ISSN 0967-859X
THE SOCIETY FOR EARTHQUAKE AND CIVIL ENGINEERING DYNAMICS

NEWSLETTER

Volume 12 No 3
October 1998

SECED wins bid to hold 12ECEE in London

Prof. Amr Elnashai describes how years of planning and preparation for SECED's bid for the next European Conference on Earthquake Engineering have finally paid dividends.

The UK bid to host the next European conference in 2002, which culminated in a presentation at the 11th European Conference on Earthquake Engineering in Paris, has been successful. The storey behind it, though, is full of intrigue. Several years ago a bid sub-committee was formed of Amr Elnashai (chair), Peter Merriman and Chris Browitt. One of their first actions was to send letters of intent to all national delegates, some two years ago! The intention was to do enough early preparation that it would have been very difficult for the other contenders to catch-up. This was followed by a questionnaire that was circulated to all the national delegates to canvass their opinions and to give them the chance to be involved in the decision making process. The questionnaire covered most aspects of a conference, such a preferred venue, time of year, duration, session organisation, number of parallel sessions, catering, exhibition etc. Then, the

Some of the SECED Members at the 11th European Conference in Earthquake Engineering in Paris

(L to R Martin Williams, Andreas Kappos, Dina A'Ayala, Peter Merriman, John Littler, Amr Elnashai, Julian Bommer) indefatigable sub-committee travelled the country to chose a venue. The three forerunners were Barbican (London), Edinburgh International (Edinburgh!) and University College Swansea. After much deliberation, the Barbican was chosen. Then followed the design and production of the bid document. This was co-ordinated by Amr and supported by the London Tourist Board. A copy of this document is lodged with the SECED Secretary for reference. Finally, posters and some more publicity material was produced for circulation during the Paris conference, having already sent the bid brochure to all the national delegates one month in advance of the conference. All seemed to be going well, especially as the Executive Committee of the European Association, with some friendly persuasion from Amr, had passed a resolution that no bid would be accepted after the end of May. On the first of June, Amr was seen belly dancing.

Then, came the crunch. The meeting of the Assembly of National Delegates was scheduled in a venue outside of the Paris conference venue, for some unknown reason, the address being circulated the day before. On the day of the meeting Amr went to lunch with his family, and had his brief case with him (which contained the address to the Assembly of National Delegates was). Unfortunately, after lunch, he walked out of the restaurant without his briefcase, went back to the hotel, had a shower and changed to get ready for the presentation and vote. This was when he discovered that the briefcase was not there, nor was the address of course. It was 5:45pm and the meeting was scheduled to start at 6:30pm. A hasty dash back to the restaurant, some 20 minutes away, where the briefcase was found less one experienced field missions camera, followed by a run to the venue resulted in Amr arriving about 20 minutes late to a packed room of perplexed national delegates who were wondering where the man who had been bullying them for the last two years was.

Then came the second hurdle. The Greek delegate also appeared to be bidding to hold the conference even through he assured Amr that his intention was to lobby early for the next conference, not this one. This put the pressure on, as Amr felt that it would be unpleasant to invoke the Executive Committee ruling not to allow bids after 1 May. Amr's presentation on behalf of SECED went well, based on a good set of slides and extensive background information, but he dodged the thorny issue of how much the registration fee would be. This, the Greek delegate, whose intentions were clearly somewhat more ambitious than simply lobbying early for the next conference, capitalised on and promised on the spot that the registration fee in 2002 would only be $250 if the conference were held in Greece!

The vote was taken, and the UK, for once, took 18 votes against Greece's 8.

A happy ending indeed, or is it the beginning? And is organising a conference for some 800 delegates something that anyone in their right mind would be looking forward to? For answers to the two aforementioned questions, write to Amr at Imperial College. If you enclose a written offer of support, your letter will definitely be acknowledged.

Experimental Determination of the Dynamic Crowd Effect

Tianjian Ji and Brian Ellis report on some full scale tests being used to calibrate the 1996 loading code

In 1996, BS 6399 included a new section dealing with dynamic loads produced by co-ordinated jumping of crowds. However, it was recognised that one item, namely the dynamic crowd effect, required further investigation, and this was the goal for a range of tests conducted by UMIST and BRE.

In response to music, a group of people can jump at the same frequency (the beat frequency) and produce a large dynamic load. This is likely to occur at some pop concerts and aerobics events. However, even if everyone in a crowd tried to jump at the same frequency, their co-ordination would not be perfect and this would effectively attenuate the resulting load. This attenuation is called the dynamic crowd effect. Although theoretical

Forthcoming SECED Meeting: 25 November 1998
The Response of Structures to Dynamic Crowd Loads

Presentations by Brian Ellis and Tianjian Ji at the SECED meeting on the 25th November 1998 will cover the background to current understanding and design practice, the measurement of crowd loading and effective bracing systems for structures.

The meeting will be held at the ICE starting at 5.30 pm, preceded by coffee at 5 pm. All are welcome.

A group of students from UMIST trying to excite resonance in a steel framed test building at the BRE Cardington facility.

investigations have been conducted, full-scale experimental data is desirable to calibrate the theory. To provide this data, a detailed test programme was required involving a group of people and an appropriate test structure.

A group of students and staff from UMIST volunteered to undertake an experiment to investigate the dynamic crowd effect. A floor of the steel framed test building at BRE Cardington laboratory was selected and its dynamic characteristics determined. The 60 students were equally divided into three groups and each group attended the tests in turn. Within each group, 2, 4, 8, 16 students were asked to take part in the tests which involved jumping in time to a musical beat. Finally, measurements were taken for groups of 32 and 64 people (staff included).

An electronic keyboard was used to generate selected musical beats to provide a timing signal for the jumping. Two beats were used throughout the tests. One beat was selected to generate a resonant loading of the floor and another to avoid a direct resonance. A range of measurements were taken on the day and the dynamic crowd effect has been evaluated on the basis of these measurements.

The original idea of the experiment was to answer some important questions related to structural design; however, the days events were designed to combine research and education. To provide background information for the visit, a pre-visit talk was given at the Department of Civil and Structural Engineering, UMIST, and a seminar was held at the Cardington Laboratory. A tour of the laboratory was also included. The students involvement made the large scale test possible and they provided a significant contribution to a real research programme partly financed by EPSRC. In addition, the students had the opportunity to visit the Cardington laboratory including a full size test building, to encounter actual research in structural engineering in the UK and thereby to supplement their university studies.

After completing the experiment, it was recognised that this was the largest controlled experiment yet conducted in a unique full size eight storey steel framed test building which occupies a small part of the largest enclosed research laboratory in the world.

The experimental programme will be described further in the SECED meeting scheduled for the 25th November._

Tianjian Ji (UMIST) **and Brian Ellis** (BRE)

Meeting Report: 29 April 1998

Accidental Explosions

Dr Roy Merrifield, H.M Principal Explosives Inspector, with the health and Safety Executive, Bootle, was the guest speaker at the SECED Technical Meeting on Wednesday 29 April 1998, and gave an interesting talk on the lessons that can be learned by studying the damage to buildings caused by accidental explosions. Dr Merrifield has long experience of inspecting such damage and covered a number of important aspects. The meeting attracted a sizeable audience and was chaired by Dr Alan J Watson, University of Sheffield.

There are many potential sources and types of explosions and Dr Merrifield considered the nature of blast waves from 'accidental' condensed phase explosions, and their effects on structures. Under the umbrella of 'accidental' explosions was included some reference to structural damage from WWII bombings and more recent terrorist attacks. Pre- or post-accident predictions of likely/actual effects of an explosion are usually performed by reference to damage caused by TNT, and some brief discussion of the 'TNT-equivalence' approach was undertaken. The effects of blast on structures was considered by reference to such incidents as 'The Peterborough Explosion' in 1989 when commercial blasting explosives equivalent to 800kg of TNT, was detonated accidentally in the midst of an industrial estate. The final part of the talk considered damage mitigation by design.

After giving a broad definition of an explosion with reference to various potential sources, ranging from dust clouds to bombs, the differences between deflagration and detonation were described. The ability of explosions to cause damage varies with the type of explosive but is commonly related to TNT and the characteristic blast parameters for the overpressure produced by a TNT explosion, and their change with distance, were described. Improvised/terrorist explosives are often more difficult to model because many factors affect the speed of combustion/detonation such as particle size, packing density, strength of initiation and confinement. The TNT-equivalence of an explosive depends on its decomposition/burning rate which in turn is influenced by the stoichiometry (oxygen balance) of the explosive but the TNT-equivalency concept is widely used for both pressure and shock wave analysis. The gas pressure produced by prolonged burning after an explosion, increases the duration of a confined shock wave, and hence its impulse and potential to cause damage.

During World War II the Ministry of Home Security did much work surveying and categorising bomb damage, and derived formulae to correlate different levels of damage to buildings with the position of the explosion and the structure of the building. These formulae show that the damage from explosions depends on both the magnitude and duration of the shock waves. Subsequent work transferred these formulae into Pressure-Impulse diagrams to show the damaging combinations of shock pressure and impulse in graphical form. More recently P-I diagrams have been produced for other structures and structural elements.

An important factor concerning blast damage to structures relates the duration of the shock wave to the natural undamped period of vibration (T) of the structure. For a typical house T = 85 m.sec, for a 10 storey reinforced concrete building T = 630 m.sec. The blast duration of the shock wave from 10 tonnes of TNT at 122m and 838m respectively are 85.4 m.sec and 153 m.sec. Thus the multi-storey concrete building will not have had time to respond en-masse before the blast wave has passed.

The hazard presented by ordinary glazing is very severe and developments to produce protective glazing are a major area of activity at present. For explosions in urban situations, effects such as screening of blast by buildings and the channelling of blast along streets are still areas of great uncertainty and the subject of current research.

In the discussion the differences between seismic and blast design were itemised as load rate and duration and surface area of application. Blast waves from explosions can be pressure or shock; but pressure waves 'ramp up' to form shock waves at distance.

Lessons learned from the analysis of damage to buildings caused by accidental explosions such as that at Peterborough, and from terrorist bombs such as that in Oklahoma City in April 1995 and Saudi Arabia on 25 June 1996 in Khobar Towers, have shown that direct blast pressures cause fewer injuries than structural collapse. There was some interesting discussion at the end of the talk concerning the ways in which the number of casualties from blast loading can be reduced. Many injuries result from collapse of the non-structural elements such as windows and suspended ceilings. To avoid structural collapse, redundancy and ductility is used to provide alternative load paths and avoid progressive collapse. Designers also recognise that explosions produce forces in directions which will sometimes enhance and sometimes reduce the effect of normal design forces. There will however always be a limit on how far design against blast can be allowed to turn buildings into bunkers.

Alan Watson

Workshop Report: 4 February 1998

Actions to Improve Industrial-Academic Interaction

At the Workshop on Mechanisms for Industrial-Academic Interaction in Earthquake Engineering held at the ICE on 4 February 1998, the following ideas were put forward. They are presented here in order to make them known to all SECED members and to encourage initiatives to put them into action.

SECED to publish guidelines for the standard presentation of research findings in a format suitable for industry.

SECED to undertake to select from a number of submitted entries one or two research projects a year and to produce a simplified report converting the findings into design guidelines for industry.

SECED should sponsor an initiative to form a network for research dissemination, and present a proposal for funding from EPSRC.

SECED to organise further and more practical courses on various aspects of earthquake engineering and seismic design.

SECED to undertake a major development of its Website, incorporating some or all of the following:

- List of UK researchers in earthquake engineering, with details of specific expertise
- List of current UK research projects in earthquake engineering
- Facility for conducting virtual technical meetings and conferences

SECED to draw up report on future needs for earthquake engineering research in the UK.

SECED to promote and foster co-operative 'research schools' in specific areas of earthquake engineering research.

SECED to consider inclusion of the following in its technical programme:

- More meetings in collaboration with non-specialist earthquake engineering groups and more out of London meetings, to reach a wider audience
- More half or full day meetings addressing specific topics on the application of research to design problems

SECED to commission and produce specific design guides on good practice in earthquake engineering - for example, a handbook to Eurocode 8

SECED to review the working of the Californian Applied Technology Council, to see if a similar organisation has relevance to the UK.

On the last point, information on experiences of improving industrial-academic performance in California were provided by CURe and anybody who would like a copy of this information should request it from the SECED Secretariat. A few copies of the discussion document produced after the Workshop are also available and can be obtained on request from the SECED Secretariat. SECED members who would like to champion any of proposed actions or have any ideas and initiatives for following up any of the proposals should write to:

The Chairman of the Research and Education Sub-Committee,
Dr. Julian Bommer,
Department of Civil and Environmental Engineering,
Imperial College,
London SW7 2BU,
Fax: 0171-225 2716
E-mail: j.bommer@ic.ac.uk.

FORTHCOMING MALLET-MILNE LECTURE: May 27 1999

Our seventh Mallet-Milne lecture, a major occasion in the earthquake engineering and civil engineering dynamics calendar, will be given by Prof. Lomnitz, who will be talking about the road to total seismic safety, at the Institution of Civil Engineers on 27 May 1997 (make a note in your diary!).

The Mallet-Milne lecture is a prestige biennial lecture given by an internationally-renowned professional in the field.

Previous lecturers have been Prof. Nick Ambraseys (1987), Prof. George Housner (1989), Prof. Geoffrey Warburton (1991), Prof. Tom Paulay (1993), Prof. Bruce Bolt (1995) and Prof. Roy Severn (1997).

A few copies of the 6th Mallet Milne lecture by Prof. R Severn 'Structural Response Prediction Using Experimental Data' are still available at a price of £5 each. Copies can be obtained from:
The Secretary,
SECED,
Institution of Civil Engineers,
Great George Street,
London SW1P 3AA, UK.

The TSUNAMI Initiative - Linking Insurance and Science

£960,000 has been committed by seven companies from the UK insurance industry and the Department of Trade and Industry (DTI), to fund the TSUNAMI initiative. TSUNAMI's aim is to improve the competitiveness of the UK insurance industry by using the UK science effort to improve the assessment of risk. TSUNAMI was set up in September 1997 and will run for three years.

SECED captures the civil engineering community's discussion on improving seismic practice in structural design and analysis, and on appropriate standards in construction and materials. The resulting influence of civil engineers is no doubt direct and highly relevant to the construction industry, but there may be other areas in which the study of earthquake and civil engineering dynamics would be relevant.

When earthquakes damage buildings, businesses and people's livelihood, part of the cost of that damage is met by the insurance industry. Insurers are therefore concerned with understanding the extent to which they are exposed to earthquake risks and how likely their losses are to reach a critical value. TSUNAMI has been established in response to this and other similar technical and scientific challenges.

During the first year of TSUNAMI, the sponsoring companies have been asked to identify those issues that might be addressed through applied research, to improve their competitiveness. Natural hazards, including earthquakes, have come high on the list of priorities. Following this process, TSUNAMI commissioned research into the El Niño phenomenon, a Seismic Database covering the World's Major Cities, a study of Tropical Cyclones Forecasting and a programme on Extreme Value Statistics at the Isaac Newton Institute for the Mathematical Sciences in Cambridge.

Also, the sponsoring companies and the DTI have committed up to £240,000 through TSUNAMI to support four "Announcements of Opportunity" (AO's). These AO's will provide funds to investigate UK Flood Risks, Tsunami Risks (the real ones), Extreme Weather Risks in Northern Europe and the Uninsured Portions of Catastrophic Losses.

TSUNAMI aims to foster continued discussion within the insurance industry of the need for applied research and to build up a knowledge of what research is carried out in the scientific community. This knowledge will help the insurance industry meet the challenges it faces. It is therefore essential that TSUNAMI is aware of work carried out by SECED and other organisations which bring together applied and theoretical science.

Further details of the initiative and the four Announcements of Opportunity can be found on the TSUNAMI Web Site at *http://www.nerc-bas.ac.uk/public/tsunami*. If you are involved in research that might be relevant to the insurance industry and would like to register your interest in TSUNAMI, then please send details of your co-ordinates, current and potential research to James Orr, TSUNAMI Project Director at J.B.Orr@BAS.AC.UK.

James Orr

TSUNAMI
Linking Insurance and Science

An initiative of the British Antarctic Survey

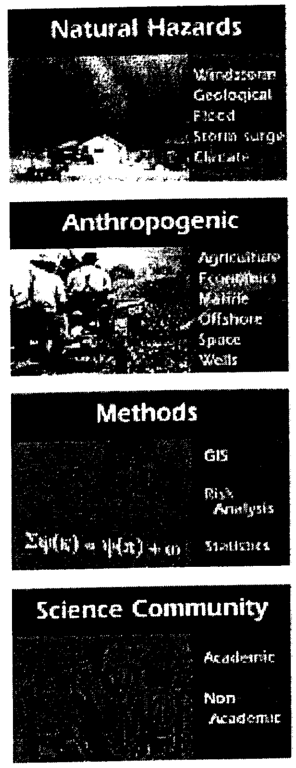
The TSUNAMI Initiative

TSUNAMI aims to improve the competitiveness of the UK insurance industry by using the UK science effort to improve the assessment of risk. It is jointly funded by the Insurance Division of the Treasury and a consortium of composite insurers, brokers and Lloyd's managing agencies. Government support is from the Sector Challenge of the Department of Trade and Industry.

TSUNAMI Web

New Funding Opportunities Announced

About TSUNAMI	Find out more about TSUNAMI
TSUNAMI funding	Funding opportunities, Application forms etc
Natural Hazards	Web links related to natural hazards
Anthropogenic risks	Web links related to risks from man's activities
Methods	Web links related to methods and techniques
Scientific Community	Web links within the scientific community
Consortia Information	Restricted access
Feedback	Send us your comments



TSUNAMI Contact

Project Director: James Orr
Email: J.B.Orr@bas.ac.uk
Telephone: (01223) 221 468
Mobile: (0411) 833 353
Fax: (01223) 350 456

British Antarctic Survey,
High Cross, Madingley Road,
Cambridge, CB3 0ET, UK.

Extract from the "Tsunami Website" (Courtesy James Orr)

SECED Register of Members

As SECED members are probably aware, it has been the intention to compile and issue a Register of Members much in the same form as the current Directory of Practitioners. However due to the estimated costs of production it has been decided to amend this proposal and instead make the information available in the form of either 1.44Mb disk or paper copy. One copy of either disc or document will be available free to members for a period of three months following the date of issue of this edition of the Newsletter and then for a cost of £10 thereafter. It should be noted that the Register contains information of all those members recorded as fully paid-up at the 1 January 1998. The computer disc has been prepared using both Microsoft Access and Aldus Pagemaker software. Requests for a copy of the Register should be made to Liz Marwood, Technical Affairs Division at the ICE.

Tel. 0171 665 2238, Fax 0171 799 1325
or E-mail: marwood_l@ice.org.uk.

New Publications Displacement Based Design

Two new research reports related to displacement-based seismic design are available at cost from Imperial College:

Borzi, B., Elnashai, A.S., Faccioli, E., Calvi, G.M. & Bommer, J.J. (1998) Inelastic spectra and ductility-damping relationships for displacement-based seismic design. *ESEE Research Report No. 98-4*, May.

Bommer, J.J. & Elnashai, A.S. (1998) Parameterised displacement spectra for seismic design. *ESEE Research Report No. 98-7*, August.

To order copies of these reports, please contact:

Miss Angela Bishop on 0171-594 6056,
fax: 0171-225 2716,
E-mail: a.bishop@ic.ac.uk.

Short Course - 22 to 24 September 1999

Practical Seismic Design for New and Existing Structures

A three-day short course on *"Practical Seismic Design for New and Existing Structures"* will be run jointly by SECED and Imperial College from 22-24 September 1999. The course, which will be held at Imperial College and will be recognised for CET/CPD days, will be aimed mainly at practising civil engineers although a limited number of student spaces will be available. The full programme for the course and details for registration will be published in the next SECED Newsletter.

NOTABLE EARTHQUAKES APRIL - JUNE 1998

Reported by British Geological Survey

YEAR	DAY	MON	TIME UTC	LAT	LON	DEP KM	MAGNITUDES ML	MB	MS	LOCATION
1998	10	APR	15:00	32.55N	60.01E	33			5.7	NORTHERN IRAN
				Reports Indicate that 12 people were killed, 30 injured and 25 surrounding villages were damaged.						
1998	05	MAY	02:12	56.06N	6.04W	15	3.5			OFF JURA, STRATHCLYDE
				Felt throughout Colonsay and Jura with maximum intensities of 5 EMS.						
1998	16	MAY	23:54	53.01N	2.13E	15	3.8			SOUTHERN NORTH SEA
1998	22	MAY	04:48	17.30S	65.00W	33			6.6	CENTRAL BOLIVIA
				At least 105 people were killed, 200 injured and eighty percent of building destroyed in the Aiquile area.						
1998	27	MAY	05:34	0.29N	119.51E	8		6.7		MINAHASSA PENINSULA
1998	30	MAY	06:22	37.20N	69.90E	33			6.9	NE AFGHANISTAN
				At least 4700 people were killed, 1500 injured, a number of villages completely destroyed and thousands of people left homeless throughout the Takhar province.						
1998	31	MAY	12:55	51.19N	4.71W	15	2.6			BRISTOL CHANNEL
1998	31	MAY	13:23	64.20N	2.37W	15	3.1			NORWEGIAN SEA
1998	21	JUN	19:23	54.07N	1.01E	25	2.8			SOUTHERN NORTH SEA
1998	23	JUN	20:16	58.77N	16.22W	23	3.5			NORTHERN ATLANTIC
1998	27	JUN	13:55	36.88N	35.37E	10		5.8	6.2	SOUTHERN TURKEY
				At least 136 people were killed, 1500 injured and over 1900 building damaged.						

NOTABLE EARTHQUAKES JULY - SEPTEMBER 1998

Reported by British Geological Survey

YEAR	DAY	MON	TIME UTC	LAT	LON	DEP KM	MAGNITUDES ML	MB	MS	LOCATION
1998	09	JUL	05:19	39.50N	29.20E	33		5.5		AZORES ISLANDS
				At least three people were killed, thirty more injured and several buildings were completely destroyed.						
1998	16	JUL	11:56	11.00S	166.00E	110			6.6	SANTA CRUZ ISLANDS
1998	17	JUL	08:49	3.10S	141.80E	33			7.0	PAPUA NEW GUINEA
				At least 1,600 people were killed and caused extensive damage. The earthquake caused a tsunami along the north coast of Papua new Guinea.						
1998	21	JUL	07:17	55.10N	3.63W	12	2.0			LOCHARBRIGGS, D&G
				Felt throughout Locharbriggs and Tinwald with intensities of at least 3 EMS.						
1998	23	JUL	21:38	56.15N	3.71W	1	1.6			CLACKMANNAN, CENTRAL
				Felt throughout the Clackmannan district with intensities of at least 3 EMS.						
1998	29	JUL	18:00	2.60S	138.90E	33			6.6	IRIAN JAYA, INDONESIA
1998	04	AUG	18:59	0.50S	80.10W	33			7.1	COAST OF ECUADOR
				Latest reports indicate that at least one person died and three were injured In the port of Bahia de Caraquez, where several buildings were destroyed.						
1998	02	SEP	08:37	5.50N	126.7E	33			6.7	MINDANO, PHILIPPINES
1998	02	SEP	18:33	56.14N	3.71W	2	1.8			CLACKMANNAN, CENTRAL
				Felt throughout the Clackmannan district with intensities of at least 3 EMS.						
1998	03	SEP	17:37	29.30S	71.60W	33			6.5	CENTRAL CHILE
1998	28	SEP	13:34	8.00S	112.3E	33		6.1		JAVA, INDONESIA

Issued by Bennett Simpson, British Geological Survey, October 1998

Forthcoming Events

25 November 1998
The Response of Structures to Dynamic Crowd Loads. *ICE 5.30 pm*

3 February 1999
Offshore soil-structure interaction. *ICE 5.30 pm*

24 February 1999
The Adana earthquake.

31 March 1999
Remote sensing.

28 April 1999
Strong motions.

27 May 1999
The 7th Mallet Milne Lecture

Selected extracts from previous SECED Newsletters can now be found on the World Wide Web at the Institution of Civil Engineers:

http://www.ice.org.uk/public/seced.html

Comments are welcomed and should be sent to: A.J.Crewe@bristol.ac.uk

Contents

SECED Newsletter

The SECED Newsletter is published quarterly. Contributions are welcome and manuscripts should be sent on a PC compatible disk. Copy typed on one side of the paper only is also acceptable.

Diagrams should be sharply defined and prepared in a form suitable for direct reproduction. Photographs should be high quality (black and white prints are preferred). Diagrams and photographs are only returned to the authors on request.

Articles should be sent to:

Adam Crewe,
Editor SECED Newsletter,
University of Bristol,
Department of Civil Engineering,
Queen's Building,
University Walk,
Bristol BS8 1TR,
UK.

Email: A.J.Crewe@bristol.ac.uk

SECED

SECED, The Society for Earthquake and Civil Engineering Dynamics, is the UK national section of the International and European Associations for Earthquake Engineering and is an affiliated society of the Institution of Civil Engineers.

It is also sponsored by the Institution of Mechanical Engineers, the Institution of Structural Engineers, and the Geophysical Society. The Society is also closely associated with the UK Earthquake Engineering Field Investigation Team. The objective of the Society is to promote co-operation in the advancement of knowledge in the fields of earthquake engineering and civil engineering dynamics including blast, impact and other vibration problems.

For further information about SECED contact:
The Secretary,
SECED,
Institution of Civil Engineers,
Great George Street,
London SW1P 3AA, UK.