the agency corporate plan, and the broad level objectives outlined in that plan. The ABS corporate mission is:

"We assist and encourage informed decision-making, research and discussion within governments and the community, by providing a high quality, objective and responsive national statistical service."

The methodology area has a key role to play in meeting this mission, and elements of the work program must relate closely to supporting the ABS in achieving this mission.

While the corporate mission provides the broad direction, there are many other factors which help determine the methodology program. The people and skills available to undertake the work provide a very real set of opportunities as well as constraints, while the budget constrains the recruitment of further skills. Opportunities for co-operative research with external researchers, including those in other statistical agencies, also acts to influence the planned work program. Other external influences include major changes to client needs, and changes to available technology, both in the way they affect internal agency processes and the effect they may have on accessibility of data from providers. As well, the program is influenced by significant breakthroughs in the development of better methodologies by external researchers including other statistical agencies, or breakthroughs in related fields that place pressure on the agency to further develop or apply new methodologies.

The next section of this paper discusses in more detail the relationship between the corporate plan and the methodology work program. Section 3 looks at how the changing external environment influences the work program while Section 4 looks at some aspects of the role of a cost benefit analysis in determining the work program, and then describes the interaction between the availability of skilled resources and the work program. Section 5 sets out the processes that are in place in the ABS to establish the forward work program. And finally, some possible mechanisms and benefits for sharing information on work programs between statistical agencies are discussed.

## 2. The Role of the Corporate Plan in Setting the Methodology Work Program

The ABS mission was given above. Supporting this mission, the corporate plan sets out six broad objectives that define the goals of the organisation, with 37 strategies defining areas on which the bureau will focus over the next few years. The six broad objectives are:

**Purpose**
Informed and satisfied clients through an objective, relevant, and responsive statistical system.

**Product**
Reliable, timely, and coherent statistics.

**Providers**
Good relationships with providers, respecting their rights.

**People**
A team of people with the skills and motivation to achieve the ABS mission.

**Productivity**
Continuing productivity improvements.

**Profile**
A high regard held for the ABS by decision-makers and the community.

The methodology area plays a role, to varying degrees, in effecting progress under each of these objectives. While it is impossible in this paper to relate in detail all aspects of the work program to corporate plan objectives, the following paragraphs provide information on some priority projects planned or being undertaken as part of specific strategies under these objectives, and a brief discussion of the role of the methodology area in these projects.

A strategy within the first objective is to "undertake a program of reviews of ABS activities to strike an appropriate balance between emerging and continuing demands." This involves extensive liaison by the agency with users to determine real priorities and explore possibilities for viable, more cost effective alternatives to the data currently provided. This allows resources to be freed up and demands emerging in other areas to be satisfied. Methodologists are involved in this review activity from the earliest stages. The provision of cost effective solutions to real needs requires a good understanding of exactly how the information from collections is to be used. Any reduction in current collection activity requires the methodologist to understand the implications of different levels and structures of error in the data on these uses. This allows targeted design of collections to meet priority needs, with lower priority needs often being met in an adequate way through alternative means, for example, through the use of modelling techniques. The design of new activities, either collections or analytic approaches, to meet emerging needs for statistics has clear implications for the methodology work program.

The second objective focuses on ensuring the statistical integrity of ABS products: one key strategy is to set objectives for quality, including timeliness, and to measure achievement. This objective also covers the relatability of data from different collections and the improvement of methods to achieve this. The methodology area plays a role in identifying and, where possible, measuring the error structures of statistical outputs, including both sampling and non-sampling error. The role often extends to determining the implications of the error structures for alternative uses of the data, and hence an assessment of quality in terms of fitness for the intended use.

The methodology area also plays a role in ensuring the relatability of data. This is done by establishing best practice methods and standardising bureau procedures to conform to these where possible. For example, the methods used to overcome frame and reporting difficulties and deficiences through new business provisions, the treatment of changes in business structure, the treatment of outliers, and editing and imputation, are standardised as far as practical across the agency. Because the methodology area is a centralised group, providing services across a wide range of bureau activities, it is able to be an integrating force within the bureau.

Under the third objective, two strategies have a strong relevance to methodologists. The first is to minimise reporting load by accessing alternative data sources, coordinating approaches, using flexible data capture methods and commonly understood concepts and terminology. The second is to develop systems and indicators to measure and manage reporting load. Methodological involvement in the first area arises as a result of the potential effects on quality of alternative approaches to data collection, and the need to evaluate these alternatives in terms of provider load, quality affects, and cost. As well, the use of alternative data, for example, from administrative services, often requires investigation of alternative estimation strategies, including possible use of model based approaches. The management of provider load mentioned in the second strategy includes the appropriate design by methodologists, of samples and selection processes to balance load against data collection needs, and to share the load amongst providers.

Methodologists also have a key role in the fourth corporate objective, through the strategy "through training and development, equip ABS people to meet ABS objectives." They have the knowledge base from which to provide training in many of the statistical skills required to ensure the ongoing reliability and usability of ABS products and services.

The fifth objective involves the implementation of a continuous improvement culture and approach in the ABS. This will involve methodologists in helping to instil this culture. It will also involve them in developing and evaluating new approaches, in reviewing and re-engineering processes to take advantage of new methods or technology, and in identifying, developing, and adopting best practise methods from other organisations including other statistical agencies.

The sixth objective, a high regard for the ABS by decision-makers and the community, includes the strategy of pursuing opportunities to participate in discussions on international statistical standards and practices, and to maintain our standing as a leading national statistical agency. A good reputation is vital for a statistical agency if it is to have the confidence of decision-makers and the community, and hence if its products and services are to be used effectively. The methodology area must play a role in promoting, both nationally and internationally, the quality of the agency's statistical methodology.

As can be seen from the above discussion, the corporate plan provides very real directions for the agency as a whole, and for the methodology area, to pursue in its work program. However, it does not, in itself, determine specific priorities for the methodology area. This must be addressed by looking at the detailed work program of the rest of the agency, the expected cost to benefit ratio of involving methodologists in various aspects of the bureau program, and the ability of client areas to pick up and achieve benefits from the methodological output. It must be addressed by bringing the requirements for methodological support into balance with the level and quantity of skills available.

## 3. The Influence of Changes in the External Environment

The methodology area is a support area, and as such the detail of its work program is

determined by the work program of the agency as a whole. In particular, as the work program of the methodology area is largely associated with the design, development, and evaluation of new or different ways of doing things, it is particularly determined by the changes in the work program of the agency as a whole: the new and different collection activities; reductions to past activities; and effective use in new technologies and new analytic approaches. This section looks briefly at the influences on change in the agency's work program that will flow through to the work program of the methodologists.

There are a number of ways the external environment can bring change to the agency work program. These include major changes in user needs relevant to fulfilling the first objective of the corporate plan. They also include new technological opportunities, and breakthroughs in survey methodology as a result of research, internal or external, relevant to achieving a number of corporate objectives.

### *3.1. Changing user needs*

Changes in user needs may take the form of a new or an increased need for data on a particular topic, for example, the family, the indigenous population, the environment, or the service industries. In some cases the need is new and the topic no more difficult than other topics to cover effectively with a survey approach. Such cases do not typically involve significant methodological input. More frequently however, the need is not new, but is recognised as a difficult requirement to meet, with pressure for a solution building as the policy need increases. For example, this was the case in the ABS for information on the indigenous population and some components of the service industries. In these cases the methodology area is involved extensively in testing, evaluating, and developing workable methodologies.

Sometimes the new user need is not for a different topic, but for information that supports a more sophisticated analysis by users of the data on an existing topic. This may give rise to the need for new types of output on the topic. For example, the sophistication of analysis made possible by current technology is leading to greater demand for distributional data, data on the probability of transition from one state to another, and data on the relationships between variables and how this changes over time, including data that best allow the estimation of certain model parameters. For users of this information, simple level and movement estimates are not enough, and as users have been able to articulate their needs, changes have been made.

An example of these changes is the running of longitudinal surveys. Increased policy interest in the long term unemployed and the transition probabilities of various at risk groups into and out of employment coupled with a government policy of program evaluation have led to a longitudinal household survey in the ABS. Similarly interest in the characteristics of businesses contributing to economic growth, and particularly employment, has given rise to a strong interest in longitudinal surveys of businesses. Another example of changing needs is provided in the increased interest in microsimulation of social data. This places pressure on the inter-relatability of household survey data between collections,

often at quite detailed levels, and with specific implications for the weighting strategies used.

### 3.2. *Technology related change*

New technological opportunities provide another impetus for change in the agency work program. This is especially true in the area of data capture. New technology may provide opportunities for accessing data more cheaply or more quickly, but evaluation may be required to ensure the technology is implemented in a way that provides the best solution, and in particular that the effects of new technology on data quality are understood. The likelihood of breaks in a series, or even changes in the seasonality of the series, needs to be assessed, and if necessary action taken to provide a bridge in the series.

New technology available to data providers may also have implications for the range of data that they can readily provide. For example, a recent modernisation program within the Australian Taxation Office has enabled them to provide the ABS with more comprehensive and timely administrative by-product data that have potential implications for cost effective design and estimation in the ABS annual financial business surveys. Similarly Electronic Data Interchange offers the promise of easy access to a range of statistical information for businesses.

New technology can also affect directly the quality and cost effectiveness of ABS processes. For example, editing and analysis processes have undergone significant changes in many agencies in recent years as a result of improvements in technology. Again the methodologists of these agencies, including the ABS, have been closely involved in the evaluation and implementation of new approaches.

Technology also offers direct benefit to the methodology work program. Recent advances in both hardware and software have substantially increased the scope for interactive analysis. This has improved the cost effectiveness of data analysis in statistical agencies, and in the case of the ABS has been instrumental in including more analytic work within the work program, enhancing the value of the data as an information source. Another way in which technology can affect the methodology work program is through the development of computerised tools to assist in methodological applications. Many agencies have systems to support survey design. The ABS has recently developed an expert system for time series analysis, automating the more routine processes, and embedding many of the expert decision rules common in performing seasonal adjustment and trend analysis. Use of the system within the methodology area, or directly by clients of the area, will free resources to undertake other investigative research.

### 3.3. *Methodological research*

As well as technological innovations, there can be innovations in methodological approaches to agency work. These innovations may result from internal work, or the work of researchers outside the agency, including the work of other statistical agencies. It is the responsibility of the methods area to keep abreast of relevant developments and assess the implications of these developments for the ABS. The

work program needs to provide sufficient capacity for the interchange of ideas, and the evaluation of the applicability of the more promising of these ideas.

A recent instance where the ABS methodology program has been affected by developments of this kind has been in household survey weighting. External researchers in microsimulation have identified aspects of the way the bureau has applied weights to some household surveys which, when the surveys are used as the basis for microsimulation, give rise to inconsistencies. At the same time other statistical agencies have been grappling with the same problem and developed linear and integrated weighting approaches directly applicable to the Australian situation. Given the changed external demand, coupled with the real advances in weighting methods developed by other statistical agencies, the ABS methods work program was amended to include a household survey weighting project that involves substantial work in the evaluation and application of new weighting techniques to ABS household surveys.

External research can affect the work program in other ways as well. Where an external researcher is working on a problem related to the agency, this of itself will put some pressure on the agency to gain knowledge in the area, in order to be able to adequately meet the queries of the researcher and take advantage of any findings of the resultant research. Alternatively there may be the opportunity for joint research or co-operative development in a particular field with external researchers or another statistical agency. Similarly the temporary availability of a research fellow who is expert in a particular field, may provide particular opportunities for the work program to develop in a given direction.

## 4. Cost Benefit Analysis

While there are many determinants of the work program of the methodology area, an obvious prerequisite for any project is that it satisfies a cost benefit analysis. For longer term research the analysis may be less clear cut than for shorter term projects, which relate directly to the solution of current problems. In both cases, however, it is important that there be some appreciation of a pay-off towards corporate goals in the forseeable future. Resourcing in the ABS is insufficient to allow "basic research" in statistics, that is research not directed at solving currently encountered problems, and we look largely to the academic sector to provide this basis for future breakthroughs.

An important determinant of the benefit that will arise from short term methodological work is the extent to which the outcomes of that work will be implemented. For example, development of a quality monitoring system for an area that is reluctant to implement it, is unlikely to have substantial pay-off. Development of the same system for an area that is facing tight budgeting problems, asking for assistance in implementing productivity gains, and enthusiastic to continue to assure quality, could be expected to be very worthwhile. Thus in a pragmatic sense, it is often profitable for a methodologist to target projects at areas where their work is most welcomed, and where there is a willingness to implement ideas.

The use of user funding of methodological work by client areas would have the

advantage of ensuring that some form of cost benefit analysis was undertaken by clients in requesting methodological services, and would be likely to lead to high levels of implementation of the outcomes of shorter term projects. However, the disadvantages of charging users in situations where the methodology area is being asked to lead change and provide a statistical audit function, as well as to undertake strategic longer term projects, have prevented the ABS from using this approach to determining the methodology forward work program. Other means must be found to ensure the best results for the agency from the resources available.

### *4.1. Availability of skilled resources*

The availability of skilled resources affects the work program of the methodology area in two ways. Firstly, certain elements must be built into the program to ensure the ongoing availability of the required skills. These include appropriate recruitment action, training, and development activities. Secondly, the program must be planned to be achievable with the skills available, recognising the ongoing load that will be placed by ad hoc urgent requests for assistance. If too large a work program is attempted, it is likely the strategic issues will fall victim to the urgent day to day issues. Alternatively while work may be undertaken in certain new and important directions, this will be of the little benefit if insufficient resources are available for the required follow through with clients to ensure effective implementation.

### *4.2. Maintaining availability of methodological skills*

Looking first at ensuring the ongoing availability of the required skills in the methodology area, the main issues are recruitment, training and development, and retention. With regard to recruitment, the ABS methodology work program includes an annual specialist recruitment campaign, and ongoing liaison with universities to ensure effective recruitment approaches. As those recruited form the future skills of the area, recruitment is undertaken by senior methodologists.

The training that follows recruitment is a significant component of the work program both in terms of its provision and receipt. Undertaking methodological work, and in particular those aspects that involve playing a key role in achieving change within an organisation, requires not only statistical expertise but also a very good understanding of the practical constraints of the work area, and good interpersonal skills. Furthermore, the highly varied and often unpredictable nature of the work of a methodology area, and the need to be able to pursue long term objectives, while remaining responsive to short term and urgent needs, means that senior methodologists also need to be skilled managers and supervisors.

In the ABS, staff of the methodology area are relatively young and less experienced, compared to staff in other parts of the organisation. Over a third are new recruits to the ABS with less than two years work experience, another third have two to five years experience, while slightly less than a third have five or more years experience. To

ensure the availability of the right mix of skills, the training program for ABS methodologists incorporates the following elements:

- Training in survey methodology where this has not been adequately covered at university. (The ABS has developed a one semester undergraduate statistics course in survey methods which it presents at the Australian National University, and which it encourages other universities to present. As well, advanced courses are provided nationally in post graduate courses in some universities. Recruits to the methodology area of the ABS who have not undertaken these or very similar courses attend the courses at the Australian National University.)
- Attendance at conferences and workshops relevant to the work of the methodology area, as well as encouragement through paid study leave to undertake further, related academic training.
- Opportunities for on the job training. (This might involve design or redesign of smaller, less complex surveys that provide good opportunities for practical training, while not in themselves being of high priority; it also includes a weekly seminar series where particular work projects or areas of research are discussed.)
- A planned program of job rotation amongst methodologists to ensure exposure to a wide variety of statistical problems and collections.
- Opportunities for gaining a better understanding of client areas and survey processes by outposting to client areas. (Again the right opportunities may result in important but lower priority work joining the program.)
- General statistical training relevant to the ABS as a whole. (This provides an overview of the various elements of the agency's work program.)
- Management and supervision training.

The training component of the work program of the ABS methodology area is high partly because of the high turnover rate of staff in the area, and retention of staff is an important issue in the methodology area. Recruits join the ABS with strong quantitative and analytic skills, and these are further enhanced by training and practical application in survey methodology across all subject fields. Methodologists are therefore very attractive employees elsewhere in the bureau, in statistical areas of other Government departments, and in private enterprise. Those statisticians not attracted to moving to more practically oriented work, or enticed by high private sector remuneration, are often interested in research work and a university environment. An important element of retaining staff is to ensure job satisfaction. This may influence the work program of the area. In a methodology area it may mean allowing personal research interests to be followed where they are in line with the directions of the program priorities, despite possibly low levels of immediate pay-off. It may mean allowing researchers the opportunity to write up, present and publish work, building the time required for this into the work program. In a situation of strong and urgent demand for the methodology area to address priority agency issues, this must be carefully balanced, but time needs to be built into the program to cover research and publication of results.

### 4.3. *Implications of constraints on the available level of skills*

The above paragraphs have looked at the implications of maintaining a viable set of skills for the methodology work program. The other issue to be discussed in this section is the implications that available resources have on what can be undertaken in the work program.

In planning an effective work program, and considering an individual project as part of that work program, the following issues need to be taken into account in addition to whether the project, if successful, would be likely to make a significant contribution to corporate goals:

- the resources, including level of skills, required to undertake the research and investigative work;
- the likely level of support from the client area (for example, ensuring clean data are available for analysis, in collecting information needed in an analysis, setting flags and providing evaluation data);
- the resources required to implement solutions from the work (for example, to change systems to allow estimates to be calculated in a different way, or to provide training and documentation for the client area to effectively undertake new approaches);
- the willingness of the client area to implement solutions (and hence the resources that would be required to change the culture of the area to acceptance of the new approach);
- the support for the project from senior management in the agency, and its willingness to support the methodology area in any required culture change.

If there is a deficiency in any of these areas, it is unlikely the agency will reap the full benefits of the project. In the ABS, the work program is put together as the sum of a number of projects, both client initiated and methodologist initiated. When the projects are taken together as a whole, an attempt is made to ensure that all necessary support will be available.

Where a complex project on the work program has not been initiated by clients, but has strong management support, and particularly where it is expected that implementation of project results will need to be "sold" to the client area, it is recognised that experienced people will need to be available to ensure the success of the project. A number of projects that fall into this category in the ABS have been separated from the ongoing client support activity and included in a special projects area with a higher ratio of senior staff and with fewer administrative responsibilities. This allows the necessary senior level focus and follow-through of the project.

Part of the planning process for the methodology work program is to ensure appropriate resources are available from the client area to provide support for the project and to implement the outcomes. Where it is clear that the required resources, either in the methodology area or in the client area, are not available, projects are explicitly rejected from the work program for the current time, and relevant information provided to management. Recent examples of explicitly rejected projects on this basis are: further work on confidentiality of microdata

(given the low expectation of success in obtaining objective rules that provide reasonable release criteria, given past studies); generalised confidentiality tools (again because of the high cost to expected benefit ratio); sample redesign work on some surveys (system constraints and high costs of changes); and some small area estimates (the high cost of system requirements).

In summary, the influences on a methodology work program are many and varied. As well as the preplanned program, there will be a significant component that is made up of urgent needs and areas where priorities change on the detail of a work program on a daily basis. In planning the work program it is important to allow for this flexibility. At the same time it is important to map out broad areas to progress, and to ensure that projects undertaken are brought to completion, and outcomes implemented. The way the methodology area goes about its planning process in the ABS, incorporating changing priorities over the course of the year and gathering commitment for implementation, is set out in the next section.

## 5. The Planning Process in the ABS

A tiered planning process operates within the ABS. On the highest level is the mission statement and corporate planning, providing the broad objectives the organisation is striving to meet. Underlying this is the formal ABS Planning Cycle. This operates on a rolling three-year basis. Each year around June, divisions nominate the strategic issues that will drive the forward planning of the division in the three years ahead, submitting proposals for additions to the forward work program as well as options for savings that might free resources to meet the emerging client requirements. Following a series of corporate discussions on the priorities of emerging needs and the feasibility of savings, as well as the implications for the corporate budget, the forward program is completed around November and becomes the base for further planning.

The formal planning cycle for the ABS, described above, can generate major new projects for the methodology area, for example, the design of a new set of collections, or the cutting back of a collection with the intention of meeting data gaps through model based approaches. However, the detail of the work program does not fall from this process. Following the November finalisation of the ABS forward work program, there is a meeting of the Statistical Services Branch Advisory Group, consisting of the senior management team across the ABS. The aim of this group is to advise on priorities in the methodology work program across the bureau, given corporate priorities, and to identify impediments to progress in the work program or in the implementation of outcomes from the work program.

As well as meeting in November/December to look at the implications of the ABS three-year forward work program on planning for the methodology area, the Advisory Group also meets in April to look at short term issues, problems of resourcing, fine tuning of priorities, and implementation of outcomes.

For each meeting of the advisory group, a broad work plan for the methodology area is set out, indicating the main areas of development work, as distinct from ongoing maintenance or basic design work, to be pursued, the resources required

and the resources available, ranked by perceived priority. The paper also includes projects that cannot be part of the planned program due to lack of resources.

In addition to being cast within the frame of the corporate plan and the forward work program, these papers are developed on the basis of a program of ongoing consultation with client areas. An important element is regular consultation with the head of each of the subject projects to determine coming requirements in terms of support. From this consultation is developed a detailed forward work program, describing individual tasks and expected resource costs, proposed starting and finishing data, the methodologist responsible, and the client details. The forward work program is stored on an electronic data base accessible across the bureau.

This working level consultation is supplemented with twice yearly meetings with the executive of each client division (there are four such divisions in the bureau). These meetings are used to obtain a top-down view of priorities within the different client fields. It is often at these meetings that the main input in terms of corporate priorities for development, as distinct from basic maintenance and design, is provided. These meetings provide methodologists with a chance to explore areas of possible advance for the ABS and gauge the likely level of management support across senior management. The methodology area is also represented on peak internal ABS steering groups for the two broad areas of statistics, the Economic Statistics Steering Group, and the Social Statistics Steering Group, as well as numerous support committees that report to these groups. These groups also provide an important input to the methodology work program planning process.

Another important element in getting the proposed work program document together for the advisory group has been internal consultation within the methodology program. This gives senior methodologists a chance to get together and discuss priorities and opportunities. Brainstorming and discussion at meetings of methodologists from different areas of the program provide a fertile ground for the development of ideas and strategies to meet corporate goals. It also encourages ownership of the program developed.

An additional element of the consultation process in preparing a draft work program for the advisory group should be consultation with external researchers and other statistical agencies to identify issues possibly on the horizon for the ABS, or opportunities for shared work. At this stage the ABS does not follow a well laid out plan, although some consultation of this sort occurs, chiefly through forums such as national and international statistical conferences, and bilateral discussions with other agencies.

Once the Statistical Services' Advisory Group has agreed on the broad parameters of the work program, the remaining planning function is to establish workable project agreements between the statistical units that now make up the methodology program. In particular, there is a need to develop project agreements between the Central Office methodology area, and each of the small Maths Stats units providing support in the States Offices, where a number of the major collections are undertaken.

Progress against the overall methodology plans is monitored through the Forward Work Program data base and particular views from it, produced as regular reports. These are supplemented with an Annual Branch Report which focuses on progress

the branch has made against objectives, and what the branch hopes to achieve in the coming year. The branch report is discussed by the division heads and feedback provides input to the following planning round.

### *5.1. Sharing of plans between statistical agencies*

Currently the process of sharing work plans and progress reports among statistical agencies is one of visits, conferences, and journal articles. The latter mechanisms tend to provide information largely after the event, while the former can involve substantial expense, especially for geographically isolated countries such as Australia. It may be possible for methodological areas which produce forward planning documents to circulate them to other statistical agencies, as they are determined. Internet may provide an option for sharing information of this sort. Summarised annual reports might also be of use, together with a listing of reports and papers produced that are available to other agencies.