

Thoughts during the Building Research Establishment's 75th Anniversary

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Introduction

The Building Research Establishment (BRE)¹ has been celebrating its 75th anniversary, yet, for many of its friends, the celebrations have been clouded by threats to privatise what, at present, is a government agency, or, worse, to sell it off in bits, like British Rail. As I write in late July 1996, *Building* reports:

*"The campaign to create a National Centre for Construction NCC, incorporating a privatised Building Research Establishment will reach a critical point on Monday when an industry delegation meets senior government ministers. The delegation from the Construction Industry Council, which is leading the campaign for a non-profit making NCC, will try to persuade ministers that the proposed centre is commercially viable."*²

These personal thoughts are directed at the way BRE, and particularly its main component BRS, the Building Research Station, was set up and the changing attitudes of government to state-funded research. It comments only on a few aspects of BRS's work, and directs these comments on events judged as important for the community at large as well as for the construction industry and professions. Because of its importance as a community matter, it will also touch on aspects of the work of the Fire Research Station FRS, now part of the BRE, contrasting this aspect with that of the fire insurance industry.

In celebrating its 75th anniversary, BRE put on show its current work and some past achievements at Garston and Cardington, also at its small Scottish unit at East Kilbride. It has published a commemorative booklet recording events in the history of its three units – Building Research Station, which since the mid-1920s has been based at Garston, near Watford, in Hertfordshire; the Fire Research Station, formerly at Borehamwood, Hertfordshire and now also at Garston, with a large burn-hall' at Cardington, Bedfordshire; and the Forest Products Research Laboratory FPRL, formerly at Princes Risborough, Buckinghamshire, and now also at Garston. *The Architects' Journal* has published a chronicle of BRS history directed particularly at research closest to architects.³

Origins of British building research

It is possible to name architects, builders and engineers who, over the centuries, have experimented with materials, structures and methods of construction. Some of their endeavours have been recorded in the *Transactions of the Newcomen Society*, *Construction History* and similar journals. From time to time in the R&D pages I used to write in *Building* I exploited such rich quarries as the nineteenth century pages of *The Builder* and *The Civil Engineer* and *Architects' Journal* for accounts of experiments on materials and structures by early pioneers of "building research". But many of their experiments were fragmentary and unrelated, and aimed at solving a particular problem, like Smeaton's work on hydraulic limes for Eddystone

lighthouse, Fairbairn and Hodgkinson on cast-iron beams and wrought-iron trusses and Grant's experiments on Portland cement for the Metropolitan Board of Works.⁴

During the nineteenth century, the only state-funded experimental work was undertaken at the Royal Engineers Establishment, Chatham. Indeed the concept of the state supporting industrial research was foreign to Victorian England, unlike France, Prussia and other German states. And it was a concern with the technical achievements of German industry by members of the Liberal administration just before World War One which brought into being DSIR, the Department of Scientific and Industrial Research, and the establishment of NPL, the National Physical Laboratory. BRS was a child of that period, although the motive – "Homes for Heroes" – was different.

BRS: the first years

Nineteen twenty the year when wartime promises were proving difficult to satisfy without bankrupting the Treasury, was the year when H.O. Weller MICE was appointed director of building research, his mission being to develop "*knowledge of the newer materials and physical processes that determine the behaviour of buildings, and to convey the findings to the building industry and the public in language they could understand.*"

As Sir Frederick Lea, in *Science and Building. A history of the Building Research Station*⁵ pointed out, up to 1914 the building industry was craft-based and, in general, had shown little interest in a scientific approach to materials and procedures. It lacked technically trained personnel, while bye-laws within which it operated were obsolete. To build up a team able to change this situation was a Herculean task beyond Weller and a small unit, sited in huts on a wartime housing estate at East Acton. They could at the time do little more than report on cob and pisé de terre experimental houses at Amesbury, Wiltshire; study the stability of thin concrete walls being used for economy in house construction; and begin work on thermal behaviour of building materials which was to become a topic of increasing importance as energy prices rose and problems like condensation grew as a result of poorly insulated and ventilated dwellings.

It is surprising that the Acton unit survived a series of drastic cuts in government expenditure during 1922-23, known as the "Geddes axe". Indeed it might well have gone under in 1925 when a new Conservative administration took over, but for a happy set of events. The first was the replacement of Weller by an ambitious young Bradford civil engineer with research experience, Reginald Stradling; the second, the presence on the building research board of Raymond Unwin, the town planner, at the time chief technical officer at the Ministry of Health, who in the immediate post-war years had been promoting housing research; and third, the willing acceptance by Neville Chamberlain to be Minister of Health rather than Chancellor of the Exchequer, a post which went, on Chamberlain's suggestion, to Winston Churchill. Chamberlain had a strong interest in housing improvements, and had worked with Unwin when he chaired the post-war "unhealthy areas" committee in 1920-21.

In *Raymond Unwin: Founding Father of BRS*⁶ I described how Chamberlain, advised by Unwin, agreed to support before the Treasury an application for funds for expansion of building research, provided more of the work was directed to housing. The grant sought was small but enough to allow the director, Stradling, to draw up in a few days a programme aimed at meeting the Ministry of Health's needs. The funds made available allowed BRS to buy a small country estate at Garston, near Watford, and develop it as a permanent base. The year 2000 rather than 1975 might well be regarded as the year in which to celebrate BRE's 75th anniversary, only of course if it is then still in existence.

Unwin was a member of the RIBA science committee, becoming its chairman in 1927 as well as chairman of the joint committee on heating and ventilation of the Fuel and Building Research Boards. He supported Stradling in drawing up a programme which provided, in essence a framework for research and its application which is still valid⁷:

BUILDING RESEARCH			
The Science of Building			Intelligence and Special Investigations
Efficiency of Buildings	Weathering	Materials	Structural Strength
Information bureau	Examination of building failures	Special Investigations	Publications

BRS and pre-war housing: flats for the working classes

In 1928, the Ministry of Health, under Chamberlain, turned its attention to sum clearance and re-housing, in part on edge-of-town estates like Dagenham and in part in blocks of flats in slum-cleared inner-areas. The programme provided an opportunity for Stradling, supported by Unwin, to provide information for the Ministry's technical committee, including a statement on criteria – "fire resistance, acoustics, structural factors, habitability" – against which the "efficiency" of various forms of construction could be assessed.

So useful was the research-based information provided that the building research board thought "it constitutes almost a skeleton textbook on building materials". Supported by RIBA and RICS, work was started on the textbook by Robert Fitzmaurice, the first volume appearing in 1938 as *The Principles of Modern Building: Vol.1 walls, partition and chimneys*.⁸ The book, bought by me as an architectural student, was my first introduction to the science of building – as was its intention.

The war years and immediate post-war matters

The Second World War disrupted BRS work. Priority, for a time, was given to air-raid precautions R&D and, in 1940, Reginald Stradling left to become a chief adviser at the Ministry of Home Security. The Station's work was drawn on only indirectly by the defence ministries, mainly through a series of "Wartime Building Bulletins". There is a full account of wartime activities in F.M. Lea *The Science of Building*.⁹

When thinking on post war housing was started in 1942, it was considered that alternatives to conventional methods of house construction would have to be developed if urgent housing needs were to be met. Fortunately, unlike after the First World War, government had at its disposal BRS advice, supported by criteria for assessment of alternative methods and materials, derived from the 1930s and enshrined in *Principles of Modern Building*. This became the "bible" of the committee set up under Sir George Burt to approve or discard new systems for the post-war house building programme.

At the same time, BRS staff played a major role in the preparation of a series of "Post-War Building Studies" which covered topics like daylighting, and sound and thermal insulation. These and similar investigations were a stimulus to research supported by housing and education ministries. In the immediate post-war years, there was a major trial of alternative domestic heating systems in an estate of houses at Abbots Langley, Hertfordshire. There were close links

with the Ministry of Education architects and school-building consortia. A much needed expansion of resources at Garston was facilitated and a small unit in Scotland was set up. Scientific and professional staff was increased from 170 in 1939 to 230 in 1948.

Up to this date the main clients of BRS had been the housing and education ministries, and the authorities who were carrying out their programmes. In parallel, and to some degree in competition, there had developed in the Ministry of Works a chief scientific adviser's division under Reginald Stradling, no longer with the Ministry of Home Security. Its concern was with the efficiency of the construction industry, rather than with the needs of the industry's clients, and was somewhat of a strange bed-fellow with its own more traditional ministry which should have been regarded as a main client.

The 1950s: a critical period for building research

In the two years 1949-50 two government decisions were to have a marked effect on BRS, not fully appreciated by the staff at the time. The first was the decision by the Attlee administration in 1949 to set up a new major DSIR establishment, MERL (the Mechanical Engineering Research Laboratory), in Scotland. The second was a decision in 1950 to transfer to DSIR the staff of the Ministry of Work's Chief Scientific Adviser's division, some at the time working in London, others at an experimental site at Thatched Barn on the Barnet Bypass.

Together these changes had effects on building research – some beneficial and others less happy – which were to last until the 1970s and, in some instances, into the 1980s. They meant that, with staff recruitment at Garston frozen to enable DSIR to plan the staffing of MERL, plans for an architects' division, with the task of following up the performance approach to building design stressed in *Principles of Modern Building*, had, for example, to be put into cold storage. On the other hand, bringing into BRS researchers with a background in economics and the human sciences had a beneficial effect, especially when they and their work were transferred from London to Garston, and integrated into the BRS programme.¹⁰

The experimental and development work at Thatched Barn presented greater difficulties, and may, in some people's views including my own, have had longer term disbenefits, even though, in the shorter term, work like the introduction of tower cranes from the continent was to benefit British construction. How far a state-funded organisation should initiate development, and at what stage it should stand aside and let industry take over is a matter of technical as well as commercial and political significance.

It is frustrating for researchers to see what they consider to be a powerful innovation not taken up by industry. In such cases R&D becomes, first, development and, then, demonstration and, in doing so, can compete with parallel development work by commercial firms. It also can divert resources from other programmes, and may bias what should have been an independent, scientific approach. During the 1960s and early 1970s, it remains a matter of judgement whether developments like the perforated V-shaped ceramic block, fibre-reinforcement of gypsum¹¹ and certain types of site plant would have better been left earlier to industry.

Certainly the prominence given to development of various concrete panel systems by enthusiasts at BRS was a more serious error of judgement on two grounds: it suggested uncritical support for "high-rise" as the solution to urban housing. It probably obscured, and may even have obstructed independent research on their performance, for example, into structural performance, thermal performance including condensation control and efficiency of heating systems, at least until these problems arose later in public authority housing. Two items, that of Peter Stone on the comparative costs of different forms of urban development and of a study of the uses of space around high-rise housing,¹² are examples of work obscured by an enthusiasm for high-rise

housing and concrete panel systems, shown, for example in the Edmonton project.¹³

A change in sponsors

The late 1960s and early 1970s saw a series of changes in responsibility for construction research and for BRS in particular: first the abolition of a relatively independent DSIR and the transfer of its responsibilities and establishments to a Ministry of Technology, reflecting a temporary enthusiasm of Harold Wilson and some colleagues in his administration; then the transfer to the Ministry of Public Building and Works during a period of enthusiasm under Harold Macmillan's administration for modernising the construction industry – a period which saw the setting up of 'agrément' based on a French model, first as part of BRS and then as the responsibility of a separate board; and finally transfer to a more stable and supportive ministry, the Department of the Environment. Under DOE there was a change of emphasis towards improved and consolidated forms of building regulation and backup on European issues affecting construction, on the one hand; and conservation issues, particularly of energy, on the other.

One aspect of this change was the transfer of FRS to become an important component of BRE, with the separating of fire testing from research and the eventual handing over of facilities at Boreham Wood to the fire insurance industry's testing organisation. This later was extended to cover other risk assessments for the insurance industry.

FRS brought with it a unique research facility, the Cardington former airship hangar in which full scale investigation, first into fire performance and more recently structural performance, can be carried out. It also showed that it is possible to distinguish between research directed at a community issue, the safety of people in fires, and that directed at a commercial issue, that of the insurance of buildings and their contents against fire losses.

A personal conclusion

Based on many years of observation of the progress of building research in UK and worldwide I believe there are problems like fire and structural safety, and conservation of energy and the health of people who live and work in and around buildings which are matters affecting the whole community, and require independent, state funding. It is foolish to hand such issues to the care of a single sector of the construction industry.

In addition there are matters like a better understanding of the performance of buildings and their component services and materials which affect the community as a whole, as well as the construction industry and its clients, and are a collective concern of the community, and the industry and its clients.

In times of housing crisis, either because of shortages following wars or other disasters or of a deteriorating housing stock, government has a direct responsibility for remedial action. There is a role for state-funded research and there is a role and a need for a centre of excellence able to direct attention to new issues and, where it has special expertise, to investigate failures in performance, and to suggest where there must be improvements in design, construction and manufacturing practices.

During its 75 years BRS, and its more recent fellows FPRL and FRS, have met these needs – sometimes outstandingly well, usually more than satisfactorily and only occasionally at an unacceptable cost or diversion of resources better used in other directions. Governments have sometimes neglected and sometimes fostered, but at least until now, have never attempted to destroy their national organisation for building research.

Postscript

On October 24, John Gummer, Secretary of State for the Environment, announced that he was initiating a competitive sale of the Building Research Establishment. A few days later, Price Waterhouse, Corporate Finance, placed an advertisement in the 'Businesses for Sale' page of the *Financial Times*. Gummer had made his decision on the advice of Price Waterhouse, who held that government could make a profit on the sale rather than handing BRE over to the independent National Centre for Construction with a £10 million-plus dowry.

Privatisation highlights two key issues: the independence and impartiality of the BRE work, and the future of its database of knowledge – human and archival. In earlier years a large proportion of BRE's income, although coming from public funds, was directed at longer term programmes of research, judged by staff and an independent advisory board and specialist committees to be of general benefit to the country and its construction industry, as well as giving backup to special investigations paid for by individual authorities and firms. This has changed over the last ten or so years as more and more of BRE's income has come from specific contract work, mostly controlled by DOE who, until now, has guaranteed over 50% of the contract income. Under privatisation, not only will any remaining income for longer term research disappear, but there could be a sharp reduction in direct government contracts. Over its 75 years, the Building Research Station, The Fire Research Station and The Forest Products Laboratory built-up in library and archives a data-base of information unmatched elsewhere. Its dispersal on privatisation would be a national tragedy.

In promoting privatisation, DOE has stated that it wants 'to secure the continued provision of high quality, independent and impartial research and development and advice, at good value for money, that meets the requirements of government and industry'. But it also wants to 'optimise the net proceedings for the taxpayer', the primary consideration being the price offered by the selected bidder before the end of February 1997, i.e. within the life of the present government.

One matter, hinted at earlier, that the Garston site had development potential, has come out into the open and could put off commercial bidders. The site is in the Metropolitan Green Belt, and any major commercial development is unlikely to get the local planning authority's approval. At the end of November, DOE's consultants were considering a confidential short list of about ten bidders including a BRE management-buy-out for a Foundation for the Built Environment. It is possible that none will meet DOE's price target, and one is left to wonder whether negotiations, possibly for the management-buy-out option, will drag out well into the new year, and that clouds will gather and obscure the privatisation issue as the general election approaches.

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