

# **A Report of the BRIC Meeting to discuss Current Success and Future Opportunities**

**Held at 28 Portland Place, London  
16 June 2008**

## **EXECUTIVE SUMMARY**

A meeting was held on 16 June 2008 to consider how we measure the success and impact of BRIC to date and the type of activities that are required to take BRIC forward and what the potential future opportunities are. The workshop was attended by members of the BRIC Steering Group, BRIC Club Members, BRIC grant holders, bioProcessUK, the BRIC Programme Manager and representatives from BBSRC and EPSRC.

The meeting comprised three introductory talks and two breakout sessions in which participants discussed measuring the success and impact of BRIC and the potential future opportunities for BRIC. The following points were highlighted:

### **Benefits of BRIC to the UK bioprocessing community**

- Excellent multidisciplinary research is being funded through BRIC with the expectation of longer term delivery of commercial value.
- BRIC is a great benefit to the bioprocessing community with international recognition and is much more than 16 individual grants due to the co-ordinated activities associated with the Club. It has provided a critical mass of research, people and facilities that would not have been possible through responsive mode funding alone.
- BRIC bridges the gap between Research Council responsive mode funding and the TSB CR&D funding.
- BRIC is building an active bioprocessing community with members having access to leading expertise, facilities and materials.
- Through the dissemination events the BRIC community is really starting to develop and has the ability to attract new talent into the area.
- Academics have a much broader sense of the industrial challenges than would be achieved through individual 1:1 collaborations.
- BRIC is starting to provide funding to build the critical mass for the bioprocessing Centres of Excellence recommended by the BIG-T report to come about with departments focusing on bioprocessing.
- Skills needs are beginning to be addressed with BBSRC funding a total of 14 Targeted Priority Studentships in four member institutions and 13 Industrial CASE studentships with seven BRIC companies.
- PDRAs and postgraduates funded in bioprocessing gain invaluable skills in training at the commercial interface with a greater understanding of the problems faced by industry.
- BRIC provides a great opportunity for the PDRAs to work closely with some of the leading bioprocessing industrialists and to gain an advantage over other post doctorate researchers for their future careers.
- Since its launch 5 new companies have signed up to BRIC including 3 in the area of stem cells.

Plans are now being developed to capture and measure the successes of BRIC and build “case histories” to strengthen the case for further support.

## Potential future opportunities for BRIC

It is critically important to build on current success, as well as taking forward the outputs to ensure they are translated into commercial success (potentially with the TSB).

- It is key that industry continues to contribute widely to BRIC for example providing access to materials, facilities and expertise, ensuring the research focuses on industrial needs and challenging the academics.
- More research funding should be made available in the form of research grants funding all the themes identified in the BRIC strategy, building on those projects already funded to take the research to a commercial level and to build long term critical mass and increased capacity for research and training.
- Areas of research that were highlighted as new areas that should be covered by the BRIC remit or where little research had been funded through the calls to date:
  - Stem cell bioprocessing/ regenerative technologies
  - Protein chemistry, protein design for manufacturability
  - Formulation linked into process development design / process in silico prediction
  - Process Analytical Technologies (PATs)
  - Modelling / data handling
- Further funding for previously funded grants should include:
  - “Follow-on Funding” support to help take the research closer to market e.g. money from the TSB for collaborative research to take the research to a commercial level
  - Post-BRIC placements in industry to help maximise the potential of the research projects and train the PDRAs in an industry environment
- Industry relevant training should be made available at all levels including secondments of more senior staff with time spent in industry, post-BRIC placements for the PDRAs and Industrial CASE awards for studentships directly related to the BRIC projects.
- Industry relevant training in bioprocessing should also be available with modules both in academia and industry potentially to give a recognised Masters in Bioprocessing qualification.
- Networking should be continued through the dissemination events, wider conferences, smaller specialised seminars and special interest group roadshows.
- An electronic forum such as a newsletter or web based bulletin board for BRIC Club Members should be set up to share information such as publications, new IP, presentations, seminars, meeting and jobs.
- A database of “who’s who” in BRIC and all the associated postgraduates would be a useful tool for the community.

It is proposed that a working group is set up to develop plans for future activities reporting to the BRIC Steering Group as appropriate.

## **BACKGROUND**

The Bioprocessing Research Industry Club (BRIC) was established in July 2005 as a mechanism to invest funds in industrially-relevant bioprocessing research. The objective of the club is to support innovative research in bioprocessing underpinning the needs of UK industry and to ensure effective knowledge and skills transfer between the science and engineering base and industry. BRIC also provides mechanisms for the dissemination of research outputs and networking with industrial Club members. BRIC is funded through BBSRC and EPSRC and Industrial Club members who make annual contributions to a joint Research Council - industry fund to support research projects. BRIC is jointly managed by BBSRC and [bioProcessUK](#), the TSB-funded Knowledge Transfer Network.

The aims of BRIC are to strengthen and develop the research community in bioprocessing and improve academic-industry links by supporting innovative bioprocessing-related research projects and networking activities. BRIC will support industrially-relevant research projects in academic institutions from a joint fund in excess of £14M ~ £1M of which comes from industry contributions.

BRIC will operate for 5 years from 2006 to 2011 and will support research projects through three rounds of funding with the first two rounds of awards made in 2006 and 2007, and the awards for the third round will be announced in September 2008.

The first call was broad and covered the two main themes of the BRIC remit; Bioscience underpinning bioprocess improvement and New tools for bioprocessing. The second call focused on three areas; Understanding, controlling and manipulating cell metabolism in microbial fermentations, Advances in downstream processing including formulation and Tools to accelerate bioprocess development. The third and final call to BRIC focused on bioprocess integration with three priority areas; Alternative processes for the recovery and purification of biopharmaceutical products, Bioprocess integration and intensification for biopharmaceutical manufacture and Quantitation and characterisation of products and impurities in biopharmaceutical manufacture, covering products which fall into the broad groupings of therapeutic proteins (antibodies, cytokines etc), megamolecular complexes (viruses, plasmids, multi-component assemblies) and cellular formulations (stem cells, differentiated cells, tissues etc).

Although it is still early days in terms of BRIC activities with dissemination events and projects continuing until 2011, the funding for research projects will be fully allocated by September 2008. There is a need to maintain the momentum of BRIC and therefore it is timely to look at what should follow BRIC. In March 2008 the BRIC Steering Group started to consider the evaluation of the success of BRIC and potential future opportunities and it was decided to hold a separate meeting in order to explore this in more detail.

## **AIMS**

The aim of the meeting was to:

- consider how we measure the success and impact of BRIC to date and what evidence is required to demonstrate this;
- consider the type of activities that are required to take BRIC forward and what the potential future opportunities are;
- produce a list of priority activities to be considered by the BRIC Steering Group and to be recommended to BBSRC/ EPSRC and other funding bodies as appropriate.

## **PARTICIPANTS**

The workshop was attended by members of the BRIC Steering Group, BRIC Club Members, BRIC grant holders, bioProcessUK, the BRIC Programme Manager and representatives from BBSRC and

EPSRC. Representatives from the TSB and BERR were invited but unable to attend. A list of delegates can be found at Annex 1.

## **MEETING STRUCTURE**

The meeting comprised three introductory talks and two breakout sessions. The agenda can be found at Annex 2.

Professor John Birch (Lonza Biologics and Chair of the BRIC Steering Group) gave a welcome presentation highlighting the aims of the meeting Dr Mark Carver (Avecia and BRIC Steering Group) on the background to how BRIC developed following a working group to highlight industrially relevant research areas. Mark had given a presentation to BBSRC Strategy Board in July 2004 to bid for funds. Professor Andy Lyddiatt, the BRIC Programme Manager, gave an overview of the progress to date of BRIC activities highlighting how the three calls had evolved the priority areas they covered and the areas of the BRIC remit which had received funding. The presentation slides are attached at Annex 3.

Two breakout sessions were held in which participants were divided into four groups (Annex 4). These were run according to the agenda. Each group was pre-ordained to ensure a mix of Steering Group and Club members and academics.

## **SYNOPSIS OF THE BREAKOUT GROUP DISCUSSIONS**

### **Session 1: Measuring the Success and Impact of BRIC**

The aim of this session was to consider the evidence that will demonstrate the impact of BRIC and the mechanisms of gathering that information. To ensure BRIC's successful future development it is important that the extent to which the Club is meeting its aims is determined. Therefore, even though the first round of projects have been running for approximately 18 months, it is still necessary to start to consider the assessment of the outputs of research funded under BRIC and the wider success of the Club activities. A logic chart has been developed to highlight the immediate outputs, intermediate impacts and the ultimate outcomes of BRIC (Annex 5). The groups were invited to discuss how we can best capture the outputs of BRIC in the short-term and in the longer-term to demonstrate the impact of BRIC activities in order to decide the best approach for taking the Club forward and ensuring that research outputs are translated into commercial success and a strong bioprocessing sector.

### **Scientific Outputs**

Overall there was a general consensus that BRIC was of enormous benefit to the bioprocessing community both for academia and industry. However there is a need to change the mindset of the BRIC members both academic and industrialists to document any outputs arising from BRIC. Some of these outputs will be easy to capture through the BRIC annual reports whilst others will be more difficult to quantify and will require input from the BRIC Club Members. BRIC is not all about clear short-term tangible benefits but about creating a community and underpinning the future of the bioprocessing industry bringing in new people and new approaches. The BRIC Programme Manager should encourage the BRIC grant holders to report any activities and outputs that can be related to their BRIC grant.

Examples of outputs that should be captured through the annual reports from individual research projects are:

- Publications (look at the impact factor of the journal within its sector)
- Citations in international journals

- Patents
- Conference presentations
- Conference posters
- Visits to and from Club Members
- Visits to and from other BRIC research groups
- Special interest groups that have arisen
- Seminars internal/ external that have been held

The science may not be mature enough yet to capture many outputs and therefore it may be necessary to use forecasting as an indicator of what might be achieved. A clearer measure of how “on track” the projects are is needed.

It was suggested that a survey of all the industry Club Members should be undertaken at the same time as the annual reports are completed by grant holders to gather information on the measurable benefits to the Club Members as well as grant holder activities. Examples of information that could be gathered from the survey are:

- Number of industrial members attending the dissemination events
- Number of new BRIC Club Members that have joined since its launch
- Meetings/ Seminars with academics outside of the BRIC dissemination events
- In-kind contributions of time at dissemination events – how many industrialists attend the events
- In-kind materials provided
- Knowledge / Technology transfer that has occurred and brought about changes within industry that is not covered through patents or publications
- Access to academics to discuss scientific problems
- New collaborations made through BRIC
- Industrial CASE studentships
- Other activities that have been stimulated by core BRIC activities

A survey has now been sent out to all BRIC Club Members and a copy is attached at Annex 6.

There are many other benefits to BRIC as a whole the benefits of which may need to be co-ordinated through a professional evaluation. For example the infrastructure that has been funded to perform the research with new researchers working in bioprocessing, new facilities and tools funded and the total number of researchers working on solving industry-related bioprocessing challenges. How many new PDRAs and post graduates are now working in bioprocessing that will become potential new recruits for industry through their training on the BRIC grants? How many people have attended the call workshops? Were any connections made but not followed up with a BRIC grant application? Sessions focusing on BRIC research have been held at existing meetings e.g. ESACT and the bioprocess UK annual meeting which should be included in any evaluation.

To understand the benefits to the community of BRIC and all its activities it will be important to have a baseline with which to compare the outputs. For example would any of these projects been funded pre-BRIC through BBSRC/ EPSRC responsive mode calls and would industry have known about this work. What was the number of grants funded in bioprocessing pre-BRIC and has the success rate increased since its launch? How many people were doing research in this area pre-BRIC?

It was agreed that BRIC has filled a funding gap between the Research Councils and TSB and is much more than 16 individual grants due to the co-ordinated activities associated with the Club. It has lead industry and academics working together in this area to solve generic problems and the funding of the research projects has provided the first step to developing the bioprocessing Centres of Excellence as envisioned by BIG-T to come about with departments focusing on bioprocessing. There

is also evidence that BRIC is gaining international recognition with some industrialists commenting their US counterparts have little access to Universities and lead academics.

### **Training and Studentships**

In the longer term BRIC aims to develop skills and train new people in bioprocessing. BBSRC has funded a total of 14 Targeted Priority Studentships in four member institutions through two calls in 2006 and 2007 with another call planned for 2008. In addition bioProcessUK has worked with several Club Member companies putting Industrial CASE studentship applications together and 13 studentships have been funded in seven bioprocessing companies. It is unclear how many of the standard BBSRC Doctoral Training Grants and CASE awards relate to bioprocessing but it was recommended that a database of students should be collated with information on the projects they are working on. In addition an attempt should be made to track their careers which would add to the impacts of BRIC. A recommendation was made to include postgraduates relating to BRIC grants at the dissemination events and possibly include the IChemE Young Bio Researchers.

Postdoctoral training is a key component of BRIC training new researchers in the field of bioprocessing and providing them with a greater understanding of industrial problems than with a standard grant. The PDRAs on the BRIC grant should be monitored to identify what happens to them post-BRIC to evaluate the level of skills transfer and whether this is into industry or retained in academia. Information on the PDRAs should be included in the students database.

The PDRAs and postgraduates funded in bioprocessing are gaining invaluable skills in training at the commercial interface with an understanding of both industry and academia and the problems faced by industry. BRIC provides a great opportunity for the PDRAs to work closely with some of the leading bioprocessing industrialists and to gain an advantage over other post doctorate researchers for their future careers.

### **Benefits to the Researchers and Club Members**

It was agreed that the key benefit to both the researchers and the company Club Members was a sense of a growing bioprocessing community with improved academic-industry links. This can be seen by the high level of support for events, the number of companies signed up to BRIC and the large companies engaged in biotech. BRIC has provided a forum in which new collaborations can be initiated not only between academics and industrialists but between industry and different academic research groups. Members have easy access to expertise both in academia and in industry and the dissemination events provide a great networking opportunity for meeting new people to discuss the bioprocessing challenges. The bioprocessing industry has been able to articulate its "problems" to the academics and direct the research projects to address these challenges. The academic community have been able to better understand the issues and can work with industry to overcome these challenges. BRIC also provides a mechanism through which materials can be exchanged so that academics can work on industry related cell lines, proteins etc. Through this BRIC has a bigger advantage than individual one to one collaborative grants.

BRIC has also enabled an improvement in the talent base in bioprocessing addressing the current shortage of researchers trained in this area through the training of PDRAs, Targeted Priority Studentships and Industrial CASE awards. Through BRIC disciplines have been brought together with the engineering and biotechnology communities working with each other. In addition the workshop in April 2007 BRIC has embraced the area of stem cell bioprocessing to share the expertise in bioprocessing with the challenge of scaling up cell therapy products. Since its launch five new companies have signed up to BRIC including three in the area of stem cells.

The BRIC call priorities have evolved over the three rounds to encourage projects that cover all of the BRIC remit and the BRIC Programme Manager has helped develop the applications in the second and third rounds to ensure they are addressing the needs of industry. Through bioProcessUK and the BRIC Programme Manager new collaborations have come about with special interest groups forming between the funded researchers.

There may be outputs from BRIC which have not led to research grants e.g. people that have made connections through the call workshops and gone on to start a collaboration outside of BRIC. Also those who have submitted applications but have not received funding through BRIC may have received funding elsewhere. It is important to include these in any evaluation process as well as the outputs from the funded grants.

### **Benefits to the Bioprocessing Community**

Overall BRIC has provided a bridge between responsive mode funding and collaborative R&D furthering the scientific research in areas directly relevant to industry. The Club has provided the academic community with a much broader view of industry than with individual one to one interactions and industry has benefitted from a greater involvement of academics on industrial problems. The whole community has more awareness of itself and has an increased ability to attract new talent. The Club has facilitated networking between different groups with the opportunity to initiate new collaborations and provided the access to a large knowledge base which is especially important for the smaller companies.

The Club has provided a critical mass of research, people and facilities in bioprocessing which would not have been possible through responsive mode funding alone and has given the UK a clear focus on bioprocessing issues. It has increased the UK's profile internationally as one of the leading places to do bioprocessing research and a good place to invest. BRIC has created a bioprocessing community, with a culture of trust between academics and industrialists, empowered to work together to address common challenges with the expectation to add commercial value generating a momentum for bioprocessing excellence.

### **Session 2: What are the potential future opportunities for BRIC?**

The aim of this session was to consider the type of activities and potential opportunities to take BRIC forward. The final round of grant funding under the BRIC will conclude in September 2008, however, the research projects, networking and dissemination activities will continue until 2011. Therefore, it is timely to think about the potential future structure of BRIC, activities and support that maybe required to maintain the quality/ merit of the Club. This will enable an analysis of future needs both to take forward the outputs from BRIC grants and the development of wider plans and options that may, if appropriate, include a case for further support for BRIC or an extension into new areas. This should ensure that the momentum of the community built through BRIC is not lost and that suitable mechanisms are in place to ensure the translation of research outputs to commercial application.

### **Activities**

It was agreed that further funding and activities should be continued to capitalise on current successes. Therefore it is critically important to agree a plan for future activities to build on what is already a very successful initiative. It is key that industry continues to feed into system providing access to materials, facilities and expertise, ensuring the research focuses on industrial needs and stretching the academics with their demands. Anecdotal evidence has shown that the Club Members are prepared to continue their subscription payments to ensure that BRIC is continued. This information now needs to be confirmed through the industry survey.

The following activities were put forward:

#### Further Research Funding

There was a clear consensus that more funding should be available for bioprocessing as without it the community may dissipate. All the current activities are still valid and working and should be continued especially the workshops which are a key part of building and maintaining the community.

It was recommended that “follow-on money” should be available for the current research projects to continue any research with potential applications in industry. This should link into the TSB where opportunities arise close to the market and take the research to a commercial level.

#### Industry Placements and Training

A key activity that was highlighted was industry relevant training at all levels. Academics should have the opportunity to spend time e.g. 6-12 months in industry on secondments. However, long-term secondments can have negative effects on academic careers and research groups. Post-BRIC placements with BRIC Club Members for PDRAs to follow on from the BRIC grants would help maximise the potential of the research projects and provide invaluable training in an industrial environment. The placements could take a similar form to the Enterprise Fellowships already offered through the BBSRC.

Postgraduate training with secondments in industry so that students can understand the industry environment and the research challenges should be made available possibly through Industrial CASE awards directly linked to research projects. Studentship awards have the problem of having very small consumable costs and therefore industry should provide more in-kind contributions to BRIC in the way of materials and access to facilities and equipment.

Industry should provide more training at the masters level as an MRes/ EngD degree. A Masters of Bioprocessing was proposed with modules completed at various institutions and in industry to give a recognised qualification.

The training activities at postgraduate level should be more integrated into the Club than it has been previously.

#### Networking and Information Sharing

There should be funding available for smaller specialised seminars for the special interest groups starting to form and the possibility of having road-shows for these groups to tour the Club Members.

It was suggested that a wider, more general BRIC dissemination event / conference should be held to include unfunded PIs and other interested academics and potential new Club Members.

It was agreed that an electronic forum would be useful to share information such as a newsletter or web based bulletin board. News such as publications, new IP, presentations, seminars, meeting and jobs would be useful to advertise to the BRIC members. A database of “who’s who” in BRIC and all the associated postgraduates would be a useful tool for the community.

#### **Research Areas**

It was agreed that there was still much more research to be done underpinning the bioprocessing industry for all of the research challenges described in the BRIC remit. A few topics were highlighted as new areas that should be covered by the BRIC remit or where little research had been funded through the calls to date:



- Stem cell bioprocessing/ regenerative technologies – scale-up of cells, delivery and understanding what the bioprocess will look like. The larger pharmaceutical companies are now starting to show an interest in this area as well as the SMEs.
- Protein design for improved manufacturability
- Formulation linked into process development design / process in silico prediction
- Process Analytical Technologies (PATs) (system for designing, analyzing, and controlling manufacturing through timely measurements)
- Modelling / Statistics

### **International Activities**

There are a lot of international activities in bioprocessing with the National Institute for Bioprocessing Research and Training (NIBRT) in Dublin and Biotech, Research & Innovation Centre, Copenhagen. The US, China and India are also very active in this area. In China and India there is less regulation and manufacturing is cheaper – how is the UK to compete. It was agreed that the BRIC membership should not include international companies with no UK base but could use these international activities as a way of benchmarking the UK success and to share best practice.

### **WAY FORWARD**

It is proposed that a working group is set up to develop plans for future activities reporting to the BRIC Steering Group as appropriate.

## Delegate List

**Philip Aldridge** Centre of Excellence for Life Sciences  
**Professor David Archer** University of Nottingham  
**Dr John Birch** Lonza Biologics plc  
**Dr Jeremy Bright** GlycoForm Limited  
**Dr Mark Carver** Avecia Biologics  
**Dr Rocky Cranenburgh** Cobra Biomanufacturing plc  
**Professor Zhanfeng Cui** University of Oxford  
**Professor Alan Dickson** University of Manchester  
**Dr Brendan Fish** MedImmune  
**Dr David Glover** UCB-Celltech  
**Professor Andy Lyddiatt** BRIC Programme Manager  
**Dr Carol Marshall** GlaxoSmithKline  
**Dr Chris Mason** University College London  
**Greg McGarrell** MedCell Bioscience Ltd  
**Andy Pickett** Ipsen  
**Dr Malcolm Rhodes** bioProcessUK  
**Professor Nigel Slater** University of Cambridge  
**Dr Darrell Sleep** Novozymes Delta Ltd  
**Dr Glyn Stacey** NIBSC  
**Professor Nigel Titchener-Hooker** University College London  
**Dr John Woodgate** Pall Life Sciences  
**Dr Simon Webster** Avacta Plc  
**Professor Philip Wright** University of Sheffield

## Research Council Representatives

**Dr Alexandra Brooks** Business Innovation Unit, BBSRC  
**Dr Andy Cureton** Business Innovation Unit, BBSRC  
**Dr Karen Lewis** Business Innovation Unit, BBSRC  
**Dr Paul Reeves** Evaluation and Policy Unit, BBSRC  
**Dr Kedar Pandya** EPSRC  
**Dr Caroline Batchelor** EPSRC

## Agenda

10.00 Welcome – Introduction & Aims ~ John Birch, Lonza & Chair of BRIC Steering Group

10.05 Background to BRIC ~ Mark Carver, Avecia

10.20 Overview of BRIC Progress to date ~ Andy Lyddiatt, BRIC Programme Manager

10.40 Coffee Break

### Session 1 ~ Measuring the Success and Impact of BRIC

**Aim:** To consider the evidence that will demonstrate the impact of BRIC and the mechanisms of gathering that information.

To ensure BRIC's successful future development it is important that the extent to which the Club is meeting its aims is determined. It is still early days in terms of assessing the outputs of research funded under BRIC and the success of the Club as a whole given that projects funded through the first round have been running for approximately 18 months. Within this context the group is invited to discuss how we can best capture the outputs of BRIC in the short-term and in the longer-term, demonstrating the impact of BRIC activities in order to decide the best approach to taking the Club forward and ensuring that research outputs are translated into commercial success and a strong bioprocessing sector.

11.00 Breakout Groups

Discussion Topic	Starting Group	Chair	Scribe
Understanding and capturing the scientific outputs to date	1	Andy Lyddiatt	Alex
Understanding and capturing the skills that have been developed through BRIC	2	Malcolm	Andy C
Understanding and capturing the benefits to the company Club Members, Universities and the researchers	3	Brendan Fish	Karen
What is the added value to the bioprocessing community from having a Club in this area?	4	David Glover	Caroline

12.20 Summarising of breakout groups and general discussion on measuring the impacts of BRIC.

12.45 - 13.30 Lunch

## Session 2 ~ What are the potential future opportunities for BRIC

**Aim:** To consider the type of activities and potential opportunities to take BRIC forward.

The final round of grant funding under the BRIC will conclude in September 2008, however, the research projects, networking and dissemination activities will continue until 2011. Therefore, it is timely to think about the potential future structure of BRIC, activities and support that maybe required to maintain the quality/ merit of the Club. This will enable an analysis of future needs both to take forward the outputs from BRIC grants and the development of wider plans and options that may, if appropriate, include a case for further support for BRIC or an extension into new areas. This should ensure that the momentum of the community built through BRIC is not lost and that suitable mechanisms are in place to ensure the translation of research outputs to commercial application.

### 13.30 Breakout Groups

Delegates will split into the four groups as in session 1 and each group will discuss the following topics:

- BRIC currently supports basic research and networking activities through a coordinator and dissemination events.
  - Going forward what activities are important to ensure the success and impact on the bioprocessing sector of BRIC research outputs? Are there any new activities that should be considered?
  - Groups may find it useful to refer to the BRIC Logic Chart included in the papers to visualise the immediate outputs, intermediate impacts and ultimate outcomes of the Clubs activities.
- BRIC has delivered 3 calls for research proposals under the scope of the Club remit. Whilst the 1<sup>st</sup> call was broad the 2<sup>nd</sup> and 3<sup>rd</sup> calls focused on specific priority areas (details of which are included in the meeting papers).
  - Are there any research areas that require further support and what should this support look like?
  - Looking at the wider bioprocessing environment are there opportunities to expand the BRIC remit to include new areas? What types of activities are needed to support these new areas?
- What is the current national and international landscape of other relevant activities? Are there benefits to interaction with BRIC?

14.35 Summarising of breakout groups and general discussion on the future opportunities for BRIC.

15.00 Coffee Break and voting session for activities

15.30 Presentation of the results of the voting session ~ John Birch, Lonza

15.40 General Discussion

16.00 Close of meeting

### **Mechanism of the Breakout Group in Session 1**

Delegates will have been divided into 4 groups of 5-6 members. Each group will be assigned to an initial topic facilitated by a Chair and a scribe. The group will discuss their topic for 20 minutes and then all groups will rotate onto the next topic. The Chair and scribe will stay with the discussion topic. The Chair will summarise the first group's discussions and the next group will then add to these discussions. The groups will then rotate again a second and third time until each group has discussed each topic. Initial discussions will last 20 minutes and the subsequent discussion groups will last 10 minutes each. At the end of the breakout all groups will come back together and the Chairs for each topic will summarise the discussions and a general discussion will follow.

### **Mechanism of the Breakout Group in Session 1**

Delegates will split into the four groups as in session 1 and each group will have 60 minutes to discuss the three topics highlighted.

At the end of the breakout all groups will come back together and the Chairs for each topic will summarise the discussions and a general discussion will follow.

### **Mechanism for the Voting Session**

At the end of the discussions there may not be a clear conclusion on the best way forward and therefore we may need to run a voting session. The main issues will be highlighted from both discussion sessions which will be displayed around the room. Each delegate will be given 6 sticky dots which they can then use to vote on what they think are the most important issues to be addressed. All 6 dots can be used against one issue or they can be spread out over several points. At the end of the process the votes will be counted up and this will provide the office with a priority list of actions to address.




**BRIC • BIOPROCESSING RESEARCH INDUSTRY CLUB**

**BRIC: Current Success and Future Opportunities**


16 June 2008

**Aims of the Meeting**

**Professor John Birch**

**BRIC to Date**



BRIC Launched in 2005  
Total Funding Pot = £14M over 5 years

- BBSRC £8.27M
- EPSRC £4.35M
- Industry £1M

1<sup>st</sup> Call 2006 - £5M allocated on 9 projects  
2<sup>nd</sup> Call 2007 - £3.5M allocated on 7 projects  
3<sup>rd</sup> Call 2008 ~ £5M will be allocated in September 08


3 Dissemination events held to date  
Events will continue until 2011




**BRIC to Date**



- Still early days in terms of BRIC activities but the funding for research projects will be fully allocated by September 2008.
- Need to keep the momentum of BRIC and therefore it is timely to look what should happen next.
- March 2008 BRIC Steering Group started to consider the evaluation of the success of BRIC and potential future opportunities.
- Steering Group decided to hold a separate meeting in order to explore this in more detail.



**Aims of the Meeting**




- To consider how we measure the success and impact of BRIC and what evidence is required to demonstrate this.
- To consider the type of activities that are required to take BRIC forward and what the potential future opportunities are.
- To produce a list of priority activities to be considered by the BRIC Steering Group and to be recommended to BBSRC/ EPSRC and other funding bodies as appropriate.




**Agenda**



- Presentations:
  - Background to BRIC ~ Mark Carver
    - How BRIC came about and how the funds were raised
  - BRIC Progress to Date ~ Andy Lyddiatt
    - BRIC Call priorities, projects funded and how the club evolved through the 3 calls
- Breakout Sessions:
  - AM: Measuring the success and impact of BRIC
  - PM: What are the potential future opportunities for BRIC
- Voting & General Discussion
  - Produce list of priority actions



**Breakout Session 1**



**Measuring the Success and Impact of BRIC**


**Aim:**

- To consider the evidence that will demonstrate the impact of BRIC and the mechanisms of gathering that information.
  - discuss how we can best capture the outputs of BRIC in the short-term and in the longer-term to demonstrate the success and impact of BRIC activities

**Discussion Topics**

- Understanding and capturing the scientific outputs to date
- Understanding and capturing the skills that have been developed through BRIC
- Understanding and capturing the benefits to the company Club Members, Universities and the researchers
- What is the added value to the bioprocessing community from having a Club in this area?

BRIC • BIOPROCESSING RESEARCH INDUSTRY CLUB



## Breakout Session 2

**bbsrc**  
biotechnology and biological  
sciences research council

### What are the potential future opportunities for BRIC?


**Aim:**

- To consider the type of activities and potential opportunities to take BRIC forward
  - consider the potential future structure of BRIC, activities and support that maybe required to maintain the quality/ merit of the Club.

**Discussion Topics**

- What activities are important to ensure the success and impact on the bioprocessing sector of BRIC research outputs? Are there any new activities that should be considered?
- Are there any research areas that require further support and what should this support look like?
- Looking at the wider bioprocessing environment are there opportunities to expand the BRIC remit to include new areas? What types of activities are needed to support these new areas?
- What is the current national and international landscape of other relevant activities? Are there benefits to interaction with BRIC?

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## Voting Session


**bbsrc**  
biotechnology and biological  
sciences research council

- From the general discussion after Session 2 breakout groups a list of activities will be drawn up and placed around the room.
- During the coffee break delegates will be able to go and place their sticky dots against activities that they think are most important.
- A priority list will then be drawn up and presented and a general discussion will follow.




**BRIC • BIOPROCESSING RESEARCH INDUSTRY CLUB**  
**BRIC: Current Success and Future Opportunities**  
 16 June 2008  
**Background to BRIC**  
**Dr Mark Carver**



**BIG-T Report**



- Bioscience 2015 report by the Bioscience Innovation and Growth Team (BIGT) was published in November 2003 looking at the future of bioscience in the UK covering issues ranging from clinical research and clinical trials support through bioprocessing to training and financing for the sector.
- It made 6 key recommendations; the 4th recommended an increased investment in bioprocessing research by building a strong bioprocessing sub-sector within UK bioscience:
  - through a network of bioprocessing Centres of Excellence in the UK
  - attracting significant inward investment in bioprocessing assets and
  - fostering bioprocessing community development.



**BBSRC**



- In response to the BIG-T report BBSRC established a Working Group in 2004.  
 Working Group Members:  

John Birch – Lonza (Chair)	Richard Oreffo – Southampton
Anne Brindley – AstraZeneca	Gordon Roberts – Leicester
Mark Carver – Avecia Biologics	Nigel Slater – Cambridge
Carol Marshall – GSK	Mark Smales – Kent
David Thatcher – Cobra Biomanufacturing	
- The report from the Working Group identified key areas and important scientific challenges for further bioprocessing research activity in consultation with industry & academia.
- The Working Group suggested that a Club was the most appropriate mechanism to take forward.
- The Working Group report was presented to BBSRC Strategy Board by Mark Carver in July 2004.



**BBSRC**



- Strategy Board agreed BBSRC would allocate £6M over 5 years to bioprocessing research.
- Strategy Board emphasised that the research projects supported should be of relevance to industrial needs & industry should have a strong role in the direction of the programme.

**BIG-T Bioprocessing Conclusions**

Bioscience Innovation and Growth Team Report  
 'Bioscience 2015: Improving National health, Increasing national Wealth'


Biopharmaceuticals are large complex molecules requiring complex manufacture and analysis. Development is slow, expensive and complicated and is often a bottleneck in getting products to clinic.

**Need for tools that will accelerate the development process**


New generations of biopharmaceuticals are needed in large volumes (e.g. Mabs) Better cost efficiency of production needed.

**Need for improved understanding of cellular processes that limit productivity**

The Complexity of biomolecules presents challenges in terms of understanding the effect of process conditions on product structure and heterogeneity



BIG-T Priority Research Areas



**Recommended Priority Research Areas**

**Bioscience Underpinning Bioprocessing**


Understanding the cellular and molecular processes that allow prediction of process performance.

Why? Fundamental scientific understanding is needed to allow prediction Of metabolic output. Currently knowledge of even the best understood recombinant cell lines does not allow prediction of output of new clones.


Empirical understanding is not lacking in these areas, good robust science is.

Problems might appear trivial but in reality are complex and pose significant intellectual and methodological challenges.

Proteomic approaches to improved MAb production in engineered NS0 cells have demonstrated importance of correct heavy chain/light chain ratios for optimised antibody folding (University of Kent)



BIG-T Priority Research Areas





### Next Generation Expression Systems

Particularly systems that allow , more specific and more controlled post translational modification of recombinant products

Include systems for production of recombinant proteins with humanised glycosylation patterns in microbial hosts

e.g E coli strains containing Campylobacter jejuni glycosylation system developed by IC, LSHTM and ETH Zurich.

Engineered Pichia strains produced by GlcoFi in USA.

Fully successful systems will offer the full benefits of microbial synthesis (high intensity, simple media, virus free production etc) allied to the ability to produce post translationally modified product of the right type



BIG-T Priority Research Areas



### Recommended Priority Research Areas

#### Improved Tools for Bioprocessing

Need for tools to accelerate Bioprocess development

- e.g. high throughput methods
- Process modelling
- Ultra scale down systems
- Risk based analytical tools

To enable prediction of impact of molecular properties of materials on process performance

To predict the impact of cellular characteristics on processing efficiency

Tools could include novel in process sensors (e.g. Smart Holograms) And ultra scale down cell reactor models.



BIG-T Priority Research Areas



### Criteria for Success

•High quality scientific engagement with complex multi component problems

•Fundamental collaboration between academia and industry to address real problems.

•Industrial input and long term engagement

•Effective and appropriately directive management of the network

•Adequate funding over a realistic timescale



BIG-T Priority Research Areas




BRIC • BIOPROCESSING RESEARCH INDUSTRY CLUB



## BRIC



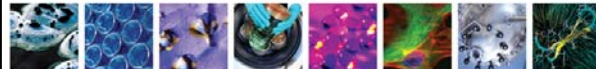
- In January 2005 18 companies agreed to join providing £1M over 5 years
- BBSRC contributed £6M & EPSRC £3M (increased to £8.27M & £4.35 respectively under fEC)
- In July 2005 Bioprocessing Research Industry Club (BRIC) was launched supported with a funding pot of £14M.
- BRIC now has company 20 Club Members.



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## Overview of Progress to Date (June 2008)

Andy Lyddiatt  
BRIC Programme Manager



BRIC • BIOPROCESSING RESEARCH INDUSTRY CLUB

- Established 2005
- Strengthen/develop research community in bioprocessing
- Improve academic-industry links
- Support innovative bioprocessing-related research projects
- BRIC to support industrially-relevant research projects from a joint fund in excess of £13M
- £1M raised from industry club members who influence research programme
- Projects (~25) funded to 2011 – extension model under preliminary discussion



### Key BRIC Features



- Agreement on generic research areas
- Central 'pot' of money (Research Councils/Industry)
- Strong Industry Steer
- Managed Programme
- Reporting and Interaction between Participants
- Training in Key Areas
- New Investigators active in Bioprocessing Research
- Outpoint of Trained and Industrially-aware Personnel
- Growth of UK Bioprocessing Community


### Expected Research Outcomes



- Greater systems-based understanding of biology for improved bioprocessing
- Increased predictability of biological processes for bioprocessing, including improved scale-up and reproducibility;
- Improved cost efficiency – both in manufacturing and development;
- Increased flexibility to improve product characteristics and reduce product heterogeneity
- Increased speed to clinic and market
- New tools and methodologies for bioprocessing

**Expected that outcomes best achieved by novel interdisciplinary approaches**


### Club Management




#### A Key Role for BBSRC:

- Overall management of the Club on advice from the Steering Group
- Ensuring effective peer review of applications
- Awarding of research grants
- Administering project funding, monitoring and reporting
- Preparing Steering Group papers
- Work with bioProcessUK to organise dissemination events, workshops and coordination meetings

### A Role for bioProcessUK ?




A Knowledge Transfer Network funded by the UK Technology Strategy Board



**A Business Unit at the BIA under the direction of Steering Group chaired by Steve Taylor (Avecia)**

- **Objectives and Goals to:**
- Implement Bioscience 2015 agenda
- **Work with BBSRC to administer Bioprocessing Industry Research Club (BRIC)**
- Promote/facilitate a network of Bioprocess CoEs (~5?) across UK
- Work with UKTI to attract significant investment in bioprocessing assets
- Broker industrial-academic partnerships in research and training
- Run relevant Career Opportunity Workshops
- Foster bioprocessing community development



### Role for Programme Manager



- Project Monitoring and Progress Evaluation
- Coordination of Grant Holder Outputs
- Dissemination of BRIC information
- Guidance for Full Applicants to Call 3
- Network Support within BRIC Community
- Actively interface between BRIC and bioProcess UK
- Extension of BRIC benefits to wider community
- Contribution to BRIC Strategic Development (2-5 years)
- Recording case history of achievement to support 'The Way Forward'

### Industrial BRIC Members

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### Opportunities for BRIC Industrial Members



- Input to Club scope and definition of the research challenges
- Shape strategy and focus of individual funding calls
- Influence quality and strategic relevance of proposals submitted to calls by:
  - workshops participation to discuss the research challenges
  - briefing applicants on company perspective of challenges
  - suggesting innovative ways of addressing challenges
  - assist Steering Group in the project assessment process
- Participate in six-monthly dissemination events
- Engage with BRIC researchers/industrialists to discuss emerging data
- Influence short-term research directions
- Shape development of an innovative and relevant research community
- Contribute to strategic planning for longer-term sustainability

### Allocation of Research Funding

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- 3 rounds of funding initiated
  - First Call Launched October 2005
  - *Funding announced June 2006*
  - Second Call Launched October 2006
  - *Funding announced July 2007*
  - Third Call Launched October 2007
- Interactive review process involved pre-outline, outline and invited full-applications
- 80 applications from 38 Institutes for BRIC1&2 Calls
- 14 Institutes funded to date

### Current Academic BRIC Members

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### Opportunities for BRIC Academic Members



- Conduct multidisciplinary research relevant to innovative bioprocessing
- Undertake problem solving relevant to the market-place
- Offer unique learning environment and training opportunities for PIs, postdocs and PhD students alike
- Interact with a multi-disciplinary community connected to the real world
- Experience industrial approaches to project management and assessment
- Sell research capabilities to an industrial network
- Seek one on one relationships with industrial customers
- Respond flexibly to short-term research directions
- Shape development of an innovative and relevant research community
- Contribute to strategic planning for longer-term sustainability

### Scope of Calls (BRIC1-3)




- Bioscience underpinning bioprocess improvement (1)
- New tools for bioprocessing (1)
- Understanding, controlling and manipulating cell metabolism in microbial fermentations (2)
- Advances in downstream processing including formulation (2)
- Tools to accelerate bioprocess development (2)
- Alternative processes for the recovery and purification of biopharmaceutical products (3)
- Bioprocess integration and intensification for biopharmaceutical manufacture (3)
- Quantitation and characterisation of products and impurities in biopharmaceutical manufacture (3)

**Proposals sought which:**


- service nominated product groupings
- encourage new collaborations
- augment/unify work in earlier calls

### Allocation of Funds Against Scientific Challenges (i)




Scientific Challenges	Projects funded	Grant Value	% of total funding of individual grants	% of total funding of priority areas
Understanding, controlling and manipulating metabolism in microbial fermentation	Cole - Birmingham (1)	£386,309	5	30
	Keshavarz-Moore - UCL (1)	£377,945	4	
	Leak - Imperial (2)	£724,360	8	
	Archer/ Oliver - Nottingham/Manchester (2)	£784,837	9	
	Wright - Sheffield (2)	£297,941	3	
Understanding, controlling and manipulating metabolism in mammalian cell culture	Dickson - Manchester (1)	£768,109	9	35
	Smales - Kent (1)	£987,761	12	
	Schroder - Durham (1)	£677,697	8	
	James - Sheffield (1)	£524,266	6	

### Allocation of Funds Against Scientific Challenges (ii)




Scientific Challenges	Projects funded	Grant Value	% of total funding of individual grants	% of total funding of priority areas
Growth of stem and tissue cells in-vitro	Chaudhuri/ Orefo - Bath/ Southampton (1)	£371,825	4	4
Improved understanding of the properties of proteins		0	0	0
Effective modelling of whole bioprocesses		0	0	0
High-throughput process technologies	Dalby - UCL (1)	£424,203	5	5
Analytical Methodologies for Bioprocessing	Lakey - Newcastle (2)	£363,525	4	4
Improved Downstream Processing	Slater/ Farzaneh - Cambridge/ Kings (1)	£481,970	6	22
Advances in downstream processing including formulation	Williams - Imperial (2)	£384,817	5	
	Thomas - Birmingham (2)	£595,931	7	
	Moore - Strathclyde (2)	£392,967	5	
<b>TOTAL:</b>		<b>£8,544,463</b>	<b>100</b>	<b>100</b>

### Achievements (i)




- Representative cross-section of UK bioprocess sector as industrial members of BRIC
- Credible coverage of majority of the original research scope
- Productive operation/support of a pre-outline/outline/invited full application model of proposal review
- Applications characterised by new partnerships suggested to address cross-disciplinary/cultural issues
- New players emerging in the bioprocessing field
- Encouragement of established players to consider new fields
- New mind-set targeted other bioprocessing funding avenues
- Increased strategic awareness of industrial need among academic research leaders and staff
- Increased understanding of academic constraints by industrialists
- Advancement of working partnerships between UK industry and academia

### Achievements (ii)



- Workshops to introduce the scope of BRIC Funding Calls have stimulated dialogue among and between UK academics and industrial players
- Six-monthly dissemination events have illuminated a tangible resurgence and growth of the UK bioprocessing community
- 'Shared interest' groups are emerging
  - Unfolded response in eucaryotic protein expression systems
  - Universities of Kent, Manchester, Sheffield and Durham
  - Physical and electronic interaction at, and between, dissemination meets
  - Common experimental system kindly made available by Lonza
  - Potential for input for *Pichia* research (Nottingham, Cambridge, Imperial)
- Other groups in line to be encouraged at October Dissemination Meet
  - Innovative downstream processing
  - Expression and recovery of nanoscale bioproducts
  - Bioprocessing issues in regenerative medicine
- CASE and Industrial Studentships promoted to a wider audience
- Industrial engagement in BRIC has recognised the need to provide relevant experimental vehicles for academic researchers

### BRIC3 Full Applications to be Considered in July



Invited applications classified against Scientific Research Challenges

Scientific Challenge	Grants
Improved Downstream Processing Advances in downstream processing including formulation	7
Analytical Methodologies for Bioprocessing	2
Growth of stem and tissue cells in-vitro	7
Improved understanding of the properties of proteins	3
Understanding and Manipulating metabolism in microbial fermentation	3

**Many applications steered toward strategic relevance and competitiveness through iterative dialogue**

## Anticipated Outcomes: 2010 and Beyond



- BRIC output demonstrably greater than sum of the parts
- Advancement of working partnership between UK industry and academia
- Specific spin-off interactions between BRIC members and University Research Groups
- Transfer of Knowledge, Technology and People
- Increased output of trained personnel (researchers *and* supervisors) with improved understanding of industrial needs
- Self-sustaining and 'given' interaction between university research and the bioprocess industries

## BIGT Recommendations Revisited



### BIGT Report – **recommended:**

- Centres of Bioprocessing Excellence in UK HEIs to deliver: (i) trained UGs, PGs & PDs (ii) leading edge R&D (iii) industrial collaborations
- Increase output of relevant interdisciplinary training in science, technology & business
- Specific vocational and CPD training for industrialists & their recruits
- A focus for CoE R&D on 'next-horizon' products and associated technologies
- Significant inward investment in bioprocessing
- Growth of the Bioprocessing Community

## Groups

### Group 1

Andy Lyddiatt (Chair)  
Alex Brooks (Scribe)  
Alan Dickson  
Zahid Latif  
Chris Mason  
Carol Marshall  
Darrell Sleep  
John Woodgate

### Group 2

Malcolm Rhodes (Chair)  
Andy Cureton (Scribe)  
David Archer  
Jeremy Bright  
Mark Carver  
Glyn Stacey  
Philip Wright

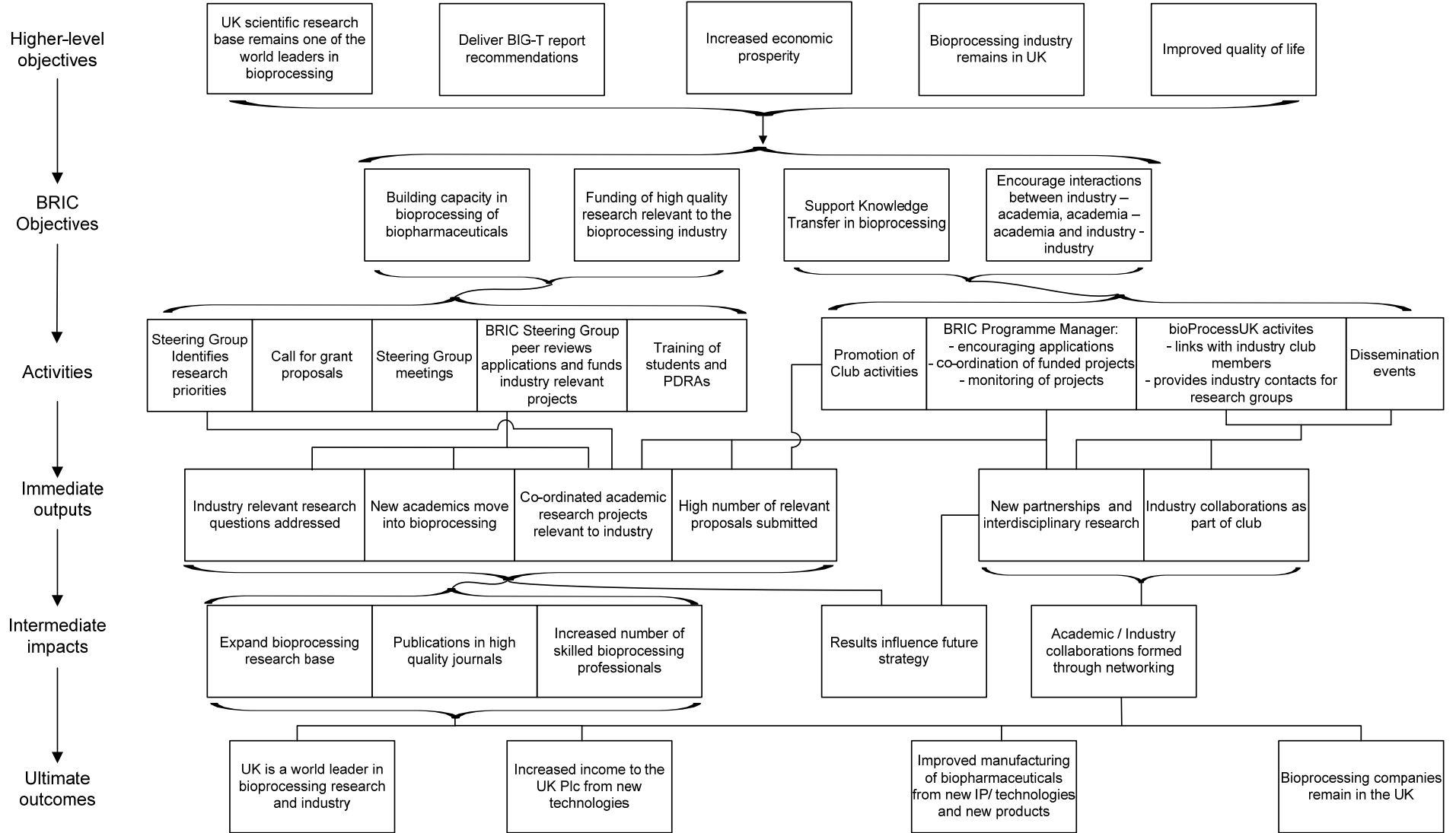
### Group 3

Brendan Fish (Chair)  
Karen Lewis (Scribe)  
John Birch  
Greg McGarrell  
Kedar Pandya  
Andy Pickett  
Nigel Slater  
Nigel Titchener-Hooker

### Group 4

David Glover (Chair)  
Caroline Batchelor (Scribe)  
Phillip Aldridge  
Rocky Cranenburgh  
Zhanfeng Cui  
Paul Reeves  
Simon Webster

# BRIC Logic Chart



## BRIC Industry Member Survey

**1. Please enter your name:**

**2. Please enter your company name:**

**3. Why did your company become a member of BRIC? (please mark all that apply and comment if you wish)**

- Why did your company become a member of BRIC? (please mark all that apply and comment if you wish) Influencing BRIC research agenda
- Contributing to consensus voice for the bioprocessing community
- Access to intellectual property and exploitation opportunities
- Access to people
- Other companies had joined and we did not want to be left behind
- Other (please specify)

Comments:

**4. What is your level of satisfaction with the return on your BRIC investment?**

- 1 (not satisfied)
- 2 (fairly satisfied)
- 3 (satisfied)
- 4 (very satisfied)
- 5 (extremely satisfied)

Comments:

**5. Has anyone from your company visited BRIC academic researchers?**

How many visits?

How many person hours did your company dedicate?

**6. Have any BRIC researchers visited your company?**

How many visits?

How many person hours did your company dedicate?

**7. Did any new or improved academic contacts develop from your BRIC membership?**

names of contacts

nature of collaboration

was contact previously known to you?

would you have met them without BRIC

**8. Did any new or improved commercial contacts develop from your BRIC membership?**

names of contacts

nature of collaboration

was contact previously known to you?

would you have met them without BRIC?



## 9. Have you established any formal collaboration with BRIC members

	yes	Partner	Details (please specify below)	Direct result of BRIC?
CASE				
studentships				
Joint funding applications				
Joint publications				
Collaborative R&D				
Other				

Details:

10. How many of your employees have attended BRIC meetings? Please provide names in the boxes below.

11. How many employees have had access to BRIC dissemination materials? Please give names if possible.

12. Has your company received material contributions from BRIC?

	yes	Details (please specify)
systems knowledge		
experimental samples/vehicles		
experimental/analytical techniques		
literature material		
contacts with third parties		

Details:

13. Has your company provided any material contributions to BRIC grantholders?

	Yes	Details (Please specify)
systems knowledge		
experimental samples/vehicles		
experimental/analytical techniques		
literature material		
contacts with third parties		

Details:

14. Please list any changes have you made to current practice as a result of BRIC interactions

15. What is your company's current experience with recruitment within the bioprocessing sector?

	1 (very poor)	2 (poor)	3 (fair)	4 (good)	5 (very good)
Number of UK applicants					
Training of UK applicants					

Comments:

**16. To what extent will BRIC membership be helpful for recruitment in the future?**

	1 (not at all helpful)	2 (somewhat helpful)	3 (helpful)	4 (very helpful)	5 (extremely helpful)
--	------------------------	----------------------	-------------	------------------	-----------------------

<b>Your company's recruitment</b>					
-----------------------------------	--	--	--	--	--

<b>Bioprocessing sector's recruitment</b>					
---	--	--	--	--	--

**17. To what extent have BRIC research grants been helpful in providing training relevant to the bioprocessing sector to early career researchers?**

- not at all helpful
- somewhat helpful
- helpful
- very helpful
- extremely helpful

Comments:

**18. To what extent have BRIC interactions been helpful in improving the attractiveness of the bioprocessing sector to early career researchers?**

- not at all helpful
- somewhat helpful
- helpful
- very helpful
- extremely helpful

**19. Has your company participated in any of the following administration and assessment activities for BRIC? Please indicate the number of hours spent on each**

Research Call Reviews

Outline application reviews

Full application reviews

Steering group activity

**20. Are there any areas in the BRIC remit that are not currently receiving enough support?**

Are there any areas in the BRIC remit that are not currently receiving enough support?

Yes (please specify in box below) / No

Areas not receiving enough:

**21. Are there any areas in the BRIC remit that are currently receiving too much support?**

Are there any areas in the BRIC remit that are currently receiving too much support? Yes (please specify in box below)/ No

Areas receiving too much:

**22. To what extent is your company satisfied with the coverage of the BRIC remit by the funded grants?**

1 (not satisfied)

2 (fairly satisfied)

3 (satisfied)

4 (very satisfied)

5 (extremely satisfied)

Comments:

**23. How relevant is BBSRC and EPSRC research to your company?**

	1 (not at all relevant)	2 (somewhat relevant)	3 (relevant)	4 (very relevant)	5 (extremely relevant)
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**BRIC research**  
**BBSRC/EPSRC**  
**research**

Comments:

**24. To what extent has the BRIC programme been helpful in improving the profile of the bioprocessing industry in the UK?**

- not at all helpful
- somewhat helpful
- helpful
- very helpful
- extremely helpful

Comments:

**25. To what extent would BBSRC/EPSRC not continuing to support for BRIC be damaging to the profile of the bioprocessing industry in the UK?**

- 1 (not at all damaging)
- 2 (somewhat damaging)
- 3 (damaging)
- 4 (very damaging)
- 5 (extremely damaging)

Comments:

**26. To what extent has the BRIC membership been helpful in improving awareness of your company's and your industry's needs in the academic community?**

	1 (not at all helpful)	2 (somewhat helpful)	3 (helpful)	4 (very helpful)	5 (extremely helpful)
--	------------------------	----------------------	-------------	------------------	-----------------------

**Your company's**  
**needs**

**Bioprocessing**  
**sector's needs**

**27. What has been the added value of BRIC membership to your company?****28. Please tell us about any other benefits/outputs from BRIC not included in the answers above.****29. Do you have any other comments or suggestions for improving BRIC and for monitoring its impact?****30. Further contributions from industry are likely to be needed to demonstrate the need for more research in this area, and to secure future funding. Would your company consider extending its BRIC membership? (please tick one box below)**

- At the same payment level?
- An elevated payment level?
- The same cash level but with increased in-kind contributions?
- No (please give reason below)

My company does not wish to extend its BRIC membership further because:

END