

## Benefits of industrial group projects

### 1 *The students' views*

“We feel that we worked effectively together in achieving the aims of our project. Every member brought a different element of his or her personality and character to create a productive working environment. The diverse mix of skills meant that the workload could be shared.

“In completing the project, every member of the team has had a thorough grounding in the area of project management. The skills learnt and experience gained will prove invaluable when applied in industry in the future. The rigid time schedule meant that the team had to be organized and have the ability to make critical decisions about the direction the project was moving in. On most occasions, a democratic approach was taken to resolve any disputes.”

Students in Software Hut team 8, 1999, the winning team working for Sheffield Volunteer Bureau, (Jane Berry, Shabana Mushtaq, Ajay Mistry, Matthew Wood and Darren Mothersele).

“The whole team visited the client at his site to demonstrate an Access-based prototype to him. This was very useful in highlighting what changes needed to be made. The visit was also very successful in that it helped to bridge the “semantic gap” (between us and the clients) and it provided us with a better understanding of the company and its computing facilities. As a result of the meeting we were able to finalise the requirements. This was a major milestone.

“Each member of the group was fully committed to his duties on the project from the start. Each member was trying to be competitive in his allocated duties. What is important though is the full understanding, cooperation and trust between the group members as a whole.”

Students in Software Hut team 4, 1999, the winning team working for Don Valley Bearings Ltd., (Jason Chow, Ali Al-Khalifah, Chris McCarthy, Tak Sing Lam and William Dowie).

“We think the industrial projects are an extremely good idea for the following reasons:

2 Customer facing - this is becoming more important for Software Engineers

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Exposure to real life problems - makes a refreshing change to artificial problems designed by Universities

2 Potential for working relationships with customers after completion of MSc.

2 Confidence boost from solving real-life problem by applying skills learnt at University

2 Requires interpersonal skills development - this may be missed with individual projects

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Confirms importance of requirements capture - the customer actually receives the end product so it must meet their spec.

Our views have not changed a great deal in hindsight, and if anything we are now more convinced of the usefulness of such courses.”

Tariq Hussain and Paul Lyon, Members of Genesys Solutions student company, 1998.

“While working as a member of the Genesys company, I have learnt a number of things which I believe will provide invaluable experience in my future. The administration of a small company with weekly board meetings and monthly reports will be useful as I now have an idea of the infrastructure of a small company.

“I have learnt a lot about team work, how to work together in a team to achieve a goal and how to deal with problems, such as disagreements, that occur when working in teams. As team leader, I had to delegate work to other team members, which was sometimes difficult to do.

“One of the most useful experiences was that of working with clients to build bespoke software. This highlighted many problems that I had not been previously aware of. Problems arise, for example, because no one member of the client’s team is entirely aware of the full scope of their organisation’s business.

“My experiences at Genesys lead me to believe that the requirements capture and specification of the system are much more difficult than actual design and implementation.”

Trevor Harris, Member of Genesys Solutions student company, 2000.

## 2 *The industrial clients’ views*

### *Software Hut - Year 2.*

A company marketing medical equipment:

Client: Giles, Chief Executive.

2 Financial costs were negligible - "it was cheap"

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However there was some time expenditure and this could have been better if all students had turned up to meetings - exams and other assignments got in the way.

2 We have tightened up the planning and monitoring aspects.

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The company obtained three good quality prototypes, each of which had bits that could be used in a final version of the system, "which was brilliant for us". "The company can get so much out of a project if they approach it in the right way." The project came "at the right time" for Uniplex, as they were already attempting to build software to handle sales data.

2 “The overall ability of the students seemed very high - I was pleased with what I saw.”

A leading local nightclub and concert venue.

Client: Julie, Chief Executive.

Julie clearly understood the educational value of the project to the students and recognised that students would be using the experience to develop communication skills. She felt their main weakness was poor time management. In particular, most groups did not provide evidence of starting work on the project until the third or fourth week. As a result, activity was very rushed in the later stages and "the outcome would have been better" had this not been the case.

We have focused on much more rigid time planning and monitored it stringently.

There is a "massive disparity" between different groups' understanding and representation of her requirements. Julie felt she could identify which teams were likely to win as early as her second meeting with them: the better teams showed a marked difference in approach, asking difficult questions and showing considerable insight into the business requirements.

This reinforces the policy of having competing groups, at least some will be good.

“I understand my business (process) so much better talking to the students who asked deep questions made me think about things in a way I would not otherwise have done. This has

improved our business process.”

A scientific instruments company.  
Dr David Payne

The project was beneficial in that it opened up contact between the company and computing students, who are potential graduate recruits.

“As a general comment, the students’ work and ability to keep us informed of progress was very good. The majority of students seemed well motivated and enthusiastic.”

***GENESYS, Student software company - Year 4.***

A company specialising in designing hospital facilities.  
Client: Ken, Research Director.

The students were asked to investigate constraints-based CAD design with VR simulation. This was a feasibility study involving the development of a prototype solution.

“Very impressed with the quality of work and the short time taken to achieve a great deal. Have got very close to what the company wanted. Could be very significant to the company’s future business. Some problems caused by lack of liaison between members of the company. Very good technical knowledge, very keen.”

A company specialising in consultancy in the field of metallurgical processing.  
Client: Barry, Managing Director.

The students produced a self-paced web-based learning package for the company who were in the process of introducing new technology.

“This was highly successful, popular with staff and is still used 12 months later for new staff.”

Barry was very impressed with the students’ professionalism, their attitude to dealing with changes and problems caused by delays at the company end in the installation of the systems and said that the quality of their product was excellent.

A major medical charity.  
Client: Sharon, Chief Field Officer.

Project: To provide a database for field officers to record all contacts and donations details and to generate reports, receipts etc. - currently all paper based. Needs to be available on laptops and the central database has to be updated every day by each officer. Significant replication and integrity issues. CRC HQ (London) want to expand the system out into all regions and to interface it to their central records. Major issues relating to vast quantities of data and interfacing Access to professional databases as well as differences of opinion between regional officers and HQ IT directors.

Involved two Genesys teams, both very professional and enthusiastic.

“Very helpful and dealt with a lot of difficult and changing problems superbly. Very, very pleased.”

### 3 *The project lecturers' views*

Having been involved in the running of second and fourth year industrial projects for a number of years, we have become increasingly committed to the value of project-based learning in software engineering. Learning by application of engineering concepts and practices, that have been introduced in the lecture theatre, to real business problems exposes students to the sometimes messy and rarely straightforward human, business and social elements of software development.

We feel our projects are enormously valuable to our students, even if they only come to realize how valuable when they graduate, look for jobs and get started in their careers. In the majority of cases, our students respond exceptionally well to the real world challenges we organize for them.

For lecturers and tutors who like small group work, focused on practical and immediate problem solving, the experience of supervising industrial projects with second and fourth year undergraduate students can be quite exhilarating. Every student team and every client's brief pose different challenges and problems. You have to be both a tough manager and stickler for detail, as well as a sympathetic sounding board for the students' ideas. You are frequently asked for opinions and guidance in project situations where there is no obviously right answer, nor correct way to make progress. You have to live with this, sometimes having helpful insights into students' problems and dilemmas, sometimes making mistakes.

Hut:

Our personal feelings about the Software Hut is that it usually runs very well. The proposed changes, to extend the course to 20 credits and to incorporate initial teaching material about human-computer interaction and software testing, could be very successful. Both the human-computer interaction and software testing syllabi can be made more lively with reference to problems in real industrial project practice. Providing students' motivation does not wane over the two semesters, this extension of the duration of the project, together with its corresponding increase in credit rating, should enable students to smooth some rough edges that are often still present in the software at the end of most students' one semester efforts.

Genesys:

Our feelings about Genesys are much more mixed. Personally, we felt that the company lost its edge and keenness, when student numbers grew to over 20, in 1999-2000. We don't know whether the difficulties that last year's projects ran into can be attributed directly to company size, whether they reflect difficulties in supervising such intensive project work adequately with a ratio of 1 supervisor to every 3 project teams, or 10-12 students. Or whether they reflect problems in software engineering methodologies.

In 1999-2000, we feel that we failed to manage most of my projects as we would have wished. The students failed to estimate effort, allowed projects to increase dramatically in scope and did not reflect on proper control of their projects, no matter how hard we exhorted them to plan, concentrate on delivering key functionality, justify changes and additions and re-plan. Perhaps we were trying too hard and were not taken seriously! perhaps it just demonstrates that the academic software engineering approach just does not adapt well to projects where the *time to market* is so short.

We also think that as supervisors we may have divorced ourselves too far from the client, in our desire to give autonomy to the students. In general, I think the student-client communications, even at fourth year level, do need "shadowing". Clients need to be assured that they can talk directly with supervisors, particularly if they are not happy about student performance.

We would strongly advocate the introduction of formal presentations for Genesys students at the end of each term, at which the students report back on progress to both supervisors and clients together. This would serve three useful purposes. The students would undertake a serious review of project requirements, methods and achievements and be asked to explain and justify their project activities to a

wider audience. Feedback to Genesys clients would be improved. Supervisors and clients could form a shared assessment of students, on the basis of the quality of the presentation, which could lead to a saving of time in the assessment process.

Last year, we also felt that we were straining to use the right development methods and tools for the set of clients' demands. Finding a usable method or set of development techniques suitable for extensive Internet-related development will be very important to Genesys' future success. We would really welcome Genesys being afforded the opportunity to test out different approaches to software development, such as XP and FDD. We would also like to see what they can do with a Linux-based Web development environment and what they can do with Java, now that this level of student has a fairly thorough grounding in the language.