Chapter 1
Some Future Prospects in Hydroinformatics

M.B. Abbott

Abstract This chapter reviews more recent developments in hydroinformatics, contrasting the developments in engineering practice and those currently predominant in academia. The possibility is considered of whether a major part of current academic research corresponds to a degenerating research programme in the sense established by Lakatos. It is then indicated how the industrial and the academic developments can be reintegrated, as exemplified by a new approach, called the Waterknowledge Initiative. The modus operandi of the production and operation of the deliverables of the Initiative is explained, including the new institutional and business developments through which they may most appropriately come to presence. The notion of a global knowledge provider is introduced correspondingly.

Keywords Hydroinformatics · industry · academia · fifth-generation modelling · Waterknowledge Initiative · agriculture

1.1 Introduction

The present situation in hydroinformatics is increasingly marked by a discrepancy between the activities proceeding in industrial practice and those occurring in academia. The roots of this discrepancy may be traced to the social–economic pressures exerted upon practice on the one hand, and the often very different pressures exerted upon academic teaching and research on the other. The possibility must then be considered of whether a major part of current academic research corresponds to a degenerating research programme in the sense established by Lakatos (e.g. Lakatos, 1976/1979). It is then necessary to consider how the industrial and the academic developments can be reintegrated, as will be exemplified here by a new approach, called the Waterknowledge Initiative. This is de-

M.B. Abbott
Knowledge Engineering BVBA, Avenue Francois Folie 28, Box 28, 1180 Brussels, Belgium, and European Institute for Industrial Leadership, Château Latour de Freins, 1180, Brussels, Belgium, www.eiil.net., e-mail: knowledge.engineering@skynet.be
voted to elaborating and applying a fifth generation in modelling practice whereby web-based access to and instantiation and operation of numerical modelling systems are woven together with web-facilitated access to the most supportive and immediately relevant, human-expert knowledge and understanding. It will be explained why the production of this Initiative must be conceived as essentially sociotechnical constructs. The modus operandi of the production and operation of the deliverables of the Initiative must also be explicated, including the new institutional and business developments through which they may most appropriately come to presence. The notion of a global knowledge provider can then be introduced correspondingly. This contribution thus modifies as well as updates an earlier overview of Abbott (2004).

1.2 Hydroinformatics in Engineering Practice

Hydroinformatics was born when numerical modelling and data collection and processing came into a synergic relation at the end of the 1980s (Abbott, 1991). By that time, the field of numerical modelling had expanded its range from one that was restricted to the modelling of flows of water exclusively to a much wider ranging field that combined flows and all that these flows transported with them or otherwise influenced, which increasingly included living creatures that had, in turn, their own means of motion (Abbott and Warren, 1974). Data collection had expanded its range of activities similarly, passing from recordings of water levels and velocity distributions to recordings and samplings of distributions of sediments, chemical substances and aquatic vegetation and other forms of aquatic life, including marine, – and even to movements of human populations over daily and other cycles (Abbott et al., 1977). This development was driven by engineering practice applied to many construction and management projects, of which the largest and most prominent were associated with the flood protection of the city of Venice, the rail and motorway link across the Great Belt and the similar link between Denmark and Sweden across the Sound (Øresund, in Danish). The levels of investment involved in these last constructions alone, of some eight billion euros, justified large investments in modelling and measuring equipment with its surveillance, control and data acquisition (SCADA) systems and radio-linked, online and so real-time operating systems. The advantages of using a hydroinformatics approach became increasingly evident as these projects progressed, while these advantages attained to a new dimension in the last of these great engineering works due to the admission of the general public, whether through their interest groups or individually, into the chains of decision-making processes throughout the project. The extension of hydroinformatics onto this sociotechnical dimension as projected already in Abbott (1996) was realised for the first time in this project in such a way as to make the project publicly acceptable in the first place and a success in every other place. In the concluding words of Thorkilsen and Dynesen (2001), representing the owners of the project:

With regard to the subject of the present paper, the role of hydroinformatics in the completion of the Øresund Fixed Link, hydroinformatics certainly took an important place, right