

ITA - The professional dimension

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The origin of the International Tunnelling Association derived from the perception - curiously, the perception of those outside the tunnelling world - of the opportunities that might derive from the potential benefits of a wider use of space beneath the surface, of special interest for some of the poorest countries. From its birth, therefore, the ITA has had objectives which are both long term and for the public good. There is also the related function of helping to develop and to share best practices in the technology of tunnelling and in urban planning for underground works. These are all aspects of professional ahead of commercial considerations. A professional approach may be defined as ethical, objective, perceptive, skilled in the art of the profession, primarily concerned, for a project, in the interests of the project Owner, but always regardful of the wider interests related to the project.

These reflections have been prepared as a contribution to the 25th anniversary of ITA in Oslo, the city of the inaugural meeting in 1974. The author concentrates on those aspects of the professional dimension most apt to his personal experiences. Much of the work of ITA which concerns the professional dimension derives from Working Groups addressing many aspects of the use of underground space.

If we turn back the clock fifty years or so, we find a world in which tunnelling largely followed tradition with some initial signs of striving towards a more rational, analytical basis for the design of the underground project. Essentially, however, there was a 'linear', i.e. end - on process, of planning geological investigation conceptual design detailed design (of the permanent Works) preparation of contracts appointment of Contractor construction operation and maintenance. The plant and equipment available to the Contractor was generally familiar to the designer of the project and was in general purpose use, apart from fairly simple shields for soft ground, drilling jumbos for rock. Those commissioning underground projects were often experienced themselves to some degree in underground work and recognised the merits of continuity across all aspects of procuring the project, achieved by the Engineer (in British FIDIC -style definition) or in the equivalent functionary elsewhere. The Engineer had (and yet has or should have) the double duty, the first that of designing the Works (with appropriate specialist advice) on behalf of the Client (design including planning, investigations and possibly other studies), the second that of Contract administrator, independent (under FIDIC) or not from the Client, the Employer of the Contractor.

There was also, as tunnelling tackled increasingly unfamiliar and difficult ground, appreciation of the influence of uncertainty on the strategy of management policy. Uncertainty leads towards risk, i.e. the extent of the consequences of uncertainty, and how this should be contained. Risk provides a good starting point for the consideration of the breadth of professional involvement at the present day.

Risk respects no disciplinary boundaries. Tradition in a simpler age would have expected strategic decisions about risk to be made by the Engineer, the designer and administrator of the project, on the strength of information that might be provided to some extent by specialists. With increasing complexity and specialisation, it is more likely at the present day that a much greater degree of interactive dialogue would be necessary to provide a reliable basis for such decisions, with modifications in one respect causing modifications in others, across the whole field of design and construction. There is here a recognition that *process design*, i.e. the design of the features of construction and of special construction plant, has a complexity to match that of *product design*, the design of the project and its elements, using language familiar in manufacturing industry. It is well understood that opportunity is the counterpart of risk, that the challenge of risk may lead to innovative solutions. Innovation like risk runs across disciplines.

As a generalisation, the old division between design and construction used to imply that design was the professional function of the engineer, construction the commercial function of the contractor, the latter

working in an organisation predominantly of engineers but motivated by a strictly commercial environment whose primary concern was for profitability of the organisation rather than the viability of the project. Of course, a related issue for debate is whether those expected to work as professionals should be reimbursed in relation to their contribution to the success of the project. Today the professional approach is, or should be, pervasive within the project team, starting from the Owner. At each interface, between those concerned with the project, valid and effective communication depends upon a shared professional attitude.

The professional approach by engineers to the setting up of a tunnelling project may run directly counter to that of the lawyer. The lawyer attends to what he perceives to be the means for protecting the interests of his Client, seen from a restricted vantage point from which the actual consequences, that may be expected from his actions, are obscured.

A colleague, Colin Kirkland, is addressing the practical ways out of contractual problems. In this contribution, however, it is necessary to insist that, once the merits of a professional approach are accepted, a successful project must depend on a sound basis for risk analysis, risk control and risk sharing. These criteria were defined in a document, prepared during the early days of the ITA, namely: *Tunnelling - improved contract practices [Construction Industry Research and Information Association (CIRIA) Report 79 May 1978]*. This document particularly emphasised "the need to accept uncertainty and to minimise the damage which results from relationships which are founded on widely diverse interpretations of vague information of great economic consequence. CIRIA Report 79 was designed to provide a basis for good professional engineering, where energies may be directed to ingenious solutions in preference to the misdirection into claims and counterclaims where commercial elements prevail in an uncertain environment. ITA has maintained continued development of the principles of risk containment in relation to the basis of contract.

The engineer owes a particular duty of care to all those, workers underground or the public at the surface or elsewhere, who might be exposed to danger arising from a misjudgment or a lack of attention. It is here that observation lies at the heart of the function of the practical engineer, observation of features expected and unexpected, seeking explanation as possible precursors of problems. The Observational Method is a particular expression of systematic application of observation of much practical benefit, planning with pre - designed means for dealing with problems foreseen in principle but uncertain in precise manifestation, particularly relevant where the ground may have variable characteristics. The Observational Method provides the discipline, across all participants to a project, to explore causes of risk in order to anticipate and control consequences, in itself a valuable feature of a professional approach.

A professional approach will therefore enhance the prospects for a successful project. To develop in a manner to encourage a professional approach requires choice of the appropriate starting point. It is here that so many mistakes are made too frequently which cannot subsequently be corrected by the actions of the participants. It is also here that the professional with an adequate grasp of the Owner's requirements and of the capabilities of the tunnelling industry can, if involved in the project from the outset, help the potential to be fulfilled. This post has been titled elsewhere (PIARC 'The First Road Tunnel' 1995) that of the 'surrogate operator', an advisor to the Owner "to bring the project to birth on an achievable basis, eliminating the barrier between objectives and practicabilities. The 'surrogate operator' can thus preserve the prospective Client, the Owner, from starting from the alternative of a lawyer's defensive base from which an optimised project can never result.

The ITA started in the direction to emphasise and enhance the professional contribution from engineers and of many others engaged in aspects of planning and executing the best use of underground space. This account has concentrated predominantly on the features of design and construction. The case is equally valid in other aspects of achieving the objectives of ITA. For underground construction, a proper emphasis of the professional dimension can make great impact on the intelligent market for underground space.

For the next twenty five years, integration across the several activities of planning, design and execution of underground activities should be increasingly emphasised by the ITA, developing models for the attainment, by a fully professional approach, of successful projects.