



## UCISA Award for Excellence

### Application Form

#### Institution Name

London School of Economics and Political Science (LSE)

#### Originating Department

Centre for Learning Technology and IT Services

#### Contact Name (and email address)

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#### Objective of the *Project/Service*

To develop an integrated, scalable cost effective video lecture capture and podcasting service

#### Description of the *Project/Service*

The London School of Economics attracts students from all over the world. One of the reasons they come to London to study is that they value the contact with other students and staff and "presence" of studying on campus. The traditional lecture is very much part of this experience. While the lecture remains central to students study and can provide a rewarding experience<sup>1</sup>, there is ample evidence that lectures are not always as pedagogically effective as they might be. This may be compounded in a situation where, as in the LSE for many students, English is not their first language.

In this project what we were seeking to achieve was to build upon the value of the lecture by offering students the ability to review the lecture at times that suite their study schedule and critically to be able to control the process of review so that they can maximise the learning gains. The lecture is of course far more than the words spoken by the lecturer and particularly in quantitative areas the visual material (whether delivered via PowerPoint or similar, or written by the lecturer during the lecture) is an essential part of this process.

Recognising the above, we wished to adopt a system that would enable us to capture lectures and would include the visual material but would be available for students to review on the Web at a time and from the location of their choosing. It was also essential that students could control the presentation, navigate easily to the section they wish to view and to be able to easily review that section until they had mastered the content.

It was also essential that the system would have little or no impact on the lecturers teaching style and that they would for all practicable purposes, be unaware they were being recorded.

Critically we wanted the solution adopted to be scalable and cost effective.

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<sup>1</sup> See for example M.Burgen (2006), *In Defense of lecturing* Carnegie foundation for the advancement of Teaching. Accessed at <http://www.carnegiefoundation.org/change/sub.asp?key=98&subkey=2105>

This submission documents the route taken by LSE to realize this objective.

### **Phase 1 initial experiments**

In the academic year 2003/4 we began recording lectures. The process involved someone being present at the lecture to film it. After the lecture, the visual material, usually PowerPoint presentation was obtained from the lecturer and the presentation and video were synchronised during the postproduction process.

We evaluated and tested various software packages in order to help us achieve this including Boxmind (Boxmind.com) and Microsoft Producer as well as working from scratch. We found that Microsoft Producer generally gave very satisfactory results including providing an indexing system to help students navigate through the presentation. However the process of synchronisation and generally "tidying up" was time-consuming and the final product would need to be reviewed by the lecturer.

We were able to use this approach on a small number of courses and the student evaluations were very positive indeed. It was clear that this type of approach was providing genuine help and support to students and we wished to extend it. However the time and effort involved meant that realistically we would never be able to extend it beyond a few courses and we would only ever be able to support a small minority of our students.

### **Phase 2 experiments with automated capture 2004-2006**

In the second phase we continued with the videoing of lectures as in phase 1 and as before were only able to capture a small number. In addition we began experimenting with the use of a networked personal video recorder (PVR) for automated capture.

The KISS box (<http://www.kissbox.nl/dbs/>) is a personal video recorder that is also a networked device that can be controlled via a web page. The big advantage to us was that it would no longer require a technician to be present and if our trials were successful, it had the potential to be scaled up. The disadvantage was that the system only captured the output from a visualiser or PC with the associated audio.

Our trials of the kiss box pointed to a number of limitations, while it did indeed provide "proof of concept" it did not in practice, prove easy to schedule recordings remotely.

A big disadvantage from the student's point of view is that recordings by this method did not give them any easy navigational tools to access different points of the presentation. They could only move forward and backward by use of the standard media player sliders. The quality was also not as good.

The PVR route potentially offered a scalable solution but one that would be obtained by sacrificing key elements of the functionality that students most appreciate. It does however provide a means of capture that might be suited to our smaller teaching areas or ones that are less frequently used.

### **Audio capture and podcasting**

We also recognised that in some instances it was not necessary to attempt to capture the visual material and the greater flexibility provided by audio in that students could download it to iPods and other mobile devices was an important consideration.

We simultaneously therefore investigated various podcasting options.

We trialed various methods of capture and we found an effective solution through the use of low cost digital recorders such as those from Olympus(<http://www.olympus.co.uk/consumer/2581.htm>) which include a built-in USB port. This enabled us to set up a system whereby lecturers could borrow a digital recorder and then return it to us where the digital audio file would be directly loaded onto a PC. Some "light touch" editing may take place (e.g. adjusting volume levels) before the file was uploaded into

our virtual learning environment (WebCT) and made available to students shortly after the lecture had been given.

We also investigated other means of delivery e.g. iTunesU. This is now only becoming available in Europe and while the advantages for many students of having the podcast already in iTunes so it can be directly downloaded to an iPod are clear, this has to be offset against the need to continue to provide alternative access routes for students who don't use iTunes and the potential pedagogic disadvantages of separating the podcast from other elements on the course content. We will certainly be continuing with the podcasting approach outlined above but in conjunction with the Apreso video capture solution we are now implementing.

### **The third phase: selection and commissioning of the Apreso system 2006/7**

We continued to evaluate possible solutions and as part of this process, the Apreso classroom product ([www.apreso.com](http://www.apreso.com)) was noted. The specifications of Apreso classroom appeared to much more closely match our requirements than any other product or solution that we identified. In particular Apreso met our requirements as follows:

- will capture the video, audio and the output from a VGA source
- an "invisible" system, that lecturers need not be aware of when teaching and that does not inhibit their preferred teaching style
- an automated system for capture that would deliver the digitised lecture almost immediately without involving any postproduction work
- an interface that provided the key navigational features that students from our earlier evaluations have identified as being particularly important
- a scheduling system that enables the lectures to be captured to be scheduled on a termly basis in advance
- a scalable system that can grow in line with our identified needs with the potential to serve classrooms across the school.

The system was investigated before purchase and at the start of the 2006/7 academic year three large lecture theatres were equipped, each holding around 200 students. These are proving to be extremely successful and it is now being extended to a further three lecture theatres. The largest of these theatres holds 800 students.

The Apreso system not only provides a finished digitised lecture with all the navigational features we had identified as significant from our early experiments with Microsoft Producer, it also provides an audio only podcasting option, a low bandwidth mode that includes the audio and the captured visual material and an accessibility of mode that allows the navigational sequence to be "read" by a screen reader.

The system to date has proved very reliable. The "failures" we have had have been to do with the ancillary equipment or human intervention, e.g. problems with a microphone or inputs being switched over for other purposes and not being switched back. One disadvantage of an automated system such as Apreso is that while a test can be run at the start of each day, failure only become apparent after the event when it is too late.

### **Cost effectiveness**

The objective of the introduction of the lecture capture system is to enhance the quality of the student learning experience. The cost effectiveness of investment needs to be seen within that context both in terms of the way in which it allows us to offer video lectures to large numbers of students across a significant range of courses in a way that would not be possible by traditional recording means and to the extent to which evaluation data from students indicates clearly that it is indeed playing a significant role in enhancing their learning experiences.

The basic costs of the system are shown below.

### **Table 1 Apreso costs**

The cost per lecture recorded is based on implementing three lecture capture stations and one content management server. The full details are listed in Annexe d. The staff support is estimated at 1 hour per week based on updating the recording schedule and checking the early morning test captures. These costs are based on a perpetual license in year one followed by annual maintenance costs in each subsequent year.

Year 1	Hardware and setup	£7445.41	Cost per Lecture	£33.76
	Software	£11,700.00		
	Staff costs	£450.00		
Year 2	Hardware and setup	£0.00	Cost per Lecture	£4.26
	Software	£2,106.00		
	Staff costs	£450.00		

In contrast, the costs of producing a video lecture manually are shown below

Digital video camera, microphone, tripod etc	£3000
PC and editing software	£1000
Labour	
Filming and setup 1.5hrs @ £15per hour	£22.50
Post production 4hours @£15per hour	£60.00
Lecturer review 1 hour @£20 per hour	£20.00

If we leave aside equipment costs, the labour cost per traditional video lecture are at a conservative estimate £100.

In both cases there will of course be additional server and storage costs but as they will be the same per hour of recorded lecture, they can be ignored for the purposes of this comparison.

The system has allowed us to scale up from the labour intensive capture of around 15 lectures 2/3 years ago and 45 lectures captured last year through a combination of recording manually and use of the PVR to over 300 lectures since the beginning of the current academic year and with the expectation that as the newly purchased systems come on stream we will capture a thousand next year. The architecture of the system gives us a potential to continue to expand far beyond that number.

The system has also been used when lectures have had to be rescheduled leading to a timetable clashes (a major power failure in central London recently closed the LSE for a day and Apreso is assisting with the rescheduling) or when lecturers have to cancel their regular slot and are able nevertheless to record a lecture and make it available online.

It is also being used to record public lectures and non-teaching events.

### **Demonstration of Excellence**

The initial capital investment therefore is enabling us to capture a large number of lecturers without any additional increase in staffing. If we were to attempt to capture a similar number using traditional videoing and postproduction methods, the staffing requirements would be considerable. Even in the unlikely event that a couple of dozen people were assigned to video and postproduction work the results would not be available to students for some days, if not weeks after the event has taken place.

The Director of the Centre for Learning and Teaching has pointed to research that indicates the importance for student learning of being able to review lecture material within 24 hours of the lecture in order to maximise comprehension and while this research was examining written rather than recorded material it seems reasonable to hypothesise that the ability for students to review lecture material while the lecture is still fresh in their minds is an important aid to student

learning.

The student evaluation data so far has been overwhelmingly positive. (see Annexe B.) Comments such “invaluable” and “I don’t think I would have passed without it” were made, as were comments on the benefit to students whose first language is not English. We will conduct a further survey at the end of this academic year but we have already received a number of unsolicited e-mails from students commenting favourably on the system and perhaps just as significantly a number of e-mails complaining when for technical reasons a lecture has failed to record. The Students Union are encouraging the School to expand its use. See Annexe C

### **Transference of best practice, publicity and dissemination to the community**

Internally we are seeing a rapid growth in the number of lectures recorded and the numbers of lecturers taking part. We are now negotiating that difficult area where the initiative goes beyond enthusiastic early adopters to becoming mainstream.

A number of universities and colleges have been tracking our initiative and we have hosted demonstrations or provided information to several interested universities including Imperial, Cranfield and Newcastle. Imperial have progressed this interest and are now evaluating the technology. We also presented our approach at a major international conference (Online Educa Berlin 2006)

### **Next steps**

In the next phase of development we anticipate

- Integrating the Apreso scheduling system with our timetabling system so a lecturer will be able to elect to use Apreso at the same time as providing other data to the timetabling system. They will then be timetabled into an appropriately equipped classroom and the capture scheduled automatically.
- Extending the number of appropriately equipped classrooms so that all the major lecture theatres are equipped with the full Apreso system that includes video capture of a lecturer and a significant number of the larger classrooms are equipped to capture audio and the output of a PC/visualiser with Apreso.
- Investigating ways in which the captured lecture content can be enhanced and re-used. Potential uses have been identified within the University of London External Program and for a revenue-generating Executive Education and training programme.

A business case is being developed for a further extension of the system within the LSE.

### **Supporting documentation about the *Project/Service***

Annexe A: Screenshots illustrating the evolution of the system

Annexe B: Extracts from the student evaluation data.

Name of Staff involved (including job titles and email addresses)

#### **CLT**

Chris Fryer Systems Administrator [C.j.Fryer@lse.ac.uk](mailto:C.j.Fryer@lse.ac.uk)

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#### **IT Services**

Andy Coulthard Andy Coulthard MIS Manager [a.coulthard@lse.ac.uk](mailto:a.coulthard@lse.ac.uk)

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Support of Institution UCISA Representative

Name: Andy Coulthard, MIS Manager, London School of Economics and Political Science

When completed, e-mail the submission to [execsec@ucisa.ac.uk](mailto:execsec@ucisa.ac.uk)

## Annexe A: The Evolution of the lecture recording system

### Phase one : Proof of concept, the “hand assembled” video lecture

This is a screenshot of an early "hand assembled" video lecture. It demonstrates effectively the proof of concept. It did however require videoing in real-time, several hours postproduction work, overnight encoding and final checking by the lecturer. Turnaround time would be at least a week.

Note the PowerPoint slide being displayed on the right and the navigation window in the bottom left that enables a student to jump to a particular part of a presentation they wish.

The screenshot shows a Microsoft Internet Explorer browser window titled "Media and Communications - Microsoft Internet Explorer - [Working Offline]". The address bar displays the local path: `\\ttg\presentations\MC411_04\MC411_04_files\default.htm`. The main content area is split into three sections:

- Video Player:** On the left, a video player shows a woman with short blonde hair and glasses, wearing a grey blazer, speaking at a podium. The video progress bar indicates 0:26:10 / 0:48:11.
- Navigation Window:** Below the video player is a vertical list of navigation links:
  - Harvey: Time-Space Compression...
  - Waters on Giddens
  - Waters on Giddens (2)
  - Waters on Harvey
  - Place
  - Place
  - Place-based Identity
  - Massey (1991)
  - Consequences: Place Polygamy**
  - Space
- PowerPoint Slide:** On the right, a slide titled "Consequences: Place Polygamy" is displayed. The slide content includes:
  - Beck (2000: 72-75): Transnational place polygamy, marriage to several places at once, belonging to different worlds: this is the gateway to globality in one's own life; it leads to the globalization of biography.
  - Crossing between cultures, world experienced in one place (London, for ex.)

The browser's status bar at the bottom shows "Done" and "Local intranet".

## Phase 2: capture via a PVR

This slide shows a video lecture captured via the Kissbox PVR (in this instance the mathematics lecture captured via the visualiser and placed into WebCT). This system had the potential to be scalable but a note it does not have the navigation control of the example in phase 1. Students can only navigate through the presentation via the use of the slider and guessing whereabouts they wished to go.

The screenshot displays a web browser window titled "ST102 - Elementary Statistical Theory - WebCT 4.1.3 - Mozilla Firefox". The address bar shows the URL [http://webct.lse.ac.uk/SCRIPT/2004\\_ST102/scripts/serve\\_home](http://webct.lse.ac.uk/SCRIPT/2004_ST102/scripts/serve_home). The WebCT interface includes a "Control Panel" with a "View" tab and "Designer Options". A "Course Menu" is visible on the left, listing various resources like "Homepage", "Course Contents", "Discussions", "Library", "Search", "Print Notes", "WebCT help Guides", "On-line Resource List", "Additional Tools", "Quiz", "Your Work Schedule", "Presentations", "Mail", "Calendar", "Homeworks", "Chat", "Whiteboard", "Syllabus", "Glossary", "My Progress", "Assignments", "Self Test", "My Grades", "Search Library", and "Hidden". The main content area shows "ST102 - Elementary Statistical Theory" with a "Wednesday's video lectures" section. The video player is titled "Now Playing" and shows a hand writing mathematical formulas on a whiteboard. The formulas include  $858 \hat{\sigma}^2 \sum (x_i - \bar{x})^2$ ,  $1175 = \hat{\sigma}^2$ , and  $\frac{858}{1175} \frac{\hat{\sigma}^2}{\hat{\sigma}^2} \frac{1}{\sum (x_i - \bar{x})^2}$ . The video player has a "Paused" status and a progress bar. The system tray at the bottom shows the time as 18:52.

### Phase 3: Capture via Apreso.

This screenshot captures Apreso. video lecture. It is captured entirely automatically and was available by the time the lecturer had walked back to his office. No postproduction work was required. It was one of several captured that day in an entirely scalable solution.

Note the navigation icons in the bottom left-hand corner that enables student to navigate to exactly the point they wish, thus reintroducing the key feature we had at phase 1 that lost at phase 2.

The screenshot shows a video lecture player interface. The main content area displays a slide from an econometrics lecture. The slide title is "VARIABLE MISSPECIFICATION I: OMISSION OF A RELEVANT VARIABLE" and the regression equation is  $LGEARN = \beta_1 + \beta_2 S + \beta_3 EXP + u$ . The slide includes a table of regression results for the model `. reg LGEARN S EXP` and a formula for the expected value of the coefficient  $E(b_2)$ .

Source	SS	df	MS	. cor S EXP (obs=540)		
Model	50.9842581	2	25.492129		S	EXP
Residual	135.723385	537	.252743734			
Total	186.707643	539	.34639637	S	1.0000	
				EXP	-0.2179	1.0000

  

LGEARN	Coeff.	Std. Err.	t	P> t	[95% Conf. Interval]
S	.1235911	.0090989	13.58	0.000	.1057173 .141465
EXP	.0350826	.0050046	7.01	0.000	.0252515 .0449137
_cons	.5093196	.1663823	3.06	0.002	.1824796 .8361596

$$E(b_2) = \beta_2 + \beta_3 \frac{\sum (EXP_i - \bar{EXP})(LGEARN_i - \bar{LGEARN})}{\sum (EXP_i - \bar{EXP})^2}$$

The video player interface includes a navigation bar at the bottom left with a "Scenes" tab, a "Info" tab, and a "Help" tab. The "Scenes" tab is active, showing a list of scenes with a thumbnail and a duration of 7:15. The video is currently at 8:45, which is Scene 7 of 24. The player is playing at 177K with a duration of 8:55 / 54:54. The interface also shows a "Done" button and a "start" button.

## **Annexe B: Evaluation data**

**“I found the online recordings extremely useful, they were a tremendous help especially since lecturers usually go over concepts really fast in lectures ... Having the video allows me to pause”**

**“Incredible resource for recap, revision and retention purposes”**

**“WITHOUT THE ..EXTRA EXAMPLES RECORDINGS, I WOULD HAVE COMPLETELY FAILED.... SO BRILLIANT IDEA”**

**“They're fantastic, honestly, it would be great if every subject had them. My grades would be much lower without”**

**“COULD THIS WONDERFUL FACILITY PLEASE PLEASE PLEASE BE MORE WIDELY PUBLICISED. as a disabled student I would have benefited invaluablely from this opportunity, it would have greatly helped to make my revision more efficient in lieu of my particularly disability”**

**“They are extremely useful as it is not always possible to understand everything said in a lecture first time round. Furthermore, the notes are rather scanty and thus online lectures would definitely help fill the gaps where they occur”**

## **Annexe c Unsolicited email from the Students Union**

### **FW: PLAYING BACK THE LECTURE**

From: Su.Mature <[Su.Mature@lse.ac.uk](mailto:Su.Mature@lse.ac.uk)>  
To: CLT-Enquiries <[CLT-Enquiries@lse.ac.uk](mailto:CLT-Enquiries@lse.ac.uk)>  
Date: Nov 21 2006 - 3:03pm

Dear CLT Director Steve Ryan,

My name is Michail and I am writing to you on behalf of the LSESU EXECUTIVE committee. We have noticed the recent installation of the Apreso video capture/podcast facility equipment in the Old , New and Hong Kong Theatre. We would like to congratulate you for encouraging departments to initiate the semi-automatic capturing and digitisation of lectures. However, the current reality is that most of students cannot reap the benefits of this service because it is limited to 3 theatres. As a result students have to bear the cost of buying digital recorders, of poor sound quality, just to record their lectures. For this reason, we would like you to expand this scheme, by setting up the equipment in as many teaching rooms as possible. We understand that the LSE is approaching this in a step-by-step, slightly experimental fashion and we will support the allocation of more LSE resources towards your activities, as we value them beneficial to the students' learning experience.

Thank you for providing added learning value for traditionally taught courses.

LSE SU EXECUTIVE

## Annexe d

Full break down of costs based on three capture stations and one content management server.

Note: The staff time is expected to reduce when we have implemented integration with the LSE timetable system

<b>PERPETUAL LICENCE</b>	Year One	Year Two	Year Three	Year Four	Year Five	<b>TOTAL</b>
Licence cost	£11,700.00					<b>£11,700.00</b>
Support contract		£2,106.00	£2,106.00	£2,106.00	£2,106.00	<b>£8,424.00</b>
Hardware - Capture Station	£6,288.03			£6,288.03		<b>£12,576.06</b>
Staff Support at c.1 hour per teaching week @ £15 per hour	£450.00	£450.00	£450.00	£450.00	£450.00	<b>£2,250.00</b>
Initial Setup Charge	£660.00					
<b>SubTOTAL</b>	<b>£19,098.03</b>	<b>£2,556.00</b>	<b>£2,556.00</b>	<b>£8,844.03</b>	<b>£2,556.00</b>	<b>£34,950.06</b>
Content Management Server (one covers all capture stns.)	£1,157.38			£1,157.38		<b>£2,314.76</b>
<b>GRAND TOTAL</b>	<b>£20,255.41</b>	<b>£2,556.00</b>	<b>£2,556.00</b>	<b>£10,001.41</b>	<b>£2,556.00</b>	<b>£37,264.82</b>
Average Cost per Lecture @ 200 per station per year	£33.76	£4.26	£4.26	£16.67	£4.26	<b>£12.42</b>