

# **A NATIONAL CENTRE FOR ALTERNATIVES?**

**COMMENTS FROM THE BOYD GROUP  
ON THE HOUSE OF LORDS SELECT COMMITTEE'S  
PROPOSALS FOR A CENTRE FOR THE THREE Rs**

**October 2002**

## SUMMARY

The recent report of the House of Lords Select Committee on Animals in Scientific Procedures recommends that a national Centre for the Three Rs be set up, but offers only brief arguments in support of the proposals. This discussion paper from the Boyd Group explores a number of fundamental questions that need to be addressed before any practical plans are made. In particular it should be asked:

(1) *Are there currently difficulties that hamper the development and implementation of alternatives?*

A variety of problems are suggested in this paper, including scientific, resource, information, and 'historical'/ 'attitudinal' difficulties. However, there are differences of opinion within the Boyd Group on whether and how far these actually constrain the development and use of alternatives in practice.

(2) *Following from this, in what ways might a new initiative contribute towards overcoming these difficulties?*

A variety of potential benefits are posited, including:

- providing a 'one-stop shop' for access to information on the Three Rs;
- bringing together the diverse expertise required to think creatively about means of developing non-animal and refined methods in particular cases, providing a focus for such work in the UK;
- stimulating, facilitating and co-ordinating (but not in itself providing) training to properly equip those involved to consider creatively and challenge the need to use animals in science.

(3) *How far are these potential benefits actually achievable? Would a new Centre or other initiative raise unrealistic expectations about possibilities for developing replacement alternatives?*

Opinions within the Boyd Group differ on how far a new Centre could contribute in advancing the development of alternatives, in particular because of disagreements about

- (a) the extent to which the integrated complexity of living systems presents a barrier to the development of non-animal alternatives, and
- (b) whether it would be possible to garner the diverse expertise needed to 'spot the potential' for new or improved applications of the Three Rs across a wide variety of scientific fields.

However, the possibility that a new initiative could improve information exchange on existing alternatives is more widely agreed.

(4) *Could these benefits be achieved under existing arrangements, and what added value might a new initiative bring?*

It is noted that a range of organisations already carries out the kinds of activities listed under 2 above. Some participants believe that a new organisation would simply further divide scarce resources (contributed by government, industry or the public), and add costs through yet another administrative system. But others believe that existing initiatives on the Three Rs are currently rather piecemeal and that there is a need for better co-ordination of all these efforts and a more targeted approach in the development of alternatives to animal use.

(5) *If a new initiative is deemed worthwhile, how should it be organised and funded?*

It is noted, in particular, that to be more than a cosmetic, PR exercise, the Centre would have to have sufficient expertise, independence and credibility to bring tangible benefits and command widespread confidence. It is also emphasised that, to achieve any benefit at all, a new initiative would require adequate, long-term and guaranteed funding, and that this would require big, new Government money. Before the possible structure of a national Centre is further discussed, there must be clarity and agreement about what it can reasonably be expected to achieve, and why this cannot be achieved in less costly, and perhaps more efficient, ways. Further questions for in-depth discussion are listed.

In particular, in determining the likely value of a new national Centre, there are needs:

- a) to determine whether it is possible to identify specific areas of research, or research techniques, that might be new and fruitful areas for investment in research on alternatives; and
- b) to examine how well other national or international centres have performed in terms of replacing, reducing or refining animal methods in biomedical research or toxicology- so as to learn from experience.

The Boyd Group is now beginning work to attempt to pin-point examples of *particular* needs that a new initiative could address.

# A NATIONAL CENTRE FOR ALTERNATIVES?

---

---

## 1 Background to the Boyd Group's comments

Following discussions between Colin Blakemore, Peter Tatchell and Gill Langley, a small group, which included some members of the Boyd Group, came together last September to discuss Peter's concerns that animals are being used unnecessarily in biomedical research, that there is far more potential to develop replacement alternatives, and that there should be more money committed to research to develop alternatives. This group met three times face-to-face and also engaged in lively e mail discussion of constraints and barriers that might limit the development and use of alternatives, including the issue of adequate funding; and practical ways in which these difficulties might be overcome.

In May 2002, some members of the small group re-convened, with some new participants, as a sub-group of the Boyd Group, in order to examine and evaluate in detail the arguments for and against a Centre for Alternatives, and/or other methods of targeting more effort and resources specifically to the development of alternatives, particularly replacement alternatives.

The following are participants in the current Boyd Group sub-group: Colin Blakemore; Krys Bottrill; Kenneth Boyd; Simon Festing; Brian Furman; Bryan Howard; Robert Hubrecht; Tony Peatfield; Barry Phillips; Vicky Robinson; Les Ward and Jane Smith.

Most of these people also participated in a House of Lords Select Committee Conference on animals in scientific procedures, held towards the end of Committee's evidence taking. Within this conference, a Working Group on Centres for Alternatives found "a remarkable degree of consensus", concluding that an independent, "hub and spokes model", alternatives centre should be set up.

The House of Lords Committee, taking note particularly of the conclusions of this conference, and also evidence from ECVAM, the OECD and the John Hopkins University Centre for Alternatives in the USA, has now recommended that "a Centre for the Three Rs be set up, consisting of a small administrative hub which co-ordinates research units embedded in existing centres of scientific excellence". The research units would "draw on existing expertise in research centres at universities and medical schools and act as drivers to incorporate research into the Three Rs into the everyday business of research science".

The Government is required to respond to the House of Lords report within 6 months. The following 'points for consideration' have been made in e mail discussions between participants in the Boyd Group's sub-group, and this discussion paper has been agreed by the whole Group.

## 2 Questions for consideration

The Lords Select Committee offers only brief arguments in support of its proposals for a new centre for alternatives. Before considering the specific proposals made in the Committee's

---

\* HL Paper 150-1 (2002), page 39. The Conference Proceedings are found in Appendix 4, pp. 66-76.

report, some more fundamental questions should be asked, in order to evaluate the strength of the case for a new initiative in this area. These questions include:

1. Are there currently constraints and difficulties which hamper the development and implementation of alternatives?
2. If so, in what ways might a new initiative contribute towards overcoming these difficulties?
3. Are the kinds of potential benefits claimed for a Centre or other new initiative actually achievable? That is, are they *likely* benefits?
4. If there are likely benefits, could these be achieved by existing organisations? What added value might a new initiative bring?

Finally, if there are persuasive arguments that a new initiative would be worthwhile:

5. Would the 'hub and spoke' structure envisaged in the House of Lords report be the most appropriate model? If so, how exactly should it be organised and funded?

Boyd Group discussions have (at least) touched on all these questions, each of which is considered below.

### **3 What is meant by 'alternatives' in this context?**

In considering the arguments for and against a centre for alternatives, it is important to be absolutely clear what is meant by an 'alternative'. To have an alternative is to have more than one equally valid and effective means of achieving an objective. In the present context the goal is to find alternatives that reduce the harms caused to animals in particular experiments or procedures. In this sense, the term is not restricted to non-animal methods, but also includes animal-based approaches that involve fewer animals or cause less animal suffering. Nevertheless, the main focus of our discussions has been on possibilities for advancing the development of non-animal alternatives (replacement alternatives) since this is the area in which there is most debate about potential to enhance progress, and which provided the original impetus for the small group.

### **4 Are there currently constraints on the development of such alternatives?**

Participants in the Boyd Group have identified a number of difficulties that might limit the development of alternatives, particularly replacement alternatives - but there are differences of opinion on whether and how far each of these actually poses problems in practice.

The constraints include:

*(1) Scientific constraints:*

Clearly, there are scientific obstacles in developing relevant, reliable non-animal methods that can mimic the complex integrated physiological systems of humans and other animals. However, such scientific barriers are likely to be stronger or weaker in some cases than in others, and will need to be considered case-by-case.

*(2) Resource constraints:*

Although much of the research sponsored by the funding councils and medical charities is actually non-animal based, very little funding is directed towards research specifically focussed on the development of alternatives. Organisations such as the Dr Hadwen

Trust, FRAME, Lord Dowding Fund, the Home Office (via the APC), and the MRC offer only limited funds for work specifically dedicated to the development of alternatives. Moreover, the question of time is also important, since if researchers take time away from goal-oriented research in order to develop different (non-animal) approaches to the scientific questions, they can lose pace with competitors who continue to use animal methods.

(3) *Information constraints:*

In order to obtain licences for animal work, scientists have to show the steps they have taken to consider and incorporate all Three Rs into their research plans. However, accessing information about available alternative approaches to particular scientific questions can be difficult, partly because such information is not always published, and, even when it is, is not usually indexed so as to highlight the Three Rs.

(4) *Other constraints:*

Other constraints might arise for more 'historical' reasons. If researchers have used animal methods in the past, they may be reluctant to change their methodology, since findings obtained with the new methods may not be comparable with their historical data. Further than this, it is noted that animal methods are very much a standard part of biomedical research methodology - and have been ever since experimental physiology took off in the mid-nineteenth century - and some participants argue that a change of 'mind-set' is required in order to progress the development of alternatives.

These difficulties might apply in all areas of animal use in biomedical science. However, and arguably, most obvious concerted efforts to overcome them are currently underway in the field of regulatory toxicity and efficacy testing, which comprises around twenty per cent<sup>1</sup> of all animal use in science. Indeed, when commentators speak about progress and possibilities for developing replacement alternatives they often do this with reference to regulatory testing, rather than biomedical research generally, but do not necessarily make this limitation explicit.

This focus on regulatory tests might be because organising concerted efforts to develop alternatives to current uses of animals in biomedical research is perceived as more difficult when compared with regulatory toxicity and efficacy testing - for some or all of the following reasons:

- the scientific questions addressed in research (as opposed to regulatory testing) are enormously more diverse and open-ended, with less predictable outcomes;
- concomitantly, regulatory testing tends to involve standardised tests which are repeated (on different chemicals) many times the world over, whereas there is a much greater diversity of methods and approaches in biomedical research, many of which are developed and used on a relatively small and/or short-term scale;
- there are no standardised criteria for validation of alternative methods in biomedical research in general;
- in regulatory testing (as currently practised) the method used is of central importance, whereas research is not method-led, but question-led;

---

<sup>1</sup> Statistics on Living Animals. Home Office. 2000. Biomedical research comprises around seventy per cent of scientific use of animals in Britain. The remaining ten per cent of animal use includes production of biological materials, education and training, forensic enquiries and direct diagnosis of disease. However, the seventy per cent biomedical research figure includes breeding genetically modified animals and harmful mutants, if this category is excluded, the proportion biomedical research figure drops to 44%.

- regulatory testing is mostly carried out by industry, which has devoted large financial resources and considerable time and managed effort to the development and implementation of alternatives.

Opinions within the Boyd Group vary concerning whether and how far a new initiative on alternatives could help to overcome some or all of these constraints described above. The debate within the Group is reflected in the comments below, and some emerging points of consensus are also highlighted.

## **5 In what ways might a new initiative help to overcome these difficulties?**

The Lords proposals envisage a centre that would both drive and co-ordinate research in the Three Rs and provide a forum for sharing information. The following *potential* needs for, and benefits of, a new initiative(s) have been identified in discussions within the sub-group:

### **5.1 Access to information on the Three Rs**

Regarding access to information, some participants believe that there is a need for a "one-stop shop" offering:

- specialised literature and other searches of existing Three Rs and general information resources;
- training of librarians, information scientists and scientists in how to obtain information on the 3Rs;
- production of educational materials to support training; and
- liaison with other information initiatives here and abroad, eg Altweb, the I3R Group, AWIC, ZEBET etc.

It is suggested that such a centralised service could have a number of advantages, in that it could:

- provide access to a large number of databases, which might not be available locally because some institutions do not subscribe. For example, although information professionals with experience of searching for alternatives information advise licensees not to rely solely on Medline searches, researchers may not have easy access to other useful databases such as Embase or Biosis;
- offer the specialist skills and experience required to mount effective searches for information about the Three Rs. At present, scientists are not particularly knowledgeable about how to search such information, particularly because they are likely to need to search for Three Rs information only once in a while, and generalist librarians are often not au fait with the 3Rs. Moreover, academic establishments may be able to offer only limited assistance due to increasing financial constraints on library services. In contrast, professional information scientists working in a centralised service, fielding such requests on a daily basis, would develop high levels of expertise in searching for different types of information; and
- with time, develop a "bank" of search strategies, so that recurring questions could be instantly - simply by updating a previous search, rather than starting from scratch each time, as individual researchers would have to do.

To support and facilitate this role, participants are agreed that there are needs for journals publishing biomedical research papers to:

- actively encourage papers that describe advances in the Three Rs; and
- include widely agreed Three Rs terms in abstracts and key-words, so that the terms will be clearly indexed and the papers can be accessed easily via databases.

It is recommended that a meeting with journal editors be convened at the earliest opportunity in order to pursue the above goals.

## **5.2 Research in the Three Rs**

Another possibility is that a new initiative could be used to help to bring together the diverse expertise required to think creatively about means of developing non-animal and refined methods in particular cases, and to provide a focus for such work in the UK. In particular, it could

- (i) identify new opportunities and priority areas for research to develop non-animal or refined methods;
- (ii) define any scientific obstacles in these areas, and propose research needed to overcome them; and
- (iii) investigate, recommend and pursue strategies to (a) facilitate such targeted research and (b) promote the use of validated alternatives (or ask different kinds of questions in the first place), wherever possible.

It is also argued that there are particular needs for such a new approach in advancing the application of the Three Rs in *biomedical research*, rather than regulatory testing, because:

- the development of replacement alternatives is often perceived as more problematic in this area (see 3 above); and
- a range of targeted initiatives (e.g. by industry, regulatory authorities and organisations such as ECVAM and ICVAM, as well as academic researchers) are already underway in the field of regulatory testing.

However, opinions differ within the Boyd Group on both of these points - see remarks in sections 6 and 7 below.

## **5.3 Training**

In its proposals for a centre on alternatives, the House of Lords report does not explicitly mention a role in provision of training. It is vital that all those who use animals in science are properly equipped and motivated to consider creatively and challenge the need to use animals. Better training could help to achieve this. Some participants suggest that a new initiative could enhance the provision of training, by stimulating, facilitating and co-ordinating (but not itself supplying):

- education about the ethics of animal use (include possibilities for implementing the Three Rs) as early as possible in scientific careers - i.e. during undergraduate and postgraduate education;
- as part of this, better statistics training for all (potential) laboratory animal users, so as to facilitate optimisation of animal use and so better implement the strategy of Reduction;

- opportunities for licensees to attend specialised training relating to specific research areas or particular techniques, most likely in collaboration with the relevant professional scientific societies.

## 6 How far are these potential benefits actually achievable?

Here, discussions within the Boyd Group have focused on the question of whether and how far a new initiative would raise unrealistic and/or unachievable expectations. Some of those who are sceptical of the value of a new initiative point out that although, politically, it is likely to be an attractive idea which the Government will want to implement, it is important that the proposal is properly thought out so that practical and relevant objectives can be met. In particular, some participants suggest that it is likely that any new structure will raise hopes regarding cessation of animal experiments which will later be dashed, and that this would be a 'PR own goal' for all sides in the debate.

On this point, there has been particular debate within the Group about the extent to which the integrated complexity of living systems is a barrier to the development of non-animal alternatives. Some participants emphasise the difficulties that such scientific problems pose, and argue that a targeted approach may not make a difference, because:

- a) scientists already use non-animal methods wherever possible and, in fact, most biomedical research involves *in vitro* studies; but,
- b) often, the *only* way to answer these questions is to use animals and it will be scientifically impossible to develop alternatives that can adequately mimic all the integrated physiological processes of intact animals.

However, other participants believe that this stance pre-judges the issues that could be addressed by a new initiative, and neglects the fact that 'biomedical research' covers a very wide range of activities which are conducted by scientists with a wide variety of skills, experience, awareness of alternatives, and access to relevant facilities.

Although it is clear that much biomedical research involves use of non-animal methods or techniques, it is important to recognise that these methods are not necessarily developed or used as 'alternatives'. For example, cell culture was developed as a method for studying cell biology and events at the cellular level, not as an 'alternative to using animals' - but certain specific applications, such as monoclonal antibody production, *have* become alternatives to animal methods. During the course of their work, scientists have developed, and will continue to develop, non-animal techniques that potentially can provide alternatives for certain procedures or types of experiment, but recognising that these are potential alternatives, developing and promoting them as alternatives (to specific animal procedures) is not often the main objective of these scientists. It is suggested that this is what a new initiative could concentrate on. The first phase would be to spot a method or technique's potential as an alternative; and the second would be to commission targeted research, with a high perceived chance of success, to explore and exploit that potential.

However, against this, it is also pointed out that it would be difficult to garner sufficient diverse expertise to spot the potential for techniques to be used in different types of study. It is argued that this would require experts in every field of animal use, and, moreover, that in this context the current system in which a scientist assesses the literature and sometimes spots something that may have relevance to his or her own work is the only practical feasible method.

On a more positive note, although the likelihood that such a new initiative could contribute in developing *new* alternatives is disputed within the Boyd Group, the potential for a new initiative to improve information exchange on existing alternatives is more widely agreed.

## **7 Is all this already attended to adequately elsewhere?**

The House of Lords report concludes that there is a need for what could be called 'strategic planning' on development and implementation of the Three Rs. However, it is important to recognise that there are already in existence a number of structures and organisations, such as APC, BBSRC, CBPAR, Dr Hadwen Trust, FRAME, industry, LASA, RSPCA and UFAW, that do carry out the kinds of strategic activities listed in paragraph 7.20 of the Lords' report, and also described in section 5 above.

The APC is charged with providing strategic advice, and funds 3Rs projects, and all the other organisations are active in research and/or education on the Three Rs (or will be in the case of CBPAR, which is new). For example:

- for more than ten years now, FRAME, RSPCA and UFAW, together with the BVA.AWF, have been bringing together relevant experts in 'refinement workshops' to draw up guidance to promote refinement of particular techniques in laboratory animal use, including removal of blood from laboratory animals, refinements in rabbit, mouse and bird husbandry, and production and use of transgenic animals;
- UFAW also plays a strategic role, providing information on the Three Rs (books and the Animal Welfare Journal), and encouraging the development and uptake of the 3Rs through its research programme (studentships, fellowships, etc), funding 'alternatives science' at high quality institutions such as Oxford, Bristol and Edinburgh universities;
- FRAME and Dr Hadwen Trust fund and co-ordinate alternatives research in both industry and academia. This includes strategic activities. For example, FRAME has a Reduction Committee that brings together relevant experts to pursue strategies for reducing animal numbers in research and testing;
- research council workshops to address strategic and particular issues are not uncommon. For example, only recently the BBSRC held a joint workshop with the MRC on "New approaches to animal welfare";
- the PHHSC (Pharmaceutical housing and husbandry steering committee - established by UFAW) provides a forum for industry, together with UFAW and the RSPCA to prioritise and fund housing and husbandry refinement research in a way that meets the needs of industry and the animals.

Some participants in the Boyd Group remain unconvinced that a new Centre or other initiative could bring advantages that are not already realised under existing arrangements and that any new organisation would simply further divide scarce resources (contributed by government, industry or the public), and add costs through yet another administrative system.

Others, however, believe that, while there is a range of existing initiatives on the Three Rs, these are currently rather piecemeal and there is a need for better co-ordination of all these efforts, and implementation of a more targeted approach in the development of alternatives to animal use. A new Centre, it is argued, could facilitate the development of new Three Rs strategies and encourage implementation of existing as well as new strategies - particularly in relation to replacement alternatives in biomedical research.

## **8 Questions and comments regarding the Lords committee's proposals**

It is clear from the forgoing remarks that opinions differ within the Boyd Group on the likely value and practicality of any new initiative on alternatives. The House of Lords Select Committee, however, recommends a particular approach and this deserves further comment.

The Lords Select Committee recommends that the new initiative should be a Centre for the Three Rs, organised according to a "hub and spokes" model. That is, "a collection of small devolved units", with the hub being an "administrative" centre to act as an information portal and co-ordinate the "small research groups", which form the spokes. The Lords envisage that funding would come "jointly" from Government, industry and animal welfare charities, and that the centre would "co-ordinate the Government spend on the Three Rs across all departments. It also recommends that the current APC alternatives research budget (£280 000) "be given to the Centre to disburse".

However, beyond these general comments, there are no further detailed proposals for the organisation of such a Centre, and a number of questions and potential objections remain to be explored. The following points have been made in the Boyd Group's discussions thus far:

### **8.1 Organisation**

#### *(1) A virtual hub, or a more physical presence?*

For the purposes of information access and exchange (see 5.1), it is feasible that the hub of an alternatives Centre could be virtual. Provided that all the materials were digitised, the information specialists involved could be based at home or in other institutions around the country, linked via the internet, and telephone diversions set up from a central enquiry number.

However, if the Centre is to have more of a strategic research planning role (see 5.2 and 5.3), there should be more substance behind it. These functions imply some degree of central control, which is unlikely to be achievable via a loose confederation of spokes, linked by the Internet.

Of course, a virtual Centre would be much cheaper than a physical one, but is likely to be more limited in what it can achieve. See 8.2.

#### *(2) How to involve the necessary expertise?*

If the Centre's aim is not only to improve access to information and training of scientists but also to advance research on the Three Rs, it will require considerable scientific credibility - particularly if it is to influence decision-making by mainstream funding bodies. Who would have the necessary credibility and expertise to 'spot the potential' (as suggested in section 6 above) and how would these people be brought together to achieve that goal?

If such a Centre is to command the widest possible confidence (as the Lords report suggests is an aim), how would it be ensured that the Centre was viewed as sufficiently independent, egalitarian and effective? To command confidence, animal welfare (and some participants argue, anti-vivisectionist) organisations should be involved, as well researchers themselves. How could this best be achieved? Would they be part of the hub and/or the spokes – or might some alternative be envisaged?

(3) *How would the 'spokes' operate in relation to the 'hub'?*

Where would the funding for the spokes come from? What resources would they have? How would the value of their work be judged and how would their targets be set?

(4) *What would be the relationship of the Centre with existing organisations (see 7)?*

Would these organisations send representatives to the hub of the Centre, or would they be the spokes, or could there be another relationship? Have tasks been identified that are not already adequately covered by existing organisations and to which a new Centre could add value? Could the existing structures/organisations take on the tasks envisaged for the Centre by the Lords committee?

Would it be intended that the Centre would become a 'national platform' that could apply for membership of Ecopa, and, if so, what would its relationship to the Boyd Group be<sup>2</sup>? Would it be a better, cheaper and more efficient strategy for those organisations with a special interest in alternatives but which are not currently members of the Boyd Group to join it and hence strengthen its capacity to deal with the issue of alternatives?

## **8.2 How would such a Centre be funded?**

To achieve any benefit at all, a new initiative would require adequate, long-term and guaranteed funding.

Would industry and animal welfare organisations, as well as Government, be willing to fund such a Centre? As already noted, unless there was big, new Government money to support the initiative, this could result simply in the further division of already scarce resources. Moreover, in practice, it is likely to be difficult for individual organisations to devolve budgetary control to another organisation (that, presumably, might not always act in accordance with the contributing organisation's ideals).

Could the aims outlined in the House of Lords report be addressed by increasing resources to existing organisations? And/or by increasing the APC's budget, so as to allow it to address more projects and work in a more strategic way?

## **9 Conclusions**

It would be premature to recommend the establishment of a national Centre for the Three Rs, before a critical analysis has been made of the need for such a Centre, and its potential value in helping to develop or encourage the use of alternative methods. If there is to be such a Centre (or other new initiative), it has to have widespread support, and be perceived as an initiative that is likely to bring tangible benefits, rather than a cosmetic, or PR, exercise without substance.

Our discussions to date suggest that the scientific community would be supportive of some of the suggested functions of a Centre, such as provision of information on alternatives, but sceptical of its potential value in other areas such as co-ordinating funding for research on alternative methods. Some organisations already active in the development and promotion of alternatives (including research organisations) doubt whether a central organisation would have added value; others support the Lords' proposals.

---

<sup>2</sup> The Boyd Group currently represents the UK as a national platform in Ecopa - the European Consensus of National Platforms on Alternatives.

Before the possible structure of a national Centre is discussed, there must be clarity and agreement about what it could reasonably be expected to achieve, and why this cannot be achieved in less costly, and perhaps more efficient, ways.

Further, in-depth discussion and investigations should be undertaken to address questions such as:

- a) Is there reason to believe that greater co-ordination of effort in research on alternatives would increase the effectiveness of such research efforts, and is a national Centre the best means to achieve such co-ordination?
- b) Is it possible to identify specific areas of research, or research techniques, that might be new and fruitful areas for investment in research on alternatives? Is there any likelihood that a national Centre could identify such areas?
- c) How well have other national or international centres performed in terms of replacing, reducing or refining animal methods in biomedical research or toxicology? What can we learn from their experience?
- d) Would all parties (scientists, animal welfare, government etc.) agree that a national Centre for information on alternatives would be valuable and could be cost effective?
- e) Can a case be made for a national Centre as a public information/education establishment, to explain the availability, limitations and scientific problems associated with alternatives?

The Boyd Group is now beginning work to attempt to identify *particular needs* that a new initiative could address (that is, what one participant has termed a kind of 'gap analysis').

*The views expressed in Boyd Group documents are not necessarily the official views of the organisations from which participants come.*