

University degrees via the Internet: a new paradigm for public-private partnership

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Abstract. We describe here the development of a new degree programme, leading to an MSc in Information Technology, which is delivered entirely by distance learning over the Internet. The curriculum for this is based on an existing University degree, and in all academic aspects the degree conforms to established University standards. The development, delivery and management of the programme, however, involves a partnership between the awarding University and a commercial organisation, with the aim of marketing the degree on a world-wide basis. We describe the structure of the programme, the nature of the partnership, and the quality control procedures developed, and comment on the early progress of the project.

Keywords: distance learning; e-learning; online education; collaborative learning

1. Introduction

The clear focus of Electronic Commerce is on the Internet delivery of services and products to businesses and consumers. The nature of the medium implies that this will be most effective in the case of information-related services, and for this reason educational services are an obvious area of opportunity. Using the Internet to assist in education is, of course, now widespread in Universities and other educational establishments worldwide. At the simplest level, this may be only the posting of lecture notes and other course materials on the World Wide Web: something that is now routine for many University Departments. Going beyond this, there have been over a number of years many attempts to develop systems to support a paradigm of on-line learning which is more than just the delivery of information (see, e.g., Davies, 1998, Anderson and Kanuka, 1997, Suthers and Jones, 1997).

Most practical developments in this direction, at least in Europe, have been within the context of a model of educational delivery which is otherwise conventional in structure. It is apparent, however, that there is a demand for education, and in particular for degree-level courses, from individuals for whom full-time University attendance is not a practicable option: the success of the UK Open University is just one illustration of this. The emergence of the Internet offers a new framework for the delivery of such courses. This model is likely to appeal, especially, to working professionals and others whose career or personal circumstances make it impossible for them to spend a year or more at University, but for whom the opportunity to study and to obtain a high-level qualification is attractive.

Clearly, a University is the most appropriate organisation to provide degree-level courses, whether via the Internet or otherwise. Not only does a University offer the necessary high-level expertise, but the reputation and procedures of an established University provide a guarantee of the academic standards which will be

essential for the status of any qualifications awarded. Offering a programme of study over the Internet, however, is very different in many respects from traditional University teaching. The management and marketing of such programmes involves skills and procedures that are largely unfamiliar to Universities, but which belong in the repertoire of commercial organisations.

We here describe an entirely new venture, which provides the opportunity for students to study for a degree of Master of Science (MSc) pursued entirely on-line. This development arises through a partnership between a 'traditional' University in the UK, and a commercial organisation with extensive experience in providing and marketing educational services. We describe here the planning and structure of the degree programme, and discuss some of the early results of our experience.

2. Programme Structure and Content

2.1 Background

In principle, on-line delivery of a degree programme is a possibility in many if not all disciplines. In practice, however, there are likely to be a number of constraints on this. It will be necessary for students to have access to the Internet via suitable computers, and have the skills necessary to make use of the medium effectively. Because online study, self-evidently, is conducted in an environment which is quite different from that of a traditional residential campus, it is likely to appeal to a quite different group of students. Principally these will be mature students who are motivated to study for career rather than social reasons, and who have the necessary self-discipline to pursue their studies in their available time. For a programme to be viable, there will have to be a sufficient number of such students who are willing to make the necessary investment of time and money to complete the degree.

For these reasons, the most appropriate initial target for a venture of this kind seemed to be working professionals in the Information and Communications Technology industry. The ICT industry is now a major employer throughout Europe and, indeed, elsewhere, and because of the rapid and recent growth of the industry, many of those employed are both relatively young and, to some extent, under-qualified for the demands of the career they are pursuing. Obtaining high-level computing qualifications is likely to be seen as desirable both by these people and by their employers, for whom the shortage of appropriately skilled personnel is a large and growing problem.

Most of those working in a professional capacity in the ICT industry in Europe are already graduates or have professional experience sufficient for them to be seen as graduate-equivalent. For these, the appropriate level of qualification to which they might aspire is a Master's degree. A further advantage of a Master's programme, is that it typically involves the equivalent of only one or two years of full-time study, rather than the three or more years required for a first degree. The inevitable extension of time required in pursuing a degree part-time implies a very long-term commitment from a student to complete the latter, but much less for a postgraduate degree. The target qualification identified, consequently, was a MSc degree in Information Technology.

2.2 Curriculum

The programme of study is based closely, although not exactly, on an 'on-ground' MSc in Information Systems which has run successfully at The University of Liverpool for a number of years. This degree is targeted at graduates, predominantly from other disciplines, seeking to pursue a career in Computing. The course has a conventional structure, comprising eight taught modules, each of 15 CAT units, completed in one academic year, followed by a dissertation project carried out during the summer vacation. The success of this course, which has been hugely over-subscribed for a number of years, is some evidence of the demand for qualifications at this level. Further confirmation of this is provided by the popularity of the graduate training programmes offered by the CONNECT Centre, also based at Liverpool University (Charlton et.al., 1997). CONNECT offers postgraduate certificate programmes aimed at skills updating for computing professionals, and the demand for these even within the local region has been sustained at a high level for a number of years.

For the new degree, the module structure of the original MSc has been retained, with some significant modifications to the module content. Unlike the on-ground degree, which is essentially a 'conversion' course for graduates with very limited computing experience, the principal target of the online degree is expected to

be professionals already working in the industry, and the level of the module content reflects this. The course also includes modules adapted from those offered in the CONNECT programme, targeted especially at the needs of professionals working in Internet-related industry.

The major change, of course, is in the module delivery mechanism, which is described more fully below. Each taught module, in general, is delivered entirely online over the Internet, over a period of eight weeks. For this purpose, the year is divided into five periods of ten weeks, allowing for two-week vacation periods between each module. If, as is expected to be the norm, a student pursues only one module at a time, this schedule would enable the full programme, including the final dissertation project, to be completed in about two years, although this can be extended to allow for longer vacation periods.

One other feature of the curriculum is worthy of mention. The prospective students targeted by the programme are expected to include many whose existing skills and knowledge overlap with material included in the course, and whose current employment involves very high-level expertise. Focussing on these, two non-standard 'personalised' modules are offered within the programme. The first of these enables a student whose prior experience encompasses a significant part of the MSc learning outcomes to obtain credit for this, by completing a structured report describing in detail the relevant background, together with an accomplished true life project that made use of this prior experience, and their relevance to the MSc. The second type of personalised module takes the form of a work-based project. In this, the student has the opportunity to apply knowledge and skills obtained through the MSc to a problem arising within his or her employment. These modules are available only to students with an appropriate background, enabling them to replace up to a maximum of four taught modules which would otherwise duplicate knowledge already obtained. Students without the necessary level of experience complete the full programme of eight standard modules. In all cases, however, the programme concludes with the completion of the major dissertation project, valued at 60 CAT points. This also is expected in many, if not most cases to be linked to real-life problems arising in the student's work environment, which the student will address within a rigorous academic framework.

3. Module Delivery

3.1 Pedagogic principles

As was mentioned above, a typical 'standard' module of the course programme extends over a period of eight weeks, during which material corresponding approximately to that of a taught 'on-ground' module is delivered via the Internet. It is not the intention, however, to provide a replication of a classroom-based module delivery: to do so would fail to take advantage of both the virtues of the medium and the capabilities of the students, and would at best provide a debased imitation of conventional teaching. We start, instead, from the standpoint that lecture-based teaching, whatever its merits, is not necessarily an ideal which online teaching must necessarily emulate. The weaknesses of the model are very familiar to all those who have taught, or been taught, in higher-education establishments in the UK and elsewhere. Students, all too frequently, attend lectures in an entirely passive mode, expecting to listen and receive the information they require while making no positive contribution themselves. Interaction between lecturer and students, and within groups of students, is low, especially in the large classes which are typical of most modern universities.

This mode of teaching is especially inappropriate for the target group of students, who are, in general, mature, confident individuals with a wealth of personal experience to contribute on their own account. Instead, two broad principles inform the approach we use for online learning: *constructivism*, and *collaborative enquiry*.

Constructivism (Wilson, 1996) describes a view of learning in which students construct their own unique understanding of a subject, through a process which includes social interaction so that the learner can explain understandings, receive feedback from teachers and other students, clarify meanings, and reach a group consensus. Collaborative enquiry via Internet-mediated communication provides a framework for this mode of learning (Stacey, 1998). The aim is to use the medium to foster the creation of a *learning community* (Hiltz and Wellman, 1997) which will enable dialogue between participants, sharing of information, and collaborative project work. This mode of learning has much to commend it in many contexts, but is particularly appropriate when, as in this case, the students themselves will often bring to the class knowledge and expertise that is outside the experience of the course teacher, and which can be shared with the group.

3.2 The Virtual Classroom

Module delivery involves the use of proprietary software to support a *Virtual Classroom* for each module. The mode of communication is asynchronous, necessarily, given the requirement to enable students to fit the demands of the course into their work schedule, and the additional problems of catering for staff and students who may be working in several different time zones. Associated with each virtual classroom is a set of mail folders to which students, teachers, and others involved in the course administration have access (Figure 1). Each module is structured as a series of seminars, usually of one week's duration. Typically, at the start of each week, the module instructor posts a 'lecture' (some text, plus possibly, graphics, video, etc) to a folder in the Virtual Classroom, together with some 'discussion questions' for the class to consider, and other exercises and assignments (possibly including collaborative assignments) relating to the current topic. The lecture, discussion questions and exercises embrace a major textbook that serves as the nucleus of the module. During the rest of the week, the students respond to the discussion questions, posting both initial replies, and further comments on their colleagues' replies, to an open-access folder (to which the instructor may also contribute). Answers to exercises and other assignments, however, are normally posted to a closed folder accessible only to the instructor. Both the assignments *and* the discussion, however, are elements in the assessment of the module; in this mode of instruction, it is vital to require the active participation of students.

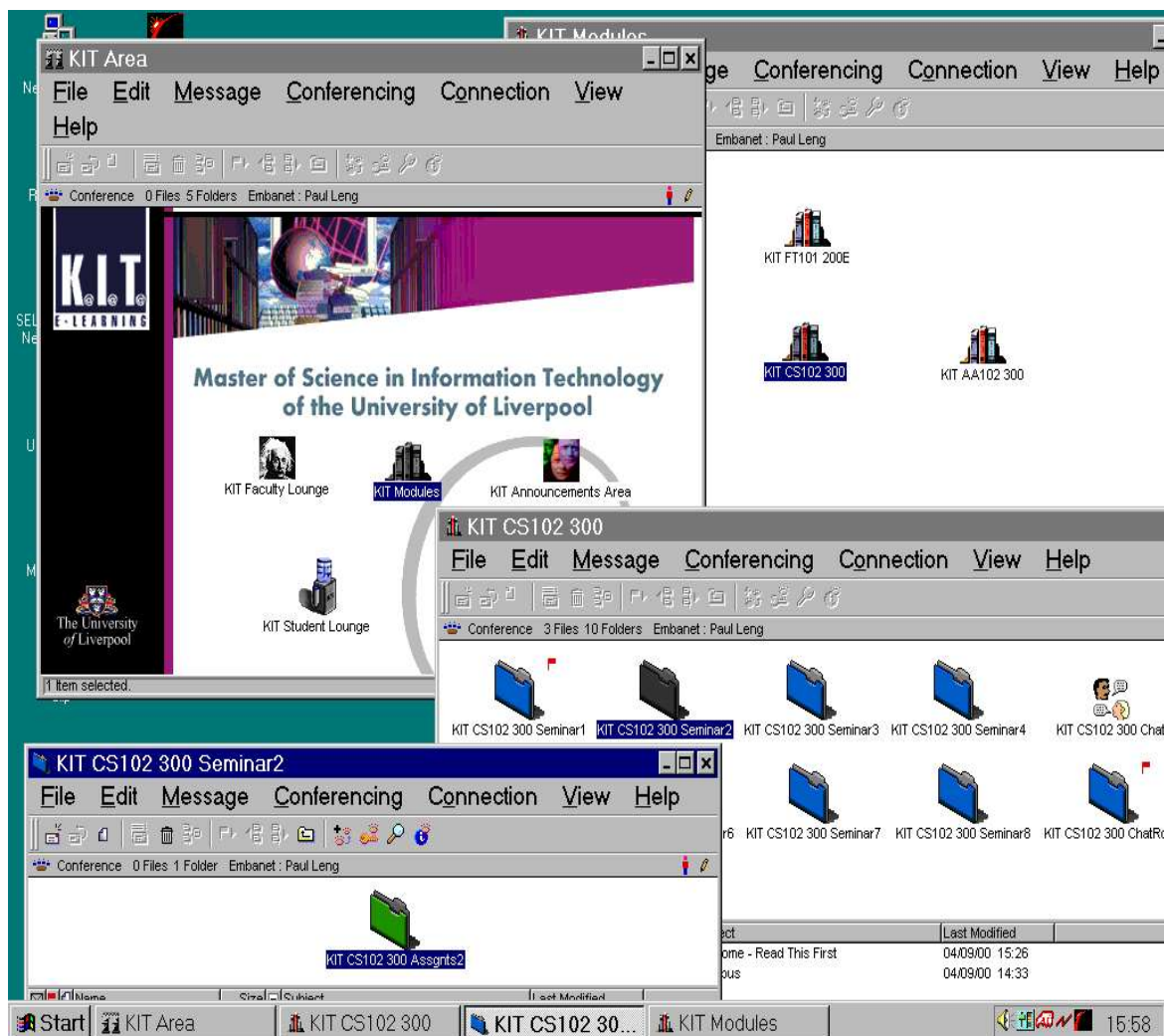


Figure 1: Screenshot of a Virtual Classroom

to the understanding of their colleagues. To a significant extent, the students thus participate actively in the teaching process, augmenting the overall learning experience as well as reducing the load on the instructor (many questions posted by students can in fact be answered by others in the class). Because participation in discussion is a requirement for students enrolled for a module, however, it also provides a means of monitoring their effective involvement. If a student is failing to keep up with the requirements of the

programme, this becomes apparent within days as his/her contributions to the discussion falter. At this point the instructor can intervene (via a private mail folder) to investigate and take action if required. Finally, the fact that discussion contributions form part of the module assessment assists in preventing impersonation and plagiarism. Involvement in the programme demands a thoughtful, personal contribution from each student on almost a daily basis, which would be almost impossible to falsify.

Overall, the expected commitment of a student to each module is approximately 15 hours per week, over a period of eight weeks. Although there is a degree of flexibility in this, in that a student can choose the hours at which he/she will participate, there is in practice much less opportunity to 'coast' than is the case in conventional education; absence from the virtual classroom is immediately apparent and will be penalised. The weekly seminar repeats itself for eight cycles. Marked dates within the cycle are the lecture posting day, the due day for posting the discussions and the due day for submitting the exercises.

Contrary to some expectations, online teaching is not less demanding on the students (nor, indeed, on instructors) than conventional lecture-room teaching. The requirement to read and discuss the contributions to the discussion from all the class is demanding for both instructor and students, imposing an upper limit of about 20 students for the size of a class. The great advantage, however, for at least some students, is that it provides the opportunity to study without the constraints of time and place required by campus-based teaching. Studying one module at a time remains compatible with the demands of a full-time career. For this reason, we anticipate the major demand for the programme to come from professionals in full-time employment in computing-related careers, who wish to deepen their knowledge and understanding of the subject to advance their careers. In most cases, this will also be to the advantage of their employers, who may see that supporting their employees in this respect is an effective way both to enhance the skills of their staff and of retaining their loyalty.

4. The Partnership

4.1 Structure

The degree programme has been created by a partnership between the University of Liverpool and a commercial organisation, K.I.T. eLearning of Rotterdam, itself created for this purpose as a subsidiary of Kidum, a Tel Aviv- based company which is the largest commercial provider of educational services in Israel. A major investor in K.I.T eLearning is Elron Electronic Industries, a publicly traded Israeli high-tech holding company. Figure 2 illustrates the other partners in the relationship.

While the potential of online learning has latterly attracted much interest in Universities, realisation of the potential has been inhibited by a number of factors. One of these has been the level of investment involved, in the context of a financial climate which, for UK Universities at least, has been difficult for a number of years. This, however, is only one of the reasons for developing the K.I.T. partnership. For Liverpool, as for most other UK Universities, venturing into European-wide or indeed world-wide course delivery is uncharted territory. We see the partnership as one which brings together the academic experience and standing of an established University, with the commercial and marketing experience of an established and successful company also active in the educational field. The role of the 'Official Agents' here is a regional one, established to provide a local focus for the marketing of the course. Software for the virtual classroom is proprietary; two providers have been investigated, and the current choice is Embanet's 'First Class' system.

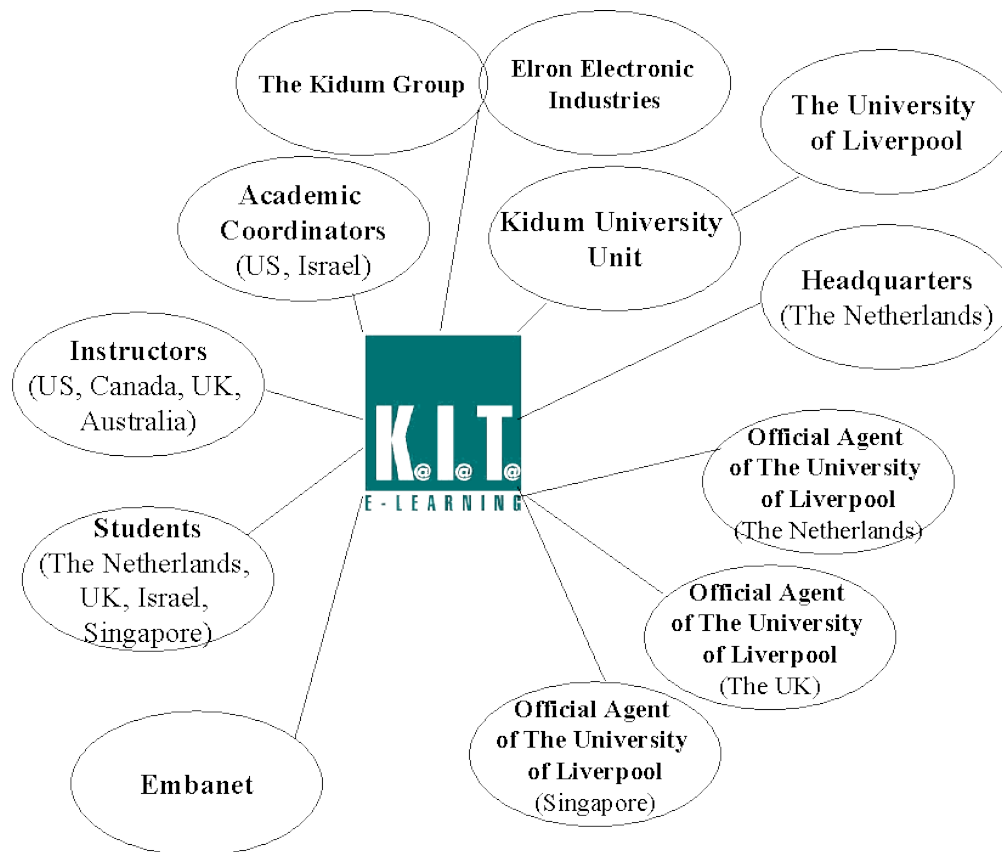


Figure 2: Partners in K.I.T. eLearning

The University's role is essentially to uphold the academic standards required for the award of the degree, while Kidum brings to the partnership, in addition to its experience in marketing, an understanding of the service concept which is vital for the market served by the programme. This collaboration has made it possible to create and market the programme within a timescale which would scarcely have been possible for a University-only venture, without compromising on the rigour of the academic review process demanded by the University.

4.2 The K-U Unit

The MSc in I.T. offered via this programme is a fully accredited degree of the University of Liverpool, and the University properly insists that the degree conforms to the standards and requirements expected of its other postgraduate degree programmes, within the framework defined by the QAA for the provision of distance learning (QAA, 2000). This requirement is met principally via the provision of a dedicated unit, the Kidum-University (K-U) Unit, based in the Department of Computer Science and staffed by established academic members of the Department with appropriate technical and secretarial support. The role of the K-U unit is to oversee all academic aspects of the course programme, and to ensure that the procedures required by the University are followed and appropriate academic standards maintained. A formal Board of Studies, chaired by the Director of the K-U Unit and including representatives both of K.I.T.eLearning and of the University's Department of Computer Science, is responsible for maintaining and developing the curriculum and for ensuring that student's concerns are met, and a Board of Examiners, including an external examiner, operates in a similar manner to that for other degrees. Other tasks of the K-U Unit, in association with the University's Faculty of Science, include approving all student admissions and the appointments of academic staff instructors.

Overseeing the operation of the degree programme is, perhaps paradoxically, made easier by the mode of delivery. Because *all* significant communications between staff and students - 'lectures', assignments,

discussions, and personal communications – are made via the virtual classroom, all are subject to scrutiny as required. The teaching materials, of course, are well-defined and approved by University procedures, and it is easy to ensure that they are delivered as required when the module is taught. The academic staff of the K-U Unit are background ‘lurkers’ in all the virtual classrooms, and monitor the delivery of each module to ensure that the agreed syllabus and procedures are followed, and the assessment is fair and of the appropriate standard. The same access can be made available to the external examiner. Because all activity in the virtual classroom is logged, a definitive record exists which can be called upon to resolve disputes over assessment and academic appeals, etc.

The procedure adopted is that, at the end of each module delivered, the students are invited to complete (anonymously) a questionnaire evaluating all aspects of its content and teaching. The instructor is asked to complete a report commenting both on the module and on the student responses, and a member of the K-U Unit who has monitored the module delivery adds his/her comments. The completed set of reports is reviewed by the Board of Studies which may feed into the Board of Examiners and/or require changes for the future.

4.3 The Instructors

The partnership, in a broader sense, goes beyond that between the principal organisations involved. Also included are the instructors, who are being drawn, literally, from across the world. Most instructors are established academics in Universities in the US, Canada, Australia and Europe, who are engaging in the programme on a part-time basis, largely because they are excited by the opportunity it offers to be involved at the start of a new development in education, and interact with students who are active and ambitious IT professionals from around the world. As most of these instructors do not have prior experience in online distance learning, they go through an intensive six week programme in which they are introduced to the same technology that they will use when instructing their students, coupled with pedagogical issues, case studies outlining the interaction among the students and the instructors, and one seminar (one week) in which they practice as students material drawn from modules in the IT programme.

5. Outcomes

The programme we have described was approved, via the prescribed University procedures, early in 2000. The first students were admitted in April of that year, but full-scale recruitment did not commence until autumn 2000, by which time the first cohort of students had completed two modules. It is too early, then, to offer firm conclusions as to outcomes, but it is pertinent to consider how this will be evaluated. Some of the relevant criteria include:

- **Standard of attainment.** As we have made clear, we are committed to ensuring that the level of attainment represented by the degree is comparable with that for other MSc degrees of the University. In this respect, we are assisted both by the role of the external examiner, and by the fact that the new degree is derived from an existing University MSc which acts as a comparator. The Director of Studies of the ‘on-ground’ MSc, and also the head of Department of Computer Science, act as independent members of the Board of Studies, and their role in maintaining comparability will be crucial.
- **Completion rates.** At the end of the second module, retention rate on the course is still almost 100%, and our aim is that the final completion rate will approach this level.
- **Employment success.** In contrast to the norm for other degrees, most of the students are expected to be already in employment, so post-degree employment rates may not be a useful measure of success. More pertinent may be employers’ perceptions of the value of the programme: we anticipate that a major avenue for recruitment will be via in-house agreements with large-scale employers seeking to provide career development for their staff.
- **Student and Instructor feedback.** In practice, until the first students complete their degrees, the principal means of evaluation of the programme will be through feedback from the students and the instructors, and questionnaires have been developed for this purpose for use at the end of each module. Responses from the first modules have been, so far, very encouraging; for example, at the end of the first module:
 - 80% of students found the online discussions useful

- 93% found participation contributed to their professional knowledge
- 100% found the assignments helpful
- 80% found the demands of the module sufficiently flexible for their needs (only 7% disagreed with this proposition).

6. Conclusions

As we have said, the first students of the K.I.T. MSc are still in a relatively early stage of their programme, so it is too early to draw final conclusions. What, however, becomes immediately apparent to all who are involved, is that online learning is not an easy option for anyone. It is demanding on both students and academics, both of whom must recognise that it requires a level of involvement and interaction far beyond what is usually expected in a University lecture room. This involvement brings its own rewards, however: paradoxically, online learning seems to provide an environment in which students can support each other, and staff and students understand each others' strengths and limitation. The atmosphere of the Virtual Classroom is closer to that of an old-fashioned University tutorial than to that of the impersonal lecture theatre. So far, the reactions of the students have been positive, and we look forward to the future with confidence and excitement. Already, we are sufficiently sure of the direction we have taken to contemplate broadening the programme: an MBA degree is, at the time of writing, in an advanced stage of development.. The structure and procedures for this follow the model we have established for the MSc, and we expect recruitment to the new degree to commence shortly

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