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Editorial

Carefully organised research programmes in many countries over the last two decades have recently resulted in many innovations in the broad area of concrete materials technology. The overall, net effect of all these studies is that it is now possible to produce concrete of high quality designed to meet the demands of loading and the environment to which the material is exposed during its lifetime. Experience has also shown that in severe environments, conventional materials and normal procedures of fabrication of concrete structures cannot develop those material qualities and engineering properties that are essential to ensure a good serviceability life without the need for undue repair and retrofitting.

With all this explosion in information and the availability of new knowledge on material technologies and structural and construction systems, the question that we need to ask is to what extent has technology transfer been achieved from the laboratory to the field and the construction industry? Without this technology transfer — without this translation of innovative ideas and concepts into construction practice — the benefits of advanced research will be lost. The greatest loser in this battle will be the society in which we live, since only through the renewal and remodeling of our infrastructure can we hope to enhance the quality of human life. One cannot, therefore, underestimate the importance of the need to break down the barriers that exist to the flow of this knowledge from one sector to the other and their adoption by industry.

Taking a global view, the picture is not optimistic and one has reluctantly to admit that we have not been successful in this technology transfer. So we need to ask some basic questions as to why, in this day and age of modern, quick and effective means of communication, we — and I mean all those involved in some form or other in the broad spectrum of the so-called construction industry — seem not to have performed so well. Indeed, if we are honest, we need to say that we have not only not succeeded but also failed in this process of communicating those relevant and appropriate innovations in concrete technology to those who need the information, evaluate them and then put them into practice.

It is a fact of life that the commercial side of industry knows little of University research. Then, of course, one needs also to ask how relevant is University research to the problems facing the industry? The industrial sector would probably maintain that almost all University research is of no use to them. The truth is probably that some — and here it may well be that 'some' means a good proportion — University research is irrelevant and of no consequence to industry. On the other side of the coin, we need also to ask can industry understand, appreciate and absorb the results of those aspects of University research that can be of use to construction practice? Or, is it that industry is consumed with a pathological aversion to any research, irrespective of its value and appropriateness? We all talk of innovation, but innovation can only ensue from a thorough understanding of the state-of-the-art as it exists today and a critical evaluation of what is known and practised. There is, of course, the possibility that innovation can

be intuitive — there certainly was that opportunity in the early decades of this century — but what is certain is that innovation cannot arise from ignorance.

We also have to ask the question why industry is so reluctant to incorporate innovation into construction practice. The major hurdle must be the organization of the industry itself, and one gets the impression that it is highly fragmented with very distinct boundaries between those involved in the process of engineering design and those involved in the organization of the activity of construction. These two arms have largely different and diverse interests, expertise and economic motivations. Communication with and within such a complex group is difficult, to say the least, in the same way that little or no communication exists between researchers working at a material science/microstructural level and those involved at a structural/engineering scale. This, perhaps, helps to explain the low level of industry's investment in construction research and development. One has to admit that this is a dismal record — a mere 0·5% of the annual sales compared to 4–5·5% in the aerospace, telecommunication and electronics industries. Another factor that probably plays an equally important part in this complex system is the increasing number of construction disputes.

Whatever the reasons are for this lack of participation in research and development, the one important factor that cannot be ignored is that construction projects directly impact on a nation's economy, public safety and the quality of life. What we cannot afford to do is to sit back and allow construction research and innovation to take its lonely course without participation from industry leaving it in the cold. From whom and when will the initiatives come to mitigate these barriers and enhance technology transfer from research results to applications?